





1°, 359° 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

Table with columns for Dec., 0°, 1°, 2°, 3°, 4°, 5°, 6°, 7°, and Dec. Each column contains three sub-columns: Hc, d, Z. The table lists astronomical data for various declinations from 0 to 90 degrees.

1°, 359° L.H.A.

LATITUDE SAME NAME AS DECLINATION

## LATITUDE CONTRARY NAME TO DECLINATION

L.H.A. 1°, 359°

Dec.	0°			1°			2°			3°			4°			5°			6°			7°			Dec.
	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	
0	89 00.0	-24.9	90.0	88 35.1	-49.3	135.0	87 45.8	-55.5	153.4	86 50.3	-57.7	161.6	85 52.6	-58.5	166.0	84 54.1	-59.1	168.7	83 55.1	-59.4	170.5	82 55.8	-59.5	171.8	0
1	88 35.1	-49.3	135.0	87 45.8	-55.5	153.4	86 50.3	-57.7	161.6	85 52.6	-58.5	166.0	84 54.1	-59.1	168.7	83 55.0	-59.3	170.5	82 55.7	-59.4	171.9	81 56.3	-59.6	172.9	1
2	87 45.8	-55.5	153.4	86 50.3	-57.7	161.6	85 52.6	-58.5	166.0	84 54.1	-59.1	168.7	83 55.0	-59.3	170.5	82 55.7	-59.4	171.9	81 56.3	-59.6	172.9	80 56.7	-59.7	173.6	2
3	86 50.3	-57.7	161.6	85 52.6	-58.5	166.0	84 54.1	-59.1	168.7	83 55.0	-59.3	170.5	82 55.7	-59.4	171.9	81 56.3	-59.6	172.9	80 56.7	-59.7	173.6	79 57.0	-59.7	174.3	3
4	85 52.6	-58.5	166.0	84 54.1	-59.1	168.7	83 55.0	-59.3	170.5	82 55.7	-59.4	171.9	81 56.3	-59.6	172.9	80 56.7	-59.7	173.6	79 57.0	-59.7	174.3	78 57.3	-59.8	174.8	4
5	84 54.1	-59.0	168.7	83 55.0	-59.3	170.6	82 55.7	-59.4	171.9	81 56.3	-59.6	172.9	80 56.7	-59.7	173.7	79 57.0	-59.7	174.3	78 57.3	-59.8	174.8	77 57.5	-59.8	175.2	5
6	83 55.1	-59.3	170.6	82 55.7	-59.4	171.9	81 56.3	-59.6	172.9	80 56.7	-59.7	173.7	79 57.0	-59.7	174.3	78 57.3	-59.8	174.8	77 57.5	-59.8	175.2	76 57.7	-59.8	175.6	6
7	82 55.8	-59.5	171.9	81 56.3	-59.6	172.9	80 56.7	-59.7	173.7	79 57.0	-59.7	174.3	78 57.3	-59.8	174.8	77 57.5	-59.8	175.2	76 57.7	-59.8	175.6	75 57.9	-59.9	175.9	7
8	81 56.3	-59.6	172.9	80 56.7	-59.7	173.7	79 57.0	-59.7	174.3	78 57.3	-59.8	174.8	77 57.5	-59.8	175.2	76 57.7	-59.8	175.6	75 57.9	-59.9	175.9	74 58.0	-59.9	176.2	8
9	80 56.7	-59.7	173.7	79 57.0	-59.7	174.3	78 57.3	-59.8	174.8	77 57.5	-59.8	175.2	76 57.7	-59.8	175.6	75 57.9	-59.9	175.9	74 58.0	-59.9	176.2	73 58.1	-59.9	176.4	9
10	79 57.0	-59.7	174.3	78 57.3	-59.8	174.9	77 57.5	-59.8	175.3	76 57.7	-59.8	175.6	75 57.9	-59.9	175.9	74 58.0	-59.9	176.2	73 58.1	-59.9	176.4	72 58.3	-59.9	176.6	10
11	78 57.3	-59.8	174.9	77 57.5	-59.8	175.3	76 57.7	-59.8	175.6	75 57.9	-59.9	175.9	74 58.0	-59.9	176.2	73 58.1	-59.9	176.5	72 58.3	-59.9	176.6	71 58.4	-59.9	176.8	11
12	77 57.5	-59.8	175.3	76 57.7	-59.8	175.7	75 57.9	-59.9	176.0	74 58.0	-59.9	176.3	73 58.1	-59.9	176.5	72 58.3	-59.9	176.6	71 58.4	-59.9	176.8	70 58.4	-59.9	177.0	12
13	76 57.7	-59.8	175.7	75 57.9	-59.9	176.0	74 58.0	-59.9	176.3	73 58.2	-59.9	176.5	72 58.3	-59.9	176.7	71 58.4	-59.9	176.7	70 58.4	-59.9	177.0	69 58.5	-59.9	177.2	13
14	75 57.9	-59.9	176.0	74 58.0	-59.8	176.3	73 58.2	-59.9	176.5	72 58.3	-59.9	176.5	71 58.4	-59.9	176.7	70 58.4	-59.9	176.9	69 58.5	-59.9	177.2	68 58.5	-59.9	177.3	14
15	74 58.0	-59.8	176.3	73 58.2	-59.9	176.5	72 58.3	-59.9	176.7	71 58.4	-59.9	176.9	70 58.5	-59.9	177.0	69 58.5	-59.9	177.2	68 58.6	-59.9	177.3	67 58.7	-59.9	177.4	15
16	73 58.2	-59.9	176.5	72 58.3	-59.9	176.7	71 58.4	-59.9	176.9	70 58.5	-59.9	177.1	69 58.6	-59.9	177.2	68 58.6	-59.9	177.3	67 58.7	-59.9	177.4	66 58.8	-59.9	177.5	16
17	72 58.3	-59.9	176.6	71 58.4	-59.9	176.7	70 58.5	-59.9	176.9	69 58.6	-59.9	177.1	68 58.7	-59.9	177.3	67 58.7	-59.9	177.4	66 58.8	-59.9	177.5	65 58.8	-59.9	177.6	17
18	71 58.4	-59.9	176.9	70 58.5	-59.9	177.1	69 58.6	-59.9	177.2	68 58.7	-59.9	177.3	67 58.7	-59.9	177.5	66 58.8	-59.9	177.6	65 58.8	-59.9	177.7	64 58.8	-59.9	177.8	18
19	70 58.5	-59.9	177.1	69 58.6	-60.0	177.2	68 58.6	-59.9	177.4	67 58.7	-59.9	177.5	66 58.7	-59.9	177.6	65 58.8	-59.9	177.7	64 58.8	-59.9	177.8	63 58.9	-59.9	177.9	19
20	69 58.6	-60.0	177.3	68 58.7	-59.9	177.4	67 58.7	-59.9	177.5	66 58.8	-59.9	177.6	65 58.8	-59.9	177.7	64 58.8	-59.9	177.8	63 58.9	-59.9	177.9	62 58.9	-59.9	178.0	20
21	68 58.6	-59.9	177.4	67 58.7	-59.9	177.5	66 58.8	-59.9	177.6	65 58.8	-59.9	177.7	64 58.8	-59.9	177.8	63 58.9	-59.9	177.9	62 58.9	-59.9	178.0	61 59.0	-60.0	178.1	21
22	67 58.7	-59.9	177.5	66 58.8	-59.9	177.6	65 58.8	-59.9	177.7	64 58.9	-59.9	177.8	63 58.9	-59.9	177.9	62 58.9	-59.9	178.0	61 59.0	-60.0	178.0	60 59.0	-60.0	178.1	22
23	66 58.8	-60.0	177.6	65 58.8	-59.9	177.7	64 58.9	-60.0	177.8	63 58.9	-60.0	177.9	62 58.9	-59.9	178.0	61 59.0	-60.0	178.0	60 59.0	-60.0	178.1	59 59.0	-59.9	178.2	23
24	65 58.8	-59.9	177.8	64 58.9	-60.0	177.8	63 58.9	-59.9	177.9	62 58.9	-59.9	178.0	61 59.0	-60.0	178.1	60 59.0	-59.9	178.1	59 59.0	-59.9	178.2	58 59.1	-60.0	178.2	24
25	64 58.9	-60.0	177.9	63 58.9	-59.9	177.9	62 59.0	-60.0	178.0	61 59.0	-60.0	178.1	60 59.0	-59.9	178.1	59 59.1	-60.0	178.1	58 59.1	-60.0	178.2	57 59.1	-60.0	178.3	25
26	63 58.9	-59.9	178.0	62 59.0	-60.0	178.0	61 59.0	-60.0	178.1	60 59.0	-59.9	178.1	59 59.1	-60.0	178.2	58 59.1	-60.0	178.2	57 59.1	-60.0	178.3	56 59.1	-59.9	178.4	26
27	62 59.0	-60.0	178.0	61 59.0	-60.0	178.1	60 59.0	-59.9	178.2	59 59.1	-60.0	178.2	58 59.1	-60.0	178.3	57 59.1	-59.9	178.3	56 59.1	-59.9	178.4	55 59.2	-60.0	178.4	27
28	61 59.0	-59.9	178.1	60 59.0	-59.9	178.2	59 59.1	-60.0	178.2	58 59.1	-60.0	178.3	57 59.1	-59.9	178.3	56 59.2	-60.0	178.4	55 59.2	-60.0	178.4	54 59.2	-60.0	178.5	28
29	60 59.1	-60.0	178.2	59 59.1	-60.0	178.3	58 59.1	-60.0	178.3	57 59.1	-59.9	178.4	56 59.2	-60.0	178.4	55 59.2	-60.0	178.4	54 59.2	-60.0	178.5	53 59.2	-59.9	178.5	29
30	59 59.1	-60.0	178.3	58 59.1	-59.9	178.3	57 59.1	-59.9	178.4	56 59.2	-60.0	178.4	55 59.2	-60.0	178.5	54 59.2	-60.0	178.5	53 59.2	-59.9	178.5	52 59.3	-60.0	178.6	30
31	58 59.1	-59.9	178.3	57 59.2	-60.0	178.4	56 59.2	-60.0	178.4	55 59.2	-60.0	178.5	54 59.2	-60.0	178.5	53 59.2	-59.9	178.5	52 59.3	-60.0	178.6	51 59.3	-60.0	178.6	31
32	57 59.2	-60.0	178.4	56 59.2	-60.0	178.4	55 59.2	-60.0	178.5	54 59.2	-60.0	178.5	53 59.2	-59.9	178.6	52 59.3	-60.0	178.6	51 59.3	-60.0	178.6	50 59.3	-60.0	178.7	32
33	56 59.2	-60.0	178.5	55 59.2	-60.0	178.5	54 59.2	-59.9	178.5	53 59.3	-60.0	178.6	52 59.3	-60.0	178.6	51 59.3	-60.0	178.6	50 59.3	-60.0	178.7	49 59.3	-60.0	178.7	33
34	55 59.2	-59.9	178.6	54 59.2	-59.9	178.6	53 59.3	-60.0	178.6	52 59.3	-60.0	178.6	51 59.3	-60.0	178.7	50 59.3	-60.0	178.7	49 59.3	-60.0	178.7	48 59.3	-59.9	178.8	34
35	54 59.3	-60.0	178.6	53 59.3	-60.0	178.6	52 59.3	-60.0	178.6	51 59.3	-60.0	178.7	50 59.3	-60.0	178.7	49 59.3	-60.0	178.7	48 59.3	-59.9	178.8	47 59.4	-60.0	178.8	35
36	53 59.3	-60.0	178.6	52 59.3	-60.0	178.7	51 59.3	-60.0	178.7	50 59.3	-59.9	178.7	49 59.3	-59.9	178.7	48 59.4	-60.0	178.8	47 59.4	-60.0	178.8	46 59.4	-60.0	178.8	36
37	52 59.3	-60.0	178.7	51 59.3	-60.0	178.7	50 59.3	-59.9	178.7	49 59.4	-60.0	178.8	48 59.4	-60.0	178.8	47 59.4	-60.0	178.8	46 59.4	-60.0	178.8	45 59.4	-60.0	178.9	37
38	51 59.3	-59.9	178.7	50 59.3	-59.9	178.7	49 59.4	-60.0	178.8	48 59.4	-60.0	178.8	47 59.4	-60.0	178.8	46 59.4	-60.0	178.8	45 59.4	-60.0	178.9	44 59.4	-60.0	178.9	38
39	50 59.4	-60.0	178.8	49 59.4	-60.0	178.8	48 59.4	-60.0	178.8	47 59.4	-60.0	178.8	46 59.4	-60.0	178.9	45 59.4	-60.0	178.9	44 59.4	-60.0	178.9	43 59.4	-59.9	178.9	39
40	49 59.4	-60.0	178.8	48 59.4	-60.0	178.8	47 59.4	-60.0	178.9	46 59.4	-60.0	178.9	45 59.4	-59.9	178.9	44 59.4	-59.9	178.9	43 59.4	-59.9	178.9	42 59.5	-60.0	179.0	40
41	48 59.4	-60.0	178.8	47 59.4	-60.0	178.9	46 59.4	-60.0	178.9	45 59.4	-59.9	178.9	44 59.4	-59.9	178.9	43 59.5	-60.0	179.0	42 59.5	-60.0	179.0	41 59.5	-60.0	179.0	41
42	47 59.4	-60.0	178.9	46 59.4	-60.0	178.9	45 59.4	-59.9	178.9	44 59.5	-60.0	178.9	43 59.5	-60.0	179.0	42 59.5	-60.0	179.0	41 59.5	-60.0	179.0	40 59.5	-60.0	179.0	42
43	46 59.4	-59.9	178.9	45 59.4	-59.9	178.9	44 59.5	-60.0	179.0	43 59.5	-60.0	179.0	42 59.5	-60.0	179.0	41 59.5	-60.0	179.0	40 59.5	-60.0	179.0	39 59.5	-60.0	179.0	43
44	45 59.5	-60.0	179.0	44 59.5	-60.0	179.0	43 59.5	-60.0	179.0	42 59.5	-60.0	179.0	41 59.5	-60.0	179.0	40 59.5	-60.0	179.0	39 59.5	-60.0					

2°, 358° 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

Table with columns for Dec., 0°, 1°, 2°, 3°, 4°, 5°, 6°, 7°, and Dec. Each column contains three sub-columns: Hc, d, Z. The table lists astronomical data for various declinations from 0 to 90 degrees.

2°, 358° L.H.A.

LATITUDE SAME NAME AS DECLINATION

LATITUDE CONTRARY NAME TO DECLINATION

L.H.A. 2°, 358°

Dec.	0°			1°			2°			3°			4°			5°			6°			7°			Dec.	
	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z		Hc
0	88 00.0	-14.2*	90.0	87 45.8	-35.5*	116.6	87 10.3	-46.6*	135.0	86 23.7	-52.0*	146.3	85 31.7	-54.8*	153.4	84 36.9	-56.3	158.2	83 40.6	-57.4	161.5	82 43.3	-58.0	164.0	0	
1	87 45.8	-35.5*	116.6	87 10.3	-46.6*	135.0	86 23.7	-52.0*	146.3	85 31.7	-54.8*	153.4	84 36.9	-56.3	158.2	83 40.6	-57.4	161.5	82 43.3	-58.0	164.0	81 45.3	-58.4	165.9	1	
2	87 10.3	-46.6*	135.0	86 23.7	-52.0*	146.3	85 31.7	-54.8*	153.4	84 36.9	-56.3	158.2	83 40.6	-57.4	161.5	82 43.3	-58.0	164.0	81 45.3	-58.4	165.9	80 46.9	-58.7	167.4	2	
3	86 23.7	-52.0*	146.3	85 31.7	-54.8*	153.4	84 36.9	-56.3	158.2	83 40.6	-57.3	161.6	82 43.2	-57.9	164.1	81 45.3	-58.4	166.0	80 46.9	-58.7	167.4	79 48.2	-59.0	168.6	3	
4	85 31.7	-54.8*	153.5	84 36.9	-56.3	158.2	83 40.6	-57.3	161.6	82 43.2	-57.9	164.1	81 45.3	-58.4	166.0	80 46.9	-58.7	167.5	79 48.2	-58.9	168.7	78 49.2	-59.1	169.7	4	
5	84 36.9	-56.3	158.3	83 40.6	-57.4	161.6	82 43.2	-57.9	164.1	81 45.3	-58.4	166.0	80 46.9	-58.7	167.5	79 48.2	-58.9	168.7	78 49.2	-58.9	168.7	77 50.1	-59.2	170.5	5	
6	83 40.6	-57.3	161.6	82 43.2	-57.9	164.1	81 45.3	-58.4	166.0	80 46.9	-58.7	167.5	79 48.2	-58.9	168.7	78 49.2	-59.1	169.7	77 50.1	-59.1	169.7	76 50.9	-59.4	171.2	6	
7	82 43.3	-58.0	164.1	81 45.3	-58.4	165.9	80 46.9	-58.7	167.5	79 48.2	-58.9	168.7	78 49.2	-59.1	169.7	77 50.1	-59.2	170.5	76 50.9	-59.2	170.5	75 51.5	-59.4	171.8	7	
8	81 45.3	-58.4	165.9	80 46.9	-58.7	167.5	79 48.2	-58.9	168.7	78 49.2	-59.1	169.7	77 50.1	-59.2	170.5	76 50.9	-59.2	170.5	75 51.5	-59.4	171.8	74 52.1	-59.5	172.4	8	
9	80 46.9	-58.7	167.6	79 48.2	-58.9	168.8	78 49.2	-59.1	169.8	77 50.1	-59.2	170.6	76 50.9	-59.4	171.3	75 51.5	-59.4	171.9	74 52.1	-59.5	172.4	73 52.6	-59.6	172.9	9	
10	79 48.2	-58.9	168.8	78 49.3	-59.1	169.8	77 50.2	-59.3	170.6	76 50.9	-59.3	171.3	75 51.6	-59.5	171.9	74 52.1	-59.5	172.4	73 52.6	-59.6	172.9	72 53.0	-59.6	173.3	10	
11	78 49.3	-59.1	169.8	77 50.2	-59.3	170.6	76 50.9	-59.3	171.3	75 51.6	-59.5	171.9	74 52.1	-59.5	172.5	73 52.6	-59.6	172.9	72 53.0	-59.6	173.3	71 53.4	-59.6	173.7	11	
12	77 50.2	-59.2	170.7	76 50.9	-59.3	171.4	75 51.6	-59.4	172.0	74 52.2	-59.5	172.5	73 52.6	-59.5	173.0	72 53.1	-59.6	173.4	71 53.4	-59.6	173.7	70 53.8	-59.7	174.0	12	
13	76 51.0	-59.4	171.4	75 51.6	-59.4	172.0	74 52.2	-59.5	172.5	73 52.6	-59.5	173.0	72 53.1	-59.6	173.4	71 53.4	-59.6	173.7	70 53.8	-59.7	174.0	69 54.1	-59.7	174.3	13	
14	75 51.6	-59.4	172.0	74 52.2	-59.5	172.5	73 52.7	-59.6	173.0	72 53.1	-59.6	173.4	71 53.5	-59.7	173.7	70 53.8	-59.7	174.0	69 54.1	-59.7	174.3	68 54.4	-59.7	174.6	14	
15	74 52.2	-59.5	172.6	73 52.7	-59.6	173.0	72 53.1	-59.6	173.4	71 53.5	-59.7	173.8	70 53.8	-59.7	174.1	69 54.1	-59.7	174.4	68 54.4	-59.7	174.6	67 54.7	-59.8	174.9	15	
16	73 52.7	-59.5	173.1	72 53.1	-59.6	173.5	71 53.5	-59.6	173.8	70 53.8	-59.6	174.1	69 54.1	-59.7	174.4	68 54.4	-59.7	174.7	67 54.7	-59.8	174.9	66 54.9	-59.8	175.1	16	
17	72 53.2	-59.6	173.5	71 53.5	-59.6	173.8	70 53.9	-59.7	174.1	69 54.2	-59.7	174.4	68 54.5	-59.8	174.7	67 54.7	-59.8	174.9	66 54.9	-59.8	175.1	65 55.1	-59.8	175.3	17	
18	71 53.6	-59.7	173.9	70 53.9	-59.7	174.2	69 54.2	-59.7	174.5	68 54.5	-59.8	174.7	67 54.7	-59.7	174.9	66 54.9	-59.7	175.1	65 55.1	-59.8	175.3	64 55.3	-59.8	175.5	18	
19	70 53.9	-59.6	174.5	69 54.2	-59.7	174.5	68 54.5	-59.7	174.7	67 54.7	-59.7	175.0	66 55.0	-59.8	175.2	65 55.2	-59.8	175.4	64 55.4	-59.8	175.6	63 55.5	-59.8	175.7	19	
20	69 54.3	-59.7	174.5	68 54.5	-59.8	174.8	67 54.8	-59.8	175.0	66 55.0	-59.8	175.2	65 55.2	-59.8	175.4	64 55.4	-59.8	175.6	63 55.5	-59.8	175.7	62 55.7	-59.8	175.9	20	
21	68 54.6	-59.8	174.8	67 54.8	-59.8	175.0	66 55.0	-59.8	175.2	65 55.2	-59.8	175.4	64 55.4	-59.8	175.6	63 55.5	-59.8	175.7	62 55.7	-59.8	175.9	61 55.9	-59.8	176.0	21	
22	67 54.8	-59.7	175.1	66 55.0	-59.7	175.3	65 55.2	-59.8	175.5	64 55.4	-59.8	175.7	63 55.5	-59.8	175.8	62 55.7	-59.8	175.9	61 55.9	-59.8	176.1	60 56.0	-59.8	176.2	22	
23	66 55.1	-59.8	175.3	65 55.3	-59.8	175.5	64 55.4	-59.8	175.7	63 55.5	-59.8	175.8	62 55.7	-59.8	176.0	61 55.9	-59.8	176.1	60 56.0	-59.8	176.2	59 56.2	-59.9	176.3	23	
24	65 55.3	-59.8	175.5	64 55.5	-59.8	175.7	63 55.6	-59.8	175.8	62 55.8	-59.8	176.0	61 55.9	-59.8	176.1	60 56.1	-59.9	176.2	59 56.2	-59.9	176.3	58 56.4	-59.9	176.5	24	
25	64 55.5	-59.8	175.7	63 55.7	-59.8	175.9	62 55.8	-59.8	176.0	61 56.0	-59.9	176.1	60 56.1	-59.9	176.3	59 56.2	-59.9	176.4	58 56.3	-59.9	176.5	57 56.4	-59.9	176.6	25	
26	63 55.7	-59.8	175.9	62 55.9	-59.9	176.0	61 56.0	-59.8	176.2	60 56.1	-59.8	176.3	59 56.2	-59.8	176.4	58 56.4	-59.9	176.5	57 56.5	-59.9	176.6	56 56.6	-59.9	176.7	26	
27	62 55.9	-59.8	176.1	61 56.0	-59.8	176.2	60 56.2	-59.9	176.3	59 56.3	-59.9	176.4	58 56.4	-59.9	176.5	57 56.5	-59.9	176.6	56 56.6	-59.9	176.7	55 56.7	-59.9	176.8	27	
28	61 56.1	-59.9	176.2	60 56.2	-59.9	176.4	59 56.3	-59.9	176.5	58 56.4	-59.9	176.6	57 56.5	-59.9	176.7	56 56.6	-59.9	176.8	55 56.7	-59.9	176.8	54 56.8	-59.9	176.9	28	
29	60 56.2	-59.8	176.4	59 56.3	-59.8	176.6	58 56.4	-59.8	176.6	57 56.6	-59.9	176.7	56 56.6	-59.8	176.8	55 56.7	-59.8	176.9	54 56.8	-59.9	177.0	53 56.9	-59.9	177.0	29	
30	59 56.4	-59.9	176.5	58 56.5	-59.9	176.5	57 56.6	-59.9	176.7	56 56.7	-59.9	176.8	55 56.8	-59.9	176.9	54 56.9	-59.9	177.0	53 56.9	-59.9	177.0	52 57.0	-59.9	177.1	30	
31	58 56.5	-59.8	176.7	57 56.6	-59.9	176.8	56 56.7	-59.9	176.8	55 56.8	-59.9	176.9	54 56.9	-59.9	177.0	53 57.0	-59.9	177.1	52 57.1	-59.9	177.2	51 57.1	-59.9	177.2	31	
32	57 56.7	-59.9	176.8	56 56.7	-59.8	176.9	55 56.8	-59.9	177.0	54 56.9	-59.9	177.0	53 57.0	-59.9	177.1	52 57.0	-59.9	177.1	51 57.1	-59.9	177.2	50 57.1	-59.9	177.2	32	
33	56 56.8	-59.9	176.9	55 56.9	-59.9	177.0	54 56.9	-59.9	177.1	53 57.0	-59.9	177.1	52 57.1	-59.9	177.2	51 57.1	-59.9	177.2	50 57.2	-59.9	177.3	49 57.2	-59.9	177.3	33	
34	55 56.9	-59.9	177.0	54 57.0	-59.9	177.1	53 57.0	-59.8	177.2	52 57.1	-59.9	177.2	51 57.2	-59.9	177.3	50 57.3	-60.0	177.4	49 57.3	-59.9	177.4	48 57.4	-59.9	177.5	34	
35	54 57.0	-59.9	177.1	53 57.1	-59.9	177.2	52 57.2	-59.9	177.3	51 57.2	-59.9	177.3	50 57.3	-59.9	177.4	49 57.3	-59.9	177.4	48 57.4	-59.9	177.5	47 57.4	-59.9	177.5	35	
36	53 57.1	-59.9	177.2	52 57.2	-59.9	177.3	51 57.3	-59.9	177.4	50 57.3	-59.9	177.4	49 57.4	-59.9	177.5	48 57.4	-59.9	177.5	47 57.5	-59.9	177.6	46 57.5	-59.9	177.6	36	
37	52 57.2	-59.9	177.3	51 57.3	-59.9	177.4	50 57.3	-59.9	177.5	49 57.3	-59.9	177.5	48 57.5	-60.0	177.6	47 57.5	-59.9	177.6	46 57.6	-60.0	177.6	45 57.6	-59.9	177.7	37	
38	51 57.3	-59.9	177.4	50 57.4	-59.9	177.5	49 57.4	-59.9	177.6	48 57.5	-59.9	177.6	47 57.5	-59.9	177.6	46 57.6	-59.9	177.7	45 57.6	-59.9	177.7	44 57.7	-59.9	177.8	38	
39	50 57.4	-59.9	177.5	49 57.5	-59.9	177.6	48 57.5	-59.9	177.6	47 57.6	-59.9	177.7	46 57.6	-59.9	177.7	45 57.7	-59.9	177.7	44 57.7	-59.9	177.8	43 57.8	-59.9	177.8	39	
40	49 57.5	-59.9	177.6	48 57.6	-60.0	177.7	47 57.6	-59.9	177.7	46 57.7	-60.0	177.8	45 57.7	-59.9	177.8	44 57.7	-59.9	177.8	43 57.8	-59.9	177.9	42 57.8	-59.9	177.9	40	
41	48 57.6	-59.9	177.7	47 57.6	-59.9	177.7	46 57.7	-59.9	177.8	45 57.7	-59.9	177.8	44 57.8	-60.0	177.9	43 57.8	-59.9	177.9	42 57.9	-60.0	177.9	41 57.9	-59.9	178.0	41	
42	47 57.7	-59.9	177.8	46 57.7	-59.9	177.8	45 57.8	-59.9	177.9	44 57.8	-59.9	177.9	43 57.8	-59.9	177.9	42 57.9	-60.0	178.0	41 57.9	-60.0	178.0	40 58.0	-60.0	178.0	42	
43	46 57.8	-60.0	177.9	45 57.8	-59.9	177.9	44 57.8	-60.0	177.9	43 57.9	-60.0	178.0	42 57.9	-59.9	178.0	41 57.9	-60.0	178.0	40 58.0	-60.0	178.1	39 58.0	-60.0	178.1	43	
44	45 57.8	-59.9	177.9	44 57.9	-60.0	178.0	43 57.9	-59.9	178.0	42 57.9	-59.9	178.0	41 58.0	-60.0	178.1	40 58.0	-59.9	178.1	39 58.0	-59.9	178.1	38 58.1	-60.0			

3°, 357° 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

Table with columns for Dec. (0 to 90) and latitude (0° to 7°). Each latitude column contains three sub-columns: Hc, d, and Z. The table lists astronomical data for various stars, with values for Hc, d, and Z provided for each star at each latitude. The stars are listed in the first column, and their corresponding Hc, d, and Z values are listed in the subsequent columns.

3°, 357° L.H.A.

LATITUDE SAME NAME AS DECLINATION

# LATITUDE CONTRARY NAME TO DECLINATION

## L.H.A. 3°, 357°

Dec.	0°			1°			2°			3°			4°			5°			6°			7°			Dec.
	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	
0	87	00.0	-9.7	86	50.3	-26.6	86	23.7	-38.2	85	45.5	-45.5	85	00.1	-49.9	84	10.3	-52.7	83	17.7	-54.5	82	23.2	-55.7	0
1	86	50.3	-26.6	86	23.7	-38.2	85	45.5	-45.5	85	00.0	-49.8	84	10.2	-52.6	83	17.6	-54.5	82	23.2	-55.8	81	27.5	-56.6	1
2	86	23.7	-38.2	85	45.5	-45.5	85	00.0	-49.8	84	10.0	-52.7	83	17.6	-54.5	82	23.1	-54.4	81	27.4	-55.7	80	30.9	-57.2	2
3	85	45.5	-45.4	85	00.0	-49.8	84	10.0	-52.6	83	17.5	-54.4	82	23.1	-54.4	81	27.4	-55.7	80	30.9	-57.2	79	33.7	-57.7	3
4	85	00.1	-49.8	84	10.2	-52.6	83	17.6	-54.5	82	23.1	-54.4	81	27.4	-55.7	80	30.9	-57.2	79	33.7	-57.7	78	36.0	-58.1	4
5	84	10.3	-52.6	83	17.6	-54.4	82	23.1	-55.7	81	27.4	-56.5	80	30.9	-57.2	79	33.6	-57.6	78	36.0	-58.1	77	37.9	-58.3	5
6	83	17.7	-54.5	82	23.2	-55.7	81	27.4	-56.5	80	30.9	-57.2	79	33.7	-57.7	78	36.0	-58.1	77	37.9	-58.3	76	39.6	-58.6	6
7	82	23.2	-55.6	81	27.5	-56.5	80	30.9	-57.2	79	33.7	-57.7	78	36.0	-58.1	77	37.9	-58.3	76	39.6	-58.6	75	41.0	-58.7	7
8	81	27.6	-56.6	80	31.0	-57.2	79	33.7	-57.7	78	36.0	-58.0	77	38.0	-58.3	76	39.6	-58.6	75	41.0	-58.7	74	42.3	-58.9	8
9	80	31.0	-57.2	79	33.8	-57.7	78	36.1	-58.1	77	38.0	-58.3	76	39.6	-58.6	75	41.0	-58.7	74	42.3	-58.9	73	44.4	-59.0	9
10	79	33.8	-57.6	78	36.1	-58.0	77	38.0	-58.3	76	39.7	-58.6	75	41.1	-58.8	74	42.3	-58.9	73	44.4	-59.0	72	44.4	-59.2	10
11	78	36.2	-58.0	77	38.1	-58.3	76	39.7	-58.5	75	41.1	-58.7	74	42.3	-58.8	73	44.3	-59.0	72	44.4	-59.1	71	45.2	-59.2	11
12	77	38.2	-58.4	76	39.8	-58.6	75	41.2	-58.8	74	42.4	-58.9	73	44.3	-59.0	72	44.5	-59.1	71	45.3	-59.2	70	46.0	-59.3	12
13	76	39.8	-58.5	75	41.2	-58.7	74	42.4	-58.8	73	44.3	-59.0	72	44.5	-59.1	71	45.3	-59.2	70	46.1	-59.3	69	46.7	-59.3	13
14	75	41.3	-58.7	74	42.5	-58.9	73	43.6	-59.0	72	44.6	-59.2	71	45.4	-59.2	70	46.1	-59.2	69	46.8	-59.4	68	47.4	-59.4	14
15	74	42.6	-58.9	73	43.6	-59.0	72	44.6	-59.2	71	45.4	-59.2	70	46.1	-59.2	69	46.8	-59.3	68	47.4	-59.4	67	48.0	-59.5	15
16	73	43.7	-59.0	72	44.6	-59.1	71	45.4	-59.2	70	46.2	-59.3	69	46.9	-59.4	68	47.5	-59.4	67	48.0	-59.4	66	48.5	-59.5	16
17	72	44.7	-59.1	71	44.5	-59.2	70	46.2	-59.2	69	46.9	-59.3	68	47.5	-59.4	67	48.1	-59.5	66	48.6	-59.5	65	49.0	-59.5	17
18	71	45.6	-59.2	70	46.3	-59.3	69	47.0	-59.4	68	47.6	-59.4	67	48.1	-59.4	66	48.6	-59.5	65	49.1	-59.5	64	49.5	-59.6	18
19	70	46.4	-59.3	69	47.0	-59.3	68	47.6	-59.4	67	48.2	-59.5	66	48.7	-59.5	65	49.1	-59.5	64	49.6	-59.6	63	49.9	-59.6	19
20	69	47.1	-59.3	68	47.7	-59.4	67	48.2	-59.4	66	48.7	-59.5	65	49.2	-59.5	64	49.2	-59.6	63	50.0	-59.6	62	50.3	-59.6	20
21	68	47.8	-59.4	67	48.3	-59.4	66	48.8	-59.5	65	49.2	-59.5	64	49.7	-59.6	63	50.0	-59.6	62	50.4	-59.6	61	50.7	-59.6	21
22	67	48.4	-59.5	66	48.9	-59.5	65	49.3	-59.5	64	49.7	-59.6	63	50.1	-59.6	62	50.4	-59.6	61	50.8	-59.7	60	51.1	-59.7	22
23	66	48.9	-59.4	65	49.4	-59.6	64	49.8	-59.6	63	50.1	-59.5	62	50.5	-59.6	61	50.8	-59.6	60	51.1	-59.6	59	51.4	-59.7	23
24	65	49.5	-59.6	64	49.8	-59.5	63	50.2	-59.6	62	50.6	-59.7	61	50.9	-59.7	60	51.2	-59.7	59	51.5	-59.7	58	51.7	-59.7	24
25	64	49.9	-59.5	63	50.3	-59.6	62	50.6	-59.6	61	50.9	-59.6	60	51.2	-59.7	59	51.2	-59.7	58	51.8	-59.7	57	52.0	-59.7	25
26	63	50.4	-59.6	62	50.7	-59.6	61	51.0	-59.6	60	51.3	-59.7	59	51.6	-59.7	58	51.8	-59.7	57	52.1	-59.8	56	52.3	-59.7	26
27	62	50.8	-59.6	61	51.1	-59.7	60	51.4	-59.7	59	51.6	-59.7	58	51.9	-59.7	57	52.1	-59.7	56	52.3	-59.7	55	52.6	-59.8	27
28	61	51.2	-59.7	60	51.4	-59.6	59	51.7	-59.7	58	52.0	-59.8	57	52.2	-59.7	56	52.4	-59.7	55	52.6	-59.7	54	52.8	-59.7	28
29	60	51.5	-59.6	59	51.8	-59.7	58	52.0	-59.7	57	52.2	-59.7	56	52.5	-59.8	55	52.7	-59.8	54	52.9	-59.8	53	53.1	-59.8	29
30	59	51.9	-59.7	58	52.1	-59.7	57	52.3	-59.7	56	52.5	-59.7	55	52.7	-59.7	54	52.9	-59.7	53	53.1	-59.8	52	53.3	-59.8	30
31	58	52.2	-59.7	57	52.4	-59.7	56	52.6	-59.7	55	52.8	-59.7	54	53.0	-59.8	53	53.2	-59.8	52	53.3	-59.7	51	53.5	-59.8	31
32	57	52.5	-59.7	56	52.7	-59.8	55	52.9	-59.8	54	53.1	-59.8	53	53.2	-59.7	52	53.4	-59.8	51	53.6	-59.8	50	53.7	-59.8	32
33	56	52.8	-59.8	55	52.9	-59.7	54	53.1	-59.7	53	53.3	-59.8	52	53.5	-59.8	51	53.6	-59.8	50	53.8	-59.8	49	53.9	-59.8	33
34	55	53.0	-59.7	54	53.2	-59.8	53	53.4	-59.8	52	53.5	-59.8	51	53.7	-59.8	50	53.8	-59.8	49	54.0	-59.8	48	54.1	-59.8	34
35	54	53.3	-59.8	53	53.4	-59.7	52	53.6	-59.8	51	53.7	-59.8	50	53.9	-59.8	49	54.0	-59.8	48	54.2	-59.8	47	54.3	-59.8	35
36	53	53.5	-59.7	52	53.7	-59.8	51	53.8	-59.8	50	54.0	-59.8	49	54.1	-59.8	48	54.2	-59.8	47	54.3	-59.8	46	54.4	-59.8	36
37	52	53.8	-59.8	51	53.9	-59.8	50	54.0	-59.8	49	54.2	-59.8	48	54.3	-59.8	47	54.4	-59.8	46	54.5	-59.8	45	54.6	-59.8	37
38	51	54.0	-59.8	50	54.1	-59.8	49	54.2	-59.8	48	54.4	-59.8	47	54.5	-59.9	46	54.6	-59.8	45	54.7	-59.8	44	54.8	-59.8	38
39	50	54.2	-59.8	49	54.3	-59.8	48	54.4	-59.8	47	54.5	-59.8	46	54.6	-59.8	45	54.8	-59.9	44	54.9	-59.9	43	55.0	-59.9	39
40	49	54.4	-59.8	48	54.5	-59.8	47	54.6	-59.8	46	54.7	-59.8	45	54.8	-59.8	44	54.9	-59.8	43	55.0	-59.8	42	55.1	-59.8	40
41	48	54.6	-59.8	47	54.7	-59.8	46	54.8	-59.8	45	54.9	-59.8	44	55.0	-59.8	43	55.1	-59.8	42	55.2	-59.9	41	55.3	-59.9	41
42	47	54.8	-59.8	46	54.9	-59.9	45	55.0	-59.9	44	55.1	-59.9	43	55.1	-59.8	42	55.2	-59.8	41	55.3	-59.8	40	55.4	-59.9	42
43	46	55.0	-59.9	45	55.0	-59.8	44	55.1	-59.8	43	55.2	-59.8	42	55.3	-59.8	41	55.4	-59.8	40	55.5	-59.8	39	55.5	-59.8	43
44	45	55.1	-59.8	44	55.2	-59.8	43	55.3	-59.8	42	55.4	-59.8	41	55.5	-59.9	40	55.5	-59.8	39	55.6	-59.8	38	55.7	-59.9	44
45	44	55.3	-59.8	43	55.4	-59.9	42	55.5	-59.9	41	55.5	-59.9	40	55.6	-59.9	39	55.7	-59.9	38	55.7	-59.9	37	55.8	-59.9	45
46	43	55.5	-59.9	42	55.5	-59.8	41	55.6	-59.9	40	55.7	-59.9	39	55.7	-59.9	38	55.8	-59.9	37	55.9	-59.9	36	55.9	-59.8	46
47	42	55.6	-59.8	41	55.6	-59.9	40	55.7	-59.8	39	55.8	-59.8	38	55.9	-59.9	37	55.9	-59.8	36	56.0	-59.9	35	56.1	-59.9	47
48	41	55.8	-59.9	40	55.8	-59.8	39	55.9	-59.8	38	56.0	-59.9	37	56.0	-59.9	36	56.1	-59.9	35	56.1	-59.9	34	56.2	-59.9	48
49	40	55.9	-59.9	39	56.0	-59.9	38	56.0	-59.8	37	56.1	-59.9	36	56.1	-59.9	35	56.2	-59.9	34	56.2	-59.9	33	56.3	-59.9	49
50	39	56.0	-59.8	38	56.1	-59.9	37	56.2	-59.9	36	56.2	-59.9	35	56.3	-59.9	34	56.3	-59.9	33	56.4	-59.9	32	56.4	-59.9	50
51	38	56.2	-59.9	37	56.2	-59.8	36	56.3	-59.9	35	56.3	-59.9	34	56.4	-59.9	33	56.4	-59.9	32	56.5	-59.9	31	56.5	-59.9	51
52	37	56.3	-59.8	36	56.4	-59.9	35	56.4	-59.9	34	56.5	-59.9	33	56.5	-59.9	32	56.6	-59.9	31	56.6	-59.9	30	56.6	-59.9	52
53	36	56.5	-59.9	35	56.5	-59.9	34	56.5	-59.8	33	56.6	-59.9	32	56.6	-59.9	31	56.7	-59.9	30	56.7	-				



4°, 356° 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

Table with columns for Dec. (0 to 90) and latitude degrees (0° to 7°). Each cell contains three values: Hc, d, and Z. The table is a grid of 91 rows and 19 columns.

4°, 356° L.H.A.

LATITUDE SAME NAME AS DECLINATION

LATITUDE CONTRARY NAME TO DECLINATION

L.H.A. 4°, 356°

Dec.	0°			1°			2°			3°			4°			5°			6°			7°			Dec.
	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	
0	86 00.0	-7.4*	90.0	85 52.6	-20.9*	104.0	85 31.7	-31.7*	116.5	85 00.1	-39.5*	126.8	84 20.7	-44.8*	134.9	83 36.0	-48.5*	141.3	82 47.6	-51.1*	146.2	81 56.6	-53.0	150.2	0
1	85 52.6	-20.9*	104.0	85 31.7	-31.7*	116.6	85 00.0	-39.4*	126.9	84 20.6	-44.7*	135.0	83 35.9	-48.5*	141.3	82 47.4	-51.1*	146.3	81 56.4	-53.0	150.2	80 03.6	-54.3	153.3	1
2	85 31.7	-31.6*	116.6	85 00.0	-39.4*	126.9	84 20.6	-44.7*	135.0	83 35.9	-48.5*	141.3	82 47.4	-51.1*	146.3	81 56.3	-52.9	150.2	80 09.2	-54.2	153.4	78 17.8	-56.6	160.0	2
3	85 00.1	-39.4*	126.9	84 20.6	-44.7*	135.0	83 35.9	-48.5*	141.3	82 47.4	-51.1*	146.3	81 56.3	-52.9	150.2	80 09.2	-54.2	153.4	80 09.2	-54.2	153.4	76 24.1	-57.1	161.6	3
4	84 20.7	-44.7*	135.1	83 35.9	-48.4*	141.4	82 47.4	-51.0*	146.3	81 56.4	-52.9	150.3	80 09.2	-54.2	153.4	78 17.8	-56.6	160.0	79 13.9	-56.1	158.2	74 28.7	-58.0	165.0	4
5	83 36.0	-48.4*	141.4	82 47.5	-51.0*	146.4	81 56.4	-52.9	150.3	80 09.2	-54.2	153.5	78 17.8	-56.6	160.0	77 21.2	-57.1	161.6	76 24.1	-57.1	161.6	72 32.4	-58.5	166.8	5
6	82 47.6	-51.0*	146.4	81 56.5	-52.9	150.3	80 09.3	-54.2	153.5	78 17.9	-56.7	160.0	77 21.2	-57.1	161.6	76 24.1	-57.1	161.6	75 26.6	-57.9	162.9	71 33.9	-58.6	167.5	6
7	81 56.6	-52.9	150.4	80 09.4	-55.3	156.2	79 14.0	-56.0	158.3	78 17.9	-56.6	160.1	77 21.2	-57.1	161.6	76 24.1	-57.1	161.6	75 26.6	-57.9	162.9	70 35.3	-58.7	168.2	7
8	81 03.7	-54.2	153.6	80 09.4	-55.3	156.2	79 14.0	-56.0	158.3	78 17.9	-56.6	160.1	77 21.2	-57.1	161.6	76 24.1	-57.1	161.6	75 26.6	-57.9	162.9	70 35.3	-58.7	168.2	8
9	80 09.5	-55.3	156.2	79 14.1	-56.0	158.4	78 18.1	-56.6	160.2	77 21.4	-57.1	161.7	76 24.2	-57.5	163.0	75 26.6	-57.8	164.1	74 28.7	-58.0	165.1	73 30.7	-58.3	166.0	9
10	79 14.2	-56.0	158.4	78 18.1	-56.6	160.2	77 21.4	-57.1	161.7	76 24.2	-57.5	163.0	75 26.6	-57.8	164.1	74 28.8	-58.1	165.1	73 30.7	-58.3	166.0	72 32.4	-58.5	166.8	10
11	78 18.2	-56.6	160.3	77 21.5	-57.1	161.8	76 24.3	-57.5	163.1	75 26.7	-57.8	164.2	74 28.9	-58.0	165.2	73 30.8	-58.3	166.2	72 32.5	-58.5	166.9	71 33.9	-58.6	167.5	11
12	77 21.6	-57.1	161.8	76 24.4	-57.5	163.1	75 26.8	-57.8	164.2	74 29.0	-58.0	165.3	73 31.0	-58.3	166.2	72 32.6	-58.4	166.7	71 34.0	-58.6	167.6	70 35.3	-58.7	168.2	12
13	76 24.5	-57.5	163.2	75 26.9	-57.8	164.3	74 29.0	-58.0	165.3	73 31.0	-58.3	166.2	72 32.6	-58.4	166.7	71 34.1	-58.6	167.6	70 35.5	-58.8	168.3	69 36.7	-58.8	168.8	13
14	75 27.0	-57.7	164.4	74 29.1	-58.0	165.3	73 31.1	-58.3	166.2	72 32.7	-58.4	167.0	71 34.2	-58.6	167.7	70 35.5	-58.8	168.3	69 36.7	-58.9	168.8	68 37.7	-58.9	169.3	14
15	74 29.3	-58.1	165.4	73 31.1	-58.3	166.3	72 32.7	-58.4	167.0	71 34.3	-58.6	167.8	69 36.7	-58.8	168.9	68 37.7	-58.9	169.4	67 38.8	-59.0	170.0	66 39.7	-59.1	170.3	15
16	73 31.2	-58.2	166.3	72 32.8	-58.4	167.1	71 34.3	-58.6	167.8	70 35.7	-58.8	168.4	69 36.7	-58.8	168.9	68 37.7	-58.9	169.4	67 38.8	-59.0	170.0	66 39.7	-59.1	170.3	16
17	72 33.0	-58.5	167.1	71 34.4	-58.6	167.8	70 35.7	-58.8	168.4	69 36.7	-58.8	168.9	68 37.7	-58.9	169.5	67 38.9	-59.1	170.0	66 39.8	-59.2	170.3	65 40.8	-59.2	170.7	17
18	71 34.5	-58.6	167.9	70 35.8	-58.7	168.5	69 36.9	-58.8	169.0	68 38.0	-58.9	169.5	67 39.0	-59.1	170.0	66 39.8	-59.1	170.4	65 40.9	-59.1	170.7	64 41.4	-59.2	171.1	18
19	70 35.9	-58.7	168.5	69 37.1	-58.9	169.1	68 38.1	-58.9	169.6	67 39.1	-59.1	170.0	66 39.9	-59.1	170.4	65 41.7	-59.1	170.8	64 41.5	-59.3	171.1	63 42.2	-59.3	171.4	19
20	69 37.2	-58.8	169.2	68 38.2	-59.0	169.6	67 39.2	-59.1	170.1	66 40.0	-59.1	170.5	65 40.8	-59.1	170.8	64 41.6	-59.3	171.2	63 42.2	-59.3	171.5	62 42.9	-59.4	171.8	20
21	68 38.4	-59.0	169.7	67 39.3	-59.0	170.1	66 40.1	-59.1	170.5	65 40.9	-59.1	170.9	64 41.7	-59.3	171.2	63 42.3	-59.3	171.5	62 43.0	-59.4	171.8	61 43.5	-59.3	172.1	21
22	67 39.4	-59.0	170.2	66 40.3	-59.1	170.6	65 41.0	-59.1	171.0	64 41.8	-59.3	171.3	63 42.4	-59.3	171.6	62 43.0	-59.3	171.9	61 43.6	-59.4	172.2	60 44.3	-59.4	172.4	22
23	66 40.4	-59.1	170.7	65 41.2	-59.2	171.0	64 41.9	-59.3	171.4	63 42.5	-59.2	171.7	62 43.1	-59.3	171.9	61 43.7	-59.4	172.2	60 44.3	-59.5	172.5	59 44.8	-59.5	172.7	23
24	65 41.3	-59.2	171.1	64 42.0	-59.2	171.4	63 42.6	-59.2	171.7	62 43.3	-59.4	172.0	61 43.8	-59.4	172.3	60 44.3	-59.4	172.5	59 44.8	-59.4	172.7	58 45.3	-59.5	172.9	24
25	64 42.1	-59.2	171.5	63 42.8	-59.3	171.8	62 43.4	-59.4	172.1	61 43.9	-59.3	172.3	60 44.4	-59.4	172.6	59 44.9	-59.4	172.8	58 45.4	-59.5	173.0	57 45.8	-59.5	173.2	25
26	63 42.9	-59.3	171.9	62 43.5	-59.3	172.1	61 44.0	-59.3	172.4	60 44.6	-59.4	172.6	59 45.0	-59.4	172.9	58 45.5	-59.5	173.1	57 45.9	-59.5	173.2	56 46.3	-59.5	173.4	26
27	62 43.6	-59.3	172.2	61 44.2	-59.4	172.5	60 44.7	-59.4	172.7	59 45.2	-59.5	172.9	58 45.6	-59.5	173.1	57 46.0	-59.5	173.3	56 46.4	-59.5	173.5	55 46.8	-59.6	173.7	27
28	61 44.3	-59.3	172.5	60 44.8	-59.4	172.8	59 45.3	-59.5	173.0	58 45.7	-59.5	173.2	57 46.1	-59.5	173.4	56 46.5	-59.5	173.5	55 46.9	-59.6	173.7	54 47.2	-59.5	173.9	28
29	60 45.0	-59.5	172.8	59 45.4	-59.4	173.0	58 45.8	-59.4	173.2	57 46.2	-59.5	173.4	56 46.6	-59.5	173.6	55 47.0	-59.6	173.8	54 47.3	-59.5	173.9	53 47.7	-59.6	174.1	29
30	59 45.5	-59.4	173.1	58 46.0	-59.5	173.3	57 46.4	-59.5	173.5	56 46.7	-59.5	173.7	55 47.1	-59.6	173.8	54 47.4	-59.5	174.0	53 47.8	-59.5	174.1	52 48.1	-59.6	174.3	30
31	58 46.1	-59.5	173.4	57 46.5	-59.5	173.6	56 46.9	-59.6	173.7	55 47.2	-59.5	173.9	54 47.5	-59.5	174.0	53 47.9	-59.6	174.2	52 48.2	-59.6	174.3	51 48.5	-59.7	174.5	31
32	57 46.6	-59.5	173.6	56 47.0	-59.5	173.8	55 47.3	-59.6	174.0	54 47.7	-59.6	174.1	53 48.0	-59.6	174.3	52 48.3	-59.6	174.4	51 48.6	-59.7	174.5	50 48.8	-59.6	174.6	32
33	56 47.1	-59.5	173.9	55 47.5	-59.6	174.0	54 47.8	-59.6	174.2	53 48.1	-59.6	174.3	52 48.4	-59.6	174.4	51 48.7	-59.7	174.6	50 48.9	-59.6	174.7	49 49.2	-59.7	174.8	33
34	55 47.6	-59.5	174.1	54 47.9	-59.5	174.2	53 48.2	-59.6	174.4	52 48.5	-59.6	174.5	51 48.8	-59.7	174.6	50 49.0	-59.6	174.7	49 49.3	-59.7	174.9	48 49.5	-59.7	175.0	34
35	54 48.1	-59.6	174.3	53 48.4	-59.6	174.4	52 48.6	-59.6	174.6	51 48.9	-59.6	174.7	50 49.1	-59.6	174.8	49 49.5	-59.7	175.0	48 49.6	-59.7	175.0	47 49.8	-59.6	175.1	35
36	53 48.5	-59.6	174.5	52 48.8	-59.6	174.6	51 49.0	-59.6	174.8	50 49.3	-59.7	174.9	49 49.5	-59.7	175.0	48 49.7	-59.6	175.1	47 49.9	-59.6	175.2	46 50.2	-59.7	175.3	36
37	52 48.9	-59.6	174.7	51 49.2	-59.7	174.8	50 49.4	-59.6	174.9	49 49.6	-59.6	175.0	48 49.8	-59.6	175.1	47 50.1	-59.7	175.2	46 50.3	-59.7	175.3	45 50.5	-59.8	175.4	37
38	51 49.3	-59.6	174.9	50 49.5	-59.6	175.0	49 49.8	-59.7	175.1	48 50.0	-59.7	175.2	47 50.2	-59.7	175.3	46 50.4	-59.7	175.4	45 50.6	-59.7	175.5	44 50.9	-59.7	175.6	38
39	50 49.7	-59.7	175.1	49 49.9	-59.7	175.2	48 50.1	-59.7	175.3	47 50.3	-59.7	175.4	46 50.5	-59.7	175.5	45 50.7	-59.7	175.5	44 50.9	-59.8	175.6	43 51.0	-59.7	175.7	39
40	49 50.0	-59.6	175.2	48 50.2	-59.6	175.3	47 50.4	-59.6	175.4	46 50.6	-59.7	175.5	45 50.8	-59.7	175.6	44 51.0	-59.7	175.7	43 51.1	-59.7	175.8	42 51.3	-59.7	175.8	40
41	48 50.4	-59.7	175.4	47 50.6	-59.7	175.5	46 50.8	-59.7	175.6	45 50.9	-59.7	175.7	44 51.1	-59.7	175.7	43 51.3	-59.8	175.8	42 51.4	-59.7	175.9	41 51.6	-59.8	175.9	41
42	47 50.7	-59.7	175.6	46 50.9	-59.7	175.7	45 51.1	-59.7	175.7	44 51.2	-59.7	175.8	43 51.4	-59.7	175.9	42 51.5	-59.7	175.9	41 51.7	-59.8	176.0	40 51.8	-59.7	176.1	42
43	46 51.0	-59.7	175.7	45 51.2	-59.7	175.8	44 51.4	-59.8	175.9	43 51.5	-59.7	175.9	42 51.7	-59.8	176.0	41 51.9	-59.7	176.1	40 51.9	-59.7	176.1	39 52.2	-59.8	176.2	43
44	45 51.3	-59.7	175.9	44 51.5	-59.7	175.9	43 51.6	-59.7	176.0	42 51.8	-59.7	176.1	41 51.9	-59.8	176.1	40 52.1	-59.8	176.2	39 52.2	-59.8	176.3	38 52.3	-59.8		

5°, 355° 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

Table with columns for Dec. (0 to 90) and latitude bands (0° to 7°). Each band contains three columns: Hc, d, and Z. The table lists astronomical data for various stars across these parameters.

5°, 355° L.H.A.

LATITUDE SAME NAME AS DECLINATION

# LATITUDE CONTRARY NAME TO DECLINATION

L.H.A. 5°, 35°

Dec.	0°			1°			2°			3°			4°			5°			6°			7°			Dec.	
	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z		Hc
0	85 00.0	-5.9	90.0	84 54.1	-17.2	101.3	84 36.9	-26.7	111.7	84 10.3	-34.4	120.9	83 36.0	-40.1	128.6	82 56.0	-44.4	134.9	82 11.7	-47.6	140.1	81 24.3	-50.0	144.3	0	
1	84 54.1	-17.2	101.3	84 36.9	-26.7	111.8	84 10.2	-34.3	120.9	83 35.9	-40.1	128.6	82 55.9	-44.4	135.0	82 11.6	-47.6	140.1	81 24.1	-49.9	144.3	80 34.3	-51.7	147.9	1	
2	84 36.9	-26.6	111.8	84 10.2	-34.3	121.0	83 34.9	-40.0	128.6	82 54.8	-44.3	135.0	82 11.5	-47.5	140.2	81 24.0	-49.9	144.4	80 34.2	-51.7	147.9	79 42.5	-53.2	150.8	2	
3	84 10.3	-34.3	121.0	83 35.9	-40.0	128.7	82 55.8	-44.3	135.0	82 11.5	-47.5	140.2	81 24.0	-49.9	144.5	80 34.1	-51.7	148.0	79 42.4	-53.1	147.9	78 49.4	-54.1	153.3	3	
4	83 36.0	-40.0	128.7	82 55.9	-44.3	135.0	82 11.5	-47.5	140.2	81 24.0	-49.9	144.5	80 34.1	-51.7	148.0	79 42.4	-53.0	150.9	78 49.4	-54.2	153.4	77 55.3	-55.1	155.5	4	
5	82 56.0	-44.3	135.1	82 11.6	-47.5	140.3	81 24.0	-49.8	144.5	80 34.1	-51.6	148.0	79 42.4	-53.0	150.9	78 49.4	-54.2	153.4	77 55.2	-55.0	155.5	77 00.2	-55.7	157.3	5	
6	82 11.7	-47.4	140.3	81 24.1	-49.8	144.6	80 34.2	-51.6	148.1	79 42.5	-53.1	151.0	78 49.4	-54.1	153.4	77 55.2	-55.0	155.5	77 00.2	-55.7	157.3	76 04.5	-56.2	158.9	6	
7	81 24.3	-49.8	144.6	80 34.3	-51.6	148.1	79 42.6	-53.1	151.0	78 49.4	-54.1	153.5	77 55.3	-55.0	155.6	77 00.2	-55.6	157.4	76 04.5	-56.2	158.9	75 08.3	-56.7	160.3	7	
8	80 34.5	-51.6	148.2	79 42.7	-53.0	151.1	78 49.5	-54.1	153.6	77 55.4	-54.9	155.6	77 00.3	-55.7	157.4	76 04.6	-56.3	159.0	75 08.3	-56.7	160.3	74 11.6	-57.1	161.8	8	
9	79 42.9	-53.0	151.2	78 49.7	-54.1	153.6	77 55.4	-54.9	155.7	77 00.4	-55.7	157.5	76 04.6	-56.7	159.0	75 08.3	-56.6	160.4	74 11.6	-57.1	161.8	73 14.6	-57.4	162.6	9	
10	78 49.9	-54.1	153.7	77 55.6	-54.9	155.8	77 00.5	-55.6	157.6	76 04.7	-56.2	159.1	75 08.4	-56.6	160.4	74 11.7	-57.1	161.8	73 14.6	-57.4	162.7	72 17.1	-57.6	163.6	10	
11	77 55.8	-55.0	155.8	77 00.7	-55.7	157.6	76 04.9	-56.2	159.2	75 08.5	-56.6	160.5	74 11.8	-57.1	161.7	73 14.6	-57.3	162.7	72 17.2	-57.6	163.7	71 19.5	-57.9	164.5	11	
12	77 00.8	-55.6	157.7	76 05.0	-56.2	159.2	75 08.7	-56.7	160.6	74 11.9	-57.0	161.8	73 14.7	-57.5	162.8	72 17.3	-57.7	163.7	71 19.6	-57.9	164.6	70 21.6	-58.1	165.3	12	
13	76 05.2	-56.2	159.3	75 08.8	-56.6	160.7	74 12.0	-57.0	161.8	73 14.9	-57.4	162.9	72 17.4	-57.7	163.8	71 19.6	-57.8	164.6	70 21.7	-58.1	165.4	69 23.5	-58.2	166.0	13	
14	75 09.0	-56.6	160.7	74 12.2	-57.0	161.9	73 15.2	-57.3	162.9	72 17.5	-57.6	163.9	71 19.7	-57.8	164.7	70 21.8	-58.1	165.4	69 23.6	-58.2	166.1	68 25.3	-58.4	166.7	14	
15	74 12.4	-57.0	162.0	73 15.2	-57.4	163.0	72 17.7	-57.7	163.9	71 19.9	-57.9	164.8	70 21.9	-58.1	165.5	69 23.7	-58.2	166.2	68 25.4	-58.4	166.8	67 26.9	-58.5	167.3	15	
16	73 15.4	-57.4	163.1	72 17.8	-57.6	164.0	71 20.0	-57.8	164.8	70 22.0	-58.0	165.6	69 23.8	-58.2	166.2	68 25.5	-58.4	166.8	67 27.0	-58.5	167.4	66 28.4	-58.6	167.9	16	
17	72 18.0	-57.6	164.1	71 20.2	-57.8	164.9	70 22.2	-58.0	165.6	69 24.0	-58.2	166.3	68 25.6	-58.4	166.9	67 27.1	-58.5	167.4	66 28.5	-58.6	167.9	65 29.3	-58.7	168.4	17	
18	71 20.4	-57.8	165.0	70 22.4	-58.1	165.7	69 24.2	-58.3	166.4	68 25.8	-58.4	167.0	67 27.3	-58.5	167.5	66 28.6	-58.6	168.0	65 29.9	-58.7	168.5	64 31.0	-58.8	168.9	18	
19	70 22.6	-58.0	165.8	69 24.3	-58.2	166.5	68 25.9	-58.3	167.0	67 27.4	-58.5	167.6	66 28.8	-58.7	168.1	65 30.0	-58.7	168.5	64 31.2	-58.9	169.0	63 32.0	-58.9	169.3	19	
20	69 24.6	-58.3	166.5	68 26.1	-58.3	167.1	67 27.6	-58.5	167.7	66 28.9	-58.6	168.2	65 30.1	-58.7	168.6	64 31.3	-58.8	169.0	63 32.3	-58.9	169.4	62 33.3	-58.9	169.8	20	
21	68 26.3	-58.3	167.2	67 27.8	-58.5	167.7	66 29.1	-58.6	168.2	65 30.3	-58.7	168.7	64 31.4	-58.8	169.1	63 32.5	-58.9	169.5	62 33.4	-58.9	169.8	61 34.4	-59.1	170.2	21	
22	67 28.0	-58.5	167.8	66 29.3	-58.6	168.3	65 30.5	-58.7	168.8	64 31.6	-58.8	169.2	63 32.6	-58.9	169.5	62 33.5	-58.9	169.9	61 34.5	-59.0	170.2	60 35.9	-59.1	170.5	22	
23	66 29.5	-58.6	168.4	65 30.7	-58.7	168.8	64 31.8	-58.8	169.2	63 32.8	-58.9	169.6	62 33.7	-58.9	170.0	61 34.6	-59.0	170.3	60 35.5	-59.1	170.6	59 36.2	-59.1	170.9	23	
24	65 30.9	-58.7	168.9	64 32.0	-58.8	169.3	63 33.0	-58.9	169.7	62 33.9	-58.9	170.0	61 34.8	-59.0	170.4	60 35.6	-59.1	170.7	59 36.4	-59.2	170.9	58 37.1	-59.2	171.2	24	
25	64 32.2	-58.8	169.4	63 33.2	-58.9	169.8	62 34.1	-59.0	170.1	61 35.0	-59.1	170.4	60 35.8	-59.1	170.7	59 36.5	-59.1	171.0	58 37.2	-59.2	171.3	57 37.9	-59.2	171.5	25	
26	63 33.4	-58.9	169.9	62 34.3	-59.0	170.2	61 35.1	-59.0	170.5	60 35.9	-59.0	170.8	59 36.7	-59.2	171.1	58 37.4	-59.2	171.3	57 38.0	-59.2	171.6	56 38.7	-59.3	171.8	26	
27	62 34.5	-58.9	170.3	61 35.3	-59.0	170.6	60 36.1	-59.1	170.9	59 36.9	-59.2	171.2	58 37.5	-59.1	171.4	57 38.5	-59.2	171.7	56 38.8	-59.3	171.9	55 39.4	-59.3	172.1	27	
28	61 35.6	-59.1	170.7	60 36.3	-59.0	171.0	59 37.0	-59.1	171.2	58 37.7	-59.2	171.5	57 38.4	-59.3	171.7	56 39.0	-59.3	172.0	55 39.5	-59.3	172.2	54 40.1	-59.3	172.4	28	
29	60 36.5	-59.0	171.1	59 37.3	-59.2	171.3	58 37.9	-59.2	171.6	57 38.5	-59.2	171.8	56 39.1	-59.2	172.0	55 39.7	-59.3	172.2	54 40.2	-59.3	172.4	53 40.8	-59.4	172.6	29	
30	59 37.5	-59.2	171.4	58 38.1	-59.2	171.7	57 38.7	-59.2	171.9	56 39.3	-59.2	172.1	55 39.9	-59.3	172.3	54 40.4	-59.3	172.5	53 40.9	-59.3	172.7	52 41.4	-59.4	172.8	30	
31	58 38.3	-59.1	171.7	57 38.9	-59.2	172.0	56 39.5	-59.2	172.2	55 40.1	-59.3	172.4	54 40.6	-59.4	172.6	53 41.1	-59.4	172.8	52 41.5	-59.4	172.9	51 42.0	-59.4	173.1	31	
32	57 39.2	-59.3	172.1	56 39.7	-59.2	172.3	55 40.3	-59.3	172.5	54 40.8	-59.4	172.7	53 41.2	-59.4	172.8	52 41.7	-59.4	173.0	51 42.1	-59.4	173.2	50 42.6	-59.5	173.3	32	
33	56 39.9	-59.2	172.4	55 40.5	-59.3	172.6	54 41.0	-59.4	172.7	53 41.4	-59.3	172.9	52 41.9	-59.4	173.1	51 42.3	-59.4	173.2	50 42.7	-59.4	173.4	49 43.1	-59.5	173.5	33	
34	55 40.7	-59.3	172.6	54 41.2	-59.4	172.8	53 41.6	-59.3	173.0	52 42.1	-59.4	173.2	51 42.5	-59.4	173.3	50 42.9	-59.5	173.4	49 43.3	-59.5	173.6	48 43.6	-59.5	173.7	34	
35	54 41.4	-59.3	172.9	53 41.8	-59.3	173.1	52 42.3	-59.4	173.2	51 42.7	-59.4	173.4	50 43.1	-59.5	173.5	49 43.4	-59.4	173.7	48 43.8	-59.5	173.8	47 44.1	-59.5	173.9	35	
36	53 42.1	-59.4	173.2	52 42.5	-59.4	173.3	51 42.9	-59.4	173.5	50 43.3	-59.5	173.6	49 43.6	-59.4	173.7	48 44.0	-59.5	173.9	47 44.3	-59.5	174.0	46 44.6	-59.5	174.1	36	
37	52 42.7	-59.4	173.4	51 43.1	-59.4	173.5	50 43.5	-59.5	173.7	49 43.8	-59.5	173.8	48 44.2	-59.5	173.9	47 44.5	-59.5	174.1	46 44.8	-59.5	174.2	45 44.1	-59.5	174.3	37	
38	51 43.3	-59.4	173.6	50 43.7	-59.5	173.8	49 44.0	-59.4	173.9	48 44.3	-59.4	174.0	47 44.7	-59.5	174.1	46 45.0	-59.5	174.2	45 45.3	-59.6	174.4	44 45.6	-59.6	174.4	38	
39	50 43.9	-59.4	173.9	49 44.2	-59.4	174.0	48 44.6	-59.5	174.1	47 44.9	-59.5	174.2	46 45.2	-59.6	174.3	45 45.5	-59.6	174.4	44 45.7	-59.6	174.5	43 46.0	-59.6	174.6	39	
40	49 44.5	-59.5	174.1	48 44.8	-59.5	174.2	47 45.1	-59.5	174.3	46 45.4	-59.6	174.4	45 45.6	-59.6	174.5	44 45.9	-59.6	174.6	43 46.2	-59.6	174.7	42 46.4	-59.6	174.8	40	
41	48 45.0	-59.5	174.3	47 45.3	-59.5	174.4	46 45.6	-59.6	174.5	45 45.8	-59.6	174.6	44 46.1	-59.6	174.7	43 46.4	-59.6	174.8	42 46.6	-59.6	174.9	41 46.8	-59.6	174.9	41	
42	47 45.5	-59.5	174.5	46 45.8	-59.5	174.6	45 46.0	-59.6	174.7	44 46.3	-59.6	174.8	43 46.5	-59.6	174.9	42 46.8	-59.6	175.0	41 47.0	-59.6	175.0	40 47.2	-59.6	175.1	42	
43	46 46.0	-59.5	174.7	45 46.3	-59.6	174.8	44 46.5	-59.6	174.8	43 46.7	-59.6	174.9	42 47.0	-59.6	175.0	41 47.2	-59.6	175.1	40 47.4	-59.6	175.2	39 47.6	-59.6	175.2	43	
44	45 46.5	-59.6	174.8	44 46.7	-59.6	174.9	43 47.0	-59.6	175.0	42 47.2	-59.6	175.1	41 47.4	-59.6	175.2	40 47.6	-59.6	175.2	39 47.8	-59.6	175.3	38 48.0	-59.6			

6°, 354° 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

Table with columns for Dec. (0 to 90) and latitude degrees (0° to 7°). Each cell contains three values: Hc, d, and Z. The table is a grid of 91 rows and 19 columns.

6°, 354° L.H.A.

LATITUDE SAME NAME AS DECLINATION

LATITUDE CONTRARY NAME TO DECLINATION

L.H.A. 6°, 354°

Table with columns for Dec., 0°, 1°, 2°, 3°, 4°, 5°, 6°, 7°, and Dec. Each column contains three sub-columns for Hc, d, and Z. The table lists celestial navigation data for various latitudes and declinations.

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. 174°, 186°

7°, 353° 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

Table with columns for Dec. (0 to 90) and latitude degrees (0° to 7°). Each degree column contains three sub-columns: Hc, d, and Z. The table lists astronomical data for various stars, with values for hour angle (Hc), declination (d), and zenith distance (Z) for each star at each degree of latitude.

7°, 353° L.H.A.

LATITUDE SAME NAME AS DECLINATION

# LATITUDE CONTRARY NAME TO DECLINATION

L.H.A. 7°, 353°

Dec.	0°			1°			2°			3°			4°			5°			6°			7°			Dec.
	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	
0	83 00.0	-4.2	90.0	82 55.8	-12.6	98.1	82 43.3	-20.2	105.9	82 23.2	-26.8	113.1	81 56.6	-32.5	119.6	81 24.3	-37.1	125.4	80 47.4	-40.9	130.4	80 06.8	-44.0	134.8	0
1	82 55.8	-12.5	98.2	82 43.2	-20.1	105.9	82 23.1	-26.8	113.1	81 56.4	-32.4	119.7	81 24.1	-37.0	125.5	80 47.3	-40.8	130.5	80 06.7	-40.9	130.4	79 22.8	-46.4	138.6	1
2	82 43.3	-20.1	106.0	82 23.1	-26.7	113.2	81 56.3	-32.3	119.7	81 24.0	-37.0	125.5	80 47.2	-40.8	130.6	80 06.6	-43.8	138.9	79 22.5	-46.3	138.7	78 36.2	-48.3	142.0	2
3	82 23.2	-26.6	113.3	81 56.4	-32.3	119.8	81 24.0	-37.0	125.5	80 47.0	-40.7	130.6	80 06.2	-43.7	138.8	79 22.4	-46.2	138.8	78 36.2	-48.3	142.0	77 47.9	-49.8	144.9	3
4	81 56.6	-32.3	119.8	81 24.1	-36.9	125.6	80 47.2	-40.7	130.7	80 06.3	-43.7	135.0	79 22.5	-46.3	138.8	78 36.2	-48.3	142.1	77 47.9	-49.8	144.9	76 58.1	-51.3	147.4	4
5	81 24.3	-36.9	125.7	80 47.2	-40.7	130.7	80 06.3	-43.7	135.0	79 22.6	-46.2	138.9	78 36.2	-48.1	142.2	77 47.9	-49.8	145.0	76 58.1	-51.2	147.5	76 06.8	-52.3	149.7	5
6	80 47.4	-40.6	130.8	80 06.5	-43.7	135.1	79 22.6	-46.2	138.9	78 36.4	-48.2	142.2	77 48.1	-49.8	145.1	76 58.1	-51.1	147.6	76 06.9	-52.3	149.7	75 14.5	-53.2	151.6	6
7	80 06.8	-43.7	135.2	79 22.8	-46.2	139.0	78 36.4	-48.2	142.2	77 48.2	-49.7	145.2	76 58.3	-51.2	147.6	76 07.0	-52.3	149.8	75 14.6	-53.2	151.7	74 21.3	-53.9	153.4	7
8	79 23.1	-46.1	139.1	78 36.6	-48.1	142.3	77 48.2	-49.7	145.2	76 58.5	-51.1	147.7	76 07.1	-52.2	149.9	75 14.7	-53.1	151.8	74 21.4	-53.9	153.5	73 27.4	-54.6	155.0	8
9	78 37.0	-48.2	142.4	77 48.5	-49.8	145.3	76 58.7	-51.0	147.8	76 07.4	-52.2	150.0	75 14.9	-53.1	151.9	74 21.6	-53.9	153.6	73 27.5	-54.6	155.1	72 32.8	-55.1	156.4	9
10	77 48.8	-49.7	145.3	76 58.7	-51.0	147.8	76 07.4	-52.2	150.0	75 15.2	-53.2	152.0	74 21.8	-53.9	153.7	73 27.7	-54.6	155.1	72 32.9	-55.1	156.5	71 37.7	-55.7	157.7	10
11	76 59.1	-51.1	147.9	76 07.7	-52.2	150.1	75 15.5	-53.1	152.1	74 22.0	-53.8	153.7	73 27.9	-54.6	155.2	72 33.1	-55.1	156.6	71 37.8	-55.6	157.8	70 42.0	-56.0	158.9	11
12	76 08.0	-52.2	150.2	74 22.4	-53.9	153.8	73 28.2	-54.6	155.3	72 33.3	-55.1	156.7	71 38.0	-55.6	157.9	70 42.2	-56.0	158.9	69 46.0	-56.3	159.9	68 49.5	-56.7	160.8	12
13	75 15.8	-53.1	152.2	73 28.5	-54.5	155.4	72 33.6	-55.1	156.8	71 38.2	-55.5	158.0	70 42.4	-56.0	159.0	69 46.2	-56.3	160.0	68 49.7	-56.7	160.9	67 53.8	-56.9	161.7	13
14	74 22.7	-53.8	154.0	72 34.0	-55.1	156.9	71 38.5	-55.5	158.1	70 42.7	-56.0	159.1	69 46.4	-56.3	160.1	68 49.9	-56.7	161.0	67 53.0	-56.9	161.8	66 55.9	-57.2	162.5	14
15	73 28.9	-54.6	155.5	71 38.9	-55.6	158.2	70 43.0	-56.0	159.2	68 46.7	-56.3	160.2	67 50.1	-56.6	161.1	66 53.2	-56.9	161.9	65 56.1	-57.2	162.6	64 58.7	-57.4	163.3	15
16	72 34.3	-55.0	157.0	70 43.1	-55.9	159.3	69 47.0	-56.3	160.3	68 50.4	-56.7	161.2	67 53.5	-57.0	162.0	66 56.3	-57.2	162.7	65 58.9	-57.4	163.4	64 59.1	-57.6	164.0	16
17	71 39.3	-55.6	158.3	69 47.4	-56.3	160.4	68 50.7	-56.6	161.3	67 53.7	-56.9	162.1	66 56.5	-57.1	162.8	65 59.1	-57.3	163.5	64 03.7	-57.7	164.6	63 03.7	-57.7	164.6	17
18	70 43.7	-55.9	159.4	68 47.4	-56.3	160.4	67 54.1	-56.9	162.1	66 56.8	-57.1	162.9	65 59.4	-57.4	163.5	64 04.0	-57.6	164.2	63 06.0	-57.8	165.3	62 06.0	-57.9	165.2	18
19	69 47.8	-56.3	160.5	67 54.1	-56.9	162.3	66 57.2	-57.2	163.0	65 59.7	-57.4	163.7	64 04.5	-57.4	164.3	62 04.2	-57.7	164.8	61 01.8	-57.7	164.8	60 06.2	-57.9	165.8	19
20	68 51.5	-56.6	161.5	66 57.5	-57.1	163.1	66 00.0	-57.3	163.8	65 02.7	-57.5	164.5	64 04.8	-57.7	165.0	63 06.8	-57.9	165.5	62 08.9	-58.0	166.1	61 10.6	-58.1	166.5	20
21	67 54.9	-56.9	162.4	66 00.4	-57.3	163.9	65 02.7	-57.5	164.5	64 04.8	-57.7	165.0	63 06.8	-57.9	165.5	62 08.9	-58.0	166.1	61 10.9	-58.1	166.6	60 12.5	-58.2	167.1	21
22	66 58.0	-57.2	163.2	65 03.1	-57.6	164.6	64 05.2	-57.7	165.1	63 07.1	-57.9	165.6	62 09.2	-58.0	166.2	61 10.9	-58.1	166.6	60 12.5	-58.2	167.1	59 14.0	-58.4	167.4	22
23	66 00.8	-57.3	164.0	64 05.5	-57.7	165.2	63 07.5	-57.9	165.7	62 09.6	-58.0	166.3	61 11.2	-58.1	166.8	60 12.8	-58.2	167.2	59 14.6	-58.4	167.6	58 15.9	-58.4	168.0	23
24	65 03.5	-57.5	164.7	63 07.8	-57.7	165.2	62 09.6	-58.0	166.3	61 11.6	-58.1	166.9	60 13.1	-58.2	167.3	59 14.6	-58.4	167.6	58 16.2	-58.4	168.1	57 17.5	-58.5	168.8	24
25	64 06.0	-57.7	165.4	62 10.0	-58.0	166.4	60 13.5	-58.2	167.4	59 14.9	-58.3	167.7	58 16.2	-58.4	168.1	57 17.5	-58.5	168.8	56 19.3	-58.6	169.3	55 20.4	-58.6	169.2	25
26	63 08.3	-57.9	166.0	61 11.6	-58.1	166.9	60 13.5	-58.2	167.4	59 14.9	-58.3	167.7	58 16.2	-58.4	168.1	57 17.5	-58.5	168.8	56 19.3	-58.6	169.3	55 20.4	-58.6	169.2	26
27	62 10.4	-58.0	166.5	61 11.6	-58.1	166.9	60 13.5	-58.2	167.4	59 14.9	-58.3	167.7	58 16.2	-58.4	168.1	57 17.5	-58.5	168.8	56 19.3	-58.6	169.3	55 20.4	-58.6	169.2	27
28	61 12.4	-58.1	167.1	60 13.9	-58.2	167.5	59 15.3	-58.3	167.8	58 16.6	-58.4	168.2	57 17.8	-58.5	168.5	56 19.4	-58.6	168.8	55 20.4	-58.6	169.2	54 21.4	-58.7	169.5	28
29	60 14.3	-58.2	167.6	59 15.7	-58.3	168.0	58 17.0	-58.5	168.3	57 18.2	-58.5	168.6	56 19.3	-58.6	168.9	55 20.4	-58.6	169.2	54 21.4	-58.7	169.5	53 22.7	-58.7	169.5	29
30	59 16.1	-58.3	168.1	58 17.4	-58.5	168.4	57 18.5	-58.4	168.3	56 19.7	-58.6	169.0	55 20.7	-58.6	169.3	54 21.8	-58.8	169.6	53 22.7	-58.8	169.8	52 23.7	-58.9	170.0	30
31	58 17.8	-58.4	168.5	57 18.9	-58.4	168.8	56 20.1	-58.6	169.1	55 21.1	-58.6	169.4	54 22.1	-58.6	169.7	53 23.0	-58.7	169.9	52 24.0	-58.9	170.1	51 24.8	-58.9	170.4	31
32	57 19.4	-58.5	168.9	56 20.5	-58.6	169.3	55 21.5	-58.7	169.5	54 22.5	-58.7	169.8	53 23.4	-58.8	170.0	52 24.3	-58.9	170.5	51 25.1	-58.9	170.5	50 25.9	-58.9	170.7	32
33	56 20.9	-58.6	169.4	55 21.9	-58.7	169.6	54 22.8	-58.7	169.9	53 23.8	-58.8	170.1	52 24.6	-58.8	170.4	51 25.4	-58.8	170.6	50 26.2	-58.9	170.8	49 27.0	-58.9	171.0	33
34	55 22.3	-58.6	169.8	54 23.2	-58.7	170.0	53 24.1	-58.7	170.2	52 25.0	-58.8	170.5	51 25.8	-58.9	170.7	50 26.6	-58.9	170.9	49 27.3	-59.0	171.1	48 28.0	-59.0	171.2	34
35	54 23.7	-58.6	170.4	53 24.5	-58.8	170.6	51 26.2	-58.8	170.8	50 27.3	-58.9	171.1	49 28.0	-59.0	171.3	48 28.7	-59.0	171.4	47 29.3	-59.0	171.4	46 29.9	-59.0	171.5	35
36	53 25.0	-58.8	170.5	52 25.8	-58.8	170.7	51 26.6	-58.9	170.9	50 27.7	-58.9	171.1	49 28.0	-59.0	171.3	48 28.7	-59.0	171.4	47 29.3	-59.0	171.4	46 30.3	-59.1	171.6	36
37	52 26.2	-58.8	170.8	51 27.0	-58.9	171.0	50 27.7	-58.9	171.2	49 28.4	-59.0	171.4	48 29.0	-59.0	171.6	47 29.7	-59.1	171.7	46 30.6	-59.0	172.0	45 31.2	-59.1	172.1	37
38	51 27.4	-58.9	171.1	49 29.2	-59.0	171.6	48 29.8	-59.0	171.5	47 30.4	-59.0	171.9	46 31.0	-59.1	172.1	45 31.6	-59.1	172.2	44 32.1	-59.1	172.2	43 32.6	-59.1	172.5	38
39	50 28.5	-58.9	171.4	48 30.8	-59.0	171.7	47 31.8	-59.1	172.3	46 31.8	-59.1	172.3	45 32.3	-59.1	172.5	44 32.8	-59.1	172.6	43 33.3	-59.1	172.7	42 33.8	-59.2	172.8	39
40	49 29.6	-58.9	171.7	47 32.4	-59.1	172.2	46 32.7	-59.1	172.6	45 32.7	-59.1	172.7	44 33.2	-59.1	172.7	43 33.7	-59.2	172.8	42 34.2	-59.2	172.9	41 34.6	-59.2	173.0	40
41	48 30.7	-59.0	172.0	46 33.9	-59.1	172.4	45 33.6	-59.1	172.8	44 33.6	-59.1	172.8	43 34.1	-59.2	172.9	42 34.5	-59.2	173.0	41 35.0	-59.2	173.0	40 35.4	-59.2	173.0	41
42	47 31.7	-59.1	172.3	45 34.9	-59.1	172.9	44 34.5	-59.2	173.0	43 34.5	-59.2	173.0	42 34.9	-59.2	173.2	41 35.3	-59.2	173.3	40 35.7	-59.2	173.4	39 36.1	-59.2	173.5	42
43	46 32.6	-59.1	172.6	44 35.9	-59.1	172.9	43 35.3	-59.2	173.3	42 35.3	-59.2	173.4	41 35.7	-59.2	173.5	39 36.5	-59.3	173.6	38 36.9	-59.3	173.7	37 37.2	-59.3	173.8	43
44	45 33.6	-59.1	172.8	44 36.9	-59.1	172.9	43 35.3	-59.2	173.3	42 35.3	-59.2	173.4	41 35.7	-59.2	173.5	39 36.9	-59.3	173.7	38 37.2	-59.2	173.8	37 37.6	-59.3		



8°, 352° 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

Table with columns for Dec., 0°, 1°, 2°, 3°, 4°, 5°, 6°, 7°, and Dec. Each column contains three sub-columns (Hc, d, Z) and rows of numerical data.

8°, 352° L.H.A.

LATITUDE SAME NAME AS DECLINATION

LATITUDE CONTRARY NAME TO DECLINATION

L.H.A. 8°, 352°

Dec.	0°			1°			2°			3°			4°			5°			6°			7°			Dec.
	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	
0	82 00.0	-3.7	90.0	81 56.3	-11.0	97.1	81 45.3	-17.9	103.9	81 27.6	-24.1	110.4	81 03.7	-29.5	116.4	80 34.5	-34.1	121.8	80 00.7	-37.9	126.6	79 23.1	-41.2	130.9	0
1	81 56.3	-11.0	97.1	81 45.3	-17.9	104.0	81 27.4	-24.0	110.5	81 03.5	-29.4	116.5	80 34.2	-34.0	121.9	80 00.2	-37.8	126.7	79 22.8	-41.1	131.0	78 41.9	-43.8	134.8	1
2	81 45.3	-17.9	104.1	81 27.4	-23.9	110.6	81 03.4	-29.3	116.6	80 34.1	-33.9	121.9	80 00.2	-37.8	126.8	79 22.4	-43.7	131.1	78 41.7	-43.8	134.8	77 58.1	-45.9	138.1	2
3	81 27.6	-23.9	110.6	81 03.5	-29.3	116.6	80 34.1	-33.9	122.0	80 00.2	-37.8	126.9	79 22.4	-43.7	131.2	78 41.5	-43.7	134.9	77 57.9	-45.8	138.2	77 12.2	-47.8	141.1	3
4	81 03.7	-29.2	116.7	80 34.2	-33.8	122.1	80 00.2	-37.7	126.9	79 22.5	-40.8	131.2	78 41.5	-43.6	135.0	77 57.8	-45.7	138.3	77 12.0	-47.6	141.3	76 24.4	-49.2	143.8	4
5	80 34.5	-33.8	122.2	80 00.4	-37.6	127.0	79 22.5	-40.8	131.2	78 41.7	-43.6	135.1	77 57.9	-45.7	138.4	76 24.4	-49.1	144.0	75 35.2	-50.4	146.3	74 44.7	-51.6	148.3	5
6	80 00.7	-37.6	127.1	79 22.8	-40.9	131.3	78 41.7	-43.6	135.1	77 58.1	-45.7	138.5	76 24.4	-49.1	144.0	75 35.2	-50.4	146.3	74 44.7	-51.5	148.3	73 53.1	-52.4	150.2	6
7	79 23.1	-40.8	131.4	78 41.9	-43.5	135.2	77 58.4	-45.7	138.6	77 12.4	-47.5	141.5	76 24.6	-49.1	144.1	75 35.3	-50.4	146.4	74 44.8	-51.5	148.4	73 53.2	-52.5	150.2	7
8	78 42.3	-43.5	135.3	77 58.4	-45.7	138.6	77 12.7	-47.5	141.6	76 24.9	-49.1	144.2	75 35.5	-50.3	146.5	74 44.9	-51.4	148.5	73 53.3	-52.4	150.3	73 00.7	-53.2	151.9	8
9	77 58.8	-45.6	138.7	77 12.7	-47.5	141.6	76 25.2	-49.0	144.3	75 35.8	-50.3	146.6	74 45.2	-51.5	148.6	73 53.5	-52.4	150.4	73 00.9	-53.2	152.0	72 07.5	-53.8	153.5	9
10	77 13.2	-47.5	141.7	76 25.2	-49.0	144.3	75 36.2	-50.4	146.7	74 45.5	-51.5	148.7	73 53.7	-52.3	150.5	73 01.1	-53.2	152.1	72 07.7	-53.9	153.6	71 13.7	-54.5	154.9	10
11	76 25.7	-49.1	144.4	75 36.6	-50.3	146.8	74 45.8	-51.4	148.8	73 54.0	-52.3	150.6	73 01.4	-53.2	152.2	72 07.9	-53.8	153.7	71 13.8	-54.4	155.0	70 19.2	-54.9	156.2	11
12	75 36.6	-50.3	146.8	74 46.3	-51.4	148.9	73 54.4	-52.3	150.7	73 01.7	-53.1	152.3	72 08.2	-53.8	153.8	71 14.1	-54.4	155.1	70 19.4	-54.9	156.3	69 24.3	-55.4	157.3	12
13	74 46.3	-51.4	148.9	73 54.4	-52.3	150.7	73 01.7	-53.1	152.3	72 08.6	-53.8	153.9	71 14.4	-54.4	155.2	70 19.7	-54.9	156.3	69 24.5	-55.3	157.4	68 28.9	-55.7	158.3	13
14	73 54.9	-52.3	150.8	73 02.1	-53.1	152.4	71 14.8	-54.4	155.3	70 20.0	-54.9	156.5	69 24.8	-55.3	157.5	68 29.2	-55.8	158.5	67 33.2	-56.1	159.4	66 36.9	-56.4	160.2	14
15	73 02.6	-53.1	152.6	72 09.0	-53.8	154.0	70 20.4	-54.9	156.6	69 25.1	-55.3	157.6	68 29.5	-55.7	158.7	67 33.7	-56.0	159.6	66 37.1	-56.4	160.3	65 40.5	-56.7	161.0	15
16	72 09.5	-53.8	154.1	71 15.2	-54.3	155.4	70 20.5	-54.9	156.6	69 25.5	-55.3	157.7	68 29.5	-55.7	158.7	67 33.7	-56.0	159.6	66 37.1	-56.4	160.4	65 40.5	-56.7	161.0	16
17	71 15.7	-54.3	155.5	70 20.5	-54.9	156.7	69 25.5	-55.3	157.8	68 30.2	-55.7	158.8	67 34.1	-56.0	159.7	66 37.7	-56.3	160.5	65 41.0	-56.6	161.3	64 44.1	-56.9	161.9	17
18	70 21.4	-54.9	156.8	69 26.0	-55.3	157.9	68 30.2	-55.7	158.8	67 34.5	-56.0	159.8	66 38.1	-56.4	160.6	65 41.4	-56.6	161.4	64 44.4	-56.9	162.0	63 47.2	-57.1	162.7	18
19	69 26.5	-55.3	158.0	68 30.7	-55.7	159.9	66 38.5	-56.3	160.7	65 41.7	-56.6	161.5	64 44.7	-56.8	162.1	63 47.5	-57.0	162.8	62 50.1	-57.2	163.4	61 52.6	-57.5	163.9	19
20	68 31.2	-55.7	159.1	67 35.5	-56.0	160.1	65 42.2	-56.6	161.6	64 45.1	-56.8	162.3	63 47.9	-57.1	162.9	62 50.5	-57.3	163.5	61 52.9	-57.5	164.0	60 55.1	-57.6	164.5	20
21	67 35.5	-56.0	160.1	66 39.5	-56.3	161.0	64 45.6	-56.8	162.4	63 48.5	-57.1	163.0	62 50.8	-57.2	163.6	61 53.6	-57.4	164.2	60 55.8	-57.6	164.7	59 57.8	-57.9	165.6	21
22	66 39.5	-56.3	161.0	64 46.1	-56.9	162.5	63 48.8	-57.1	163.1	62 51.2	-57.2	163.7	61 54.0	-57.4	164.3	60 56.2	-57.6	164.8	59 58.2	-57.7	165.3	58 00.1	-57.8	165.7	22
23	65 43.2	-56.6	161.8	63 49.2	-57.0	163.3	61 54.5	-57.4	164.5	60 56.6	-57.6	164.9	59 58.6	-57.7	165.4	59 00.5	-57.9	165.8	58 02.3	-58.0	166.2	57 03.9	-58.0	166.6	23
24	64 46.6	-56.8	162.6	62 52.2	-57.2	163.9	60 57.1	-57.6	165.1	59 59.0	-57.7	165.5	59 00.9	-57.9	165.9	58 02.6	-57.9	166.3	57 04.3	-58.1	166.7	56 05.9	-58.2	167.0	24
25	63 49.8	-57.1	163.4	61 55.0	-57.4	164.6	59 59.5	-57.7	165.6	59 01.3	-57.8	166.0	58 03.0	-57.9	166.4	57 04.7	-58.1	166.8	56 06.2	-58.2	167.2	55 07.7	-58.3	167.5	25
26	62 52.7	-57.2	164.1	60 57.1	-57.6	165.1	59 01.8	-57.8	166.2	58 03.5	-57.9	166.6	57 05.1	-58.1	166.9	56 06.6	-58.2	167.3	55 08.0	-58.2	167.6	54 09.4	-58.3	167.9	26
27	61 55.5	-57.4	164.7	59 00.0	-57.7	165.8	58 04.0	-58.0	166.7	57 05.5	-58.0	167.1	56 07.0	-58.1	167.4	55 08.4	-58.2	167.7	54 09.8	-58.4	168.0	53 11.4	-58.4	168.3	27
28	60 58.1	-57.5	165.3	58 02.3	-57.8	166.3	57 06.0	-58.0	167.2	56 07.5	-58.2	167.5	55 08.9	-58.3	167.8	54 10.2	-58.3	168.1	53 11.4	-58.4	168.4	52 12.6	-58.4	168.7	28
29	60 00.6	-57.7	165.9	57 06.6	-58.1	167.3	56 08.0	-58.2	167.6	55 09.3	-58.2	167.9	54 10.6	-58.3	168.2	53 11.9	-58.4	168.5	52 13.0	-58.4	168.8	51 14.2	-58.6	169.0	29
30	59 02.9	-57.9	166.4	56 08.5	-58.1	167.8	55 09.8	-58.2	168.1	54 11.1	-58.3	168.4	53 12.3	-58.4	168.6	52 13.5	-58.5	168.9	51 14.6	-58.6	169.1	50 15.6	-58.6	169.4	30
31	58 05.0	-57.9	167.0	55 10.4	-58.3	168.2	54 11.6	-58.3	168.5	53 12.8	-58.4	168.8	52 13.9	-58.5	169.0	51 15.0	-58.6	169.3	50 16.0	-58.6	169.5	49 17.0	-58.7	169.7	31
32	57 07.1	-58.0	167.4	54 12.1	-58.3	168.6	53 13.3	-58.4	168.9	52 14.4	-58.5	169.1	51 15.4	-58.6	169.4	50 16.4	-58.6	169.6	49 17.4	-58.7	169.8	48 18.3	-58.7	170.0	32
33	56 09.1	-58.2	167.9	53 13.8	-58.4	169.0	52 14.9	-58.5	169.3	51 15.9	-58.5	169.5	50 16.9	-58.6	169.7	49 17.8	-58.6	169.9	48 18.7	-58.6	170.1	47 19.6	-58.6	170.3	33
34	55 10.9	-58.2	168.3	52 15.4	-58.4	169.4	51 16.4	-58.5	169.6	50 17.4	-58.6	169.8	49 18.3	-58.7	170.1	48 19.2	-58.7	170.3	47 20.0	-58.7	170.4	46 20.8	-58.7	170.6	34
35	54 12.7	-58.3	168.8	51 17.0	-58.6	169.8	50 17.9	-58.6	170.0	49 18.8	-58.7	170.2	48 19.6	-58.7	170.4	47 20.5	-58.8	170.6	46 21.3	-58.8	170.7	45 22.0	-58.8	170.9	35
36	53 14.4	-58.4	169.2	50 18.4	-58.6	170.1	49 19.3	-58.6	170.3	48 20.1	-58.7	170.5	47 20.9	-58.7	170.7	46 21.7	-58.8	170.9	45 22.5	-58.9	171.0	44 23.2	-58.9	171.2	36
37	52 16.0	-58.5	169.5	49 19.8	-58.6	170.4	48 20.7	-58.7	170.6	47 21.4	-58.7	170.8	46 22.2	-58.8	171.0	45 22.9	-58.8	171.1	44 23.6	-58.9	171.3	43 24.3	-58.9	171.4	37
38	51 17.5	-58.5	169.9	48 21.0	-58.6	170.8	47 22.0	-58.7	170.9	46 22.5	-58.8	171.1	45 23.4	-58.8	171.3	44 24.1	-58.9	171.4	43 24.7	-58.9	171.6	42 24.5	-58.9	171.7	38
39	50 19.0	-58.6	170.2	47 22.5	-58.7	171.1	46 23.2	-58.8	171.2	45 23.9	-58.8	171.4	44 24.6	-58.9	171.5	43 25.2	-58.9	171.7	42 25.8	-58.9	171.8	41 26.4	-58.9	171.9	39
40	49 20.4	-58.6	170.6	46 23.8	-58.8	171.4	45 24.4	-58.8	171.5	44 25.1	-58.9	171.7	43 25.7	-58.9	171.8	42 26.3	-58.9	171.9	41 26.9	-58.9	172.1	40 27.4	-58.9	172.2	40
41	48 21.8	-58.7	170.9	45 25.0	-58.9	171.7	44 25.6	-58.9	171.8	43 26.8	-58.9	171.9	42 26.8	-58.9	172.1	41 27.8	-58.9	172.3	40 27.9	-58.9	172.3	39 28.9	-58.9	172.4	41
42	47 23.1	-58.8	171.2	44 26.1	-58.8	171.9	43 26.7	-58.9	172.1	41 27.8	-58.9	172.2	40 28.4	-59.1	172.4	39 28.9	-59.1	172.5	38 29.8	-59.1	172.5	37 30.4	-59.1	172.7	42
43	46 24.3	-58.8	171.5	43 27.3	-58.9	172.2	42 27.8	-58.9	172.3	41 28.9	-59.0	172.6	40 29.4	-59.0	172.7	39 29.8	-59.0	172.8	38 30.8	-59.0	172.8	37 31.2	-59.0	173.1	43
44	45 25.5	-58.8	171.8	41 29.4	-58.9	172.7	40 29.9	-59.0	172.8	39 30.4	-59.1	172.9	38 30.8	-59.0	173.0	37 31.2	-59.0	173.1	36 31.7	-59.1	173.2	35 32.1	-59.2	1	

9°, 351° 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

Table with columns for Dec., 0°, 1°, 2°, 3°, 4°, 5°, 6°, 7°, and Dec. Each column contains three sub-columns (Hc, d, Z) and rows of numerical data.

9°, 351° L.H.A.

LATITUDE SAME NAME AS DECLINATION

# LATITUDE CONTRARY NAME TO DECLINATION

L.H.A. 9°, 351°

Dec.	0°			1°			2°			3°			4°			5°			6°			7°			Dec.
	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	
0	81 00.0	-3.3	90.0	80 56.7	-9.8	96.3	80 46.9	-16.0	102.4	80 31.0	-21.8	108.3	80 09.5	-26.9	113.8	79 42.9	-31.4	118.8	79 11.8	-35.2	123.4	78 37.0	-38.6	127.6	0
1	80 56.7	-9.8	96.4	80 46.9	-16.0	102.5	80 30.9	-21.7	108.4	80 09.2	-26.8	113.8	79 42.6	-31.3	118.9	79 11.5	-35.2	123.5	78 36.6	-38.5	127.6	77 58.4	-41.3	131.4	1
2	80 46.9	-15.9	102.6	80 30.9	-21.7	108.4	80 09.2	-26.8	113.9	79 42.6	-31.3	119.0	79 11.3	-35.2	123.5	78 36.6	-38.4	127.7	77 58.4	-41.3	131.4	77 17.1	-43.6	134.7	2
3	80 31.0	-21.5	108.5	80 09.2	-26.6	114.0	79 42.4	-31.1	119.0	79 11.2	-35.0	123.6	78 36.2	-38.4	127.8	77 57.9	-41.2	131.5	77 16.8	-43.5	134.8	76 33.5	-45.6	137.8	3
4	80 09.5	-26.6	114.1	79 42.6	-31.1	119.1	79 11.3	-35.0	123.7	78 36.2	-38.3	127.8	77 57.8	-41.1	131.6	77 16.7	-43.5	134.9	76 33.3	-45.5	137.8	75 47.9	-47.3	140.5	4
5	79 42.9	-31.1	119.2	79 11.5	-34.9	123.8	78 36.3	-38.2	127.9	77 57.9	-41.1	131.6	77 16.7	-43.4	135.0	76 33.2	-45.4	137.9	75 47.8	-47.2	140.6	75 00.6	-48.6	142.9	5
6	79 11.8	-34.8	123.9	78 36.6	-38.2	128.0	77 58.1	-41.0	131.7	77 16.8	-43.3	135.0	76 33.3	-45.4	138.0	75 47.8	-47.2	140.7	75 00.6	-48.6	143.0	74 12.0	-49.9	145.2	6
7	78 37.0	-38.2	128.1	77 58.4	-41.0	131.8	77 17.1	-43.4	135.1	76 33.5	-45.4	138.1	75 47.9	-47.1	140.7	75 00.6	-48.5	143.1	74 12.0	-49.8	145.2	73 22.1	-50.9	147.1	7
8	77 58.8	-40.9	131.9	77 17.4	-43.3	135.2	76 33.7	-45.3	138.2	75 48.4	-47.1	140.8	75 00.8	-48.5	143.2	74 12.1	-49.8	145.3	73 22.2	-50.9	147.2	72 31.2	-51.8	149.0	8
9	77 17.9	-43.3	135.4	76 34.1	-45.3	138.3	75 48.4	-47.0	140.9	75 01.0	-48.4	143.3	74 12.3	-49.8	145.4	73 22.3	-50.8	147.3	72 31.3	-51.7	149.0	71 39.4	-52.5	150.6	9
10	76 34.6	-45.2	138.4	75 48.8	-47.0	141.1	75 01.4	-48.5	143.4	74 12.6	-49.8	145.5	73 22.5	-50.8	147.4	72 31.5	-51.7	149.1	71 39.6	-52.5	150.7	70 46.9	-53.2	152.1	10
11	75 49.4	-47.0	141.2	75 01.8	-48.4	143.5	74 12.9	-49.6	145.6	73 22.8	-50.7	147.5	72 31.7	-51.6	149.2	71 39.8	-52.5	150.8	70 47.1	-53.2	152.2	69 53.7	-53.8	153.5	11
12	75 02.4	-48.4	143.6	74 13.4	-49.7	145.8	73 23.3	-50.8	147.6	72 32.4	-51.7	149.3	71 40.1	-52.5	150.9	70 47.3	-53.2	152.3	69 53.9	-53.8	153.6	68 59.9	-54.4	154.7	12
13	74 14.0	-49.7	145.9	73 23.7	-50.7	147.8	72 32.5	-51.6	149.5	71 40.4	-52.4	151.0	70 47.6	-53.1	152.4	69 54.1	-53.7	153.7	69 00.1	-54.3	154.8	68 05.5	-54.7	155.9	13
14	73 24.3	-50.7	147.9	72 34.0	-51.6	149.6	71 40.9	-52.4	151.1	70 48.0	-53.1	152.5	69 54.5	-53.8	153.8	69 00.4	-54.3	154.9	68 05.8	-54.8	156.0	67 10.8	-55.2	157.0	14
15	72 33.6	-51.6	149.7	71 41.4	-52.4	151.3	70 48.5	-53.2	152.6	69 54.9	-53.8	153.9	69 00.7	-54.2	155.0	68 06.1	-54.7	156.1	67 11.0	-55.1	157.1	66 15.6	-55.5	158.0	15
16	71 42.0	-52.4	151.4	70 49.0	-53.1	152.8	69 55.3	-53.7	154.0	69 01.1	-54.2	155.2	68 06.5	-54.7	156.2	67 11.4	-55.2	157.2	66 15.9	-55.5	158.1	65 20.1	-55.9	158.9	16
17	70 49.6	-53.1	152.9	69 55.5	-53.7	154.2	69 01.6	-54.2	155.3	68 01.6	-54.2	156.3	67 11.8	-55.2	157.3	66 16.6	-55.5	158.2	65 20.4	-55.9	159.0	64 24.2	-56.1	159.7	17
18	69 56.5	-53.6	154.3	68 02.2	-54.2	155.4	68 07.4	-54.7	156.5	67 12.2	-55.1	157.4	66 16.6	-55.4	158.3	65 20.7	-55.8	159.1	64 24.5	-56.1	159.9	63 28.1	-56.4	160.5	18
19	69 02.9	-54.3	156.6	68 08.0	-54.7	156.6	67 12.7	-55.0	157.5	66 17.1	-55.4	158.4	65 21.2	-55.8	159.2	64 24.9	-56.1	160.0	63 28.4	-56.3	160.7	62 31.7	-56.6	161.3	19
20	68 08.6	-54.6	158.7	67 13.3	-55.1	157.7	66 17.7	-55.5	158.6	65 21.7	-55.8	159.4	64 25.4	-56.1	160.1	63 28.8	-56.3	160.8	62 32.1	-56.6	161.4	61 35.1	-56.8	162.0	20
21	67 14.0	-55.1	157.8	66 18.2	-55.4	158.7	65 22.2	-55.8	159.5	64 25.9	-56.1	160.2	63 29.3	-56.4	160.9	62 32.5	-56.6	161.5	61 35.5	-56.8	162.1	60 38.3	-57.0	162.2	21
22	66 18.9	-55.4	158.8	65 22.8	-55.8	159.6	64 26.4	-56.0	160.5	63 29.8	-56.3	161.0	62 32.9	-56.5	161.7	61 35.9	-56.8	162.2	60 38.7	-57.0	162.8	59 41.1	-57.2	163.3	22
23	65 23.5	-55.8	159.8	64 27.0	-56.0	160.5	63 30.4	-56.4	161.2	62 33.5	-56.6	161.8	61 36.4	-56.8	162.4	60 39.1	-57.0	162.9	59 41.7	-57.2	163.4	58 44.1	-57.3	163.9	23
24	64 27.7	-56.0	160.6	63 31.0	-56.3	161.3	62 34.0	-56.5	161.9	61 36.9	-56.8	162.5	60 39.6	-57.0	163.0	59 42.1	-57.1	163.5	58 44.5	-57.3	164.0	57 46.8	-57.5	164.5	24
25	63 31.7	-56.3	161.5	62 34.7	-56.6	162.1	61 37.5	-56.8	162.6	60 40.1	-56.8	163.2	59 42.6	-57.1	163.7	58 45.0	-57.3	164.1	57 47.2	-57.4	164.6	56 49.3	-57.6	165.0	25
26	62 35.4	-56.6	162.2	61 38.1	-56.7	162.8	60 40.7	-56.9	163.3	59 43.2	-57.1	163.8	58 45.5	-57.3	164.3	57 47.7	-57.5	164.7	56 49.8	-57.6	165.1	55 51.7	-57.7	165.5	26
27	61 38.8	-56.7	162.9	60 41.4	-57.0	163.5	59 43.8	-57.1	163.9	58 46.3	-57.1	164.3	57 48.2	-57.4	164.8	56 50.2	-57.5	165.2	55 52.2	-57.7	165.6	54 54.0	-57.8	166.0	27
28	60 42.1	-57.0	163.6	59 44.4	-57.1	164.1	58 46.7	-57.3	164.5	57 48.8	-57.5	165.0	56 50.8	-57.6	165.4	55 52.7	-57.7	165.7	54 54.5	-57.9	166.1	53 56.2	-57.9	166.4	28
29	59 45.1	-57.1	164.2	58 47.3	-57.3	164.7	57 49.4	-57.5	165.1	56 51.3	-57.5	165.5	55 53.2	-57.7	165.9	54 55.0	-57.8	166.2	53 56.6	-57.9	166.6	52 58.3	-58.1	166.9	29
30	58 48.0	-57.3	164.8	57 50.0	-57.4	165.3	56 51.9	-57.5	165.6	55 53.8	-57.7	166.0	54 55.5	-57.8	166.4	53 57.2	-58.0	166.7	52 58.7	-58.0	167.0	52 00.2	-58.1	167.3	30
31	57 50.7	-57.4	165.4	56 52.6	-57.6	165.8	55 54.4	-57.7	166.2	54 56.1	-57.8	166.5	53 57.7	-57.9	166.8	52 59.2	-58.0	167.1	52 00.7	-58.1	167.4	51 02.1	-58.1	167.7	31
32	56 53.3	-57.6	165.9	55 55.0	-57.6	166.3	54 56.7	-57.8	166.6	53 58.3	-57.9	167.0	52 59.8	-58.0	167.3	52 01.2	-58.0	167.6	51 02.6	-58.1	167.8	50 04.0	-58.3	168.1	32
33	55 55.7	-57.6	166.5	54 57.4	-57.8	166.8	53 58.9	-57.9	167.1	52 00.4	-58.0	167.4	51 03.7	-58.1	167.8	50 04.5	-58.2	168.0	49 06.2	-58.3	168.2	48 07.4	-58.4	168.3	33
34	54 58.1	-57.8	166.9	53 59.6	-57.9	167.3	53 01.0	-58.0	167.6	52 02.4	-58.1	167.8	51 03.7	-58.1	168.1	50 05.0	-58.2	168.3	49 06.2	-58.3	168.6	48 07.4	-58.4	168.8	34
35	54 00.3	-57.9	167.4	53 01.7	-58.0	167.7	52 03.0	-58.0	168.0	51 04.3	-58.1	168.2	50 05.6	-58.1	168.5	49 06.8	-58.2	168.8	48 07.9	-58.3	168.9	47 09.0	-58.5	169.1	35
36	53 02.4	-58.0	167.8	52 03.7	-58.0	168.1	51 05.0	-58.2	168.4	50 06.2	-58.2	168.6	49 07.3	-58.3	168.8	48 08.4	-58.3	169.1	47 09.5	-58.4	169.3	46 10.5	-58.5	169.5	36
37	52 04.4	-58.0	168.3	51 05.7	-58.2	168.5	50 06.8	-58.2	168.8	49 08.0	-58.3	169.0	48 09.0	-58.3	169.2	47 10.1	-58.5	169.4	46 11.1	-58.5	169.6	45 12.0	-58.5	169.8	37
38	51 06.4	-58.2	168.7	50 07.5	-58.2	168.9	49 08.6	-58.3	169.1	48 09.7	-58.4	169.4	47 10.7	-58.5	169.6	46 11.6	-58.4	169.7	45 12.6	-58.6	169.9	44 13.5	-58.6	170.1	38
39	50 08.2	-58.2	169.1	49 09.3	-58.3	169.3	48 10.3	-58.4	169.5	47 11.3	-58.4	169.7	46 12.2	-58.4	169.9	45 13.2	-58.6	170.1	44 14.0	-58.5	170.2	43 14.9	-58.6	170.4	39
40	49 10.0	-58.3	169.4	48 11.0	-58.4	169.6	47 11.9	-58.4	169.8	46 12.3	-58.5	170.0	45 13.8	-58.6	170.2	44 14.6	-58.6	170.4	43 15.5	-58.7	170.5	42 16.8	-58.7	170.7	40
41	48 11.7	-58.4	169.8	47 12.6	-58.4	170.0	46 13.5	-58.4	170.2	45 14.4	-58.5	170.3	44 15.2	-58.6	170.5	43 16.0	-58.6	170.7	42 16.8	-58.7	170.8	41 17.6	-58.8	171.0	41
42	47 13.3	-58.4	170.1	46 14.2	-58.5	170.3	45 15.1	-58.6	170.5	44 15.9	-58.6	170.7	43 16.6	-58.6	170.8	42 17.4	-58.7	171.0	41 18.1	-58.7	171.1	40 18.8	-58.7	171.2	42
43	46 14.9	-58.4	170.5	45 15.7	-58.5	170.6	44 16.5	-58.6	170.8	43 17.3	-58.6	171.0	42 18.0	-58.7	171.1	41 19.3	-58.7	171.4	40 19.4	-58.7	171.4	39 20.0	-58.8	171.5	43
44	45 16.5	-58.6	170.8	44 17.2	-58.6	171.0	43 17.9	-58.6	171.1	42 18.7	-58.7	171.2	41 19.3	-58.7	171.4	40 20.6	-58.7	171.7	39 21.3	-58.8	171.8	38 21.9	-58.8	1	

10°, 350° 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

Table with columns for Declination (Dec.) and Latitude (0° to 7°) and rows for Hour Angle (Hc, d, Z). Each cell contains numerical values representing astronomical data.

10°, 350° L.H.A.

LATITUDE SAME NAME AS DECLINATION

# LATITUDE CONTRARY NAME TO DECLINATION

**L.H.A. 10°, 350°**

Dec.	0°			1°			2°			3°			4°			5°			6°			7°			Dec.
	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	
0	80 00.0	-3.0	90.0	79 57.0	-8.9	95.7	79 48.2	-14.5	101.2	79 33.8	-19.8	106.5	79 14.2	-24.7	111.6	78 49.9	-29.1	116.3	78 21.2	-32.8	120.7	77 48.8	-36.1	124.7	0
1	79 57.0	-8.8	95.7	79 48.1	-14.4	101.3	79 33.7	-19.8	106.6	79 14.0	-24.6	111.7	78 49.5	-28.9	116.4	78 20.8	-32.7	120.7	77 48.4	-36.1	124.7	77 12.7	-39.0	128.3	1
2	79 48.2	-14.4	101.4	79 38.4	-19.7	106.7	79 13.9	-24.5	111.7	78 49.4	-28.9	116.5	78 20.6	-32.7	120.8	77 48.7	-36.0	124.8	77 12.3	-38.9	128.4	76 33.3	-41.4	131.7	2
3	79 33.8	-19.6	106.8	79 14.0	-24.5	111.8	78 49.4	-28.8	116.5	78 20.5	-32.6	120.9	77 47.9	-35.9	124.9	77 12.1	-38.8	128.5	76 33.4	-41.3	131.8	75 52.3	-43.5	134.7	3
4	79 14.2	-24.3	111.9	78 49.5	-28.7	116.6	78 20.6	-32.5	121.0	77 47.9	-35.8	125.0	77 12.0	-38.7	128.6	76 33.3	-41.3	131.8	75 52.1	-43.4	134.8	75 08.8	-45.3	137.5	4
5	78 49.9	-28.7	116.7	78 20.8	-32.4	121.1	77 48.1	-35.8	125.0	77 12.1	-38.7	128.7	76 33.3	-41.2	131.9	75 52.0	-43.3	134.9	75 08.7	-45.2	137.6	74 23.5	-46.8	140.0	5
6	78 21.2	-32.4	121.2	77 48.4	-35.7	125.2	77 12.3	-38.6	128.8	76 33.7	-41.1	132.0	75 52.1	-43.3	135.0	75 08.8	-45.1	137.8	74 23.5	-46.8	140.0	73 36.7	-48.1	142.3	6
7	77 48.8	-35.6	125.3	77 12.7	-38.6	128.9	76 33.7	-41.1	132.1	75 52.3	-43.1	135.1	75 08.8	-45.1	137.8	74 23.7	-46.7	140.2	73 36.7	-48.1	142.3	72 48.6	-49.3	144.3	7
8	77 13.2	-38.6	129.0	76 34.1	-41.0	132.2	75 52.6	-43.2	135.2	75 09.4	-45.0	138.2	74 23.9	-46.6	140.3	73 36.8	-48.0	142.4	72 48.6	-49.2	144.4	71 59.3	-50.3	146.2	8
9	76 34.6	-41.0	132.4	75 53.1	-43.2	135.3	75 09.4	-45.0	138.2	74 24.4	-46.5	140.5	73 37.4	-47.9	142.7	72 49.1	-49.2	144.6	71 59.6	-50.2	146.4	70 17.8	-51.9	149.5	9
10	75 53.6	-43.1	135.4	75 09.9	-45.0	138.1	74 24.4	-46.5	140.5	73 37.9	-48.0	142.8	72 49.5	-49.2	144.7	71 59.9	-50.2	146.5	71 09.4	-51.1	148.1	69 25.9	-52.6	151.0	10
11	75 10.5	-44.9	138.2	74 24.9	-46.5	140.6	73 38.4	-47.9	142.9	72 49.9	-49.1	144.9	71 09.7	-50.1	146.6	70 18.3	-51.9	149.7	69 26.1	-52.5	151.1	68 33.3	-53.2	152.3	11
12	74 25.6	-46.5	140.8	73 38.4	-47.9	142.9	72 49.9	-49.1	144.9	71 10.2	-51.0	148.4	70 18.7	-51.8	149.9	69 26.4	-52.5	151.2	68 33.6	-53.2	152.4	67 40.1	-53.7	153.6	12
13	73 39.1	-47.9	143.1	72 50.5	-49.0	145.0	72 00.8	-50.1	146.8	71 10.2	-51.0	148.4	70 18.7	-51.8	149.9	69 26.9	-52.6	151.3	68 33.9	-53.1	152.5	67 40.4	-53.7	153.7	13
14	72 51.2	-49.0	145.1	72 01.5	-50.1	146.9	71 10.7	-51.0	148.5	70 19.2	-51.8	150.5	69 27.4	-52.5	151.4	68 34.3	-53.1	152.7	67 40.8	-53.7	153.8	66 46.7	-54.2	154.7	14
15	72 02.2	-50.1	147.1	71 11.4	-51.0	148.7	70 19.7	-51.8	150.1	69 27.9	-52.4	151.6	68 34.9	-53.1	152.8	67 41.2	-53.6	153.9	66 47.1	-54.1	154.9	65 52.5	-54.5	155.9	15
16	71 12.1	-51.0	148.8	70 20.4	-51.8	150.3	69 27.9	-52.4	151.6	68 34.9	-53.1	152.8	67 41.2	-53.6	153.9	66 47.1	-54.1	155.1	65 53.0	-54.6	156.0	64 03.0	-56.3	158.6	16
17	70 21.1	-51.7	150.4	69 28.6	-52.4	151.7	68 35.5	-53.1	152.9	67 42.4	-53.6	154.2	66 48.0	-54.1	155.2	65 53.5	-54.6	156.2	64 58.4	-54.9	157.0	63 07.7	-56.5	158.8	17
18	69 29.4	-52.5	151.9	68 36.2	-53.1	153.1	67 42.4	-53.6	154.2	66 48.8	-54.1	155.4	65 54.0	-54.5	156.3	64 58.9	-54.9	157.2	64 03.5	-55.3	158.0	63 07.7	-56.5	158.8	18
19	68 36.9	-53.0	153.2	67 43.1	-53.6	154.3	66 48.8	-54.1	155.4	65 54.7	-54.5	156.4	64 59.5	-54.9	157.3	64 04.0	-55.3	158.2	63 08.7	-55.5	159.0	62 16.6	-56.8	160.6	19
20	67 43.9	-53.6	154.5	66 49.5	-54.1	155.5	65 54.7	-54.5	156.4	64 04.6	-55.2	158.2	63 09.4	-55.6	159.1	62 13.2	-55.8	159.8	61 17.4	-56.1	160.6	60 20.3	-56.6	161.2	20
21	66 50.3	-54.1	155.7	65 55.4	-54.5	156.6	65 00.2	-54.9	157.4	64 05.3	-55.2	158.4	62 13.8	-55.8	159.9	61 17.4	-56.1	160.6	60 21.3	-56.3	161.3	59 27.3	-56.8	162.3	21
22	65 56.2	-54.6	156.7	65 00.9	-54.9	157.6	64 05.3	-55.2	158.4	63 09.4	-55.6	159.1	62 13.8	-55.8	159.9	61 17.4	-56.1	160.6	60 21.3	-56.3	161.3	58 33.3	-57.1	163.4	22
23	65 01.7	-54.8	157.8	64 06.0	-55.2	158.5	63 10.1	-55.6	159.3	62 13.8	-55.8	159.9	61 17.4	-56.1	160.6	60 21.3	-56.3	161.3	59 27.3	-56.5	161.8	58 33.3	-57.1	163.4	23
24	64 06.9	-55.3	158.7	63 10.8	-55.5	159.4	62 14.5	-55.8	160.1	61 18.0	-56.1	160.7	60 21.3	-56.3	161.3	59 27.3	-56.5	161.8	58 33.3	-57.1	163.4	57 30.5	-56.8	162.8	24
25	63 11.6	-55.5	159.6	62 15.3	-55.8	160.2	61 18.7	-56.0	160.9	60 21.9	-56.3	161.4	59 25.0	-56.6	162.0	58 27.8	-56.7	162.5	57 30.5	-56.8	163.0	56 33.1	-57.1	163.4	25
26	62 16.1	-55.8	160.4	61 19.5	-56.1	161.0	60 22.7	-56.3	161.6	59 25.6	-56.5	162.1	58 28.4	-56.7	162.6	57 31.1	-56.9	163.1	56 33.6	-57.0	163.5	55 36.0	-57.2	164.0	26
27	61 20.3	-56.0	161.2	60 23.4	-56.3	161.8	59 26.4	-56.5	162.3	58 29.1	-56.7	162.8	57 31.7	-56.8	163.3	56 34.2	-57.0	163.7	55 36.6	-57.2	164.1	54 38.8	-57.3	164.5	27
28	60 24.3	-56.3	161.9	59 27.1	-56.4	162.4	58 29.9	-56.7	162.9	57 32.4	-56.8	163.4	56 34.9	-57.1	163.8	55 37.2	-57.2	164.2	54 39.4	-57.3	164.6	53 41.5	-57.5	165.0	28
29	59 28.0	-56.5	162.6	58 30.7	-56.7	163.1	57 33.2	-56.9	163.6	56 35.6	-57.1	164.0	55 37.8	-57.1	164.4	54 40.0	-57.3	164.8	53 42.1	-57.5	165.1	52 44.0	-57.6	165.5	29
30	58 31.5	-56.7	163.3	57 34.0	-56.9	163.7	56 36.3	-57.0	164.1	55 38.5	-57.1	164.5	54 40.7	-57.3	164.9	53 42.7	-57.5	165.3	52 44.6	-57.6	165.6	51 46.4	-57.6	165.9	30
31	57 34.8	-56.8	163.9	56 37.1	-57.0	164.3	55 39.3	-57.2	164.7	54 41.4	-57.3	165.1	53 43.4	-57.5	165.4	52 45.2	-57.5	165.8	51 47.0	-57.6	166.1	50 48.8	-57.8	166.4	31
32	56 38.0	-57.0	164.5	55 40.1	-57.1	164.9	54 42.1	-57.3	165.2	53 44.1	-57.4	165.5	52 45.9	-57.5	165.9	51 47.7	-57.7	166.2	50 49.4	-57.8	166.5	49 51.0	-57.9	166.8	32
33	55 41.0	-57.2	165.0	54 43.0	-57.3	165.4	53 44.8	-57.4	165.7	52 46.7	-57.6	166.1	51 48.4	-57.7	166.4	50 50.0	-57.7	166.7	49 51.6	-57.8	166.9	48 53.1	-57.9	167.2	33
34	54 43.8	-57.3	165.6	53 45.7	-57.4	165.9	52 47.4	-57.5	166.2	51 49.1	-57.6	166.5	50 50.7	-57.7	166.8	49 52.3	-57.9	167.1	48 53.8	-58.0	167.4	47 55.2	-58.0	167.6	34
35	53 46.5	-57.4	166.1	52 48.3	-57.6	166.4	51 49.9	-57.6	166.7	50 51.5	-57.8	167.0	49 53.0	-57.8	167.2	48 54.4	-57.9	167.5	47 55.8	-58.0	167.7	46 57.2	-58.1	168.0	35
36	52 49.1	-57.5	166.6	51 50.7	-57.6	166.9	50 52.3	-57.8	167.1	49 53.7	-57.8	167.4	48 55.2	-58.0	167.7	47 56.5	-58.0	167.9	46 57.8	-58.1	168.1	45 59.1	-58.2	168.3	36
37	51 51.6	-57.6	167.0	50 53.1	-57.7	167.3	49 54.5	-57.8	167.6	48 55.9	-57.9	167.8	47 57.2	-58.0	168.0	46 58.5	-58.1	168.3	45 59.7	-58.1	168.5	44 59.9	-58.2	168.7	37
38	50 54.0	-57.8	167.5	49 55.4	-57.9	167.7	48 56.7	-57.9	168.0	47 58.0	-58.0	168.2	46 59.2	-58.0	168.4	45 00.4	-58.1	168.6	44 02.7	-58.2	168.8	43 04.4	-58.3	169.4	38
39	49 56.2	-57.9	167.9	48 57.5	-57.9	168.1	47 58.8	-58.0	168.4	47 00.0	-58.1	168.6	46 01.2	-58.2	168.8	45 02.3	-58.2	169.0	44 03.4	-58.3	169.2	43 04.4	-58.3	169.4	39
40	48 58.4	-57.9	168.3	47 59.6	-58.0	168.5	47 00.8	-58.1	168.7	46 01.9	-58.1	168.9	45 03.0	-58.2	169.1	44 04.1	-58.3	169.3	43 05.1	-58.3	169.5	42 06.8	-58.4	169.7	40
41	48 00.5	-58.0	168.7	47 01.6	-58.0	168.9	46 02.7	-58.1	169.1	45 03.8	-58.2	169.3	44 04.8	-58.2	169.5	43 06.6	-58.3	169.8	42 07.5	-58.4	170.0	41 08.4	-58.5	170.3	41
42	47 02.5	-58.0	169.1	46 03.6	-58.1	169.3	45 04.6	-58.2	169.5	44 05.6	-58.2	169.6	43 07.4	-58.3	170.0	42 08.3	-58.4	170.1	41 09.1	-58.4	170.3	40 10.0	-58.5	170.6	42
43	46 04.5	-58.2	169.5	45 05.5	-58.2	169.6	44 06.4	-58.2	169.8	43 07.4	-58.3	170.0	42 08.3	-58.4	170.1	41 09.9	-58.4	170.4	40 10.7	-58.4	170.6	39 11.5	-58.5	170.9	43
44	45 06.3	-58.1	169.8	44 07.3	-58.3	170.0	43 08.2	-58.3	170.1	42 09.1	-58.4	170.3	41 09.9	-58.4	170.4	40 11.5	-58.5	170.8	39 12.5	-58.					

11°, 349° 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

Table with columns for Dec., 0°, 1°, 2°, 3°, 4°, 5°, 6°, 7°, and Dec. Each column contains three sub-columns (Hc, d, Z) and rows of numerical data representing celestial coordinates.

11°, 349° L.H.A.

LATITUDE SAME NAME AS DECLINATION

LATITUDE CONTRARY NAME TO DECLINATION

L.H.A. 11°, 349°

Main table with columns for Declination (Dec.), Hour Circle (Hc), Distance (d), and Zenith (Z) for latitudes from 0° to 90° and declinations from 0° to 7°.

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. 169°, 191°



12°, 348° 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

Table with columns for Dec., 0°, 1°, 2°, 3°, 4°, 5°, 6°, 7°, and Dec. Each column contains three sub-columns (Hc, d, Z) and rows of numerical data.

12°, 348° L.H.A.

LATITUDE SAME NAME AS DECLINATION

LATITUDE CONTRARY NAME TO DECLINATION

L.H.A. 12°, 348°

Dec.	0°			1°			2°			3°			4°			5°			6°			7°			Dec.
	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	
0	78 00.0	-2.5	90.0	77 57.5	-7.4	94.7	77 50.2	-12.3	99.3	77 38.2	-16.9	103.8	77 21.6	-21.2	108.2	77 00.8	-25.1	112.3	76 36.2	-28.8	116.2	76 08.0	-32.0	119.8	0
1	77 57.5	-7.3	94.8	77 50.1	-12.2	99.4	77 37.9	-16.7	103.9	77 21.3	-21.1	108.3	77 00.4	-25.0	112.4	76 35.7	-28.6	116.3	76 07.4	-31.9	119.9	75 36.0	-34.9	123.3	1
2	77 50.2	-12.0	99.5	77 37.9	-16.6	104.0	77 21.2	-21.0	108.4	77 00.3	-24.9	112.5	76 35.4	-28.5	116.4	76 07.1	-31.9	120.0	75 35.5	-34.7	123.4	75 01.1	-37.3	126.5	2
3	77 38.2	-16.6	104.1	77 21.3	-20.9	108.5	77 00.2	-24.8	112.6	76 35.3	-28.4	116.5	76 06.9	-31.7	120.1	75 35.2	-34.6	123.5	75 00.8	-37.2	126.6	74 23.8	-39.5	129.5	3
4	77 21.6	-20.8	108.6	77 00.4	-24.7	112.7	76 35.4	-28.3	116.6	76 06.9	-31.7	120.2	75 35.2	-34.6	123.6	75 00.6	-37.1	126.7	74 23.6	-39.5	129.6	73 44.1	-41.5	132.2	4
5	77 00.8	-24.6	112.8	76 35.7	-28.3	116.7	76 07.1	-31.6	120.3	75 35.2	-34.4	123.7	75 00.6	-37.0	126.8	74 23.5	-39.4	129.7	73 44.1	-41.4	132.3	73 02.8	-43.2	134.7	5
6	76 36.2	-28.2	116.8	76 07.4	-31.4	120.4	75 35.5	-34.4	123.8	75 00.8	-37.0	126.9	74 23.6	-39.3	129.8	73 44.1	-41.3	132.4	73 02.7	-43.1	134.8	72 19.6	-44.8	137.1	6
7	76 08.0	-31.4	120.6	75 36.0	-34.3	123.9	75 01.1	-36.9	127.0	74 23.8	-39.2	129.9	73 44.3	-41.3	132.5	73 02.8	-43.1	135.0	72 19.6	-44.7	137.2	71 34.8	-46.1	139.2	7
8	75 36.6	-34.2	124.1	75 01.7	-36.9	127.2	74 24.2	-39.1	130.0	73 44.6	-41.2	132.7	73 03.0	-43.0	135.1	72 19.7	-44.6	137.3	71 34.9	-46.0	139.3	70 48.7	-47.2	141.2	8
9	75 02.4	-36.8	127.3	74 24.8	-39.1	130.2	73 45.1	-41.1	132.8	73 03.4	-42.9	135.2	72 20.0	-44.5	137.4	71 35.1	-45.9	139.5	70 48.9	-47.2	141.3	70 01.5	-48.3	143.1	9
10	74 25.6	-39.0	130.3	73 45.7	-41.0	132.9	73 04.0	-42.9	135.3	72 20.5	-44.5	137.5	71 35.5	-45.9	139.6	70 49.2	-47.2	141.4	70 01.7	-48.2	143.2	69 13.2	-49.3	144.8	10
11	73 46.6	-41.1	133.1	73 04.7	-42.9	135.5	72 21.1	-44.5	137.7	71 36.0	-45.9	139.7	70 49.6	-47.1	141.6	70 02.0	-48.2	143.3	69 13.4	-49.2	144.9	68 23.9	-50.1	146.3	11
12	73 05.5	-42.8	135.6	72 21.8	-44.4	137.8	71 36.6	-45.8	139.9	70 50.1	-47.0	141.7	70 02.5	-48.2	143.4	69 13.8	-49.2	145.0	68 24.2	-50.0	146.5	67 33.8	-50.8	147.8	12
13	72 22.7	-44.3	138.0	71 37.4	-45.7	140.0	70 50.8	-47.0	141.9	70 03.1	-48.1	143.6	69 14.3	-49.1	145.1	68 24.6	-50.0	146.6	67 34.2	-50.8	147.9	66 43.0	-51.5	149.2	13
14	71 38.4	-45.8	140.2	70 51.7	-47.0	142.0	70 03.8	-48.1	143.7	69 15.0	-49.1	143.6	68 25.2	-50.0	146.7	67 34.6	-50.7	148.1	66 43.4	-51.5	149.3	65 51.5	-52.1	150.4	14
15	70 52.6	-46.9	142.2	70 04.7	-48.1	143.9	69 15.7	-49.0	145.4	68 25.9	-49.9	146.9	67 35.2	-50.7	148.2	66 43.9	-51.4	149.4	65 51.9	-52.0	150.6	64 59.4	-52.6	151.6	15
16	70 05.7	-48.1	144.1	69 16.6	-49.0	145.6	68 26.7	-49.9	147.0	67 36.0	-50.7	148.4	66 44.5	-51.3	149.6	65 52.5	-52.0	150.7	64 59.9	-52.6	151.8	64 06.8	-53.1	152.8	16
17	69 17.6	-48.9	145.8	68 27.7	-49.9	147.2	67 36.8	-50.7	148.5	66 45.3	-51.4	149.7	65 53.2	-52.0	150.9	65 00.5	-52.6	151.9	64 07.3	-53.1	152.9	63 13.7	-53.6	153.8	17
18	68 28.7	-49.9	147.4	67 37.7	-50.6	148.7	66 46.1	-51.3	149.9	65 53.9	-51.9	151.0	65 01.2	-52.6	152.1	64 07.9	-53.0	153.1	63 14.2	-53.5	154.0	62 20.1	-53.9	154.8	18
19	67 38.8	-50.6	148.9	66 47.1	-51.3	150.1	65 54.8	-51.9	151.2	65 02.0	-52.5	152.2	64 08.6	-53.0	153.2	63 14.9	-53.5	154.1	62 20.7	-53.9	154.9	61 26.2	-54.3	155.7	19
20	66 48.2	-51.3	150.3	65 55.8	-51.9	151.4	65 02.9	-52.5	152.4	64 09.5	-53.0	153.4	63 15.6	-53.4	154.3	62 21.4	-53.9	155.1	61 26.8	-54.3	155.9	60 31.9	-54.6	156.6	20
21	65 56.9	-51.9	151.6	65 03.9	-52.5	152.6	64 10.4	-53.0	153.5	63 16.5	-53.5	154.4	62 22.2	-53.9	155.3	61 27.5	-54.2	156.0	60 32.5	-54.6	156.8	59 37.3	-55.0	157.4	21
22	65 05.0	-52.4	152.8	64 11.4	-52.9	153.7	63 17.4	-53.4	154.6	62 23.0	-53.8	155.4	61 28.3	-54.2	156.2	60 33.3	-54.6	156.9	59 37.9	-54.9	157.6	58 42.3	-55.2	158.2	22
23	64 12.6	-53.0	153.9	63 18.5	-53.4	154.8	62 24.0	-53.8	155.6	61 29.2	-54.2	156.4	60 34.1	-54.6	157.1	59 38.7	-54.9	157.7	58 43.0	-55.1	158.4	57 47.1	-55.4	159.0	23
24	63 19.6	-53.4	155.0	62 25.1	-53.8	155.8	61 30.2	-54.2	156.5	60 35.0	-54.5	157.2	59 39.5	-54.8	157.9	58 43.8	-55.1	158.5	57 47.9	-55.5	159.1	56 51.7	-55.7	159.7	24
25	62 26.2	-53.8	156.0	61 31.3	-54.2	156.7	60 36.0	-54.5	157.4	59 40.5	-54.9	158.1	58 44.7	-55.2	158.7	57 48.7	-55.4	159.3	56 52.4	-55.6	159.8	55 56.0	-55.9	160.3	25
26	61 32.4	-54.1	156.9	60 37.1	-54.5	157.6	59 41.5	-54.8	158.3	58 45.6	-55.1	158.9	57 49.5	-55.3	159.5	56 53.3	-55.7	160.0	55 56.8	-55.9	160.5	55 00.1	-56.0	161.0	26
27	60 38.3	-54.5	157.8	59 42.6	-54.8	158.5	58 46.7	-55.2	159.1	57 50.5	-55.4	159.4	56 54.2	-55.6	160.2	55 57.6	-55.8	160.7	55 00.9	-56.0	161.1	54 04.1	-56.3	161.6	27
28	59 43.8	-54.9	158.6	58 47.8	-55.1	159.2	57 51.5	-55.3	159.8	56 55.1	-55.6	160.3	55 58.5	-55.8	160.8	55 01.8	-56.1	161.3	54 04.9	-56.3	161.8	53 07.8	-56.4	162.2	28
29	58 48.9	-55.0	159.4	57 52.7	-55.4	160.0	56 56.2	-55.6	160.5	55 59.5	-55.8	161.0	55 02.7	-56.0	161.5	54 05.7	-56.2	161.9	53 08.6	-56.4	162.4	52 11.4	-56.6	162.7	29
30	57 53.9	-55.4	160.2	56 57.3	-55.6	160.7	56 00.6	-55.8	161.2	55 03.7	-56.0	161.7	54 06.7	-56.2	162.1	53 09.5	-56.4	162.5	52 12.2	-56.6	162.9	51 14.8	-56.7	163.3	30
31	56 58.5	-55.6	160.9	56 01.7	-55.8	161.4	55 04.8	-56.0	161.9	54 07.7	-56.2	162.3	53 10.5	-56.4	162.7	52 13.1	-56.5	163.1	51 15.7	-56.7	163.5	50 18.1	-56.8	163.8	31
32	56 02.9	-55.7	161.6	55 05.9	-56.0	162.1	54 08.8	-56.2	162.5	53 11.5	-56.4	162.9	52 14.1	-56.6	163.3	51 16.6	-56.7	163.6	50 19.0	-56.9	164.0	49 21.3	-57.0	164.3	32
33	55 07.2	-56.0	162.2	54 09.9	-56.1	162.7	53 12.6	-56.4	163.1	52 15.1	-56.5	163.5	51 17.6	-56.7	163.8	50 19.9	-56.8	164.1	49 22.1	-56.9	164.5	48 24.2	-57.1	164.8	33
34	54 11.2	-56.2	162.9	53 13.8	-56.4	163.3	52 16.2	-56.5	163.6	51 18.6	-56.6	164.0	50 20.9	-56.8	164.3	49 23.1	-57.0	164.6	48 25.2	-57.1	164.9	47 27.2	-57.2	165.2	34
35	53 15.0	-56.4	163.5	52 17.4	-56.5	163.8	51 19.7	-56.6	164.2	50 22.0	-56.8	164.5	49 24.1	-56.9	164.8	48 26.1	-57.0	165.1	47 28.1	-57.1	165.4	46 30.0	-57.3	165.7	35
36	52 18.6	-56.5	164.0	51 20.9	-56.6	164.4	50 23.1	-56.8	164.7	49 25.2	-57.0	165.0	48 27.2	-57.1	165.3	47 29.1	-57.2	165.6	46 30.9	-57.2	165.9	45 32.7	-57.4	166.1	36
37	51 22.1	-56.6	164.6	50 24.3	-56.8	164.9	49 26.3	-56.9	165.2	48 28.2	-57.0	165.5	47 30.1	-57.1	165.8	46 31.9	-57.2	166.0	45 33.7	-57.4	166.3	44 35.3	-57.4	166.5	37
38	50 25.5	-56.8	165.1	49 27.5	-56.9	165.4	48 29.4	-57.1	165.7	47 31.2	-57.1	166.0	46 33.0	-57.3	166.2	45 34.7	-57.4	166.5	44 36.3	-57.5	166.7	43 37.9	-57.6	166.9	38
39	49 28.7	-56.9	165.6	48 30.6	-57.1	165.9	47 32.3	-57.1	166.2	46 34.1	-57.3	166.4	45 35.7	-57.3	166.6	44 37.3	-57.4	166.9	43 38.8	-57.5	167.1	42 40.3	-57.6	167.3	39
40	48 31.8	-57.0	166.1	47 33.5	-57.1	166.3	46 35.2	-57.2	166.6	45 36.8	-57.3	166.8	44 38.4	-57.5	167.1	43 39.9	-57.6	167.3	42 41.3	-57.6	167.5	41 42.7	-57.7	167.7	40
41	47 34.8	-57.1	166.5	46 36.4	-57.2	166.8	45 38.0	-57.4	167.0	44 39.5	-57.5	167.3	43 40.9	-57.5	167.5	42 42.3	-57.6	167.7	41 43.7	-57.7	167.9	40 45.0	-57.8	168.0	41
42	46 37.7	-57.3	167.0	45 39.2	-57.4	167.2	44 40.6	-57.4	167.5	43 42.0	-57.5	167.7	42 43.4	-57.6	167.9	41 44.7	-57.7	168.0	40 46.0	-57.8	168.2	39 47.2	-57.8	168.4	42
43	45 40.4	-57.3	167.4	44 41.8	-57.4	167.6	43 43.2	-57.5	167.9	42 44.5	-57.6	168.1	41 45.8	-57.7	168.2	40 47.0	-57.7	168.4	39 48.2	-57.8	168.6	38 49.4	-57.9	168.7	43
44	44 43.1	-57.4	167.8	43 44.4	-57.5	168.1	42 45.7	-57.6	168.2	41 46.9	-57.6	168.4	40 48.1	-57.7	168.6	39 49.3	-57.8	168.8	38 50.4	-57.8	168.9	37 51.5	-57.9	169.1	

13°, 347° 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

Table with columns for Dec., 0°, 1°, 2°, 3°, 4°, 5°, 6°, 7°, and Dec. Each column contains three sub-columns (Hc, d, Z) and rows of numerical data.

13°, 347° L.H.A.

LATITUDE SAME NAME AS DECLINATION

LATITUDE CONTRARY NAME TO DECLINATION

L.H.A. 13°, 347°

Dec.	0°			1°			2°			3°			4°			5°			6°			7°			Dec.
	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	
0	77 00.0	-2.3	90.0	76 57.7	-6.8	94.3	76 51.0	-11.4	98.6	76 39.8	-15.6	102.8	76 24.5	-19.7	106.8	76 05.2	-23.5	110.7	75 42.2	-27.0	114.4	75 15.8	-30.2	117.8	0
1	76 57.7	-6.7	94.4	76 50.9	-11.3	98.7	76 39.6	-15.5	102.9	76 24.2	-19.6	106.9	76 04.8	-23.4	110.8	75 41.7	-26.9	114.5	75 15.2	-30.1	117.9	74 45.6	-33.0	121.2	1
2	76 51.0	-11.2	98.8	76 39.6	-15.4	103.0	76 24.1	-19.5	107.0	76 04.6	-23.3	111.0	75 41.4	-26.8	114.6	75 14.8	-29.9	118.0	74 45.1	-32.9	121.3	74 12.2	-35.5	124.3	2
3	76 39.8	-15.3	103.1	76 24.2	-19.4	107.1	76 04.6	-23.2	111.0	75 41.4	-26.7	114.7	75 14.6	-29.8	118.1	74 44.8	-32.7	121.5	74 12.2	-35.4	124.4	73 37.1	-37.7	127.2	3
4	76 24.5	-19.3	107.3	76 04.8	-23.1	111.1	75 41.4	-26.6	114.8	75 14.6	-29.8	118.2	74 44.7	-32.7	121.5	74 12.0	-35.2	124.5	73 36.8	-37.6	127.3	72 59.4	-39.8	129.9	4
5	76 05.2	-23.0	111.3	75 41.7	-26.5	114.9	75 14.8	-29.7	118.4	74 44.8	-32.6	121.6	74 12.0	-35.2	124.6	73 36.7	-37.5	127.4	72 59.2	-39.7	130.0	72 19.6	-41.5	132.4	5
6	75 42.2	-26.4	115.0	75 15.2	-29.6	118.5	74 45.1	-32.5	121.7	74 12.2	-35.1	124.7	73 36.8	-37.4	127.5	72 59.2	-39.6	130.1	72 19.5	-41.4	132.5	71 38.1	-43.1	134.8	6
7	75 15.8	-29.5	118.6	74 45.6	-32.4	121.9	74 12.6	-35.0	124.9	73 37.1	-37.4	127.7	72 59.4	-39.5	130.3	72 19.6	-41.3	132.7	71 38.1	-43.0	134.9	70 55.0	-44.5	136.9	7
8	74 46.3	-32.3	122.0	74 13.2	-35.0	125.0	73 37.6	-37.3	127.8	72 59.7	-39.4	130.4	72 19.9	-41.3	132.8	71 38.3	-42.9	135.0	70 55.1	-44.4	137.0	70 10.5	-45.8	138.9	8
9	74 14.0	-34.9	125.1	73 38.2	-37.2	127.9	73 00.3	-39.3	130.5	72 20.3	-41.2	132.9	71 38.6	-42.8	135.1	70 55.4	-44.3	137.2	70 10.7	-45.7	139.1	69 24.7	-46.8	140.8	9
10	73 39.1	-37.2	128.1	73 01.0	-39.3	130.7	72 21.0	-41.2	133.1	71 39.1	-42.8	135.3	70 55.8	-44.3	137.3	70 11.0	-45.6	139.2	69 25.0	-45.9	140.9	68 37.9	-47.9	142.6	10
11	73 01.9	-39.2	130.8	72 21.7	-41.0	133.2	71 39.8	-42.7	135.4	70 56.3	-44.2	137.5	70 11.5	-45.6	139.3	69 25.4	-46.8	141.1	68 38.1	-47.8	142.7	67 50.0	-48.8	144.2	11
12	72 22.7	-41.0	133.4	71 40.7	-42.7	135.6	70 57.1	-44.2	137.6	70 12.1	-45.5	139.5	69 25.9	-46.7	141.2	68 38.6	-47.8	142.8	67 50.3	-48.7	142.8	67 01.2	-49.7	145.7	12
13	71 41.7	-42.7	135.7	70 58.0	-44.2	137.8	70 12.9	-45.5	139.6	69 26.6	-46.7	141.4	68 39.2	-47.8	143.0	67 50.8	-48.7	144.5	67 01.6	-49.6	145.8	66 11.5	-50.3	147.1	13
14	70 59.0	-44.1	137.9	70 13.8	-45.4	139.8	69 27.4	-46.6	141.5	68 39.9	-47.7	143.1	67 51.4	-48.6	144.6	67 02.1	-49.5	146.0	66 12.0	-50.3	147.3	65 21.2	-51.0	148.4	14
15	70 14.9	-45.4	140.0	69 28.4	-46.6	141.7	68 40.8	-47.7	143.3	67 52.2	-48.6	144.8	67 02.8	-49.5	146.1	66 12.6	-50.2	147.4	65 21.7	-50.9	148.6	64 30.8	-51.6	149.7	15
16	69 29.5	-46.5	141.9	68 41.8	-47.6	143.5	67 53.1	-48.5	144.9	67 03.6	-49.4	146.3	66 13.3	-50.2	147.6	65 22.4	-50.9	148.7	64 30.8	-51.6	149.8	63 38.6	-52.1	150.9	16
17	68 43.0	-47.6	143.9	67 54.8	-48.5	145.1	67 04.6	-49.4	146.5	66 14.2	-50.2	147.5	65 23.1	-50.8	148.9	64 31.5	-51.5	150.0	63 39.2	-52.0	151.0	62 46.5	-52.6	152.7	17
18	67 55.4	-48.5	145.3	67 05.7	-49.4	146.7	66 15.2	-50.2	147.9	65 24.0	-50.8	149.1	64 32.3	-51.5	150.2	63 40.0	-52.1	151.2	62 47.2	-52.6	152.1	61 53.9	-53.0	153.0	18
19	67 06.9	-49.4	146.8	66 16.3	-50.1	148.1	65 25.0	-50.8	149.3	64 33.2	-51.5	150.3	63 40.8	-52.0	151.3	62 47.9	-52.5	152.3	61 54.6	-53.0	153.1	61 00.9	-53.5	154.0	19
20	66 17.5	-50.1	148.3	65 26.2	-50.8	149.4	64 34.2	-51.4	150.5	63 41.7	-51.9	151.5	62 48.8	-52.5	152.4	61 55.4	-53.0	153.3	61 01.6	-53.0	153.1	60 07.4	-53.8	154.9	20
21	65 27.4	-50.7	149.6	64 35.4	-51.4	150.7	63 42.8	-51.9	151.7	62 49.8	-52.5	152.6	61 56.3	-53.0	153.5	61 02.4	-53.4	154.3	60 08.2	-53.8	155.1	59 13.6	-54.1	155.8	21
22	64 36.7	-51.4	150.9	63 44.0	-51.9	151.9	62 50.9	-52.5	152.8	61 57.3	-52.9	153.7	61 03.3	-53.3	154.5	60 09.0	-53.7	155.2	59 14.4	-54.1	155.9	58 19.5	-54.5	156.6	22
23	63 45.3	-51.9	152.1	62 52.1	-52.5	153.0	61 58.4	-52.9	153.9	61 04.4	-53.4	154.7	60 10.0	-53.8	155.4	59 15.3	-54.1	156.1	58 20.3	-54.5	156.8	57 25.0	-54.7	157.4	23
24	62 53.4	-52.4	153.2	61 59.6	-52.9	154.0	61 05.5	-53.3	154.8	60 11.0	-53.7	155.6	59 16.2	-54.0	156.3	58 21.2	-54.4	156.9	57 25.8	-54.7	157.6	56 30.3	-55.0	158.1	24
25	62 01.0	-52.9	154.2	61 06.7	-53.3	155.0	60 12.2	-53.7	155.8	59 17.3	-54.0	156.5	58 22.2	-54.4	157.1	57 26.8	-54.7	157.7	56 31.1	-54.9	158.3	55 35.3	-55.3	158.9	25
26	61 08.1	-53.3	155.2	60 13.4	-53.6	156.0	59 18.5	-54.0	156.7	58 23.3	-54.4	157.3	57 27.8	-54.7	157.9	56 32.1	-55.0	158.5	55 36.2	-55.3	159.0	54 40.0	-55.4	159.5	26
27	60 14.8	-53.7	156.2	59 19.8	-54.1	156.9	58 24.5	-54.4	157.5	57 28.9	-54.6	158.1	56 33.1	-54.9	158.7	55 37.1	-55.2	159.2	54 40.9	-55.4	159.7	53 44.6	-55.7	160.2	27
28	59 21.1	-54.0	157.1	58 25.7	-54.3	157.7	57 30.1	-54.6	158.3	56 34.3	-55.0	158.9	55 38.2	-55.2	159.4	54 41.9	-55.4	159.9	53 45.5	-55.6	160.4	52 48.9	-55.8	160.8	28
29	58 27.1	-54.3	157.9	57 31.4	-54.6	158.5	56 35.5	-54.9	159.1	55 39.3	-55.1	159.6	54 43.0	-55.4	160.1	53 46.5	-55.6	160.6	52 49.9	-55.9	161.0	51 53.1	-56.1	161.4	29
30	57 32.8	-54.6	158.7	56 36.8	-54.9	159.3	55 40.6	-55.2	159.8	54 44.2	-55.4	160.3	53 47.6	-55.6	160.7	52 50.9	-55.8	161.2	51 54.0	-56.0	161.6	50 57.0	-56.1	162.0	30
31	56 38.2	-54.9	159.5	55 41.9	-55.1	160.0	54 45.4	-55.3	160.5	53 48.8	-55.6	160.9	52 52.0	-55.8	161.4	51 55.1	-56.0	161.8	50 58.0	-56.1	162.2	49 00.9	-56.4	162.5	31
32	55 43.3	-55.1	160.2	54 46.8	-55.4	160.7	53 50.1	-55.6	161.1	52 53.2	-55.8	161.6	51 56.2	-55.9	162.0	50 59.1	-56.1	162.4	49 01.9	-56.1	162.7	48 04.5	-56.5	163.1	32
33	54 48.2	-55.4	160.9	53 51.4	-55.6	161.3	52 54.5	-55.8	161.8	51 57.4	-55.9	162.2	51 00.3	-56.2	162.6	50 03.0	-56.3	162.9	49 05.6	-56.5	163.3	48 08.0	-56.6	163.6	33
34	53 52.8	-55.5	161.6	52 55.8	-55.7	162.0	51 58.7	-55.9	162.4	51 01.5	-56.1	162.8	50 04.1	-56.3	163.1	49 06.7	-56.5	163.4	48 09.1	-56.6	163.8	47 11.4	-56.7	164.1	34
35	52 57.3	-55.8	162.2	52 00.1	-56.0	162.6	51 02.8	-56.1	163.0	50 05.4	-56.3	163.3	49 07.8	-56.4	163.6	48 10.2	-56.6	164.0	47 12.5	-56.6	164.3	46 14.7	-56.8	164.5	35
36	52 01.5	-55.9	162.8	51 04.1	-56.1	163.2	50 06.7	-56.3	163.5	49 09.1	-56.4	163.8	48 11.4	-56.6	164.2	47 13.6	-56.7	164.5	46 15.8	-56.8	164.7	45 17.9	-57.0	165.0	36
37	51 05.6	-56.1	163.4	50 08.0	-56.2	163.7	49 10.4	-56.4	164.1	48 12.7	-56.6	164.4	47 14.8	-56.6	164.7	46 16.9	-56.8	164.9	45 19.0	-57.0	165.2	44 20.9	-57.0	165.4	37
38	50 09.5	-56.3	163.9	49 11.8	-56.4	164.3	48 14.0	-56.6	164.6	47 16.1	-56.7	164.9	46 18.2	-56.9	165.1	45 20.1	-56.9	165.4	44 22.0	-57.0	165.6	43 23.9	-57.2	165.9	38
39	49 13.2	-56.4	164.5	48 15.4	-56.6	164.8	47 17.4	-56.6	165.1	46 19.4	-56.8	165.3	45 21.3	-56.9	165.6	44 23.2	-57.0	165.8	43 25.0	-57.1	166.1	42 26.7	-57.2	166.3	39
40	48 16.8	-56.5	165.0	47 18.8	-56.6	165.3	46 20.8	-56.8	165.5	45 22.6	-56.9	165.8	44 24.4	-57.0	166.0	43 26.2	-57.1	166.3	42 27.9	-57.1	166.5	41 29.5	-57.3	166.7	40
41	47 20.3	-56.7	165.5	46 22.2	-56.8	165.8	45 24.0	-56.9	166.0	44 25.7	-57.0	166.2	43 27.4	-57.1	166.5	42 29.1	-57.2	166.7	41 30.6	-57.3	166.9	40 32.2	-57.4	167.1	41
42	46 23.6	-56.7	166.0	45 25.4	-56.9	166.2	44 27.1	-57.0	166.5	43 28.7	-57.1	166.7	42 30.3	-57.2	166.9	41 31.9	-57.3	167.1	40 33.3	-57.3	167.3	39 34.8	-57.5	167.5	42
43	45 26.9	-56.9	166.4	44 28.5	-57.0	166.7	43 30.1	-57.1	166.9	42 31.8	-57.2	167.1	41 33.1	-57.3	167.3	40 34.6	-57.4	167.5	39 36.0	-57.4	167.7	38 37.3	-57.5	167.8	43
44	44 30.0	-57.0	166.9	43 31.5	-57.1	167.1	42 33.0	-57.2	167.3	41 34.4	-57.2	167.5	40 35.8	-57.3	167.7	39 37.2	-57.4	167.9	38 38.5	-57.5	168.0	37 39.8	-57.6	168.2	

14°, 346° 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

Table with columns for Declination (Dec.) and Latitude (0° to 7°) and rows for Hour Angle (Hc), Declination (d), and Zenith (Z). The table contains numerical data for each combination of latitude and hour angle.

14°, 346° L.H.A.

LATITUDE SAME NAME AS DECLINATION

LATITUDE CONTRARY NAME TO DECLINATION

L.H.A. 14°, 346°

Dec.	0°			1°			2°			3°			4°			5°			6°			7°			Dec.
	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	
0	76 00.0	-2.1	90.0	75 57.9	-6.4	94.0	75 51.6	-10.5	98.0	75 41.3	-14.6	101.9	75 27.0	-18.4	105.6	75 09.0	-22.1	109.3	74 47.5	-25.5	112.7	74 22.7	-28.6	116.0	0
1	75 57.9	-6.3	94.1	75 51.5	-10.4	98.1	75 41.1	-14.5	102.0	75 26.7	-18.4	105.7	75 08.6	-22.0	109.4	74 46.9	-25.3	112.9	74 22.0	-28.4	116.2	73 54.1	-31.3	119.3	1
2	75 51.6	-10.3	98.2	75 41.1	-14.4	102.1	75 26.6	-18.3	105.9	75 08.3	-21.8	109.5	74 46.6	-25.3	113.0	74 21.6	-28.4	119.4	73 53.6	-31.2	119.4	73 22.8	-33.8	122.3	2
3	75 41.3	-14.3	102.2	75 26.7	-18.1	106.0	75 08.3	-21.7	109.6	74 46.5	-25.2	113.1	74 21.3	-28.2	116.4	73 53.2	-31.0	119.5	73 22.4	-33.7	122.4	72 49.0	-36.0	125.1	3
4	75 27.0	-18.0	106.1	75 08.6	-21.7	109.7	74 46.6	-25.0	113.2	74 21.6	-28.1	116.5	73 53.1	-30.9	119.6	73 22.2	-33.6	122.5	72 48.7	-35.9	125.2	72 13.0	-38.1	127.8	4
5	75 09.0	-21.5	109.9	74 46.9	-24.9	113.3	74 21.6	-28.0	116.6	73 53.2	-30.8	119.7	73 22.2	-33.5	122.6	72 48.6	-35.8	125.4	72 12.8	-38.0	127.9	71 34.9	-39.9	130.3	5
6	74 47.5	-24.8	113.5	74 22.0	-27.9	116.8	73 53.6	-30.8	119.9	73 22.4	-33.4	122.8	72 48.7	-35.7	125.5	72 12.8	-37.9	128.0	71 34.8	-39.8	130.4	70 55.0	-41.5	132.6	6
7	74 22.7	-27.8	116.9	73 54.1	-30.6	120.0	73 22.8	-33.3	122.9	72 49.0	-35.6	125.6	72 13.0	-37.8	128.2	71 34.9	-39.7	130.5	70 55.0	-41.4	132.7	70 13.5	-42.9	134.8	7
8	73 54.9	-30.6	120.2	73 23.5	-33.2	123.1	72 49.5	-35.5	125.8	72 13.4	-37.7	128.3	71 35.2	-39.6	130.7	70 55.2	-41.3	132.9	70 13.6	-42.9	134.9	69 30.6	-44.3	136.8	8
9	73 24.3	-33.1	123.2	72 50.3	-35.5	125.9	72 14.0	-37.6	128.5	71 13.7	-39.5	130.8	70 55.6	-41.2	133.0	70 13.9	-42.8	135.1	69 30.7	-44.2	136.9	68 46.3	-45.5	138.7	9
10	72 51.2	-35.4	126.1	72 14.8	-37.5	128.6	71 36.4	-39.5	131.0	70 56.2	-41.2	133.2	70 14.4	-42.8	135.2	69 31.1	-44.1	137.1	68 46.5	-44.4	138.8	68 00.8	-46.6	140.5	10
11	72 15.8	-37.4	128.8	71 37.3	-39.4	131.1	70 56.9	-41.1	133.3	70 15.0	-42.7	135.3	69 31.6	-44.0	137.2	68 47.0	-45.4	139.0	68 01.1	-46.5	140.6	67 14.2	-47.5	142.1	11
12	71 38.4	-39.4	131.3	70 57.9	-41.1	133.5	70 15.8	-42.6	135.5	69 32.3	-44.0	137.4	68 47.6	-45.3	139.1	68 01.6	-46.4	140.8	67 14.6	-47.4	140.8	66 27.7	-48.4	143.7	12
13	70 59.0	-41.0	133.7	70 16.8	-42.5	135.7	69 33.2	-43.9	137.6	68 48.3	-45.2	139.3	68 02.3	-46.4	140.9	67 15.2	-47.4	142.4	66 27.2	-48.3	143.8	65 38.3	-49.1	145.1	13
14	70 18.0	-42.5	135.9	69 34.3	-43.9	137.7	68 49.3	-45.2	139.5	68 03.1	-46.3	141.1	67 15.9	-47.3	142.6	66 27.8	-48.3	144.0	65 38.9	-49.3	145.3	64 49.2	-49.9	146.5	14
15	69 35.5	-43.8	137.9	68 50.4	-45.1	139.7	68 04.1	-46.3	141.3	67 16.8	-47.3	142.8	66 28.6	-48.2	144.2	65 39.5	-49.0	145.5	64 49.8	-49.9	146.7	63 59.3	-50.5	147.8	15
16	68 51.7	-45.1	139.8	68 05.3	-46.3	141.5	67 17.8	-47.2	142.9	66 29.5	-48.2	144.3	65 40.4	-49.0	145.6	64 50.5	-49.8	146.8	63 59.9	-50.4	148.0	63 08.8	-51.1	149.0	16
17	68 06.6	-46.2	141.6	67 19.0	-47.2	143.1	66 30.6	-48.1	144.5	65 41.3	-48.9	145.8	64 51.4	-49.8	147.0	64 00.7	-50.4	148.1	63 09.5	-51.1	149.2	62 17.7	-51.7	150.2	17
18	67 20.4	-47.2	143.3	66 31.8	-48.1	144.7	65 42.5	-49.0	146.0	64 52.4	-49.7	147.2	64 01.6	-50.4	148.3	63 10.3	-51.0	149.3	62 18.4	-51.6	150.3	61 26.0	-52.1	151.2	18
19	66 33.2	-48.1	144.9	65 43.7	-48.9	146.2	64 53.5	-49.6	147.4	64 02.7	-50.4	148.5	63 11.2	-50.9	149.5	62 19.3	-51.6	150.5	61 26.8	-52.1	151.4	60 33.9	-52.5	152.3	19
20	65 45.1	-48.8	146.4	64 54.8	-49.6	147.6	64 03.9	-50.3	148.7	63 12.3	-50.9	149.5	62 20.3	-51.5	150.7	61 27.7	-52.0	151.6	60 34.7	-52.5	152.4	59 41.4	-53.0	153.2	20
21	64 56.3	-49.6	147.8	64 05.2	-50.3	148.9	63 13.6	-51.0	149.9	62 21.4	-51.5	150.9	61 28.8	-52.1	151.8	60 35.7	-52.5	152.6	59 42.2	-52.9	153.4	58 48.4	-53.4	154.1	21
22	64 06.7	-50.3	149.1	63 14.9	-50.9	150.1	62 22.6	-51.4	151.1	61 29.9	-52.0	152.0	60 36.7	-52.4	152.8	59 43.2	-52.9	153.6	58 49.3	-53.3	154.3	57 55.0	-53.6	155.0	22
23	63 16.4	-50.9	150.3	62 24.0	-51.4	151.3	61 31.2	-52.0	152.2	60 37.9	-52.4	153.0	59 44.3	-52.9	153.8	58 50.3	-53.3	154.5	57 56.0	-53.7	155.2	57 01.4	-54.0	155.9	23
24	62 25.5	-51.4	151.5	61 32.6	-52.0	152.4	60 39.2	-52.4	153.2	59 45.5	-52.9	154.0	58 51.4	-53.2	154.7	57 57.0	-53.6	155.4	57 02.3	-53.9	156.2	56 07.4	-54.3	156.6	24
25	61 34.1	-51.9	152.6	60 40.6	-52.3	153.4	59 46.8	-52.8	154.2	58 52.6	-53.2	154.9	57 58.2	-53.6	155.6	57 03.4	-54.0	156.2	56 08.4	-54.3	156.8	55 13.1	-54.6	157.4	25
26	60 42.2	-52.4	153.6	59 48.3	-52.8	154.4	58 54.0	-53.2	155.1	57 59.4	-53.6	155.8	57 04.6	-54.0	156.4	56 09.4	-54.2	157.0	55 14.1	-54.5	157.6	54 18.5	-54.8	158.1	26
27	59 49.8	-52.8	154.6	58 55.5	-53.2	155.3	58 00.8	-53.6	156.0	57 05.8	-53.9	156.6	56 10.6	-54.2	157.2	55 15.2	-54.5	157.8	54 19.6	-54.8	158.3	53 23.7	-55.0	158.8	27
28	58 57.0	-53.2	155.5	58 02.3	-53.6	156.2	57 07.2	-53.8	156.8	56 11.9	-54.1	157.4	55 16.4	-54.4	158.0	54 20.7	-54.7	158.5	53 24.8	-55.0	159.0	52 28.7	-55.3	159.5	28
29	58 03.8	-53.5	156.4	57 08.7	-53.8	157.0	56 13.4	-54.2	157.6	55 17.8	-54.5	158.2	54 22.0	-54.8	158.7	53 26.0	-55.0	159.2	52 29.8	-55.2	159.7	51 33.4	-55.4	160.1	29
30	57 10.3	-53.8	157.3	56 14.9	-54.2	157.8	55 19.2	-54.5	158.4	54 23.3	-54.7	158.9	53 27.2	-54.9	159.4	52 31.0	-55.2	159.9	51 34.6	-55.5	160.3	50 38.0	-55.6	160.7	30
31	56 16.5	-54.2	158.1	55 20.7	-54.4	158.6	54 24.7	-54.7	159.1	53 28.6	-55.0	159.6	52 32.3	-55.2	160.1	51 35.8	-55.4	160.5	50 39.1	-55.6	160.9	49 42.4	-55.8	161.3	31
32	55 22.3	-54.4	158.8	54 26.3	-54.7	159.3	53 30.0	-54.9	159.8	52 33.6	-55.1	160.3	51 37.1	-55.4	160.7	50 40.4	-55.6	161.1	49 43.5	-55.7	161.5	48 46.6	-56.0	161.9	32
33	54 27.9	-54.7	159.6	53 31.6	-54.9	160.0	52 35.1	-55.2	160.5	51 38.5	-55.4	160.9	50 41.7	-55.6	161.3	49 44.8	-55.8	161.7	48 47.8	-56.0	162.1	47 50.6	-56.1	162.4	33
34	53 33.2	-54.9	160.3	52 36.7	-55.2	160.7	51 39.9	-55.3	161.1	50 43.1	-55.5	161.5	49 46.1	-55.7	161.9	48 49.0	-55.9	162.3	47 51.8	-56.0	162.6	46 54.5	-56.2	162.9	34
35	52 38.3	-55.1	160.9	51 41.5	-55.3	161.4	50 44.6	-55.5	161.7	49 47.6	-55.8	162.1	48 50.4	-55.9	162.5	47 53.1	-56.0	162.8	46 55.8	-56.3	163.1	45 58.3	-56.4	163.5	35
36	51 43.2	-55.4	161.6	50 46.2	-55.6	162.0	49 49.1	-55.8	162.3	48 51.8	-55.9	162.7	47 54.5	-56.1	163.0	46 57.1	-56.2	163.3	45 59.5	-56.3	163.6	44 01.9	-56.5	163.9	36
37	50 47.8	-55.6	162.2	49 50.6	-55.7	162.6	48 53.3	-55.8	162.9	47 55.9	-56.0	163.2	46 58.4	-56.1	163.6	46 00.9	-56.4	163.8	45 03.2	-56.5	164.1	44 05.4	-56.6	164.4	37
38	49 52.3	-55.7	162.8	48 54.9	-55.8	163.1	47 57.5	-56.1	163.5	46 59.9	-56.2	163.8	46 02.3	-56.4	164.1	45 04.5	-56.4	164.3	44 06.7	-56.6	164.6	43 08.8	-56.7	164.9	38
39	48 56.6	-55.9	163.4	47 59.1	-56.1	163.7	47 01.4	-56.1	164.0	46 03.7	-56.3	164.3	45 05.9	-56.4	164.6	44 08.1	-56.6	164.8	43 10.1	-56.7	165.1	42 12.1	-56.8	165.3	39
40	48 00.7	-56.0	163.9	47 03.4	-56.1	164.2	46 05.3	-56.3	164.5	45 07.4	-56.4	164.8	44 09.5	-56.6	165.0	43 11.5	-56.7	165.3	42 13.4	-56.8	165.6	41 15.3	-56.9	165.7	40
41	47 04.7	-56.1	164.4	46 06.9	-56.3	164.7	45 09.0	-56.5	165.0	44 11.0	-56.6	165.2	43 12.9	-56.6	165.5	42 14.8	-56.8	165.7	41 16.6	-56.9	165.9	40 18.4	-57.0	166.1	41
42	46 08.6	-56.3	165.0	45 10.6	-56.4	165.2	44 12.5	-56.6	165.5	43 14.4	-56.6	165.7	42 16.3	-56.8	165.9	41 18.0	-56.8	166.2	40 19.7	-56.9	166.4	39 21.4	-57.1	166.6	42
43	45 12.3	-56.4	165.5	44 14.2	-56.6	165.7	43 16.0	-56.6	165.9	42 17.8	-56.8	166.2	41 19.5	-56.9	166.4	40 21.2	-57.0	166.6	39 22.8	-57.1	166.8	38 24.3	-57.1	167.0	43
44	44 15.9	-56.6	165.9	43 17.6	-56.6	166.2	42 19.4	-56.8	166.4	41 21.0	-56.8	166.6	40 22.6	-56.9	166.8	39 24.2	-57.1	167.0	38 25.7	-57.1	167.2	37 27.2	-57.2	167.3	

15°, 345° 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

Table with columns for Dec., 0°, 1°, 2°, 3°, 4°, 5°, 6°, 7°, and Dec. Each column contains three sub-columns (Hc, d, Z) with numerical values. The table is a grid of astronomical data.

15°, 345° L.H.A.

LATITUDE SAME NAME AS DECLINATION

LATITUDE CONTRARY NAME TO DECLINATION

L.H.A. 15°, 345°

Dec.	0°			1°			2°			3°			4°			5°			6°			7°			Dec.
	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	
0	75 00.0	-2.0	90.0	74 58.0	-5.9	93.7	74 52.2	-9.9	97.4	74 42.6	-13.7	101.1	74 29.3	-17.4	104.6	74 12.4	-20.8	108.0	73 52.2	-24.1	111.3	73 28.9	-27.2	114.5	0
1	74 58.0	-5.8	93.9	74 52.1	-9.8	97.6	74 42.3	-13.6	101.2	74 28.9	-17.3	104.7	74 11.9	-20.7	108.1	73 51.6	-24.0	111.4	73 28.1	-27.0	114.6	73 01.7	-29.7	117.6	1
2	74 52.2	-9.6	97.7	74 42.3	-13.4	101.3	74 28.7	-17.1	104.8	74 11.6	-20.5	108.3	73 51.2	-23.7	111.6	73 27.4	-26.8	114.7	73 01.1	-29.6	117.7	72 32.0	-32.3	120.5	2
3	74 42.6	-13.3	101.4	74 28.9	-17.0	105.0	74 11.6	-20.4	108.4	73 51.1	-23.7	111.7	73 27.4	-26.8	114.8	73 00.8	-29.5	117.8	72 31.5	-32.1	120.6	71 59.7	-34.4	123.3	3
4	74 29.3	-16.9	105.1	74 11.9	-20.3	108.5	73 51.2	-23.6	111.8	73 27.4	-26.6	114.9	73 00.6	-29.3	117.9	72 31.3	-32.0	120.7	71 59.4	-34.3	123.4	71 25.3	-36.5	125.9	4
5	74 12.4	-20.2	108.7	73 51.6	-23.5	112.0	73 27.6	-26.5	115.1	73 00.8	-29.3	118.1	72 31.3	-31.9	120.9	71 59.3	-34.2	123.5	71 25.1	-36.4	126.0	70 48.8	-38.3	128.3	5
6	73 52.2	-23.3	112.1	73 28.1	-26.4	115.2	73 01.1	-29.1	118.2	72 31.5	-31.8	121.0	71 59.4	-34.1	123.6	71 25.1	-36.3	126.1	70 48.7	-38.2	128.4	70 10.5	-40.0	130.6	6
7	73 28.9	-26.3	115.4	73 01.7	-29.0	118.3	72 32.0	-31.7	121.1	71 59.7	-33.9	123.8	71 25.3	-36.1	126.3	70 48.8	-38.1	128.6	70 10.5	-39.9	130.8	69 30.3	-41.4	132.8	7
8	73 02.6	-29.0	118.5	72 32.7	-31.6	121.3	72 00.3	-33.9	123.9	71 25.8	-36.1	126.4	70 49.2	-38.0	128.7	70 10.7	-39.7	130.9	69 30.6	-41.3	132.9	68 49.1	-42.9	134.8	8
9	72 33.6	-31.4	121.5	72 01.1	-33.8	124.1	71 26.4	-35.9	126.6	70 49.7	-37.9	128.9	70 11.2	-39.7	131.0	69 31.0	-41.4	133.1	68 49.3	-42.8	135.0	68 06.2	-44.1	136.7	9
10	72 02.2	-33.8	124.3	71 27.3	-35.9	126.7	70 50.5	-37.9	129.0	70 11.8	-39.6	131.2	69 31.5	-41.3	133.2	68 49.6	-42.6	135.1	68 06.5	-44.0	136.9	67 22.1	-45.2	138.5	10
11	71 28.4	-35.8	126.9	70 51.4	-37.7	129.2	70 12.6	-39.5	131.4	69 32.2	-41.2	133.4	68 50.2	-42.6	135.3	68 07.0	-44.0	137.0	67 22.5	-45.2	138.7	66 36.9	-46.2	140.2	11
12	70 52.6	-37.7	129.4	70 13.7	-39.5	131.5	69 33.1	-41.1	133.6	68 51.0	-42.5	135.4	68 07.6	-43.8	137.2	67 23.0	-45.0	138.8	66 37.3	-46.1	140.4	65 50.2	-47.2	141.8	12
13	70 14.9	-39.4	131.7	69 34.2	-41.0	133.7	68 52.0	-42.5	135.6	68 08.5	-43.8	137.4	67 23.8	-45.0	139.0	66 38.0	-46.1	140.5	65 51.2	-47.1	141.9	65 03.5	-48.0	143.3	13
14	69 35.5	-40.9	133.9	68 53.2	-42.4	135.8	68 09.5	-43.7	137.5	67 28.7	-44.9	139.2	66 38.8	-46.1	140.7	65 51.9	-47.0	142.1	65 04.1	-47.9	143.4	64 15.5	-48.7	144.7	14
15	68 54.6	-42.4	136.0	68 10.8	-43.7	137.7	67 25.8	-44.9	139.4	66 39.8	-46.0	140.9	65 52.7	-46.9	142.3	65 04.9	-47.9	143.6	64 16.2	-48.7	144.8	63 26.8	-49.5	146.0	15
16	68 12.2	-43.6	137.9	67 27.1	-44.8	139.5	66 40.9	-45.9	141.1	65 53.8	-46.9	142.5	65 05.8	-47.8	143.8	64 17.0	-48.6	145.0	63 27.5	-49.4	146.2	62 37.3	-50.0	147.2	16
17	67 28.6	-44.8	139.8	66 42.3	-45.9	141.3	65 55.0	-46.9	142.7	65 06.9	-47.8	144.0	64 18.0	-48.6	145.2	63 28.0	-49.4	146.3	62 38.1	-50.0	147.4	61 47.3	-50.7	148.4	17
18	66 43.8	-45.9	141.5	65 56.4	-46.8	142.9	65 08.1	-47.7	144.2	64 19.1	-48.5	145.4	63 29.4	-49.3	146.5	62 39.0	-49.9	147.6	61 48.1	-50.6	148.6	60 56.6	-51.2	149.5	18
19	65 57.9	-46.8	143.1	65 09.6	-47.7	144.4	64 20.4	-48.5	145.6	63 30.6	-49.3	146.7	62 40.1	-49.9	147.8	61 49.1	-50.6	148.8	60 57.5	-51.1	149.7	60 05.4	-51.6	150.6	19
20	65 11.1	-47.6	144.6	64 21.7	-48.5	145.8	63 31.9	-49.2	146.9	62 41.3	-49.8	148.0	61 50.2	-50.5	149.0	60 58.5	-51.1	149.9	60 06.4	-51.6	150.8	59 13.8	-52.1	151.6	20
21	64 23.5	-48.4	146.0	63 33.4	-49.2	147.1	62 42.7	-49.8	148.2	61 51.5	-50.5	149.3	60 59.7	-51.1	150.1	60 07.4	-51.5	151.0	59 14.8	-52.1	151.8	58 21.7	-52.5	152.6	21
22	63 35.1	-49.2	147.4	62 44.2	-49.8	148.4	61 52.9	-50.5	149.4	61 01.0	-51.0	150.2	60 08.6	-51.5	151.2	59 15.9	-52.1	152.0	58 22.7	-52.5	152.8	57 29.2	-52.9	153.5	22
23	62 45.9	-49.8	148.6	61 54.4	-50.4	149.6	61 02.4	-51.0	150.5	60 10.0	-51.5	151.4	59 17.1	-52.0	152.2	58 23.8	-52.4	153.0	57 30.2	-52.8	153.7	56 36.3	-53.2	154.4	23
24	61 56.1	-50.4	149.8	61 04.0	-51.0	150.7	60 11.4	-51.4	151.6	59 18.5	-52.0	152.4	58 25.1	-52.4	153.2	57 31.4	-52.8	153.9	56 37.4	-53.2	154.5	55 43.1	-53.6	155.2	24
25	61 05.7	-50.9	151.0	60 13.0	-51.4	151.8	59 20.0	-52.0	152.6	58 26.5	-52.4	153.4	57 32.7	-52.8	154.1	56 38.6	-53.2	154.7	55 44.2	-53.5	155.4	54 49.5	-53.8	156.0	25
26	60 14.8	-51.4	152.0	59 21.6	-51.9	152.8	58 28.0	-52.3	153.6	57 34.1	-52.7	154.3	56 39.9	-53.1	155.0	55 45.4	-53.5	155.6	54 50.7	-53.9	156.2	53 55.7	-54.2	156.7	26
27	59 23.4	-51.9	153.1	58 29.7	-52.3	153.8	57 35.7	-52.8	154.5	56 41.4	-53.1	155.2	55 46.8	-53.5	155.8	54 51.9	-53.8	156.4	53 56.8	-54.0	156.9	53 01.5	-54.3	157.5	27
28	58 31.5	-52.4	154.0	57 37.4	-52.8	154.7	56 42.9	-53.0	155.4	55 48.3	-53.5	156.0	54 53.3	-53.7	156.6	53 58.1	-54.0	157.1	53 02.8	-54.4	157.7	52 07.2	-54.7	158.2	28
29	57 39.1	-52.7	155.0	56 44.6	-53.0	155.6	55 49.9	-53.5	156.2	54 54.8	-53.7	156.8	53 59.6	-54.1	157.4	53 04.1	-54.3	157.9	52 08.4	-54.6	158.4	51 12.5	-54.8	158.8	29
30	56 46.4	-53.0	155.9	55 51.6	-53.4	156.5	54 56.4	-53.7	157.0	54 01.1	-54.0	157.6	53 05.5	-54.1	158.1	52 09.8	-54.6	158.6	51 13.8	-54.8	159.0	50 17.7	-55.0	159.5	30
31	55 53.4	-53.4	156.7	54 58.2	-53.7	157.3	54 02.7	-54.0	157.8	53 07.1	-54.3	158.3	52 11.2	-54.5	158.8	51 15.2	-54.8	159.2	50 19.0	-55.0	159.7	49 27.7	-55.2	160.1	31
32	55 00.0	-53.7	157.5	54 04.5	-54.0	158.0	53 08.7	-54.2	158.5	52 12.8	-54.5	159.0	51 16.7	-54.8	159.5	50 20.4	-55.0	159.9	49 24.0	-55.2	160.3	48 27.5	-55.4	160.7	32
33	54 06.3	-54.0	158.3	53 10.5	-54.3	158.8	52 14.5	-54.5	159.2	51 18.3	-54.8	159.7	50 21.9	-54.9	160.1	49 25.4	-55.1	160.5	48 28.8	-55.4	160.9	47 32.1	-55.6	161.2	33
34	53 12.3	-54.2	159.0	52 16.2	-54.5	159.5	51 20.0	-54.8	159.9	50 23.5	-54.9	160.3	49 27.0	-55.2	160.7	48 30.3	-55.4	161.1	47 33.4	-55.5	161.5	46 36.5	-55.7	161.8	34
35	52 18.1	-54.5	159.7	51 21.7	-54.7	160.2	50 25.2	-54.9	160.6	49 28.6	-55.2	161.0	48 31.8	-55.3	161.3	47 34.9	-55.5	161.7	46 37.9	-55.7	162.0	45 40.8	-55.9	162.3	35
36	51 23.6	-54.7	160.4	50 27.0	-54.9	160.8	49 30.3	-55.1	161.2	48 33.4	-55.3	161.6	47 36.5	-55.6	161.9	46 39.4	-55.7	162.2	45 42.2	-55.9	162.6	44 44.9	-56.0	162.9	36
37	50 28.9	-54.9	161.0	49 32.1	-55.1	161.4	48 35.2	-55.4	161.8	47 38.1	-55.5	162.1	46 40.9	-55.6	162.5	45 43.7	-55.8	162.8	44 46.3	-56.0	163.1	43 48.9	-56.1	163.4	37
38	49 34.0	-55.1	161.7	48 37.0	-55.3	162.0	47 39.8	-55.4	162.4	46 42.6	-55.6	162.7	45 45.3	-55.8	163.0	44 47.9	-56.0	163.3	43 50.3	-56.1	163.6	42 52.8	-56.3	163.8	38
39	48 38.9	-55.3	162.3	47 41.7	-55.5	162.6	46 44.4	-55.7	162.9	45 47.0	-55.8	163.2	44 49.5	-56.0	163.5	43 51.9	-56.1	163.8	42 54.2	-56.2	164.1	41 56.5	-56.4	164.3	39
40	47 43.6	-55.5	162.9	46 46.2	-55.6	163.2	45 48.7	-55.8	163.5	44 51.2	-56.0	163.8	43 53.5	-56.1	164.0	42 55.8	-56.2	164.3	41 58.0	-56.3	164.5	41 00.1	-56.4	164.8	40
41	46 48.1	-55.6	163.4	45 50.6	-55.8	163.7	44 52.9	-55.9	164.0	43 55.2	-56.0	164.3	42 57.4	-56.2	164.5	41 59.6	-56.3	164.8	41 01.7	-56.5	165.0	40 03.7	-56.6	165.2	41
42	45 52.5	-55.8	164.0	44 54.8	-55.9	164.2	43 57.0	-56.0	164.5	42 59.2	-56.2	164.8	42 01.2	-56.3	165.0	41 03.2	-56.5	165.2	40 05.2	-56.6	165.4	39 07.1	-56.7	165.6	42
43	44 56.7	-55.9	164.5	43 58.9	-56.1	164.7	43 01.0	-56.2	165.0	42 03.0	-56.3	165.2	41 04.9	-56.4	165.5	40 06.8	-56.5	165.7	39 08.7	-56.6	165.9	38 10.4	-56.7	166.1	43
44	44 00.8	-56.0	165.0	43 02.8	-56.1	165.2	42 04.8	-56.3	165.5	41 06.7	-56.4	165.7	40 08.5	-56.5	165.9	39 13.3	-56.7	166.1	38 12.0	-56.8	166.3	37 13.7	-56.8	166.5	



16°, 344° 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

Table with columns for Declination (Dec.) and Latitude (0° to 7°), and rows for Hour Angle (Hc) and Declination (d, Z). The table contains numerical data for each combination of latitude and hour angle.

16°, 344° L.H.A.

LATITUDE SAME NAME AS DECLINATION

LATITUDE CONTRARY NAME TO DECLINATION

L.H.A. 16°, 344°

Dec.	0°			1°			2°			3°			4°			5°			6°			7°			Dec.
	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	
0	74 00.0	-1.8	90.0	73 58.2	-5.6	93.5	73 52.7	-9.3	96.9	73 43.7	-12.9	100.3	73 31.2	-16.4	103.7	73 15.4	-19.7	106.9	72 56.4	-22.9	110.0	72 34.3	-25.7	113.0	0
1	73 58.2	-5.5	93.6	73 52.6	-9.2	97.1	73 43.4	-12.8	100.5	73 30.8	-16.3	103.8	73 14.8	-19.5	107.0	72 55.7	-22.7	110.2	72 33.5	-25.6	113.1	72 08.6	-28.4	116.0	1
2	73 52.7	-9.0	97.2	73 43.4	-12.6	100.6	73 30.6	-16.2	103.9	73 14.5	-19.4	107.2	72 55.3	-25.2	110.3	72 32.7	-28.1	113.4	72 07.9	-30.8	116.1	71 40.2	-33.7	118.8	2
3	73 43.7	-12.5	100.8	73 30.8	-16.0	104.1	73 14.5	-19.2	107.3	72 55.1	-22.4	110.4	72 32.7	-25.3	113.4	72 07.5	-28.1	116.3	71 39.7	-30.6	119.0	71 09.5	-33.0	121.5	3
4	73 31.2	-15.8	104.2	73 14.8	-19.1	107.5	72 55.3	-22.3	110.6	72 32.7	-25.2	113.6	72 07.4	-28.0	116.4	71 39.4	-30.4	119.1	71 09.1	-32.8	121.7	70 36.5	-35.0	124.1	4
5	73 15.4	-19.0	107.6	72 55.7	-22.2	110.7	72 33.0	-25.1	113.7	72 07.5	-27.8	116.5	71 39.4	-30.3	119.2	71 09.0	-32.7	121.8	70 36.3	-34.9	124.2	70 01.5	-36.8	126.5	5
6	72 56.4	-22.1	110.9	72 33.5	-24.9	113.9	72 07.9	-27.7	116.7	71 39.7	-30.2	119.4	71 09.1	-32.6	121.9	70 36.3	-34.8	124.4	70 01.4	-36.7	126.6	69 24.7	-38.5	128.8	6
7	72 34.3	-24.8	114.0	72 08.6	-27.6	116.9	71 40.2	-30.1	119.5	71 09.5	-32.5	122.1	70 36.5	-34.6	124.5	70 01.5	-36.6	126.8	69 24.7	-38.4	128.9	68 46.2	-40.1	130.9	7
8	72 09.5	-27.5	117.0	71 41.0	-30.0	119.7	71 10.1	-32.4	122.3	70 37.0	-34.5	124.7	70 01.9	-36.5	126.9	69 24.9	-38.3	129.1	68 46.3	-40.0	131.1	68 06.7	-41.4	133.0	8
9	71 42.0	-29.9	119.9	71 11.0	-32.3	122.4	70 37.7	-32.4	124.8	70 02.5	-36.4	127.1	69 25.4	-38.2	129.2	68 46.6	-39.8	131.2	68 06.3	-41.3	133.1	67 24.7	-42.8	134.9	9
10	71 12.1	-32.2	122.6	70 38.7	-34.3	125.0	70 03.3	-36.3	127.3	69 26.1	-38.1	129.4	68 47.2	-39.8	131.4	68 06.8	-41.3	133.3	67 25.0	-42.7	135.0	66 41.9	-43.9	136.7	10
11	70 39.9	-34.2	125.2	70 04.4	-36.2	127.5	69 27.0	-38.0	129.6	68 48.0	-39.7	131.6	68 07.4	-41.1	133.4	67 25.5	-42.5	135.2	66 42.3	-43.8	136.8	65 58.0	-44.9	138.4	11
12	70 05.7	-36.2	127.6	69 28.2	-38.0	129.8	68 49.0	-39.6	131.7	68 08.3	-41.1	133.6	67 26.3	-42.5	135.4	66 43.0	-43.8	137.0	65 58.5	-44.8	138.5	65 13.0	-45.9	140.0	12
13	69 29.5	-37.8	129.9	68 50.2	-39.5	131.9	68 09.4	-41.0	133.8	67 27.2	-42.4	135.5	66 43.8	-43.7	137.2	65 59.2	-44.8	138.7	65 13.7	-45.9	140.1	64 27.2	-46.9	141.5	13
14	68 51.7	-39.5	132.1	68 10.7	-41.0	134.0	67 28.4	-42.4	135.7	66 44.8	-43.6	137.4	66 00.1	-44.7	138.9	65 14.4	-45.7	140.3	64 27.8	-46.7	141.7	63 40.3	-47.6	142.9	14
15	68 12.2	-40.9	134.2	67 29.7	-42.2	135.9	66 46.0	-43.5	137.6	66 01.2	-44.6	139.1	65 15.4	-45.7	140.5	64 28.7	-46.7	141.8	63 41.1	-47.6	143.1	62 52.7	-48.3	144.3	15
16	67 31.3	-42.2	136.1	66 47.5	-43.5	137.8	66 02.5	-44.6	139.3	65 16.6	-45.7	140.7	64 29.7	-46.6	142.0	63 42.0	-47.5	143.3	62 53.5	-48.3	144.4	62 04.4	-49.0	145.5	16
17	66 49.1	-43.4	138.0	66 04.0	-44.6	139.5	65 17.9	-45.6	140.9	64 30.0	-46.6	142.2	63 43.1	-47.5	143.5	62 54.5	-48.2	144.6	62 05.2	-48.9	145.7	61 15.4	-49.7	146.8	17
18	66 05.7	-44.5	139.7	65 19.4	-45.5	141.1	64 32.3	-46.5	142.4	63 44.3	-47.3	143.7	62 55.6	-48.1	144.8	62 06.3	-48.9	145.9	61 16.3	-49.6	146.9	60 25.7	-50.2	147.9	18
19	65 21.2	-45.6	141.3	64 33.9	-46.5	142.6	63 45.8	-47.3	143.9	62 57.0	-48.2	145.0	62 07.5	-48.9	146.1	61 17.4	-49.6	147.1	60 26.7	-50.2	148.1	59 35.5	-50.7	149.0	19
20	64 35.6	-46.4	142.9	63 47.4	-47.3	144.1	62 58.5	-48.1	145.2	62 08.8	-48.8	146.3	61 18.6	-49.5	147.3	60 27.8	-50.1	148.3	59 36.5	-50.7	149.2	58 44.8	-51.3	150.1	20
21	63 49.2	-47.2	144.3	63 00.1	-48.0	145.5	62 10.4	-48.8	146.5	61 20.0	-49.4	147.6	60 29.1	-50.0	148.5	59 37.7	-50.6	149.4	58 45.8	-51.1	150.2	57 53.5	-51.6	151.0	21
22	63 02.0	-48.0	145.7	62 12.1	-48.8	146.8	61 21.6	-49.4	147.8	60 30.6	-50.0	148.7	59 39.1	-50.6	149.6	58 47.1	-51.1	150.5	57 54.7	-51.6	151.2	57 01.9	-52.1	152.0	22
23	62 14.0	-48.8	147.0	61 23.3	-49.3	148.0	60 32.2	-50.0	148.9	59 40.6	-50.6	149.8	58 48.5	-51.1	150.7	57 56.0	-51.6	151.5	57 03.1	-52.1	152.2	56 09.8	-52.4	152.9	23
24	61 25.2	-49.3	148.2	60 34.0	-50.0	149.2	59 42.2	-50.5	150.1	58 50.0	-51.0	150.9	57 57.4	-51.5	151.7	57 04.4	-52.0	152.4	56 11.0	-52.4	153.1	55 17.4	-52.8	153.8	24
25	60 35.9	-49.9	149.4	59 44.0	-50.5	150.3	58 51.7	-51.0	151.1	57 59.0	-51.5	151.9	57 05.9	-52.0	152.6	56 12.4	-52.4	153.3	55 18.6	-52.7	154.0	54 24.6	-53.1	154.6	25
26	59 46.0	-50.5	150.5	58 53.5	-51.0	151.3	58 00.7	-51.5	152.1	57 07.5	-52.0	152.8	56 13.9	-52.3	153.5	55 20.0	-52.7	154.2	54 25.9	-53.1	154.8	53 31.5	-53.4	155.4	26
27	58 55.5	-51.0	151.6	58 02.5	-51.4	152.4	57 09.2	-51.9	153.1	56 15.5	-52.3	153.8	55 21.6	-52.7	154.4	54 27.3	-53.0	155.0	53 32.8	-53.4	155.6	52 38.1	-53.7	156.1	27
28	58 04.5	-51.4	152.6	57 11.1	-51.9	153.3	56 17.3	-52.3	154.0	55 23.2	-52.6	154.6	54 28.9	-53.0	155.2	53 34.3	-53.4	155.8	52 39.4	-53.6	156.3	51 44.4	-54.0	156.9	28
29	57 13.1	-51.9	153.6	56 19.2	-52.2	154.2	55 25.0	-52.6	154.9	54 30.6	-53.0	155.5	53 35.9	-53.3	156.0	52 40.9	-53.6	156.6	51 45.8	-53.9	157.1	50 50.4	-54.2	157.6	29
30	56 21.2	-52.2	154.5	55 27.0	-52.7	155.1	54 32.4	-53.0	155.7	53 37.6	-53.3	156.3	52 42.6	-53.7	156.8	51 47.3	-53.9	157.3	50 51.9	-54.2	157.8	49 56.2	-54.4	158.2	30
31	55 29.0	-52.6	155.4	54 34.3	-52.9	155.9	53 39.4	-53.2	156.5	52 44.3	-53.6	157.0	51 48.9	-53.8	157.5	50 53.4	-54.1	158.0	49 57.7	-54.4	158.5	49 01.8	-54.6	158.9	31
32	54 36.4	-52.9	156.2	53 41.4	-53.3	156.7	52 46.2	-53.6	157.3	51 50.7	-53.8	157.8	50 55.1	-54.1	158.2	49 53.3	-54.4	158.7	49 03.3	-54.6	159.1	48 07.2	-54.9	159.5	32
33	53 43.5	-53.3	157.0	52 48.1	-53.5	157.5	51 52.6	-53.8	158.0	50 56.9	-54.1	158.5	50 01.0	-54.4	158.9	49 04.9	-54.6	159.3	48 08.7	-54.8	159.7	47 12.3	-55.0	160.1	33
34	52 50.2	-53.5	157.8	51 54.6	-53.8	158.3	50 58.8	-54.1	158.7	50 02.8	-54.3	159.2	49 06.6	-54.5	159.6	48 10.3	-54.7	160.0	47 13.9	-55.0	160.3	46 17.3	-55.1	160.7	34
35	51 56.7	-53.8	158.5	51 00.8	-54.1	159.0	50 04.7	-54.3	159.4	49 08.5	-54.6	159.8	48 12.1	-54.8	160.2	47 15.6	-55.0	160.6	46 18.9	-55.1	160.9	45 22.2	-55.4	161.3	35
36	51 02.9	-54.0	159.2	50 06.7	-54.3	159.7	49 10.4	-54.5	160.1	48 13.9	-54.7	160.4	47 17.3	-54.9	160.8	46 20.6	-55.1	161.2	45 23.8	-55.4	161.5	44 26.8	-55.5	161.8	36
37	50 08.9	-54.3	159.9	49 12.4	-54.5	160.3	48 15.9	-54.7	160.7	47 19.2	-54.9	161.1	46 22.4	-55.1	161.4	45 25.5	-55.3	161.7	44 28.4	-55.5	162.0	43 31.3	-55.6	162.3	37
38	49 14.6	-54.5	160.6	48 17.9	-54.7	160.9	47 21.2	-55.0	161.3	46 24.3	-55.1	161.6	45 27.3	-55.3	162.0	44 30.2	-55.5	162.3	43 33.0	-55.6	162.6	42 35.7	-55.8	162.8	38
39	48 20.1	-54.7	161.2	47 23.2	-54.9	161.6	46 26.2	-55.0	161.9	45 29.2	-55.3	162.2	44 32.0	-55.4	162.5	43 34.7	-55.6	162.8	42 37.4	-55.8	163.1	41 39.9	-55.9	163.3	39
40	47 25.4	-54.9	161.8	46 28.3	-55.0	162.1	45 31.2	-55.3	162.5	44 33.9	-55.4	162.8	43 36.6	-55.6	163.0	42 39.1	-55.7								

17°, 343° 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

Table with columns for Declination (Dec.) and Latitude (0° to 7°), and sub-columns for Hc, d, and Z. The table contains numerical data for each combination of latitude and declination.

17°, 343° L.H.A.

LATITUDE SAME NAME AS DECLINATION

LATITUDE CONTRARY NAME TO DECLINATION

L.H.A. 17°, 343°

Dec.	0°			1°			2°			3°			4°			5°			6°			7°			Dec.
	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	
0	73 00.0	-1.7	90.0	72 58.3	-5.3	93.3	72 53.2	-8.8	96.5	72 44.7	-12.2	99.7	72 33.0	-15.6	102.9	72 18.0	-18.6	105.9	72 00.1	-21.7	108.9	71 39.3	-24.6	111.7	0
1	72 58.3	-5.1	93.4	72 53.0	-8.6	96.7	72 44.4	-12.1	99.9	72 32.5	-15.4	103.0	72 17.4	-18.5	106.1	71 59.4	-21.6	109.0	71 38.4	-24.4	111.9	71 14.7	-27.0	114.6	1
2	72 53.2	-8.5	96.8	72 44.4	-11.9	100.0	72 32.3	-15.2	103.1	72 17.1	-18.3	106.2	71 58.9	-21.4	109.2	71 37.8	-24.2	112.0	71 14.0	-26.9	114.7	70 47.7	-29.4	117.3	2
3	72 44.7	-11.7	100.2	72 32.5	-15.1	103.3	72 17.1	-18.2	106.3	71 58.8	-21.3	109.3	71 37.5	-24.0	112.1	71 13.6	-26.8	114.9	70 47.1	-29.2	117.5	70 18.3	-31.6	120.0	3
4	72 33.0	-15.0	103.5	72 17.4	-18.0	106.5	71 58.9	-21.1	109.5	71 37.5	-23.9	112.3	71 13.5	-26.7	115.0	70 46.8	-29.1	117.6	70 17.9	-31.5	120.1	69 46.7	-33.6	122.5	4
5	72 18.0	-17.9	106.7	71 59.4	-21.0	109.6	71 37.8	-23.8	112.5	71 13.6	-26.5	115.2	70 46.8	-28.9	117.8	70 17.7	-31.3	120.2	69 46.4	-33.4	122.6	69 13.1	-35.4	124.8	5
6	72 00.1	-20.8	109.8	71 38.4	-23.7	112.6	71 14.0	-26.3	115.3	70 47.1	-28.8	117.9	70 17.9	-31.2	120.4	69 46.4	-33.3	122.7	69 13.0	-35.3	125.0	68 37.7	-37.1	127.1	6
7	71 39.3	-23.6	112.8	71 14.7	-26.2	115.5	70 47.7	-28.7	118.1	70 18.3	-31.1	120.6	69 46.7	-33.2	122.9	69 13.1	-35.1	125.1	68 37.7	-37.0	127.2	68 00.6	-38.7	129.2	7
8	71 15.7	-26.1	115.7	70 48.5	-28.6	118.3	70 19.0	-31.0	120.7	69 47.2	-33.0	123.1	69 13.5	-35.0	125.3	68 38.0	-36.9	127.4	68 00.7	-38.5	129.4	67 21.9	-40.1	131.2	8
9	70 49.6	-28.5	118.4	70 19.9	-30.8	120.9	69 48.0	-32.9	123.2	69 14.2	-35.0	125.5	68 38.5	-36.8	127.5	68 01.1	-38.5	129.5	67 22.2	-40.0	131.4	66 41.8	-41.4	133.1	9
10	70 21.1	-30.7	121.1	69 49.1	-32.9	123.4	69 15.1	-34.9	125.6	68 39.2	-36.6	127.7	68 01.7	-38.3	129.7	67 22.6	-39.9	131.5	66 42.2	-41.3	133.3	66 00.4	-42.6	134.9	10
11	69 50.4	-32.8	123.6	69 16.2	-34.7	125.8	68 40.2	-36.5	127.9	68 02.6	-38.3	129.9	67 23.4	-39.8	131.7	66 42.7	-41.2	133.5	66 00.9	-42.6	135.1	65 17.8	-43.7	136.6	11
12	69 17.6	-34.6	126.3	68 41.5	-36.5	128.1	68 03.7	-38.2	130.1	67 24.3	-39.7	131.9	66 43.6	-41.2	133.6	66 01.5	-42.4	135.3	65 18.3	-43.6	136.8	64 34.1	-44.7	138.2	12
13	68 43.0	-36.4	128.3	68 05.0	-38.1	130.3	67 25.5	-39.6	132.1	66 44.6	-41.0	133.8	66 02.4	-42.3	135.5	65 19.1	-43.5	137.0	64 34.7	-44.6	138.4	63 49.4	-45.7	139.8	13
14	68 06.6	-38.0	130.5	67 26.9	-39.5	132.3	66 45.9	-41.0	134.0	66 03.6	-42.3	135.6	65 20.1	-43.5	137.2	64 35.6	-44.6	138.6	63 50.1	-45.6	140.0	63 03.7	-46.5	141.2	14
15	67 28.6	-39.5	132.5	66 47.4	-40.9	134.2	66 04.9	-42.2	135.8	65 21.3	-43.4	137.4	64 36.6	-44.4	138.8	63 51.0	-45.5	140.1	63 04.5	-46.4	141.4	62 17.2	-47.2	142.6	15
16	66 49.1	-40.9	134.4	66 06.5	-42.2	136.1	65 22.7	-43.3	137.6	64 37.9	-44.4	139.0	63 52.2	-45.4	140.3	63 05.5	-46.3	141.6	62 18.1	-47.2	142.8	61 30.0	-48.0	143.9	16
17	66 08.2	-42.0	136.3	65 24.0	-43.2	137.8	64 39.4	-44.4	139.2	63 53.5	-45.3	140.6	63 06.8	-46.3	141.8	62 19.2	-47.1	143.0	61 30.9	-47.1	143.0	60 42.0	-48.6	145.2	17
18	65 26.2	-43.2	138.0	64 41.1	-44.3	139.4	63 55.0	-45.2	140.8	63 08.2	-46.3	142.0	62 20.5	-47.1	143.2	61 32.1	-47.9	144.3	60 43.0	-48.5	145.4	59 53.4	-49.3	146.3	18
19	64 43.0	-44.3	139.7	63 56.8	-45.3	141.0	63 09.8	-46.2	142.2	62 21.9	-47.0	143.4	61 33.4	-47.8	144.5	60 44.2	-48.5	145.6	59 54.5	-49.2	146.5	59 04.1	-49.8	147.5	19
20	63 58.7	-45.2	141.2	63 11.5	-46.1	142.5	62 23.6	-47.0	143.6	61 34.9	-47.7	144.7	60 45.6	-48.4	145.8	59 55.7	-49.1	146.7	59 05.3	-49.7	147.7	58 14.3	-50.3	148.5	20
21	63 13.5	-46.0	142.7	62 25.4	-46.9	143.9	61 36.6	-47.7	145.0	60 47.2	-48.4	146.0	59 57.2	-49.1	147.0	59 06.6	-49.7	147.9	58 15.6	-50.3	148.7	57 24.0	-50.7	149.6	21
22	62 27.5	-46.9	144.1	61 38.5	-47.6	145.2	60 48.9	-48.3	146.2	59 58.8	-49.0	147.2	59 08.1	-49.6	148.1	58 16.9	-50.2	149.0	57 25.3	-50.7	149.8	56 33.3	-51.3	150.5	22
23	61 40.6	-47.6	145.4	60 50.9	-48.3	146.5	60 00.6	-49.0	147.4	59 09.8	-49.6	148.3	58 18.5	-50.2	149.2	57 26.7	-50.7	150.0	56 34.6	-51.2	150.8	55 42.0	-51.6	151.5	23
24	60 53.0	-48.3	146.7	60 02.6	-49.0	147.7	59 11.6	-49.6	148.6	58 20.2	-50.1	149.5	57 28.3	-50.6	150.2	56 36.0	-51.1	151.0	55 43.4	-51.6	151.7	54 50.4	-52.0	152.4	24
25	60 04.7	-48.9	147.9	59 13.6	-49.5	148.8	58 22.0	-50.0	149.7	57 30.1	-50.6	150.5	56 37.7	-51.1	151.2	55 44.9	-51.5	151.9	54 51.8	-52.0	152.6	53 58.4	-52.4	153.2	25
26	59 15.8	-49.5	149.1	58 24.1	-50.1	149.9	57 32.0	-50.6	150.5	56 39.5	-51.1	151.4	55 46.6	-51.5	152.1	54 53.4	-52.0	152.8	53 59.8	-52.3	153.4	53 06.0	-52.7	154.0	26
27	58 26.3	-50.0	150.2	57 34.0	-50.5	150.9	56 41.4	-51.0	151.7	55 48.4	-51.5	152.4	54 55.1	-51.9	153.0	54 01.4	-52.2	153.7	53 07.5	-52.6	154.3	52 13.3	-52.9	154.8	27
28	57 36.3	-50.6	151.2	56 43.5	-51.0	151.9	55 50.4	-51.5	152.6	54 56.9	-51.8	153.3	54 03.2	-52.3	153.9	53 09.2	-52.6	154.5	52 14.9	-53.0	155.1	51 20.4	-53.3	155.6	28
29	56 45.7	-50.9	152.2	55 52.5	-51.4	152.9	54 58.9	-51.8	153.5	54 05.1	-52.2	154.2	53 10.9	-52.5	154.7	52 16.6	-53.0	155.3	51 21.9	-53.2	155.8	50 27.1	-53.5	156.3	29
30	55 54.8	-51.4	153.1	55 01.1	-51.8	153.8	54 07.1	-52.2	154.4	53 12.9	-52.6	155.0	52 18.4	-52.9	155.5	51 23.6	-53.2	156.1	50 28.7	-53.5	156.6	49 33.6	-53.8	157.0	30
31	55 03.4	-51.8	154.1	54 09.3	-52.2	154.7	53 14.9	-52.5	155.2	52 20.3	-52.8	155.8	51 25.5	-53.2	156.3	50 30.4	-53.4	156.8	49 35.2	-53.8	157.3	48 39.8	-54.0	157.7	31
32	54 11.6	-52.2	154.9	53 17.1	-52.5	155.5	52 22.4	-52.8	156.0	51 27.5	-53.2	156.6	50 32.3	-53.4	157.0	49 37.0	-53.7	157.5	48 41.4	-53.9	157.9	47 45.8	-54.3	158.4	32
33	53 19.4	-52.5	155.8	52 24.6	-52.8	156.3	51 29.6	-53.2	156.8	50 34.3	-53.4	157.3	49 38.9	-53.7	157.7	48 43.3	-54.0	158.2	47 47.5	-54.2	158.6	46 51.5	-54.4	159.0	33
34	52 26.9	-52.8	156.6	51 31.8	-53.1	157.1	50 36.4	-53.4	157.5	49 40.9	-53.7	158.0	48 45.2	-53.9	158.4	47 49.3	-54.2	158.8	46 53.3	-54.4	159.2	45 57.1	-54.6	159.6	34
35	51 34.1	-53.0	157.3	50 38.7	-53.4	157.8	49 43.0	-53.6	158.3	48 47.2	-53.9	158.7	47 51.3	-54.2	159.1	46 55.1	-54.3	159.5	45 58.9	-54.6	159.8	45 02.5	-54.8	160.2	35
36	50 41.1	-53.4	158.1	49 45.3	-53.6	158.5	48 49.4	-53.8	158.9	47 53.3	-54.1	159.3	46 57.1	-54.3	159.7	46 00.8	-54.6	160.1	45 04.3	-54.8	160.4	44 07.7	-55.0	160.8	36
37	49 47.7	-53.6	158.8	48 51.7	-53.9	159.2	47 55.5	-54.1	159.6	46 59.2	-54.3	160.0	46 02.8	-54.6	160.3	45 06.2	-54.7	160.7	44 09.5	-54.9	161.0	43 12.7	-55.1	161.3	37
38	48 54.1	-53.9	159.5	47 57.8	-54.1	159.9	47 01.4	-54.3	160.2	46 04.9	-54.5	160.6	45 08.2	-54.7	160.9	44 11.5	-54.9	161.3	43 14.6	-55.1	161.6	42 17.6	-55.2	161.9	38
39	48 00.2	-54.1	160.1	47 03.7	-54.3	160.5	46 07.1	-54.5	160.9	45 10.4	-54.7	161.2	44 13.5	-54.9	161.5	43 16.6	-55.1	161.8	42 19.5	-55.2	162.1	41 22.4	-55.4	162.4	39
40	47 06.1	-54.2	160.8	46 09.6	-54.5	161.1	45 12.6	-54.7	161.5	44 15.7	-54.9	161.8	43 18.6	-55.0	162.1	42 21.5	-55.2	162.4	41 24.3	-55.2	162.6	40 27.0	-55.6	162.9	40
41	46 11.9	-54.5	161.4	45 14.9	-54.6	161.7	44 17.9	-54.8	162.0	43 20.8	-55.0	162.3	42 23.6	-55.2	162.6	41 26.3	-55.4	162.9	40 28.9	-55.5	163.1	39 31.4	-55.6	163.4	41
42	45 17.4	-54.7	162.0	44 20.3	-54.9	162.3	43 23.1	-55.1	162.6	42 25.8	-55.2	162.9	41 28.4	-55.4	163.1	40 30.9	-55.5	163.4	39 33.4	-55.6	163.6	38 35.8	-55.8	163.9	42
43	44 22.7	-54.8	162.6	43 25.4	-55.0	162.9	42 28.0	-55.1	163.1	41 30.6	-55.3	163.4	40 33.0	-55.4	163.7	39 35.4	-55.6	163.9	38 37.8	-55.8	164.1	37 40.0	-55.9	164.3	43
44	43 27.9	-55.0	163.2	42 30.4	-55.1	163.4	41 32.9	-55.3	163.7	40 35.3	-55.5	163.9	39 37.6	-55.6	164.2	38 39.8	-55.7	164.4	37 42.0	-55.9	164.6	36 44.1	-55.9	164.8	

18°, 342° 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

Table with columns for Dec. (0 to 90) and latitude degrees (0° to 7°). Each cell contains three values: Hc, d, and Z. The table is a grid of 91 rows and 28 columns.

18°, 342° L.H.A.

LATITUDE SAME NAME AS DECLINATION

LATITUDE CONTRARY NAME TO DECLINATION

L.H.A. 18°, 342°

Dec.	0°			1°			2°			3°			4°			5°			6°			7°			Dec.
	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	
0	72	00.0	-1.6	71	58.4	-5.0	71	53.6	-8.3	71	45.6	-11.6	71	34.5	-14.7	71	20.4	-17.7	71	03.5	-20.7	70	43.7	-23.4	0
1	71	58.4	-4.8	71	53.4	-8.1	71	45.3	-11.4	71	34.5	-14.5	71	19.8	-17.6	71	02.7	-20.5	70	42.8	-23.3	70	20.3	-25.8	1
2	71	53.6	-8.0	71	45.3	-11.3	71	33.9	-14.4	71	19.5	-17.5	71	02.2	-20.3	70	42.2	-23.1	70	19.5	-25.6	69	54.5	-28.2	2
3	71	45.6	-11.1	71	34.0	-14.2	71	19.5	-17.3	70	41.9	-25.0	70	19.1	-22.8	69	53.9	-28.0	69	53.9	-28.0	69	26.3	-30.3	3
4	71	34.5	-14.1	71	19.4	-17.1	70	19.5	-17.1	70	19.5	-17.1	70	18.9	-23.0	69	53.6	-27.9	69	25.9	-30.1	68	56.8	-32.2	4
5	71	20.4	-16.9	71	02.7	-19.9	70	42.2	-22.7	70	19.1	-25.2	69	53.6	-27.7	69	25.7	-29.9	68	55.8	-32.2	68	23.8	-34.1	5
6	71	03.5	-19.8	70	42.8	-22.5	70	19.5	-25.0	69	53.9	-27.6	69	25.9	-29.9	68	55.8	-32.0	68	23.6	-33.9	67	49.7	-35.8	6
7	70	43.7	-22.3	70	20.3	-25.0	69	54.5	-27.5	69	26.3	-29.7	68	56.0	-31.8	68	23.8	-33.8	67	49.7	-35.7	67	13.9	-37.3	7
8	70	21.4	-24.9	69	55.3	-27.2	69	27.0	-29.5	68	56.6	-31.7	68	24.2	-33.7	67	50.0	-35.6	67	14.0	-37.2	66	36.6	-38.8	8
9	69	56.5	-27.1	69	28.1	-29.5	68	57.5	-29.8	68	24.9	-33.6	68	24.9	-33.6	67	50.5	-35.4	66	36.8	-38.7	65	57.8	-40.2	9
10	69	29.4	-29.4	68	58.6	-31.5	68	25.9	-33.5	67	51.3	-35.3	67	15.1	-37.0	66	37.3	-38.5	65	58.1	-40.0	65	17.6	-41.3	10
11	69	00.0	-31.3	68	27.1	-33.3	67	52.4	-35.2	66	16.0	-36.9	66	38.1	-38.4	65	58.8	-39.9	65	18.1	-41.2	64	36.3	-42.5	11
12	68	28.7	-33.3	67	53.8	-35.1	66	17.2	-36.8	66	39.1	-38.3	65	59.7	-39.9	65	18.9	-41.2	64	36.9	-42.4	63	53.8	-43.5	12
13	67	55.4	-35.0	66	18.7	-36.7	66	40.4	-38.2	66	40.4	-38.2	65	60.0	-41.0	64	37.7	-42.3	63	54.5	-43.4	63	10.3	-44.5	13
14	67	20.4	-36.6	66	42.0	-38.2	66	42.0	-38.2	66	42.0	-38.2	65	62.1	-41.0	64	38.8	-42.2	63	55.4	-43.3	62	25.8	-45.4	14
15	66	43.8	-38.1	66	03.8	-39.6	65	22.5	-40.9	64	40.4	-42.1	63	56.6	-43.3	63	12.1	-44.3	62	26.7	-45.3	61	40.4	-46.1	15
16	66	05.7	-39.5	65	24.2	-40.8	64	41.6	-42.0	63	58.0	-43.2	63	13.3	-44.2	62	27.8	-45.2	61	41.4	-46.1	60	54.3	-47.0	16
17	65	26.2	-40.8	64	43.4	-42.0	63	59.6	-43.1	63	14.8	-44.2	62	29.1	-45.1	61	42.6	-46.0	60	55.3	-46.0	60	07.3	-47.6	17
18	64	45.4	-41.9	64	01.4	-43.0	63	16.5	-44.1	62	30.6	-45.0	61	44.0	-46.0	60	56.6	-46.8	60	08.5	-47.6	59	19.7	-48.2	18
19	64	03.5	-43.0	63	18.4	-44.0	62	32.4	-45.0	61	45.6	-45.9	60	58.0	-46.7	60	09.8	-47.5	59	20.9	-48.2	58	51.5	-48.9	19
20	63	20.5	-44.0	62	34.4	-45.0	61	47.4	-45.8	60	59.7	-46.7	60	11.3	-47.4	59	22.3	-48.1	58	32.7	-48.8	57	42.6	-49.4	20
21	62	36.5	-44.9	61	49.4	-45.8	60	51.6	-46.6	60	13.0	-47.3	59	23.9	-48.1	58	34.2	-48.7	57	43.9	-49.3	56	53.2	-49.9	21
22	61	51.6	-45.7	61	03.6	-46.5	60	15.0	-47.3	59	25.7	-48.0	58	35.8	-48.6	57	45.5	-49.3	56	54.6	-49.8	56	03.3	-50.3	22
23	61	05.9	-46.5	60	17.1	-47.3	59	27.7	-48.0	58	37.7	-48.7	57	47.2	-49.3	56	56.2	-49.8	56	04.8	-50.3	55	13.0	-50.8	23
24	60	19.4	-47.2	59	29.9	-47.9	58	39.7	-48.6	57	49.0	-49.1	56	57.9	-49.7	56	06.1	-50.3	55	14.5	-50.8	54	22.2	-51.3	24
25	59	32.2	-47.9	58	41.9	-48.5	58	41.9	-48.5	57	51.1	-49.1	56	59.9	-49.7	55	16.1	-50.7	54	23.7	-51.1	53	30.9	-51.5	25
26	58	44.3	-48.5	57	53.4	-49.1	57	02.0	-49.7	56	10.2	-50.2	55	18.0	-50.7	54	25.4	-51.1	53	32.6	-51.6	52	39.4	-52.0	26
27	57	55.8	-49.1	57	04.3	-49.7	56	12.3	-50.1	55	20.3	-50.6	54	27.3	-51.0	53	34.3	-51.5	52	41.0	-51.9	51	47.4	-52.3	27
28	57	06.7	-49.6	56	14.6	-50.1	55	22.2	-50.6	54	29.4	-51.0	53	36.3	-51.5	52	42.8	-51.8	51	49.1	-52.2	50	55.2	-52.6	28
29	56	17.1	-50.1	55	24.5	-50.5	54	31.6	-51.0	53	38.4	-51.5	52	44.8	-51.8	51	51.0	-52.2	50	56.9	-52.5	49	02.6	-52.9	29
30	55	27.0	-50.5	54	34.0	-51.0	53	40.6	-51.4	52	46.9	-51.7	51	53.0	-52.2	50	58.8	-52.5	49	04.4	-52.8	48	09.7	-53.1	30
31	54	36.5	-50.9	53	43.0	-51.4	52	49.2	-51.7	51	55.2	-52.1	50	60.8	-52.4	49	10.6	-53.1	48	11.6	-53.1	47	16.6	-53.4	31
32	53	45.6	-51.4	52	51.6	-51.7	51	57.5	-52.1	50	62.1	-52.4	49	13.5	-53.0	48	13.5	-53.0	47	18.5	-53.4	46	23.2	-53.6	32
33	52	54.2	-51.7	51	59.9	-52.0	50	64.5	-52.4	49	15.6	-53.0	48	16.6	-53.0	47	20.5	-53.3	46	25.1	-53.5	45	29.6	-53.8	33
34	52	02.5	-52.0	50	17.9	-52.4	49	18.0	-52.7	48	22.6	-53.0	47	24.6	-53.2	46	27.2	-53.5	45	31.6	-53.8	44	35.8	-54.0	34
35	51	10.5	-52.4	50	15.2	-52.7	49	20.3	-53.0	48	24.9	-53.2	47	29.4	-53.5	46	33.7	-53.8	45	37.8	-54.0	44	41.8	-54.2	35
36	50	18.1	-52.6	49	22.8	-52.9	48	27.3	-53.2	47	31.7	-53.5	46	35.9	-53.8	45	39.9	-54.0	44	43.8	-54.2	43	47.6	-54.4	36
37	49	25.5	-53.0	48	29.9	-53.2	47	34.1	-53.5	46	38.1	-53.7	45	42.1	-53.9	44	45.9	-54.1	43	49.6	-54.4	42	53.2	-54.6	37
38	48	32.5	-53.2	47	36.7	-53.5	46	40.6	-53.7	45	44.5	-53.9	44	48.2	-54.2	43	51.8	-54.4	42	55.2	-54.5	41	58.6	-54.7	38
39	47	39.3	-53.4	46	43.2	-53.7	45	46.9	-53.9	44	50.6	-54.2	43	54.0	-54.3	42	57.4	-54.5	41	60.7	-54.7	40	63.9	-54.9	39
40	46	45.9	-53.7	45	49.5	-53.8	44	53.0	-54.1	43	56.4	-54.3	42	59.7	-54.5	41	62.0	-54.7	40	66.1	-54.9	39	69.1	-55.1	40
41	45	52.2	-53.8	44	55.7	-54.1	43	58.9	-54.2	42	62.1	-54.4	41	65.2	-54.6	40	68.2	-54.8	39	71.1	-55.0	38	73.9	-55.1	41
42	44	58.4	-54.1	44	01.6	-54.3	43	64.7	-54.5	42	67.2	-54.7	41	70.2	-54.8	40	73.3	-55.0	39	76.1	-55.1	37	78.8	-55.3	42
43	44	04.3	-54.3	43	07.3	-54.4	42	70.2	-54.6	41	73.0	-54.8	40	75.8	-55.0	39	78.8	-55.1	38	81.0	-55.1	36	83.5	-55.4	43
44	43	10.0	-54.4	42	12.9	-54.7	41	75.6	-54.8	40	78.4	-54.9	39	81.0	-55.1	38	83.3	-55.3	37	85.7	-55.4	35	88.2	-55.6	44
45	42	15.6	-54.6	41	18.2	-54.7	40	80.8	-54.9	39	83.3	-55.1	38	85.7	-55.2	37	88.2	-55.3	36	90.3	-55.4	34	92.8	-55.7	45
46	41	21.0	-54.7	40	23.5	-54.9	39	85.8	-55.1	38	88.2	-55.2	37	90.3	-55.4	36	92.8	-55.5	35	94.8	-55.6	33	97.3	-55.9	46
47	40	26.3	-55.0	39	28.6	-55.1	38	90.8	-55.2	37	93.0	-55.3	36	95.1	-55.4	35	97.3	-55.6	34	99.3	-55.7	32	101.8	-56.1	47
48	39	31.3	-55.0	38	33.3	-55.2	37	93.6	-55.3	36	95.7	-55.5	35	97.3	-55.6	34	99.3	-55.7	33	101.8	-55.8	31	104.3	-56.1	48
49	38	36.3	-55.2	37	38.3	-55.3	36	96.3	-55.4	35	98.4	-55.6	34	100.3	-55.7	33	101.8	-55.9	32	104.7	-56.1	30	106.8	-56.6	49
50	37	41.1	-55.3	36	43.4	-55.4	35	98.4	-55.5	34	100.3	-55.7	33	101.8	-55.9	32	103.0	-56.0	31	106.8	-56.2	29	109.3	-56.6	50
51	36	45.8	-55.4	35	47.6	-55.5	34	99.3	-55.6	33	101.8	-55.8	32	103.0	-56.0	31	104.7	-56.2	30	109.3	-56.4	28	111.8	-56.9	51
52	35	50.4	-55.5	34	52.1	-55.7	33	101.8	-55.7	32	103.0	-55.9	31	104.7	-56.2	30	106.8	-56.4	29	111.8	-56.6	27	114.3	-57.1	52
53	34	54.9	-55.6	33	56.4	-55.8	32	103.0	-55.8	31	104.7	-56.0	30	106.8	-56.3	29	109.3	-56.6	28	114.3	-56.7	26	116.8	-57.1	53
54	33	59.3	-55.8	32	60.7	-55.8	31	104.7	-55.9	30	106.8	-56.1	29	109.3	-56.4	28									

19°, 341° 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

Table with columns for Declination (Dec.) and Latitude (0° to 7°). Each latitude column contains three sub-columns for Hc, d, and Z. The table lists numerical values for each combination of latitude and declination.

19°, 341° L.H.A.

LATITUDE SAME NAME AS DECLINATION

LATITUDE CONTRARY NAME TO DECLINATION

L.H.A. 19°, 341°

Dec.	0°			1°			2°			3°			4°			5°			6°			7°			Dec.
	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	
0	71 00.0	-1.5	90.0	70 58.5	-4.7	92.9	70 53.9	-7.9	95.8	70 46.4	-11.0	98.6	70 35.9	-14.0	101.5	70 22.6	-16.9	104.2	70 06.5	-19.7	106.9	69 47.8	-22.4	109.5	0
1	70 58.5	-4.6	93.1	70 53.8	-7.8	96.0	70 46.0	-10.8	98.8	70 35.4	-13.8	101.6	70 21.9	-16.7	104.4	70 05.7	-19.6	107.0	69 46.8	-22.2	109.6	69 25.4	-24.8	112.2	1
2	70 53.9	-7.5	96.1	70 46.0	-10.6	99.0	70 35.2	-13.6	101.8	70 21.6	-16.4	104.7	70 05.2	-19.4	107.2	69 46.1	-22.0	109.8	69 24.6	-24.6	112.3	69 00.6	-26.9	114.7	2
3	70 46.4	-10.5	99.1	70 35.4	-13.5	101.9	70 21.6	-16.4	104.7	70 05.2	-19.4	107.2	69 45.8	-21.9	110.0	69 24.1	-24.4	112.5	69 00.0	-26.8	114.9	68 33.7	-29.1	117.2	3
4	70 35.9	-13.3	102.1	70 21.9	-16.2	104.9	70 05.2	-19.1	107.5	69 45.8	-21.7	110.1	69 23.9	-24.2	112.6	69 59.7	-26.7	115.0	68 33.2	-28.9	117.3	68 04.6	-31.0	119.6	4
5	70 22.6	-16.1	105.0	70 05.7	-18.9	107.7	69 46.1	-21.5	110.3	69 24.1	-24.1	112.8	68 59.7	-26.5	115.2	68 33.0	-28.7	117.5	68 04.3	-30.9	119.7	67 33.6	-32.8	121.8	5
6	70 06.5	-18.7	107.9	69 46.8	-21.4	110.5	69 24.6	-24.0	113.0	69 00.0	-26.3	115.4	68 33.2	-28.6	117.7	68 04.3	-30.7	119.9	67 33.4	-32.6	122.0	67 00.8	-34.6	124.0	6
7	69 47.8	-21.3	110.7	69 25.4	-23.8	113.2	69 00.6	-26.2	115.6	68 33.7	-28.5	117.9	68 04.6	-30.6	120.1	67 33.6	-32.5	122.2	67 00.8	-34.4	124.2	66 26.2	-36.0	126.1	7
8	69 26.5	-23.6	113.3	69 01.6	-26.1	115.7	68 34.4	-28.3	118.0	68 05.2	-30.4	120.2	67 34.0	-32.4	122.3	67 01.1	-34.3	124.3	66 26.4	-36.0	126.2	65 50.2	-37.6	128.0	8
9	69 02.9	-26.0	115.9	68 35.5	-28.2	118.2	68 06.1	-30.3	120.4	67 34.8	-32.3	122.5	67 01.6	-34.1	124.5	66 26.8	-35.8	126.4	65 50.4	-37.4	128.2	65 12.6	-38.9	129.9	9
10	68 36.9	-28.0	118.4	68 07.3	-30.1	120.6	67 35.8	-32.1	122.7	67 02.5	-34.0	124.7	66 27.5	-35.7	126.6	65 51.0	-37.3	128.4	65 13.0	-38.7	130.1	64 33.7	-40.1	131.7	10
11	68 08.9	-30.1	120.8	67 37.2	-32.1	122.9	67 03.7	-33.9	124.9	66 28.5	-35.6	126.8	65 51.8	-37.1	128.6	65 13.7	-38.7	130.3	64 34.3	-40.1	131.9	63 53.6	-41.3	133.4	11
12	67 38.8	-31.9	123.1	67 05.1	-33.7	125.1	66 29.8	-35.5	127.0	66 00.6	-37.0	128.8	65 14.7	-38.6	130.5	64 35.0	-39.9	132.1	63 54.2	-41.1	133.6	63 12.3	-42.4	135.1	12
13	67 06.9	-33.7	125.3	66 31.4	-35.4	127.2	65 54.3	-36.9	129.0	65 17.4	-38.4	130.9	64 37.4	-39.7	132.5	64 36.1	-39.8	132.3	63 55.1	-41.0	133.8	63 13.1	-42.3	135.3	13
14	66 33.2	-35.3	127.4	65 56.0	-36.9	129.2	65 17.4	-38.4	130.9	64 37.4	-39.7	132.5	64 36.3	-39.7	132.3	63 56.3	-41.0	134.0	63 14.1	-42.2	135.5	62 30.8	-43.2	136.8	14
15	65 57.9	-36.7	129.5	65 19.1	-38.2	131.1	64 39.0	-39.6	132.7	63 57.7	-40.9	134.2	63 15.3	-42.0	135.7	62 31.9	-43.1	137.0	61 47.6	-44.2	138.3	61 02.4	-45.1	139.5	15
16	65 21.2	-38.2	131.4	64 40.9	-39.6	133.0	63 59.4	-40.8	134.5	63 16.8	-41.9	135.9	62 33.3	-43.1	137.2	61 48.8	-44.1	138.5	61 03.4	-45.0	139.7	60 17.3	-45.9	140.8	16
17	64 43.0	-39.5	133.2	64 01.3	-40.7	134.7	63 18.6	-41.9	136.1	62 34.4	-43.0	137.5	61 50.2	-44.9	138.7	61 04.7	-44.9	139.9	60 18.4	-45.8	141.1	59 31.4	-46.6	142.1	17
18	64 03.5	-40.6	134.9	63 20.6	-41.8	136.4	62 36.7	-42.9	137.7	61 51.9	-43.9	139.0	61 06.2	-44.8	140.2	60 19.8	-45.7	141.3	59 32.6	-46.5	142.3	58 44.8	-47.3	143.4	18
19	63 22.9	-41.8	136.6	62 38.8	-42.9	137.9	61 53.8	-43.9	139.2	61 08.0	-44.8	140.4	60 21.4	-45.7	141.5	59 34.1	-46.5	142.6	58 46.1	-47.2	143.6	57 57.5	-47.9	144.5	19
20	62 41.1	-42.8	138.2	61 55.9	-43.7	139.4	61 09.9	-44.7	140.6	60 23.2	-45.6	141.7	59 35.7	-46.3	142.8	58 47.4	-47.1	143.8	57 58.9	-47.8	144.8	57 09.6	-48.4	145.7	20
21	61 58.3	-43.7	139.7	61 12.2	-44.7	140.9	60 25.2	-45.5	142.0	59 37.6	-46.3	143.0	58 49.4	-47.1	144.0	58 00.5	-47.8	145.0	57 11.1	-48.4	145.9	56 21.2	-49.0	146.7	21
22	61 14.6	-44.6	141.1	60 27.5	-45.5	142.2	59 39.7	-46.2	143.3	58 51.3	-47.0	144.3	58 02.3	-47.7	145.2	57 12.7	-48.3	146.1	56 22.7	-48.9	147.0	55 32.2	-49.5	147.8	22
23	60 30.0	-45.4	142.5	59 42.0	-46.2	143.6	58 53.5	-47.0	144.5	58 04.3	-47.6	145.5	57 14.6	-48.3	146.4	56 24.4	-48.9	147.2	55 33.8	-49.5	148.0	54 42.7	-50.0	148.8	23
24	59 44.6	-46.2	143.8	58 55.8	-46.9	144.8	58 06.5	-47.6	145.7	57 16.7	-48.2	146.6	56 26.3	-49.8	147.5	55 35.5	-49.3	148.2	54 44.3	-49.9	149.0	53 52.7	-50.4	149.7	24
25	58 58.4	-46.8	145.1	58 08.9	-47.5	146.0	57 18.9	-48.1	146.9	56 28.5	-48.8	147.7	55 37.5	-49.3	148.5	54 46.2	-49.9	149.2	53 54.4	-50.3	149.9	53 02.3	-50.8	150.6	25
26	58 11.6	-47.5	146.3	57 21.4	-48.1	147.1	56 30.8	-48.8	148.0	55 39.7	-49.3	148.8	54 48.2	-49.8	149.5	53 56.3	-50.3	150.2	53 04.1	-50.8	150.9	52 11.5	-51.2	151.5	26
27	57 24.1	-48.1	147.4	56 33.3	-48.7	148.2	55 42.0	-49.2	149.0	54 50.4	-49.7	149.8	53 58.4	-50.2	150.4	53 06.0	-50.7	151.1	52 13.3	-51.1	151.7	51 20.3	-51.5	152.3	27
28	56 36.0	-48.7	148.5	55 44.6	-49.2	149.3	54 52.8	-49.7	150.0	54 00.7	-50.2	150.7	53 08.2	-50.7	151.4	52 15.3	-51.0	152.0	51 22.2	-51.5	152.6	50 28.8	-51.8	153.1	28
29	55 47.3	-49.2	149.6	54 55.4	-49.7	150.3	54 03.1	-50.2	151.0	53 10.5	-50.6	151.6	52 17.5	-51.0	152.3	51 24.3	-51.5	152.8	50 30.7	-51.8	153.4	49 37.0	-52.2	153.9	29
30	54 58.1	-49.6	150.6	54 05.7	-50.1	151.3	53 12.9	-50.5	151.9	52 19.9	-51.0	152.5	51 26.5	-51.4	153.1	50 32.8	-51.7	153.7	49 38.9	-52.1	154.2	48 44.8	-52.4	154.7	30
31	54 08.5	-50.1	151.5	53 15.6	-50.6	152.2	52 22.4	-51.0	152.8	51 28.9	-51.4	153.4	50 35.1	-51.7	153.9	49 41.1	-52.1	154.4	48 46.8	-52.4	154.9	47 52.4	-52.7	155.4	31
32	53 18.4	-50.5	152.5	52 25.0	-50.9	153.1	51 31.4	-51.3	153.7	50 37.5	-51.7	154.2	49 43.4	-52.1	154.7	48 49.0	-52.3	155.2	47 54.4	-52.6	155.7	46 59.7	-53.0	156.1	32
33	52 27.9	-50.9	153.4	51 34.1	-51.3	153.9	50 40.1	-51.7	154.5	49 45.8	-52.0	155.0	48 51.3	-52.3	155.5	47 56.7	-52.7	155.9	47 01.8	-53.0	156.4	46 06.7	-53.2	156.8	33
34	51 37.0	-51.3	154.2	50 42.8	-51.6	154.8	49 48.4	-51.9	155.3	48 53.8	-52.3	155.8	47 59.0	-52.6	156.2	47 04.0	-52.9	156.7	46 08.8	-53.1	157.1	45 13.5	-53.4	157.5	34
35	50 45.7	-51.6	155.1	49 51.2	-52.0	155.6	48 56.5	-52.3	156.0	48 01.5	-52.5	156.5	47 06.4	-52.8	156.9	46 11.1	-53.1	157.3	45 15.7	-53.4	157.7	44 20.1	-53.6	158.1	35
36	49 54.1	-51.9	155.9	48 59.2	-52.2	156.3	48 04.2	-52.5	156.8	47 09.0	-52.9	157.2	46 13.6	-53.1	157.6	45 18.0	-53.3	158.0	44 22.3	-53.6	158.4	43 26.5	-53.9	158.7	36
37	49 02.2	-52.2	156.6	48 07.0	-52.5	157.1	47 11.7	-52.8	157.5	46 16.1	-53.0	157.9	45 20.5	-53.4	158.3	44 24.7	-53.6	158.7	43 28.7	-53.8	159.0	42 36.2	-54.0	159.3	37
38	48 10.0	-52.6	157.4	47 14.5	-52.8	157.8	46 18.9	-53.1	158.2	45 23.1	-53.3	158.6	44 27.1	-53.5	158.9	43 31.1	-53.8	159.3	42 34.9	-54.0	159.6	41 38.6	-54.2	159.9	38
39	47 17.4	-52.7	158.1	46 21.7	-53.0	158.5	45 25.8	-53.3	158.9	44 29.8	-53.5	159.2	43 33.6	-53.7	159.6	42 37.3	-53.9	159.9	41 40.9	-54.1	160.2	40 44.4	-54.3	160.5	39
40	46 24.7	-53.0	158.8	45 28.7	-53.3	159.2	44 32.5	-53.5	159.5	43 36.3	-53.7	159.9	42 39.9	-53.9	160.2	41 43.4	-54.1	160							



20°, 340° 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

Table with columns for Dec. (0 to 90) and latitude (0° to 7°). Each latitude column contains three sub-columns: Hc, d, and Z. The table provides astronomical data for various latitudes.

20°, 340° L.H.A.

LATITUDE SAME NAME AS DECLINATION

# LATITUDE CONTRARY NAME TO DECLINATION

L.H.A. 20°, 340°

Dec.	0°			1°			2°			3°			4°			5°			6°			7°			Dec.
	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	
0	70 00.0	-1.4	90.0	69 58.6	-4.5	92.7	69 54.3	-7.5	95.5	69 47.1	-10.4	98.2	69 37.2	-13.4	100.8	69 24.6	-16.2	103.5	69 09.3	-18.9	106.0	68 51.5	-21.5	108.5	0
1	69 58.6	-4.3	92.9	69 54.1	-7.3	95.7	69 46.8	-10.3	98.4	69 36.7	-13.2	101.0	69 23.8	-15.9	103.6	69 08.4	-18.7	106.2	68 50.4	-21.2	108.7	68 30.0	-23.7	111.1	1
2	69 54.3	-7.2	95.8	69 46.8	-10.1	98.5	69 36.5	-13.0	101.2	69 23.5	-15.8	103.8	69 07.9	-18.5	106.4	68 49.7	-21.1	108.8	68 29.2	-23.6	111.2	68 06.3	-25.9	113.6	2
3	69 47.1	-9.9	98.7	69 36.7	-12.9	101.4	69 23.5	-15.6	104.0	69 07.7	-18.3	106.5	68 49.4	-20.9	109.0	68 28.6	-23.3	111.4	68 05.6	-25.7	113.7	67 40.4	-27.9	116.0	3
4	69 37.2	-12.6	101.6	69 23.8	-15.4	104.2	69 07.9	-18.2	106.7	68 49.7	-20.8	109.2	68 28.5	-23.2	111.6	68 05.3	-25.6	113.9	67 39.9	-27.8	116.1	67 12.5	-29.9	118.3	4
5	69 24.6	-15.3	104.3	69 08.4	-18.0	106.9	68 49.7	-20.5	109.4	68 28.6	-23.0	111.8	68 05.3	-25.4	114.1	67 39.7	-27.6	116.3	67 12.1	-29.6	118.4	66 42.6	-31.6	120.5	5
6	69 09.3	-17.8	107.1	68 50.4	-20.4	109.6	68 29.2	-22.9	111.9	68 05.6	-25.2	114.3	67 39.9	-27.4	116.5	67 12.1	-29.5	118.6	66 42.5	-31.5	120.7	66 11.0	-33.3	122.6	6
7	68 51.5	-20.3	109.7	68 30.0	-22.7	112.1	68 06.3	-25.1	114.4	67 40.4	-27.3	116.7	67 12.5	-29.4	118.8	66 42.6	-31.3	120.8	66 11.0	-33.2	122.8	65 37.7	-34.9	124.7	7
8	68 31.2	-22.6	112.3	68 07.3	-24.9	114.6	67 41.2	-27.1	116.9	67 13.1	-29.2	119.0	66 43.1	-31.2	121.0	66 11.3	-33.0	123.0	65 37.8	-34.7	124.8	65 02.8	-36.3	126.8	8
9	68 08.6	-24.7	114.8	67 42.4	-27.0	117.1	67 14.1	-29.1	119.2	66 43.9	-31.0	121.2	66 11.9	-32.9	123.2	65 38.3	-34.6	125.0	65 03.1	-36.2	126.8	64 26.5	-37.7	128.5	9
10	67 43.9	-26.9	117.3	67 15.4	-29.0	119.4	66 45.0	-30.9	121.4	66 12.9	-32.8	123.4	65 39.0	-34.4	125.2	65 03.7	-36.1	127.0	64 26.9	-37.6	128.7	63 48.8	-39.0	130.2	10
11	67 17.0	-28.8	119.6	66 46.4	-30.7	121.6	66 14.1	-32.6	123.6	65 40.1	-34.3	125.4	65 04.6	-36.0	127.2	64 27.6	-37.4	128.9	63 49.3	-38.8	130.4	63 09.8	-40.1	132.0	11
12	66 48.2	-30.7	121.9	66 15.7	-32.5	123.8	65 41.5	-34.2	125.6	65 05.8	-35.8	127.4	64 28.6	-37.3	129.1	63 50.2	-38.7	130.6	63 10.5	-40.0	132.2	62 29.7	-41.2	133.6	12
13	66 17.5	-32.4	124.0	65 43.2	-34.1	125.9	65 07.3	-35.7	127.6	64 30.0	-37.2	129.3	63 51.3	-38.6	130.9	63 11.5	-39.9	132.4	62 30.5	-41.1	133.8	61 48.5	-42.2	135.1	13
14	65 45.1	-34.0	126.1	65 09.1	-35.6	127.8	64 31.6	-37.1	129.5	63 52.8	-38.5	131.1	63 12.7	-39.7	132.6	62 31.6	-41.0	134.0	61 49.4	-42.1	135.3	61 06.3	-43.2	136.6	14
15	65 11.1	-35.5	128.1	64 33.5	-37.0	129.7	63 54.5	-38.4	131.3	63 14.3	-39.7	132.8	62 33.0	-40.9	134.2	61 50.6	-42.0	135.6	61 07.3	-43.1	136.8	60 23.1	-44.0	138.0	15
16	64 35.6	-36.9	130.0	63 56.5	-38.3	131.5	63 16.1	-39.6	133.0	62 34.6	-40.8	134.5	61 52.1	-41.9	135.8	61 08.6	-43.0	137.1	60 24.2	-43.9	138.3	59 39.1	-44.9	139.4	16
17	63 58.7	-38.2	131.8	63 18.2	-39.5	133.3	62 36.5	-40.7	134.7	61 53.8	-41.8	136.0	61 10.2	-42.9	137.3	60 25.6	-43.8	138.5	59 40.3	-44.7	139.6	58 54.2	-45.5	140.7	17
18	63 20.5	-39.4	133.5	62 38.7	-40.7	134.9	61 55.8	-41.8	136.3	61 12.0	-42.8	137.5	60 27.3	-43.8	138.7	59 41.8	-44.6	139.9	58 55.6	-45.5	140.9	58 07.8	-46.3	142.0	18
19	62 41.1	-40.6	135.2	61 58.0	-41.6	136.5	61 14.0	-42.7	137.8	60 29.2	-43.7	139.0	59 43.5	-44.5	140.1	58 57.2	-45.5	141.2	58 10.1	-46.2	142.2	57 22.4	-47.0	143.1	19
20	62 00.5	-41.6	136.8	61 16.4	-42.7	138.0	60 31.3	-43.6	139.2	59 45.5	-44.5	140.3	58 59.0	-45.4	141.4	58 11.7	-46.1	142.4	57 23.9	-46.9	143.4	56 35.4	-47.5	144.3	20
21	61 18.9	-42.5	138.3	60 33.7	-43.5	139.5	59 47.7	-44.4	140.6	59 01.0	-45.2	141.7	58 13.6	-46.0	142.7	57 25.6	-46.8	143.6	56 37.0	-47.4	144.5	55 47.9	-48.1	145.4	21
22	60 36.4	-43.5	139.8	59 50.3	-44.4	140.9	59 03.3	-45.2	141.9	58 15.0	-46.0	142.9	57 27.6	-46.7	143.9	56 38.8	-47.3	144.8	55 49.6	-48.0	145.6	54 59.8	-48.6	146.4	22
23	59 52.9	-44.3	141.1	59 05.8	-45.1	142.2	58 18.1	-45.9	143.2	57 29.8	-46.7	144.1	56 40.9	-47.3	145.0	55 51.5	-48.0	145.9	55 01.6	-48.6	146.7	54 11.2	-49.1	147.4	23
24	59 08.6	-45.1	142.5	58 20.7	-45.9	143.5	57 32.2	-46.6	144.4	56 43.1	-47.2	145.3	55 53.6	-47.9	146.1	55 03.5	-48.5	146.9	54 13.0	-49.0	147.7	53 22.1	-49.6	148.4	24
25	58 23.5	-45.8	143.7	57 34.8	-46.5	144.7	56 45.6	-47.2	145.6	55 55.9	-47.9	146.4	55 05.7	-48.5	147.2	54 15.0	-49.0	148.0	53 24.0	-49.5	148.7	52 32.5	-50.0	149.4	25
26	57 37.7	-46.5	145.0	56 48.3	-47.2	145.8	55 58.4	-47.8	146.7	55 08.0	-48.3	147.5	54 17.2	-48.9	148.2	53 26.0	-49.4	148.9	52 34.5	-50.0	149.6	51 42.5	-50.4	150.3	26
27	56 51.2	-47.1	146.1	56 01.1	-47.7	147.0	55 10.6	-48.3	147.7	54 19.7	-48.9	148.5	53 28.6	-49.4	149.2	52 36.6	-49.9	149.9	51 44.5	-50.3	150.5	50 52.1	-50.7	151.1	27
28	56 04.1	-47.7	147.2	55 13.4	-48.3	148.0	54 22.3	-48.8	148.8	53 30.8	-49.4	149.5	52 38.9	-49.8	150.1	51 46.7	-50.3	150.8	50 54.2	-50.7	151.4	50 01.4	-51.1	152.0	28
29	55 16.4	-48.3	148.3	54 25.1	-48.8	149.1	53 33.5	-49.4	149.8	52 41.4	-49.7	150.4	51 49.1	-50.2	151.1	50 56.4	-50.6	151.7	50 03.5	-51.1	152.2	49 10.3	-51.5	152.8	29
30	54 28.1	-48.7	149.4	53 36.3	-49.3	150.1	52 44.1	-49.7	150.7	51 51.7	-50.2	151.3	50 58.9	-50.7	151.9	50 05.8	-51.0	152.5	49 12.4	-51.4	153.0	48 18.8	-51.7	153.6	30
31	53 39.4	-49.3	150.4	52 47.0	-49.7	151.0	51 54.4	-50.1	151.6	51 01.5	-50.6	152.2	50 08.2	-50.9	152.8	49 14.8	-51.4	153.3	48 21.0	-51.7	153.8	47 27.1	-52.1	154.3	31
32	52 50.1	-49.6	151.3	51 57.3	-50.1	151.9	51 04.3	-50.6	152.5	50 10.9	-50.9	153.1	49 17.3	-51.3	153.6	48 23.4	-51.6	154.1	47 29.3	-51.9	154.6	46 35.0	-52.3	155.0	32
33	52 00.5	-50.1	152.2	51 07.2	-50.5	152.8	50 13.7	-50.9	153.4	49 20.0	-51.3	153.9	48 26.0	-51.6	154.4	47 31.8	-52.0	154.9	46 37.4	-52.3	155.3	45 42.7	-52.5	155.7	33
34	51 10.4	-50.5	153.1	50 16.4	-50.8	153.7	49 22.8	-51.2	154.2	48 28.7	-51.6	154.7	47 34.4	-51.9	155.1	46 39.8	-52.2	155.6	45 45.1	-52.5	156.0	44 50.2	-52.8	156.4	34
35	50 19.9	-50.8	154.0	49 25.9	-51.2	154.5	48 31.6	-51.5	155.0	47 37.1	-51.8	155.4	46 42.5	-52.1	155.9	45 47.6	-52.5	156.3	44 52.6	-52.8	156.7	43 57.4	-53.0	157.1	35
36	49 29.1	-51.2	154.8	48 34.7	-51.6	155.3	47 40.1	-51.9	155.7	46 45.3	-52.2	156.2	45 50.3	-52.5	156.6	44 55.1	-52.7	157.0	43 59.8	-53.0	157.4	43 04.4	-53.3	157.7	36
37	48 37.9	-51.5	155.6	47 43.1	-51.8	156.0	46 48.2	-52.1	156.5	45 53.1	-52.4	156.9	44 57.8	-52.6	157.3	44 02.4	-52.9	157.7	43 06.8	-53.1	158.0	42 11.1	-53.4	158.4	37
38	47 46.4	-51.8	156.4	46 51.3	-52.1	156.8	45 56.1	-52.4	157.2	45 00.7	-52.6	157.6	44 05.2	-52.9	158.0	43 09.5	-53.2	158.3	42 13.7	-53.4	158.7	41 17.7	-53.6	159.0	38
39	46 54.6	-52.1	157.1	45 59.2	-52.3	157.5	45 03.7	-52.6	157.9	44 08.1	-52.9	158.3	43 12.3	-53.2	158.6	42 16.3	-53.3	158.9	41 20.3	-53.6	159.3	40 24.1	-53.8	159.6	39
40	46 02.5	-52.3	157.8	45 06.9	-52.6	158.2	44 11.1	-52.9	158.6	43 15.2	-53.1	158.9	42 19.1	-53.3	159.2	41 23.0	-53.6	159.6	40 26.7	-53.8	159.9	39 30.5	-54.0	160.1	40
41	45 10.2	-52.6	158.5	44 14.3	-52.9	158.9	43 18.2	-53.0	159.2	42 22.1	-53.3	159.6	41 25.8	-53.5	159.9	40 29.4	-53.7	160.2	39 32.9	-53.9	160.4	38 36.3	-54.1	160.7	41
42	44 17.6	-52.8	159.2	43 21.4	-53.0	159.5	42 25.2	-53.3	159.9	41 28.8	-53.5	160.2	40 32.3	-53.7	160.5	39 35.7	-53.9	160.7	38 39.0	-54.1	161.0	37 42.2	-54.3	161.3	42
43	43 24.8	-53.1	159.9	42 28.4	-53.3	160.2	41 31.9	-53.5	160.5	40 35.3	-53.7	160.8	39 38.6	-53.9	161.0	38 44.7	-54.1	161.1	37 44.9	-54.2	161.6	36 47.9	-54.4	161.8	43
44	42 31.7	-53.2	160.5	41 35.1	-53.5	160.8	40 38.4	-53.7	161.1	39 41.6	-53.9	161.4	38 44.7	-54.0	161.6	37 47.7	-54.2	161.9	36 50.7	-54.4	162.1				

21°, 339° 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

Table with columns for Declination (Dec.) and Longitude (0° to 7°). Each longitude column contains three sub-columns: Hc, d, and Z. The table lists astronomical data for each degree of longitude, with values for Hc, d, and Z. The table is organized into 1-degree increments from 0° to 7°.

21°, 339° L.H.A.

LATITUDE SAME NAME AS DECLINATION

# LATITUDE CONTRARY NAME TO DECLINATION

L.H.A. 21°, 339°

Dec.	0°			1°			2°			3°			4°			5°			6°			7°			Dec.
	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	
0	69 00.0	-1.4	90.0	68 58.6	-4.2	92.6	68 54.6	-7.2	95.2	68 47.8	-10.0	97.8	68 38.4	-12.8	100.3	68 26.3	-15.4	102.8	68 11.8	-18.1	105.2	67 54.9	-20.6	107.6	0
1	68 58.6	-4.0	92.8	68 54.4	-7.0	95.4	68 47.4	-9.8	97.9	68 37.8	-12.6	100.5	68 25.6	-15.3	103.0	68 10.3	-17.7	105.6	67 50.9	-17.9	105.4	67 53.7	-20.3	107.8	1
2	68 54.6	-6.8	95.6	68 47.4	-9.6	98.1	68 37.6	-12.4	100.7	68 25.2	-14.9	103.3	68 10.1	-17.5	105.8	67 52.6	-20.0	108.1	67 32.8	-22.4	110.4	67 10.8	-24.7	112.7	2
3	68 47.8	-9.4	98.3	68 37.8	-12.2	100.9	68 25.2	-14.9	103.3	68 10.1	-17.5	105.8	67 52.6	-20.0	108.1	67 32.8	-22.4	110.4	67 10.8	-24.7	112.7	66 46.6	-26.9	114.8	3
4	68 38.4	-12.1	101.0	68 26.3	-14.5	103.7	68 10.9	-17.2	106.1	67 53.0	-19.6	108.5	67 32.8	-22.0	110.8	67 10.4	-24.3	113.0	66 45.9	-26.5	115.2	66 19.4	-28.6	117.3	4
5	68 26.3	-14.5	103.7	68 10.9	-17.2	106.1	67 53.0	-19.6	108.5	67 32.8	-22.0	110.8	67 10.4	-24.3	113.0	66 45.9	-26.5	115.2	66 19.4	-28.6	117.3	65 51.0	-30.5	119.2	5
6	68 11.8	-16.9	106.3	67 53.7	-19.4	108.7	67 33.4	-21.9	111.0	67 10.8	-24.2	113.2	66 46.1	-26.4	115.4	66 19.4	-28.4	117.4	65 50.8	-30.3	119.4	65 20.5	-32.2	121.3	6
7	67 54.9	-19.4	108.9	67 34.3	-21.7	111.2	67 11.5	-24.0	113.4	66 46.6	-26.2	115.6	66 19.7	-28.2	117.6	65 51.0	-30.2	119.6	65 20.5	-32.0	121.5	64 48.3	-33.7	123.3	7
8	67 35.5	-21.5	111.4	67 12.6	-23.9	113.6	66 47.5	-26.1	115.8	66 20.4	-28.1	117.8	65 51.5	-30.0	119.8	65 20.8	-31.9	121.7	64 48.5	-33.6	123.5	64 14.6	-35.2	125.2	8
9	67 14.0	-23.7	113.8	66 48.7	-25.9	116.0	66 21.4	-27.9	118.0	65 52.3	-29.8	120.0	65 21.5	-31.7	121.9	64 48.9	-33.4	123.7	64 14.9	-35.0	125.4	63 39.9	-36.6	127.1	9
10	66 50.3	-25.7	116.2	66 22.8	-27.8	118.3	65 53.5	-29.7	120.2	65 22.5	-31.6	122.1	64 49.8	-33.3	123.9	64 15.5	-34.9	125.6	63 39.9	-36.4	127.3	63 02.8	-37.8	128.9	10
11	66 24.6	-27.7	118.5	65 55.0	-29.5	120.4	65 23.8	-31.4	122.3	64 50.9	-33.1	124.1	64 16.5	-34.8	125.9	63 40.6	-36.2	127.5	63 03.5	-37.7	129.1	62 25.0	-39.0	130.6	11
12	65 56.9	-29.5	120.7	65 25.5	-31.3	122.6	64 52.4	-33.0	124.4	64 17.8	-34.7	126.1	63 41.7	-36.1	127.7	63 04.4	-37.6	129.3	62 25.8	-38.9	130.8	61 46.0	-40.9	132.2	12
13	65 27.4	-31.1	122.8	64 54.2	-32.9	124.6	64 19.4	-34.5	126.3	63 43.1	-36.0	127.9	63 05.6	-37.4	129.5	62 26.8	-38.7	131.0	61 46.9	-39.9	132.4	61 06.0	-41.2	133.7	13
14	64 56.3	-32.8	124.8	64 21.3	-34.4	126.5	63 44.9	-35.9	128.2	63 07.1	-37.3	129.7	62 28.2	-38.6	131.2	61 48.1	-39.9	132.6	61 07.0	-41.0	134.0	60 24.8	-42.0	135.2	14
15	64 23.5	-34.3	126.8	63 46.9	-35.8	128.4	63 09.0	-37.2	130.0	62 29.8	-38.5	131.4	61 49.6	-39.8	132.8	61 08.2	-40.8	134.2	60 26.0	-42.0	135.5	59 42.8	-43.0	136.7	15
16	63 49.2	-35.7	128.7	63 11.1	-37.1	130.2	62 31.8	-38.4	131.7	61 51.3	-39.6	133.1	61 09.8	-40.8	134.4	60 27.4	-41.9	135.7	59 44.0	-42.9	136.9	58 59.8	-43.8	138.0	16
17	63 13.5	-37.0	130.5	62 34.0	-38.3	131.9	61 53.4	-39.6	133.3	61 11.7	-40.7	134.7	60 29.0	-41.7	135.9	59 45.5	-42.8	137.1	59 01.1	-43.9	138.3	58 16.0	-44.6	139.3	17
18	62 36.5	-38.2	132.2	61 55.7	-39.5	133.6	61 13.8	-40.6	134.9	60 31.0	-41.7	136.2	59 47.3	-42.7	137.4	59 02.7	-43.6	138.5	58 17.4	-44.5	139.6	57 31.4	-45.3	140.6	18
19	61 58.3	-39.4	133.9	61 16.2	-40.5	135.2	60 33.2	-41.6	136.4	59 49.3	-42.6	137.6	59 04.6	-43.5	138.7	58 19.1	-44.4	139.8	57 32.9	-45.2	140.8	56 46.1	-46.0	141.8	19
20	61 18.9	-40.4	135.4	60 35.5	-41.5	136.7	59 51.6	-42.5	137.9	59 06.7	-43.4	139.0	58 21.1	-44.3	140.1	57 34.7	-45.1	141.1	56 47.7	-45.9	142.1	56 00.1	-46.6	143.0	20
21	60 38.5	-41.4	137.0	59 54.2	-42.4	138.1	59 09.1	-43.3	139.3	58 23.3	-44.2	140.3	57 36.8	-45.1	141.3	56 49.6	-45.8	142.3	56 01.8	-46.5	143.2	55 13.5	-47.2	144.1	21
22	59 57.1	-42.4	138.4	59 11.8	-43.3	139.5	58 25.8	-44.2	140.6	57 39.1	-45.0	141.6	56 51.7	-45.7	142.6	56 03.8	-46.4	143.5	55 15.3	-47.1	144.3	54 26.3	-47.7	145.2	22
23	59 14.7	-43.2	139.8	58 28.5	-44.1	140.9	57 41.6	-44.9	141.9	56 54.1	-45.6	142.8	56 06.0	-46.3	143.7	55 17.4	-47.1	144.6	54 28.2	-47.6	145.4	53 38.6	-48.3	146.2	23
24	58 31.5	-44.0	141.2	57 44.4	-44.8	142.2	56 56.7	-45.6	143.1	56 08.5	-46.3	144.0	55 19.7	-47.0	144.9	53 30.3	-47.5	145.7	53 40.6	-48.2	146.4	52 50.3	-48.7	147.2	24
25	57 47.5	-44.8	142.5	56 59.6	-45.5	143.4	56 11.1	-46.2	144.3	55 22.2	-46.9	145.1	54 32.7	-47.5	145.9	53 42.8	-48.2	146.7	52 52.4	-48.7	147.4	52 01.6	-49.2	148.1	25
26	57 02.7	-45.5	143.7	56 14.1	-46.2	144.6	55 24.9	-46.8	145.4	54 35.3	-47.5	146.2	53 45.2	-48.1	147.0	52 54.6	-48.6	147.7	52 03.7	-49.1	148.4	51 12.4	-49.6	149.1	26
27	56 17.2	-46.1	144.9	55 27.9	-46.8	145.7	54 38.1	-47.4	146.5	53 47.8	-48.0	147.3	52 57.1	-48.5	148.0	52 06.0	-49.0	148.7	51 14.6	-49.5	149.3	50 22.8	-49.9	150.0	27
28	55 31.1	-46.8	146.0	54 41.1	-47.4	146.8	53 50.7	-48.0	147.6	52 59.8	-48.5	148.3	52 08.6	-49.0	149.0	51 17.0	-49.5	149.6	50 25.1	-49.9	150.2	49 32.9	-50.4	150.8	28
29	54 44.3	-47.3	147.1	53 53.7	-47.9	147.9	53 02.7	-48.4	148.6	52 11.3	-48.9	149.3	51 19.6	-49.4	149.9	50 27.5	-49.8	150.5	49 35.2	-50.3	151.1	48 42.5	-50.7	151.6	29
30	53 57.0	-47.8	148.2	53 05.8	-48.4	148.9	52 14.3	-48.9	149.5	51 22.4	-49.4	150.2	50 30.2	-49.8	150.8	49 37.7	-50.3	151.4	48 44.9	-50.7	151.9	47 51.8	-51.1	152.4	30
31	53 09.2	-48.4	149.2	52 17.4	-48.8	149.9	51 25.4	-49.3	150.5	50 33.0	-49.8	151.1	49 40.4	-50.2	151.7	48 47.4	-50.6	152.2	47 54.2	-51.0	152.7	47 00.7	-51.3	153.2	31
32	52 20.8	-48.8	150.2	51 28.6	-49.3	150.8	50 36.1	-49.8	151.4	49 43.2	-50.1	152.0	48 50.2	-50.6	152.5	47 56.8	-50.9	153.0	47 03.2	-51.3	153.5	46 09.4	-51.6	154.0	32
33	51 32.0	-49.3	151.1	50 39.3	-49.7	151.7	49 46.3	-50.1	152.3	48 53.1	-50.5	152.8	47 59.6	-50.9	153.3	47 05.9	-51.3	153.8	46 11.9	-51.5	154.3	45 17.8	-51.9	154.7	33
34	50 42.7	-49.6	152.0	49 49.6	-50.1	152.6	48 56.2	-50.5	153.1	48 02.6	-50.9	153.6	47 08.7	-51.2	154.1	46 14.6	-51.5	154.6	45 20.4	-51.9	155.0	44 25.9	-52.2	155.4	34
35	49 53.1	-50.1	152.9	48 59.5	-50.4	153.4	48 05.7	-50.8	153.9	47 11.7	-51.1	154.4	46 17.5	-51.5	154.9	45 23.1	-51.8	155.3	44 28.5	-52.1	155.7	43 33.7	-52.4	156.1	35
36	49 03.0	-50.4	153.7	48 09.1	-50.8	154.2	47 14.9	-51.1	154.7	46 20.6	-51.5	155.2	45 26.0	-51.7	155.6	44 31.3	-52.1	156.0	43 36.4	-52.3	156.4	42 41.3	-52.6	156.8	36
37	48 12.6	-50.8	154.6	47 18.3	-51.1	155.0	46 23.8	-51.4	155.5	45 29.1	-51.7	155.9	44 34.3	-52.1	156.3	43 39.2	-52.3	156.7	42 44.1	-52.6	157.1	41 48.7	-52.8	157.4	37
38	47 21.8	-51.0	155.4	46 27.2	-51.4	155.8	45 32.4	-51.7	156.2	44 37.4	-52.0	156.6	43 42.2	-52.2	157.0	42 46.9	-52.5	157.4	41 51.5	-52.8	157.7	40 55.9	-53.0	158.1	38
39	46 30.8	-51.4	156.1	45 35.8	-51.7	156.5	44 40.7	-52.0	156.9	43 45.4	-52.2	157.3	42 50.0	-52.5	157.7	41 54.4	-52.8	158.0	40 58.7	-53.0	158.4	40 02.9	-53.3	158.7	39
40	45 39.4	-51.7	156.9	44 44.1	-51.9	157.3	43 48.7	-52.2	157.6	42 53.2	-52.5	157.9	41 57.5	-52.7	158.3	41 01.6	-52.9	158.7	40 05.7	-53.2	159.0	39 09.6	-53.4	159.3	40
41	44 47.7	-51.9	157.6	43 52.2	-52.2	158.0	42 56.5	-52.4	158.3	42 00.7	-52.7	158.7	41 04.8	-53.0	159.0	40 08.7	-53.2	159.3	39 12.5	-53.3	159.6	38 16.2	-53.5	159.8	41
42	43 55.8	-52.1	158.3	43 00.0	-52.4	158.6	42 04.1	-52.7	159.0	41 08.0	-52.9	159.3	40 11.8	-53.1	159.6	39 15.5	-53.3	159.9	38 19.2	-53.6	160.2	37 22.7	-53.8	160.4	42
43	43 03.7	-52.4	159.0	42 07.6	-52.6	159.3	41 11.4	-52.9	159.6	40 15.1	-53.1	159.9	39 18.7	-53.3	160.2	38 22.2	-53.5	160.5	37 25.6	-53.7	160.7	36 28.9	-53.8	161.0	43
44	42 11.3	-52.7	159.6	41 15.0	-52.9	159.9	40 18.5	-53.0	160.2	39 22.0	-53.3	160.5	38 25.4	-53.5	160.8	37 28.7	-53.7	161.0	36 31.9	-53.8	161.3	35 35.1	-54.1	161.5	44</

22°, 338° 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

Table with columns for Declination (Dec.) and Latitude (0° to 7°). Each latitude column contains three sub-columns: Hc, d, and Z. The table lists astronomical data for each combination of declination and latitude.

22°, 338° L.H.A.

LATITUDE SAME NAME AS DECLINATION

LATITUDE CONTRARY NAME TO DECLINATION

L.H.A. 22°, 338°

Dec.	0°			1°			2°			3°			4°			5°			6°			7°			Dec.
	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	Hc	d	Z	
0	68 00.0	-1.3	90.0	67 58.7	-4.1	92.5	67 54.8	-6.8	94.9	67 48.4	-9.6	97.4	67 39.4	-12.2	99.8	67 28.0	-14.8	102.2	67 14.1	-17.3	104.5	66 58.0	-19.8	106.8	0
1	67 58.7	-3.9	92.7	67 54.6	-6.6	95.1	67 48.0	-9.4	97.6	67 38.8	-12.0	100.0	67 27.2	-14.6	102.4	67 13.2	-17.2	104.7	66 56.8	-19.6	107.0	66 38.2	-21.9	109.2	1
2	67 54.8	-6.4	95.3	67 48.0	-9.2	97.8	67 38.8	-11.8	100.2	67 26.8	-14.4	102.6	67 12.6	-17.0	104.9	66 56.6	-19.6	107.3	66 37.2	-21.7	109.4	66 16.3	-24.0	111.5	2
3	67 48.4	-9.0	98.0	67 38.8	-11.6	100.4	67 26.8	-14.2	102.7	67 12.6	-16.8	105.1	66 55.6	-19.2	107.3	66 36.6	-21.5	109.5	66 15.5	-23.7	111.7	65 53.2	-25.9	113.8	3
4	67 39.4	-11.4	100.6	67 27.2	-14.0	102.9	67 12.6	-16.6	105.3	66 55.6	-19.0	107.5	66 36.4	-21.3	109.7	66 15.1	-23.5	111.9	65 51.8	-25.7	114.0	65 26.4	-27.7	116.0	4
5	67 28.0	-13.9	103.1	67 13.2	-16.4	105.5	66 56.0	-18.8	107.7	66 36.6	-21.1	109.9	66 15.1	-23.3	112.1	65 51.6	-25.5	114.2	65 26.1	-27.6	116.2	64 58.7	-29.4	118.1	5
6	67 14.1	-16.1	105.7	66 56.8	-18.6	107.9	66 37.2	-20.9	110.1	66 15.5	-23.2	112.3	65 51.8	-25.4	114.3	65 26.1	-27.4	116.3	64 58.5	-29.2	118.3	64 29.3	-31.1	120.1	6
7	66 58.0	-18.5	108.1	66 38.2	-20.8	110.4	66 16.3	-23.1	112.5	65 52.3	-25.1	114.6	65 26.4	-27.1	116.5	64 58.7	-29.1	118.5	64 29.3	-31.0	120.3	63 58.2	-32.7	122.1	7
8	66 39.5	-20.6	110.6	66 17.4	-22.9	112.7	65 53.2	-24.9	114.8	65 27.2	-27.0	116.8	64 59.3	-29.0	118.7	64 29.6	-30.7	120.5	63 58.3	-32.4	122.3	63 25.5	-34.0	124.0	8
9	66 18.9	-22.7	112.9	65 54.5	-24.8	115.0	65 28.3	-26.9	117.0	65 00.2	-28.8	118.9	64 30.3	-30.6	120.7	63 58.9	-32.3	122.5	63 25.9	-33.9	124.2	62 51.5	-35.5	125.8	9
10	65 56.2	-24.6	115.2	65 29.7	-26.7	117.2	65 01.4	-28.6	119.1	64 31.4	-30.4	120.9	63 59.7	-32.1	122.7	63 26.6	-33.8	124.4	62 52.0	-35.3	126.0	62 16.0	-36.7	127.6	10
11	65 31.6	-26.6	117.4	65 03.0	-28.4	119.3	64 32.8	-30.3	121.2	64 01.0	-32.0	122.9	63 27.6	-33.6	124.6	62 52.8	-35.1	126.2	62 16.7	-36.6	127.8	61 39.3	-37.8	129.2	11
12	65 05.0	-28.3	119.6	64 34.6	-30.2	121.4	64 02.5	-31.8	123.2	63 29.0	-33.5	124.8	62 54.0	-35.0	126.5	62 17.7	-36.4	128.0	61 40.1	-37.7	129.5	61 01.5	-39.0	130.9	12
13	64 36.7	-30.0	121.6	64 04.4	-31.7	123.4	63 30.7	-33.4	125.1	62 55.5	-34.9	126.7	62 19.0	-36.3	128.2	61 41.3	-37.6	129.7	61 02.4	-38.9	131.1	60 22.4	-40.0	132.4	13
14	64 06.7	-31.6	123.6	63 32.7	-33.2	125.3	62 57.3	-34.7	126.9	62 20.6	-36.1	128.5	61 42.7	-37.5	129.9	61 03.7	-38.8	131.3	60 23.5	-39.9	132.6	59 42.4	-41.0	133.9	14
15	63 35.1	-33.1	125.6	62 59.5	-34.6	127.2	62 22.6	-36.1	128.7	61 44.5	-37.4	130.2	61 05.2	-38.6	131.5	60 24.9	-39.8	132.9	59 43.6	-40.9	134.1	59 01.4	-42.0	135.3	15
16	63 02.0	-34.5	127.4	62 24.9	-36.0	129.0	61 46.5	-37.2	130.4	61 07.1	-38.5	131.8	60 26.6	-39.7	133.1	59 45.1	-40.8	134.4	59 02.7	-41.8	135.6	58 19.4	-42.7	136.7	16
17	62 27.5	-35.9	129.2	61 48.9	-37.1	130.7	61 09.3	-38.4	132.1	60 28.9	-39.6	133.4	59 46.9	-40.7	134.6	59 04.3	-41.7	135.8	58 20.9	-42.7	136.9	57 36.7	-43.6	138.0	17
18	61 51.6	-37.0	130.9	61 11.8	-38.3	132.3	60 30.9	-39.5	133.6	59 49.0	-40.6	134.9	59 06.2	-41.6	136.1	58 22.6	-42.6	137.2	57 38.2	-43.5	138.3	56 53.1	-44.3	139.3	18
19	61 14.6	-38.2	132.6	60 33.5	-39.4	133.9	59 51.4	-40.5	135.1	59 08.4	-41.5	136.3	58 24.6	-42.4	137.5	57 40.0	-43.3	138.5	56 54.7	-44.2	139.5	56 08.8	-45.1	140.5	19
20	60 36.4	-39.3	134.2	59 54.5	-40.4	135.4	59 10.9	-41.4	136.6	58 26.9	-42.3	137.7	57 42.2	-43.3	138.8	56 56.7	-44.2	139.8	56 10.5	-44.9	140.8	55 23.7	-45.6	141.7	20
21	59 57.1	-40.3	135.7	59 13.7	-41.3	136.9	58 29.5	-42.3	138.0	57 44.6	-43.2	139.1	56 58.9	-44.1	140.1	56 12.5	-44.8	141.0	55 25.6	-45.6	142.0	54 38.1	-46.3	142.8	21
22	59 16.8	-41.3	137.2	58 32.4	-42.2	138.3	57 47.2	-43.1	139.3	57 01.4	-44.0	140.3	56 14.8	-44.7	141.3	55 27.7	-45.5	142.2	54 40.0	-46.2	143.1	53 51.8	-46.9	143.9	22
23	58 35.5	-42.1	138.6	57 50.2	-43.1	139.6	57 04.1	-43.9	140.6	56 17.4	-44.7	141.6	55 30.1	-45.4	142.5	54 42.2	-46.1	143.4	53 53.8	-46.7	144.2	53 04.9	-47.4	145.0	23
24	57 53.4	-43.0	139.9	57 07.1	-43.8	140.9	56 20.2	-44.6	141.9	55 32.7	-45.3	142.8	54 44.7	-46.0	143.6	54 56.1	-46.7	144.5	53 07.1	-47.3	145.2	52 17.5	-47.8	146.0	24
25	57 10.4	-43.8	141.2	56 23.3	-44.5	142.2	55 35.6	-45.2	143.1	54 47.4	-46.0	143.8	53 58.7	-46.7	144.7	53 09.4	-47.2	145.5	52 19.8	-47.9	146.3	51 29.7	-48.4	147.0	25
26	56 26.6	-44.4	142.5	55 38.8	-45.2	143.4	54 50.4	-45.9	144.2	54 01.4	-46.5	145.0	53 12.0	-47.1	145.8	52 22.2	-47.7	146.5	51 31.9	-48.2	147.2	50 41.3	-48.8	147.9	26
27	55 42.2	-45.2	143.7	54 53.6	-45.9	144.5	54 04.5	-46.5	145.3	53 14.9	-47.1	146.1	52 24.9	-47.7	146.8	51 34.5	-48.3	147.5	50 43.7	-48.8	148.2	49 52.5	-49.2	148.8	27
28	54 57.0	-45.8	144.8	54 07.7	-46.4	145.6	53 18.0	-47.1	146.4	52 27.8	-47.6	147.1	51 37.2	-48.1	147.8	50 46.2	-48.6	148.5	49 54.9	-49.1	149.1	49 03.3	-49.6	149.7	28
29	54 11.2	-46.4	145.9	53 21.3	-47.0	146.7	52 30.9	-47.5	147.4	51 40.2	-48.1	148.1	50 49.1	-48.6	148.8	49 57.6	-49.1	149.4	49 05.8	-49.5	150.0	48 13.7	-50.0	150.5	29
30	53 24.8	-46.9	147.0	52 34.3	-47.5	147.7	51 43.4	-48.1	148.4	50 52.1	-48.6	149.1	50 00.5	-49.1	149.7	49 08.5	-49.5	150.3	48 16.3	-49.9	150.8	47 23.7	-50.3	151.4	30
31	52 37.9	-47.5	148.1	51 46.8	-48.0	148.7	50 55.3	-48.5	149.4	50 03.6	-48.9	150.0	49 11.4	-49.4	150.6	48 19.0	-49.8	151.1	47 26.4	-50.3	151.7	46 33.4	-50.6	152.2	31
32	51 50.4	-47.9	149.1	50 58.8	-48.4	149.7	50 06.8	-48.9	150.3	49 14.6	-49.4	150.9	48 22.0	-49.8	151.4	47 29.2	-50.2	152.0	46 36.1	-50.6	152.5	45 42.8	-50.9	152.9	32
33	51 02.5	-48.4	150.0	50 10.4	-48.9	150.6	49 17.9	-49.3	151.2	48 25.2	-49.7	151.7	47 32.2	-50.1	152.3	46 39.0	-50.5	152.8	45 45.5	-50.8	153.2	44 51.9	-51.3	153.7	33
34	50 14.1	-48.9	151.0	49 21.5	-49.3	151.5	48 28.6	-49.7	152.1	47 35.5	-50.1	152.6	46 42.1	-50.5	153.1	45 48.5	-50.8	153.5	44 54.7	-51.2	154.0	44 00.6	-51.5	154.4	34
35	49 25.2	-49.2	151.9	48 32.2	-49.7	152.4	47 38.9	-50.1	152.9	46 45.4	-50.5	153.4	45 51.6	-50.8	153.9	44 57.7	-51.2	154.3	44 03.5	-51.4	154.7	43 09.1	-51.7	155.1	35
36	48 36.0	-49.7	152.7	47 42.5	-50.0	153.2	46 48.8	-50.3	153.7	45 54.9	-50.7	154.2	45 00.8	-51.0	154.6	44 06.5	-51.4	155.0	43 12.1	-51.7	155.4	42 17.4	-52.0	155.8	36
37	47 46.3	-49.9	153.6	46 52.5	-50.3	154.0	45 58.5	-50.7	154.5	45 04.2	-51.0	154.9	44 09.8	-51.4	155.4	43 15.1	-51.6	155.7	42 20.4	-52.0	156.1	41 25.4	-52.2	156.5	37
38	46 56.4	-50.4	154.4	46 02.2	-50.7	154.8	45 07.8	-51.0	155.3	44 13.2	-51.3	155.7	43 18.4	-51.6	156.1	42 23.5	-51.9	156.4	41 28.4	-52.2	156.8	40 33.2	-52.4	157.1	38
39	46 06.0	-50.6	155.2	45 11.5	-51.0	155.6	44 16.8	-51.3	156.0	43 21.9	-51.6	156.4	42 26.8	-51.9	156.8	41 31.6	-52.1	157.1	40 36.2	-52.3	157.5	39 40.8	-52.7	157.8	39
40	45 15.4	-51.0	155.9	44 20.5	-51.2	156.3	43 25.5	-51.6	156.7	42 30.3	-51.8	157.1	41 34.9	-52.1	157.4	40 39.5	-52.4	157.8	39 43.9	-52.6	158.1	38 48.1	-52.8	158.4	40
41	44 24.4	-51.2	156.7	43 29.3	-51.6	157.1	42 33.9	-51.8	157.4	41 38.5	-52.1	157.8	40 42.8	-52.3	158.1	39 47.1	-52.5	158.4	38 51.3	-52.8	158.7	37 55.3	-53.0	159.0	41
42	43 33.2	-51.5	157.4	42 37.7	-51.7	157.8	41 42.1	-52.0	158.1	40 46.4	-52.3	158.4	39 50.5	-52.5	158.7	38 54.6	-52.8	159.0	37 58.5	-53.0	159.3	37 02.3	-53.2	159.6	42
43	42 41.7	-51.7	158.1	41 46.0	-52.0	158.4	40 50.1	-52.2	158.8	39 54.1	-52.5	159.1	38 58.0	-52.7	159.4	38 01.8	-52.9	159.6	37 05.5	-53.1	159.9	36 09.9	-53.3	160.2	43
44	41 50.0	-52.0	158.8	40 54.0	-52.3	159.1	39 57.9	-52.5	159.4	39 01.6	-52.6	159.7	38 05.3	-52.9	160.0	37 08.9	-53.1	160.2	36 12.4	-53.3	160.5	35 15.8	-53.5	160.7	44