Integer

Sight Reduction Tables

Latitude 42° to 48°

USE OF THE TABLES.

The Greenwich Hour Angle (GHA) and Declination of the SUN are taken from the current year's Sun Almanac for the precise date and time of the observation.
The GHA is combined with an Assumed Longitude, somewhere close to your actual position (obtained from your GPS or, if you are a traditionalist, your Dead Reckoning position) to give your Local Hour Angle (LHA).
The resulting LHA must be a whole degree of latitude.

If LHA and Declination = SAME
Start at the first page and work forward until you find the page with your LHA.
Enter the table with your Declination and Latitude, and read off Hc, d' and Z.
Take care to note whether d' is +ve or -ve.

If LHA and Declination = CONTRARY
Start at the last page and work backwards until you find the page with your LHA.
Enter the table with your Declination and Latitude, and read of Hc, d' and Z.
Take care to note whether d' is +ve or -ve.

NOTE: Values of Hc, d' and Z are always in **BOLD** text whenever LHA and Declination are contrary.

Hc, the computed Altitude, must now be corrected for minutes of Declination by means of the correction table at the end of the tables.
Enter the table with minutes of declination and d'. It doesn't matter which way round you use the table.
If d' is -ve, SUBTRACT the value obtained from the correction table from Hc to determine the corrected value of Hc.
If d' is +ve, ADD the value obtained from the correction table to HC to determine the corrected value of Hc.

Accuracy and Precision
This particular set of tables returns Hc, d' and Z as INTEGERS.
In the majority of situations this will give you satisfactory results as well as simplifying the entire sight reduction process.

These tables have been compared to the US National Imagery and Mapping Agency Sight Reduction Tables for Air Navigation Pub249 with the following results.

No difference for Hc° has been identified by the author.
No difference in D' has been identified by the author.
No difference in Z° has been identified by the author.

Disclaimer
While the author has taken great care with these tables, no warranty is implied or expressed as to their fitness for purpose.

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

0° 360° LHA — Latitude SAME as Declination — 0° 360° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	48°00'	+60'	180°	47°00'	+60'	180°	46°00'	+60'	180°	45°00'	+60'	180°	44°00'	+60'	180°	43°00'	+60'	180°	42°00'	+60'	180°	0
1	49°00'	+60'	180°	48°00'	+60'	180°	47°00'	+60'	180°	46°00'	+60'	180°	45°00'	+60'	180°	44°00'	+60'	180°	43°00'	+60'	180°	1
2	50°00'	+60'	180°	49°00'	+60'	180°	48°00'	+60'	180°	47°00'	+60'	180°	46°00'	+60'	180°	45°00'	+60'	180°	44°00'	+60'	180°	2
3	51°00'	+60'	180°	50°00'	+60'	180°	49°00'	+60'	180°	48°00'	+60'	180°	47°00'	+60'	180°	46°00'	+60'	180°	45°00'	+60'	180°	3
4	52°00'	+60'	180°	51°00'	+60'	180°	50°00'	+60'	180°	49°00'	+60'	180°	48°00'	+60'	180°	47°00'	+60'	180°	46°00'	+60'	180°	4
5	53°00'	+60'	180°	52°00'	+60'	180°	51°00'	+60'	180°	50°00'	+60'	180°	49°00'	+60'	180°	48°00'	+60'	180°	47°00'	+60'	180°	5
6	54°00'	+60'	180°	53°00'	+60'	180°	52°00'	+60'	180°	51°00'	+60'	180°	50°00'	+60'	180°	49°00'	+60'	180°	48°00'	+60'	180°	6
7	55°00'	+60'	180°	54°00'	+60'	180°	53°00'	+60'	180°	52°00'	+60'	180°	51°00'	+60'	180°	50°00'	+60'	180°	49°00'	+60'	180°	7
8	56°00'	+60'	180°	55°00'	+60'	180°	54°00'	+60'	180°	53°00'	+60'	180°	52°00'	+60'	180°	51°00'	+60'	180°	50°00'	+60'	180°	8
9	57°00'	+60'	180°	56°00'	+60'	180°	55°00'	+60'	180°	54°00'	+60'	180°	53°00'	+60'	180°	52°00'	+60'	180°	51°00'	+60'	180°	9
10	58°00'	+60'	180°	57°00'	+60'	180°	56°00'	+60'	180°	55°00'	+60'	180°	54°00'	+60'	180°	53°00'	+60'	180°	52°00'	+60'	180°	10
11	59°00'	+60'	180°	58°00'	+60'	180°	57°00'	+60'	180°	56°00'	+60'	180°	55°00'	+60'	180°	54°00'	+60'	180°	53°00'	+60'	180°	11
12	60°00'	+60'	180°	59°00'	+60'	180°	58°00'	+60'	180°	57°00'	+60'	180°	56°00'	+60'	180°	55°00'	+60'	180°	54°00'	+60'	180°	12
13	61°00'	+60'	180°	60°00'	+60'	180°	59°00'	+60'	180°	58°00'	+60'	180°	57°00'	+60'	180°	56°00'	+60'	180°	55°00'	+60'	180°	13
14	62°00'	+60'	180°	61°00'	+60'	180°	60°00'	+60'	180°	59°00'	+60'	180°	58°00'	+60'	180°	57°00'	+60'	180°	56°00'	+60'	180°	14
15	63°00'	+60'	180°	62°00'	+60'	180°	61°00'	+60'	180°	60°00'	+60'	180°	59°00'	+60'	180°	58°00'	+60'	180°	57°00'	+60'	180°	15
16	64°00'	+60'	180°	63°00'	+60'	180°	62°00'	+60'	180°	61°00'	+60'	180°	60°00'	+60'	180°	59°00'	+60'	180°	58°00'	+60'	180°	16
17	65°00'	+60'	180°	64°00'	+60'	180°	63°00'	+60'	180°	62°00'	+60'	180°	61°00'	+60'	180°	60°00'	+60'	180°	59°00'	+60'	180°	17
18	66°00'	+60'	180°	65°00'	+60'	180°	64°00'	+60'	180°	63°00'	+60'	180°	62°00'	+60'	180°	61°00'	+60'	180°	60°00'	+60'	180°	18
19	67°00'	+60'	180°	66°00'	+60'	180°	65°00'	+60'	180°	64°00'	+60'	180°	63°00'	+60'	180°	62°00'	+60'	180°	61°00'	+60'	180°	19
20	68°00'	+60'	180°	67°00'	+60'	180°	66°00'	+60'	180°	65°00'	+60'	180°	64°00'	+60'	180°	63°00'	+60'	180°	62°00'	+60'	180°	20
21	69°00'	+60'	180°	68°00'	+60'	180°	67°00'	+60'	180°	66°00'	+60'	180°	65°00'	+60'	180°	64°00'	+60'	180°	63°00'	+60'	180°	21
22	70°00'	+60'	180°	69°00'	+60'	180°	68°00'	+60'	180°	67°00'	+60'	180°	66°00'	+60'	180°	65°00'	+60'	180°	64°00'	+60'	180°	22
23	71°00'	+60'	180°	70°00'	+60'	180°	69°00'	+60'	180°	68°00'	+60'	180°	67°00'	+60'	180°	66°00'	+60'	180°	65°00'	+60'	180°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

0° 360° LHA — Latitude SAME as Declination — 0° 360° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

1° 359° LHA — Latitude SAME as Declination — 1° 359° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	47°59'	+60'	179°	46°59'	+60'	179°	45°59'	+60'	179°	44°59'	+60'	179°	43°59'	+60'	179°	43°00'	+60'	179°	42°00'	+60'	179°	0
1	48°59'	+60'	178°	47°59'	+60'	179°	46°59'	+60'	179°	45°59'	+60'	179°	44°59'	+60'	179°	44°00'	+60'	179°	43°00'	+60'	179°	1
2	49°59'	+60'	178°	48°59'	+60'	178°	47°59'	+60'	179°	46°59'	+60'	179°	45°59'	+60'	179°	44°59'	+60'	179°	44°00'	+60'	179°	2
3	50°59'	+60'	178°	49°59'	+60'	178°	48°59'	+60'	178°	47°59'	+60'	179°	46°59'	+60'	179°	45°59'	+60'	179°	45°00'	+60'	179°	3
4	51°59'	+60'	178°	50°59'	+60'	178°	49°59'	+60'	178°	48°59'	+60'	178°	47°59'	+60'	179°	46°59'	+60'	179°	45°59'	+60'	179°	4
5	52°59'	+60'	178°	51°59'	+60'	178°	50°59'	+60'	178°	49°59'	+60'	178°	48°59'	+60'	178°	47°59'	+60'	179°	46°59'	+60'	179°	5
6	53°59'	+60'	178°	52°59'	+60'	178°	51°59'	+60'	178°	50°59'	+60'	178°	49°59'	+60'	178°	48°59'	+60'	178°	47°59'	+60'	179°	6
7	54°59'	+60'	178°	53°59'	+60'	178°	52°59'	+60'	178°	51°59'	+60'	178°	50°59'	+60'	178°	49°59'	+60'	178°	48°59'	+60'	178°	7
8	55°59'	+60'	178°	54°59'	+60'	178°	53°59'	+60'	178°	52°59'	+60'	178°	51°59'	+60'	178°	50°59'	+60'	178°	49°59'	+60'	178°	8
9	56°59'	+60'	178°	55°59'	+60'	178°	54°59'	+60'	178°	53°59'	+60'	178°	52°59'	+60'	178°	51°59'	+60'	178°	50°59'	+60'	178°	9
10	57°59'	+60'	178°	56°59'	+60'	178°	55°59'	+60'	178°	54°59'	+60'	178°	53°59'	+60'	178°	52°59'	+60'	178°	51°59'	+60'	178°	10
11	58°59'	+60'	178°	57°59'	+60'	178°	56°59'	+60'	178°	55°59'	+60'	178°	54°59'	+60'	178°	53°59'	+60'	178°	52°59'	+60'	178°	11
12	59°59'	+60'	178°	58°59'	+60'	178°	57°59'	+60'	178°	56°59'	+60'	178°	55°59'	+60'	178°	54°59'	+60'	178°	53°59'	+60'	178°	12
13	60°59'	+60'	178°	59°59'	+60'	178°	58°59'	+60'	178°	57°59'	+60'	178°	56°59'	+60'	178°	55°59'	+60'	178°	54°59'	+60'	178°	13
14	61°59'	+60'	178°	60°59'	+60'	178°	59°59'	+60'	178°	58°59'	+60'	178°	57°59'	+60'	178°	56°59'	+60'	178°	55°59'	+60'	178°	14
15	62°59'	+60'	178°	61°59'	+60'	178°	60°59'	+60'	178°	59°59'	+60'	178°	58°59'	+60'	178°	57°59'	+60'	178°	56°59'	+60'	178°	15
16	63°59'	+60'	178°	62°59'	+60'	178°	61°59'	+60'	178°	60°59'	+60'	178°	59°59'	+60'	178°	58°59'	+60'	178°	57°59'	+60'	178°	16
17	64°59'	+60'	178°	63°59'	+60'	178°	62°59'	+60'	178°	61°59'	+60'	178°	60°59'	+60'	178°	59°59'	+60'	178°	58°59'	+60'	178°	17
18	65°59'	+60'	178°	64°59'	+60'	178°	63°59'	+60'	178°	62°59'	+60'	178°	61°59'	+60'	178°	60°59'	+60'	178°	59°59'	+60'	178°	18
19	66°59'	+60'	178°	65°59'	+60'	178°	64°59'	+60'	178°	63°59'	+60'	178°	62°59'	+60'	178°	61°59'	+60'	178°	60°59'	+60'	178°	19
20	67°59'	+60'	177°	66°59'	+60'	178°	65°59'	+60'	178°	64°59'	+60'	178°	63°59'	+60'	178°	62°59'	+60'	178°	61°59'	+60'	178°	20
21	68°59'	+60'	177°	67°59'	+60'	178°	66°59'	+60'	178°	65°59'	+60'	178°	64°59'	+60'	178°	63°59'	+60'	178°	62°59'	+60'	178°	21
22	69°59'	+60'	177°	68°59'	+60'	177°	67°59'	+60'	178°	66°59'	+60'	178°	65°59'	+60'	178°	64°59'	+60'	178°	63°59'	+60'	178°	22
23	70°59'	+60'	177°	69°59'	+60'	177°	68°59'	+60'	177°	67°59'	+60'	178°	66°59'	+60'	178°	65°59'	+60'	178°	64°59'	+60'	178°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

1° 359° LHA — Latitude SAME as Declination — 1° 359° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

2° 358° LHA — Latitude SAME as Declination — 2° 358° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	47°58'	+60'	177°	46°58'	+60'	177°	45°58'	+60'	177°	44°58'	+60'	177°	43°58'	+60'	177°	42°58'	+60'	177°	41°58'	+60'	177°	0
1	48°58'	+60'	177°	47°58'	+60'	177°	46°58'	+60'	177°	45°58'	+60'	177°	44°58'	+60'	177°	43°58'	+60'	177°	42°58'	+60'	177°	1
2	49°58'	+60'	177°	48°58'	+60'	177°	47°58'	+60'	177°	46°58'	+60'	177°	45°58'	+60'	177°	44°58'	+60'	177°	43°58'	+60'	177°	2
3	50°58'	+60'	177°	49°58'	+60'	177°	48°58'	+60'	177°	47°58'	+60'	177°	46°58'	+60'	177°	45°58'	+60'	177°	44°58'	+60'	177°	3
4	51°57'	+60'	177°	50°58'	+60'	177°	49°58'	+60'	177°	48°58'	+60'	177°	47°58'	+60'	177°	46°58'	+60'	177°	45°58'	+60'	177°	4
5	52°57'	+62'	177°	51°58'	+62'	177°	50°58'	+62'	177°	49°58'	+62'	177°	48°58'	+62'	177°	47°58'	+62'	177°	46°58'	+62'	177°	5
6	53°59'	+60'	178°	52°59'	+60'	178°	51°59'	+60'	178°	50°59'	+60'	178°	49°59'	+60'	178°	48°59'	+60'	178°	47°59'	+60'	179°	6
7	54°59'	+60'	178°	53°59'	+60'	178°	52°59'	+60'	178°	51°59'	+60'	178°	50°59'	+60'	178°	49°59'	+60'	178°	48°59'	+60'	178°	7
8	55°59'	+60'	178°	54°59'	+60'	178°	53°59'	+60'	178°	52°59'	+60'	178°	51°59'	+60'	178°	50°59'	+60'	178°	49°59'	+60'	178°	8
9	56°59'	+60'	178°	55°59'	+60'	178°	54°59'	+60'	178°	53°59'	+60'	178°	52°59'	+60'	178°	51°59'	+60'	178°	50°59'	+60'	178°	9
10	57°59'	+60'	178°	56°59'	+60'	178°	55°59'	+60'	178°	54°59'	+60'	178°	53°59'	+60'	178°	52°59'	+60'	178°	51°59'	+60'	178°	10
11	58°59'	+60'	178°	57°59'	+60'	178°	56°59'	+60'	178°	55°59'	+60'	178°	54°59'	+60'	178°	53°59'	+60'	178°	52°59'	+60'	178°	11
12	59°59'	+60'	178°	58°59'	+60'	178°	57°59'	+60'	178°	56°59'	+60'	178°	55°59'	+60'	178°	54°59'	+60'	178°	53°59'	+60'	178°	12
13	60°59'	+60'	178°	59°59'	+60'	178°	58°59'	+60'	178°	57°59'	+60'	178°	56°59'	+60'	178°	55°59'	+60'	178°	54°59'	+60'	178°	13
14	61°59'	+60'	178°	60°59'	+60'	178°	59°59'	+60'	178°	58°59'	+60'	178°	57°59'	+60'	178°	56°59'	+60'	178°	55°59'	+60'	178°	14
15	62°59'	+60'	178°	61°59'	+60'	178°	60°59'	+60'	178°	59°59'	+60'	178°	58°59'	+60'	178°	57°59'	+60'	178°	56°59'	+60'	178°	15
16	63°59'	+60'	178°	62°59'	+60'	178°	61°59'	+60'	178°	60°59'	+60'	178°	59°59'	+60'	178°	58°59'	+60'	178°	57°59'	+60'	178°	16
17	64°59'	+60'	178°	63°59'	+60'	178°	62°59'	+60'	178°	61°59'	+60'	178°	60°59'	+60'	178°	59°59'	+60'	178°	58°59'	+60'	178°	17
18	65°59'	+60'	178°	64°59'	+60'	178°	63°59'	+60'	178°	62°59'	+60'	178°	61°59'	+60'	178°	60°59'	+60'	178°	59°59'	+60'	178°	18
19	66°59'	+60'	178°	65°59'	+60'	178°	64°59'	+60'	178°	63°59'	+60'	178°	62°59'	+60'	178°	61°59'	+60'	178°	60°59'	+60'	178°	19
20	67°59'	+60'	177°	66°59'	+60'	178°	65°59'	+60'	178°	64°59'	+60'	178°	63°59'	+60'	178°	62°59'	+60'	178°	61°59'	+60'	178°	20
21	68°59'	+60'	177°	67°59'	+60'	178°	66°59'	+60'	178°	65°59'	+60'	178°	64°59'	+60'	178°	63°59'	+60'	178°	62°59'	+60'	178°	21
22	69°59'	+60'	177°	68°59'	+60'	177°	67°59'	+60'	178°	66°59'	+60'	178°	65°59'	+60'	178°	64°59'	+60'	178°	63°59'	+60'	178°	22
23	70°59'	+60'	177°	69°59'	+60'	177°	68°59'	+60'	177°	67°59'	+60'	178°	66°59'	+60'	178°	65°59'	+60'	178°	64°59'	+60'	178°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

2° 358° LHA — Latitude SAME as Declination — 2° 358° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

3° 357° LHA — Latitude SAME as Declination — 3° 357° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	47°55'	+60'	176°	46°55'	+60'	176°	45°55'	+60'	176°	44°55'	+60'	176°	43°55'	+60'	176°	42°56'	+60'	176°	41°56'	+60'	176°	0
1	48°55'	+60'	175°	47°55'	+60'	176°	46°55'	+60'	176°	45°55'	+60'	176°	44°55'	+60'	176°	43°56'	+60'	176°	42°56'	+60'	176°	1
2	49°55'	+60'	175°	48°55'	+60'	175°	47°55'	+60'	176°	46°55'	+60'	176°	45°55'	+60'	176°	44°55'	+60'	176°	43°56'	+60'	176°	2
3	50°54'	+60'	175°	49°55'	+60'	175°	48°55'	+60'	175°	47°55'	+60'	176°	46°55'	+60'	176°	45°55'	+60'	176°	44°56'	+60'	176°	3
4	51°54'	+60'	175°	50°55'	+60'	175°	49°55'	+60'	175°	48°55'	+60'	175°	47°55'	+60'	176°	46°55'	+60'	176°	45°55'	+60'	176°	4
5	52°54'	+60'	175°	51°54'	+60'	175°	50°55'	+60'	175°	49°55'	+60'	175°	48°55'	+60'	175°	47°55'	+60'	176°	46°55'	+60'	176°	5
6	53°54'	+60'	175°	52°54'	+60'	175°	51°55'	+60'	175°	50°55'	+60'	175°	49°55'	+60'	175°	48°55'	+60'	175°	47°55'	+60'	176°	6
7	54°54'	+60'	175°	53°54'	+60'	175°	52°54'	+60'	175°	51°55'	+60'	175°	50°55'	+60'	175°	49°55'	+60'	175°	48°55'	+60'	175°	7
8	55°54'	+60'	175°	54°54'	+60'	175°	53°54'	+60'	175°	52°55'	+60'	175°	51°55'	+60'	175°	50°55'	+60'	175°	49°55'	+60'	175°	8
9	56°54'	+60'	175°	55°54'	+60'	175°	54°54'	+60'	175°	53°54'	+60'	175°	52°55'	+60'	175°	51°55'	+60'	175°	50°55'	+60'	175°	9
10	57°54'	+60'	174°	56°54'	+60'	175°	55°54'	+60'	175°	54°54'	+60'	175°	53°55'	+60'	175°	52°55'	+60'	175°	51°55'	+60'	175°	10
11	58°53'	+60'	174°	57°54'	+60'	174°	56°54'	+60'	175°	55°54'	+60'	175°	54°54'	+60'	175°	53°55'	+60'	175°	52°55'	+60'	175°	11
12	59°53'	+60'	174°	58°53'	+60'	174°	57°54'	+60'	174°	56°54'	+60'	175°	55°54'	+60'	175°	54°55'	+60'	175°	53°55'	+60'	175°	12
13	60°53'	+60'	174°	59°53'	+60'	174°	58°54'	+60'	174°	57°54'	+60'	174°	56°54'	+60'	175°	55°54'	+60'	175°	54°55'	+60'	175°	13
14	61°53'	+60'	174°	60°53'	+60'	174°	59°53'	+60'	174°	58°54'	+60'	174°	57°54'	+60'	175°	56°54'	+60'	175°	55°55'	+60'	175°	14
15	62°53'	+60'	174°	61°53'	+60'	174°	60°53'	+60'	174°	59°54'	+60'	174°	58°54'	+60'	174°	57°54'	+60'	175°	56°54'	+60'	175°	15
16	63°52'	+60'	173°	62°53'	+60'	174°	61°53'	+60'	174°	60°53'	+60'	174°	59°54'	+60'	174°	58°54'	+60'	174°	57°54'	+60'	175°	16
17	64°52'	+60'	173°	63°53'	+60'	173°	62°53'	+60'	174°	61°53'	+60'	174°	60°54'	+60'	174°	59°54'	+60'	174°	58°54'	+60'	174°	17
18	65°52'	+60'	173°	64°52'	+60'	173°	63°53'	+60'	174°	62°53'	+60'	174°	61°53'	+60'	174°	60°54'	+60'	174°	59°54'	+60'	174°	18
19	66°52'	+60'	173°	65°52'	+60'	173°	64°52'	+60'	173°	63°53'	+60'	174°	62°53'	+60'	174°	61°54'	+60'	174°	60°54'	+60'	174°	19
20	67°51'	+60'	173°	66°52'	+60'	173°	65°52'	+60'	173°	64°53'	+60'	173°	63°53'	+60'	174°	62°53'	+60'	174°	61°54'	+60'	174°	20
21	68°51'	+60'	172°	67°51'	+60'	173°	66°52'	+60'	173°	65°52'	+60'	173°	64°53'	+60'	173°	63°53'	+60'	174°	62°54'	+60'	174°	21
22	69°51'	+60'	172°	68°51'	+60'	172°	67°52'	+60'	173°	66°52'	+60'	173°	65°53'	+60'	173°	64°53'	+60'	173°	63°53'	+60'	174°	22
23	70°50'	+60'	172°	69°51'	+60'	172°	68°51'	+60'	172°	67°52'	+60'	173°	66°52'	+60'	173°	65°53'	+60'	173°	64°53'	+60'	173°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

3° 357° LHA — Latitude SAME as Declination — 3° 357° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

4° 356° LHA — Latitude SAME as Declination — 4° 356° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	47°51'	+60'	174°	46°51'	+60'	174°	45°51'	+60'	174°	44°52'	+60'	174°	43°52'	+60'	174°	42°52'	+60'	175°	41°52'	+60'	175°	0
1	48°51'	+60'	174°	47°51'	+60'	174°	46°51'	+60'	174°	45°51'	+60'	174°	44°52'	+60'	174°	43°52'	+60'	174°	42°52'	+60'	175°	1
2	49°50'	+60'	174°	48°51'	+60'	174°	47°51'	+60'	174°	46°51'	+60'	174°	45°52'	+60'	174°	44°52'	+60'	174°	43°52'	+60'	174°	2
3	50°50'	+60'	174°	49°51'	+60'	174°	48°51'	+60'	174°	47°51'	+60'	174°	46°51'	+60'	174°	45°52'	+60'	174°	44°52'	+60'	174°	3
4	51°50'	+60'	174°	50°50'	+60'	174°	49°51'	+60'	174°	48°51'	+60'	174°	47°51'	+60'	174°	46°52'	+60'	174°	45°52'	+60'	174°	4
5	52°50'	+60'	173°	51°50'	+60'	174°	50°50'	+60'	174°	49°51'	+60'	174°	48°51'	+60'	174°	47°52'	+60'	174°	46°52'	+60'	174°	5
6	53°49'	+60'	173°	52°50'	+60'	173°	51°50'	+60'	174°	50°51'	+60'	174°	49°51'	+60'	174°	48°51'	+60'	174°	47°52'	+60'	174°	6
7	54°49'	+60'	173°	53°50'	+60'	173°	52°50'	+60'	173°	51°50'	+60'	174°	50°51'	+60'	174°	49°51'	+60'	174°	48°52'	+60'	174°	7
8	55°49'	+60'	173°	54°49'	+60'	173°	53°50'	+60'	173°	52°50'	+60'	173°	51°51'	+60'	174°	50°51'	+60'	174°	49°51'	+60'	174°	8
9	56°49'	+60'	173°	55°49'	+60'	173°	54°50'	+60'	173°	53°50'	+60'	173°	52°50'	+60'	173°	51°51'	+60'	174°	50°51'	+60'	174°	9
10	57°48'	+60'	173°	56°49'	+60'	173°	55°49'	+60'	173°	54°50'	+60'	173°	53°50'	+60'	173°	52°51'	+60'	173°	51°51'	+60'	174°	10
11	58°48'	+60'	172°	57°49'	+60'	173°	56°49'	+60'	173°	55°50'	+60'	173°	54°50'	+60'	173°	53°50'	+60'	173°	52°51'	+60'	173°	11
12	59°48'	+60'	172°	58°48'	+60'	172°	57°49'	+60'	173°	56°49'	+60'	173°	55°50'	+60'	173°	54°50'	+60'	173°	53°51'	+60'	173°	12
13	60°48'	+60'	172°	59°48'	+60'	172°	58°49'	+60'	172°	57°49'	+60'	173°	56°50'	+60'	173°	55°50'	+60'	173°	54°50'	+60'	173°	13
14	61°47'	+60'	172°	60°48'	+60'	172°	59°48'	+60'	172°	58°49'	+60'	172°	57°49'	+60'	173°	56°50'	+60'	173°	55°50'	+60'	173°	14
15	62°47'	+60'	172°	61°47'	+60'	172°	60°48'	+60'	172°	59°49'	+60'	172°	58°49'	+60'	173°	57°50'	+60'	173°	56°50'	+60'	173°	15
16	63°46'	+60'	171°	62°47'	+60'	172°	61°48'	+60'	172°	60°48'	+60'	172°	59°49'	+60'	172°	58°49'	+60'	173°	57°50'	+60'	173°	16
17	64°46'	+60'	171°	63°47'	+60'	171°	62°47'	+60'	172°	61°48'	+60'	172°	60°49'	+60'	172°	59°49'	+60'	172°	58°50'	+60'	173°	17
18	65°46'	+60'	171°	64°46'	+60'	171°	63°47'	+60'	171°	62°48'	+60'	172°	61°48'	+60'	172°	60°49'	+60'	172°	59°49'	+60'	172°	18
19	66°45'	+59'	170°	65°46'	+60'	171°	64°47'	+60'	171°	63°47'	+60'	171°	62°48'	+60'	172°	61°49'	+60'	172°	60°49'	+60'	172°	19
20	67°44'	+59'	170°	66°45'	+59'	170°	65°46'	+60'	171°	64°47'	+60'	171°	63°48'	+60'	171°	62°48'	+60'	172°	61°49'	+60'	172°	20
21	68°44'	+59'	170°	67°45'	+59'	170°	66°46'	+59'	170°	65°46'	+60'	171°	64°47'	+60'	171°	63°48'	+60'	172°	62°49'	+60'	172°	21
22	69°43'	+59'	169°	68°44'	+59'	170°	67°45'	+59'	170°	66°46'	+60'	171°	65°47'	+60'	171°	64°48'	+60'	171°	63°48'	+60'	172°	22
23	70°43'	+59'	169°	69°44'	+59'	169°	68°45'	+59'	170°	67°46'	+59'	170°	66°46'	+60'	171°	65°47'	+60'	171°	64°48'	+60'	171°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

4° 356° LHA — Latitude SAME as Declination — 4° 356° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

5° 355° LHA — Latitude SAME as Declination — 5° 355° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	47°46'	+60'	173°	46°46'	+60'	173°	45°46'	+60'	173°	44°47'	+60'	173°	43°47'	+60'	173°	42°48'	+60'	173°	41°48'	+60'	173°	0
1	48°45'	+60'	172°	47°46'	+60'	173°	46°46'	+60'	173°	45°47'	+60'	173°	44°47'	+60'	173°	43°48'	+60'	173°	42°48'	+60'	173°	1
2	49°45'	+60'	172°	48°45'	+60'	172°	47°46'	+60'	173°	46°46'	+60'	173°	45°47'	+60'	173°	44°47'	+60'	173°	43°48'	+60'	173°	2
3	50°45'	+60'	172°	49°45'	+60'	172°	48°46'	+60'	172°	47°46'	+60'	173°	46°47'	+60'	173°	45°47'	+60'	173°	44°48'	+60'	173°	3
4	51°44'	+60'	172°	50°45'	+60'	172°	49°45'	+60'	172°	48°46'	+60'	172°	47°46'	+60'	173°	46°47'	+60'	173°	45°47'	+60'	173°	4
5	52°44'	+60'	172°	51°45'	+60'	172°	50°45'	+60'	172°	49°46'	+60'	172°	48°46'	+60'	172°	47°47'	+60'	173°	46°47'	+60'	173°	5
6	53°44'	+60'	172°	52°44'	+60'	172°	51°45'	+60'	172°	50°45'	+60'	172°	49°46'	+60'	172°	48°47'	+60'	172°	47°47'	+60'	173°	6
7	54°43'	+60'	171°	53°44'	+60'	172°	52°45'	+60'	172°	51°45'	+60'	172°	50°46'	+60'	172°	49°46'	+60'	172°	48°47'	+60'	172°	7
8	55°43'	+60'	171°	54°44'	+60'	171°	53°44'	+60'	172°	52°45'	+60'	172°	51°45'	+60'	172°	50°46'	+60'	172°	49°47'	+60'	172°	8
9	56°42'	+60'	171°	55°43'	+60'	171°	54°44'	+60'	171°	53°45'	+60'	172°	52°45'	+60'	172°	51°46'	+60'	172°	50°46'	+60'	172°	9
10	57°42'	+60'	171°	56°43'	+60'	171°	55°43'	+60'	171°	54°44'	+60'	171°	53°45'	+60'	172°	52°45'	+60'	172°	51°46'	+60'	172°	10
11	58°42'	+60'	171°	57°42'	+60'	171°	56°43'	+60'	171°	55°44'	+60'	171°	54°44'	+60'	171°	53°45'	+60'	172°	52°46'	+60'	172°	11
12	59°41'	+59'	170°	58°42'	+60'	171°	57°43'	+60'	171°	56°43'	+60'	171°	55°44'	+60'	171°	54°45'	+60'	172°	53°45'	+60'	172°	12
13	60°41'	+59'	170°	59°41'	+60'	170°	58°42'	+60'	171°	57°43'	+60'	171°	56°44'	+60'	171°	55°45'	+60'	171°	54°45'	+60'	172°	13
14	61°40'	+59'	170°	60°41'	+59'	170°	59°42'	+60'	170°	58°43'	+60'	171°	57°43'	+60'	171°	56°44'	+60'	171°	55°45'	+60'	171°	14
15	62°39'	+59'	169°	61°40'	+59'	170°	60°41'	+59'	170°	59°42'	+60'	170°	58°43'	+60'	171°	57°44'	+60'	171°	56°45'	+60'	171°	15
16	63°39'	+59'	169°	62°40'	+59'	169°	61°41'	+59'	170°	60°42'	+60'	170°	59°43'	+60'	170°	58°43'	+60'	171°	57°44'	+60'	171°	16
17	64°38'	+59'	169°	63°39'	+59'	169°	62°40'	+59'	170°	61°41'	+59'	170°	60°42'	+60'	170°	59°43'	+60'	170°	58°44'	+60'	171°	17
18	65°37'	+59'	168°	64°39'	+59'	169°	63°40'	+59'	169°	62°41'	+59'	170°	61°42'	+59'	170°	60°43'	+60'	170°	59°43'	+60'	171°	18
19	66°37'	+59'	168°	65°38'	+59'	168°	64°39'	+59'	169°	63°40'	+59'	169°	62°41'	+59'	170°	61°42'	+60'	170°	60°43'	+60'	170°	19
20	67°36'	+59'	168°	66°37'	+59'	168°	65°38'	+59'	169°	64°40'	+59'	169°	63°41'	+59'	169°	62°42'	+59'	170°	61°43'	+60'	170°	20
21	68°35'	+59'	167°	67°36'	+59'	168°	66°38'	+59'	168°	65°39'	+59'	169°	64°40'	+59'	169°	63°41'	+59'	169°	62°42'	+59'	170°	21
22	69°34'	+59'	167°	68°35'	+59'	167°	67°37'	+59'	168°	66°38'	+59'	168°	65°39'	+59'	169°	64°41'	+59'	169°	63°42'	+59'	169°	22
23	70°33'	+59'	166°	69°35'	+59'	167°	68°36'	+59'	167°	67°37'	+59'	168°	66°39'	+59'	168°	65°40'	+59'	169°	64°41'	+59'	169°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

5° 355° LHA — Latitude SAME as Declination — 5° 355° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

6° 354° LHA — Latitude SAME as Declination — 6° 354° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	47°39'	+60'	171°	46°40'	+60'	171°	45°41'	+60'	171°	44°41'	+60'	172°	43°42'	+60'	172°	42°42'	+60'	172°	41°43'	+60'	172°	0
1	48°39'	+60'	171°	47°39'	+60'	171°	46°40'	+60'	171°	45°41'	+60'	171°	44°42'	+60'	172°	43°42'	+60'	172°	42°43'	+60'	172°	1
2	49°38'	+60'	171°	48°39'	+60'	171°	47°40'	+60'	171°	46°41'	+60'	171°	45°41'	+60'	171°	44°42'	+60'	172°	43°43'	+60'	172°	2
3	50°38'	+60'	171°	49°39'	+60'	171°	48°39'	+60'	171°	47°40'	+60'	171°	46°41'	+60'	171°	45°42'	+60'	171°	44°42'	+60'	172°	3
4	51°37'	+60'	170°	50°38'	+60'	171°	49°39'	+60'	171°	48°40'	+60'	171°	47°41'	+60'	171°	46°41'	+60'	171°	45°42'	+60'	171°	4
5	52°37'	+59'	170°	51°38'	+60'	170°	50°39'	+60'	171°	49°39'	+60'	171°	48°40'	+60'	171°	47°41'	+60'	171°	46°42'	+60'	171°	5
6	53°36'	+59'	170°	52°37'	+60'	170°	51°38'	+60'	170°	50°39'	+60'	171°	49°40'	+60'	171°	48°41'	+60'	171°	47°41'	+60'	171°	6
7	54°36'	+59'	170°	53°37'	+59'	170°	52°38'	+60'	170°	51°39'	+60'	170°	50°39'	+60'	171°	49°40'	+60'	171°	48°41'	+60'	171°	7
8	55°35'	+59'	169°	54°36'	+59'	170°	53°37'	+60'	170°	52°38'	+60'	170°	51°39'	+60'	170°	50°40'	+60'	171°	49°41'	+60'	171°	8
9	56°35'	+59'	169°	55°36'	+59'	169°	54°37'	+59'	170°	53°38'	+60'	170°	52°39'	+60'	170°	51°39'	+60'	170°	50°40'	+60'	171°	9
10	57°34'	+59'	169°	56°35'	+59'	169°	55°36'	+59'	170°	54°37'	+59'	170°	53°38'	+60'	170°	52°39'	+60'	170°	51°40'	+60'	170°	10
11	58°33'	+59'	169°	57°35'	+59'	169°	56°36'	+59'	169°	55°37'	+59'	170°	54°38'	+60'	170°	53°39'	+60'	170°	52°40'	+60'	170°	11
12	59°33'	+59'	168°	58°34'	+59'	169°	57°35'	+59'	169°	56°36'	+59'	169°	55°37'	+59'	170°	54°38'	+60'	170°	53°39'	+60'	170°	12
13	60°32'	+59'	168°	59°33'	+59'	168°	58°35'	+59'	169°	57°36'	+59'	169°	56°37'	+59'	169°	55°38'	+60'	170°	54°39'	+60'	170°	13
14	61°31'	+59'	168°	60°33'	+59'	168°	59°34'	+59'	168°	58°35'	+59'	169°	57°36'	+59'	169°	56°37'	+59'	169°	55°38'	+60'	170°	14
15	62°30'	+59'	167°	61°32'	+59'	168°	60°33'	+59'	168°	59°34'	+59'	168°	58°36'	+59'	169°	57°37'	+59'	169°	56°38'	+59'	169°	15
16	63°30'	+59'	167°	62°31'	+59'	167°	61°32'	+59'	168°	60°34'	+59'	168°	59°35'	+59'	169°	58°36'	+59'	169°	57°37'	+59'	169°	16
17	64°29'	+59'	167°	63°30'	+59'	167°	62°32'	+59'	167°	61°33'	+59'	168°	60°34'	+59'	168°	59°36'	+59'	169°	58°37'	+59'	169°	17
18	65°28'	+59'	166°	64°29'	+59'	167°	63°31'	+59'	167°	62°32'	+59'	168°	61°34'	+59'	168°	60°35'	+59'	168°	59°36'	+59'	169°	18
19	66°27'	+59'	166°	65°28'	+59'	166°	64°30'	+59'	167°	63°32'	+59'	167°	62°33'	+59'	168°	61°34'	+59'	168°	60°36'	+59'	168°	19
20	67°25'	+59'	165°	66°27'	+59'	166°	65°29'	+59'	166°	64°31'	+59'	167°	63°32'	+59'	167°	62°34'	+59'	168°	61°35'	+59'	168°	20
21	68°24'	+59'	165°	67°26'	+59'	165°	66°28'	+59'	166°	65°30'	+59'	166°	64°31'	+59'	167°	63°33'	+59'	167°	62°34'	+59'	168°	21
22	69°23'	+58'	164°	68°25'	+59'	165°	67°27'	+59'	165°	66°29'	+59'	166°	65°30'	+59'	166°	64°32'	+59'	167°	63°34'	+59'	167°	22
23	70°21'	+58'	163°	69°23'	+58'	164°	68°26'	+59'	165°	67°28'	+59'	165°	66°29'	+59'	166°	65°31'	+59'	167°	64°33'	+59'	167°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

6° 354° LHA — Latitude SAME as Declination — 6° 354° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

7° 353° LHA — Latitude SAME as Declination — 7° 353° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	47°32'	+59'	170°	46°33'	+59'	170°	45°34'	+60'	170°	44°34'	+60'	170°	43°35'	+60'	170°	42°36'	+60'	170°	41°37'	+60'	171°	0
1	48°31'	+59'	169°	47°32'	+59'	170°	46°33'	+60'	170°	45°34'	+60'	170°	44°35'	+60'	170°	43°36'	+60'	170°	42°37'	+60'	170°	1
2	49°31'	+59'	169°	48°32'	+59'	169°	47°33'	+59'	170°	46°34'	+60'	170°	45°34'	+60'	170°	44°35'	+60'	170°	43°36'	+60'	170°	2
3	50°30'	+59'	169°	49°31'	+59'	169°	48°32'	+59'	169°	47°33'	+59'	170°	46°34'	+60'	170°	45°35'	+60'	170°	44°36'	+60'	170°	3
4	51°29'	+59'	169°	50°30'	+59'	169°	49°32'	+59'	169°	48°33'	+59'	169°	47°34'	+60'	170°	46°35'	+60'	170°	45°35'	+60'	170°	4
5	52°29'	+59'	169°	51°30'	+59'	169°	50°31'	+59'	169°	49°32'	+59'	169°	48°33'	+59'	169°	47°34'	+60'	170°	46°35'	+60'	170°	5
6	53°28'	+59'	168°	52°29'	+59'	169°	51°30'	+59'	169°	50°32'	+59'	169°	49°33'	+59'	169°	48°34'	+60'	169°	47°35'	+60'	170°	6
7	54°27'	+59'	168°	53°29'	+59'	168°	52°30'	+59'	169°	51°31'	+59'	169°	50°32'	+59'	169°	49°33'	+59'	169°	48°34'	+60'	169°	7
8	55°27'	+59'	168°	54°28'	+59'	168°	53°29'	+59'	168°	52°30'	+59'	169°	51°32'	+59'	169°	50°33'	+59'	169°	49°34'	+60'	169°	8
9	56°26'	+59'	167°	55°27'	+59'	168°	54°28'	+59'	168°	53°30'	+59'	168°	52°31'	+59'	169°	51°32'	+59'	169°	50°33'	+59'	169°	9
10	57°25'	+59'	167°	56°26'	+59'	167°	55°28'	+59'	168°	54°29'	+59'	168°	53°30'	+59'	168°	52°32'	+59'	169°	51°33'	+59'	169°	10
11	58°24'	+59'	167°	57°26'	+59'	167°	56°27'	+59'	167°	55°28'	+59'	168°	54°30'	+59'	168°	53°31'	+59'	168°	52°32'	+59'	169°	11
12	59°23'	+59'	166°	58°25'	+59'	167°	57°26'	+59'	167°	56°28'	+59'	168°	55°29'	+59'	168°	54°30'	+59'	168°	53°32'	+59'	168°	12
13	60°22'	+59'	166°	59°24'	+59'	167°	58°25'	+59'	167°	57°27'	+59'	167°	56°28'	+59'	168°	55°30'	+59'	168°	54°31'	+59'	168°	13
14	61°21'	+59'	166°	60°23'	+59'	166°	59°25'	+59'	167°	58°26'	+59'	167°	57°28'	+59'	167°	56°29'	+59'	168°	55°30'	+59'	168°	14
15	62°20'	+59'	165°	61°22'	+59'	166°	60°24'	+59'	166°	59°25'	+59'	167°	58°27'	+59'	167°	57°28'	+59'	167°	56°30'	+59'	168°	15
16	63°19'	+59'	165°	62°21'	+59'	165°	61°23'	+59'	166°	60°24'	+59'	166°	59°26'	+59'	167°	58°28'	+59'	167°	57°29'	+59'	167°	16
17	64°17'	+59'	164°	63°20'	+59'	165°	62°22'	+59'	165°	61°23'	+59'	166°	60°25'	+59'	166°	59°27'	+59'	167°	58°28'	+59'	167°	17
18	65°16'	+59'	164°	64°18'	+59'	164°	63°20'	+59'	165°	62°22'	+59'	166°	61°24'	+59'	166°	60°26'	+59'	166°	59°28'	+59'	167°	18
19	66°15'	+58'	163°	65°17'	+59'	164°	64°19'	+59'	165°	63°21'	+59'	165°	62°23'	+59'	166°	61°25'	+59'	166°	60°27'	+59'	166°	19
20	67°13'	+58'	163°	66°16'	+58'	163°	65°18'	+59'	164°	64°20'	+59'	165°	63°22'	+59'	165°	62°24'	+59'	166°	61°26'	+59'	166°	20
21	68°11'	+58'	162°	67°14'	+58'	163°	66°17'	+58'	164°	65°19'	+59'	164°	64°21'	+59'	165°	63°23'	+59'	165°	62°25'	+59'	166°	21
22	69°09'	+58'	161°	68°12'	+58'	162°	67°15'	+58'	163°	66°18'	+59'	164°	65°20'	+59'	164°	64°22'	+59'	165°	63°24'	+59'	165°	22
23	70°07'	+58'	161°	69°11'	+58'	162°	68°13'	+58'	162°	67°16'	+58'	163°	66°19'	+59'	164°	65°21'	+59'	164°	64°23'	+59'	165°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

7° 353° LHA — Latitude SAME as Declination — 7° 353° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

8° 352° LHA — Latitude SAME as Declination — 8° 352° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	47°23'	+59'	168°	46°24'	+59'	168°	45°26'	+59'	169°	44°27'	+59'	169°	43°28'	+59'	169°	42°29'	+59'	169°	41°30'	+60'	169°	0
1	48°22'	+59'	168°	47°24'	+59'	168°	46°25'	+59'	168°	45°26'	+59'	169°	44°27'	+59'	169°	43°28'	+59'	169°	42°30'	+60'	169°	1
2	49°22'	+59'	168°	48°23'	+59'	168°	47°24'	+59'	168°	46°26'	+59'	168°	45°27'	+59'	169°	44°28'	+59'	169°	43°29'	+59'	169°	2
3	50°21'	+59'	167°	49°22'	+59'	168°	48°24'	+59'	168°	47°25'	+59'	168°	46°26'	+59'	168°	45°27'	+59'	169°	44°29'	+59'	169°	3
4	51°20'	+59'	167°	50°21'	+59'	167°	49°23'	+59'	168°	48°24'	+59'	168°	47°26'	+59'	168°	46°27'	+59'	168°	45°28'	+59'	169°	4
5	52°19'	+59'	167°	51°21'	+59'	167°	50°22'	+59'	167°	49°24'	+59'	168°	48°25'	+59'	168°	47°26'	+59'	168°	46°27'	+59'	168°	5
6	53°18'	+59'	167°	52°20'	+59'	167°	51°21'	+59'	167°	50°23'	+59'	167°	49°24'	+59'	168°	48°26'	+59'	168°	47°27'	+59'	168°	6
7	54°17'	+59'	166°	53°19'	+59'	167°	52°21'	+59'	167°	51°22'	+59'	167°	50°24'	+59'	167°	49°25'	+59'	168°	48°26'	+59'	168°	7
8	55°16'	+59'	166°	54°18'	+59'	166°	53°20'	+59'	167°	52°21'	+59'	167°	51°23'	+59'	167°	50°24'	+59'	168°	49°26'	+59'	168°	8
9	56°15'	+59'	166°	55°17'	+59'	166°	54°19'	+59'	166°	53°21'	+59'	167°	52°22'	+59'	167°	51°24'	+59'	167°	50°25'	+59'	168°	9
10	57°14'	+59'	165°	56°16'	+59'	166°	55°18'	+59'	166°	54°20'	+59'	166°	53°21'	+59'	167°	52°23'	+59'	167°	51°24'	+59'	167°	10
11	58°13'	+59'	165°	57°15'	+59'	165°	56°17'	+59'	166°	55°19'	+59'	166°	54°21'	+59'	166°	53°22'	+59'	167°	52°24'	+59'	167°	11
12	59°12'	+59'	165°	58°14'	+59'	165°	57°16'	+59'	165°	56°18'	+59'	166°	55°20'	+59'	166°	54°21'	+59'	166°	53°23'	+59'	167°	12
13	60°11'	+59'	164°	59°13'	+59'	165°	58°15'	+59'	165°	57°17'	+59'	165°	56°19'	+59'	166°	55°21'	+59'	166°	54°22'	+59'	167°	13
14	61°09'	+59'	164°	60°12'	+59'	164°	59°14'	+59'	165°	58°16'	+59'	165°	57°18'	+59'	166°	56°20'	+59'	166°	55°21'	+59'	166°	14
15	62°08'	+58'	163°	61°10'	+59'	164°	60°13'	+59'	164°	59°15'	+59'	165°	58°17'	+59'	165°	57°19'	+59'	166°	56°21'	+59'	166°	15
16	63°06'	+58'	163°	62°09'	+59'	163°	61°11'	+59'	164°	60°14'	+59'	164°	59°16'	+59'	165°	58°18'	+59'	165°	57°20'	+59'	166°	16
17	64°05'	+58'	162°	63°07'	+58'	163°	62°10'	+59'	163°	61°12'	+59'	164°	60°15'	+59'	164°	59°17'	+59'	165°	58°19'	+59'	165°	17
18	65°03'	+58'	162°	64°06'	+58'	162°	63°09'	+58'	163°	62°11'	+59'	164°	61°14'	+59'	164°	60°16'	+59'	165°	59°18'	+59'	165°	18
19	66°01'	+58'	161°	65°04'	+58'	162°	64°07'	+58'	162°	63°10'	+59'	163°	62°12'	+59'	164°	61°15'	+59'	164°	60°17'	+59'	165°	19
20	66°59'	+58'	160°	66°02'	+58'	161°	65°05'	+58'	162°	64°08'	+58'	163°	63°11'	+59'	163°	62°13'	+59'	164°	61°16'	+59'	164°	20
21	67°57'	+58'	160°	67°00'	+58'	161°	66°04'	+58'	161°	65°07'	+58'	162°	64°09'	+58'	163°	63°12'	+59'	163°	62°15'	+59'	164°	21
22	68°54'	+57'	159°	67°58'	+58'	160°	67°02'	+58'	161°	66°05'	+58'	161°	65°08'	+58'	162°	64°11'	+59'	163°	63°13'	+59'	163°	22
23	69°52'	+57'	158°	68°56'	+57'	159°	68°00'	+58'	160°	67°03'	+58'	161°	66°06'	+58'	162°	65°09'	+58'	162°	64°12'	+59'	163°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

8° 352° LHA — Latitude SAME as Declination — 8° 352° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

9° 351° LHA — Latitude SAME as Declination — 9° 351° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	47°13'	+59'	167°	46°15'	+59'	167°	45°16'	+59'	167°	44°18'	+59'	167°	43°19'	+59'	168°	42°21'	+59'	168°	41°22'	+59'	168°	0
1	48°12'	+59'	166°	47°14'	+59'	167°	46°16'	+59'	167°	45°17'	+59'	167°	44°19'	+59'	167°	43°20'	+59'	168°	42°21'	+59'	168°	1
2	49°12'	+59'	166°	48°13'	+59'	166°	47°15'	+59'	167°	46°16'	+59'	167°	45°18'	+59'	167°	44°19'	+59'	167°	43°21'	+59'	168°	2
3	50°11'	+59'	166°	49°12'	+59'	166°	48°14'	+59'	166°	47°16'	+59'	167°	46°17'	+59'	167°	45°19'	+59'	167°	44°20'	+59'	167°	3
4	51°10'	+59'	166°	50°11'	+59'	166°	49°13'	+59'	166°	48°15'	+59'	166°	47°16'	+59'	167°	46°18'	+59'	167°	45°20'	+59'	167°	4
5	52°08'	+59'	165°	51°10'	+59'	166°	50°12'	+59'	166°	49°14'	+59'	166°	48°16'	+59'	166°	47°17'	+59'	167°	46°19'	+59'	167°	5
6	53°07'	+59'	165°	52°09'	+59'	165°	51°11'	+59'	166°	50°13'	+59'	166°	49°15'	+59'	166°	48°17'	+59'	166°	47°18'	+59'	167°	6
7	54°06'	+59'	165°	53°08'	+59'	165°	52°10'	+59'	165°	51°12'	+59'	166°	50°14'	+59'	166°	49°16'	+59'	166°	48°17'	+59'	167°	7
8	55°05'	+59'	164°	54°07'	+59'	165°	53°09'	+59'	165°	52°11'	+59'	165°	51°13'	+59'	166°	50°15'	+59'	166°	49°17'	+59'	166°	8
9	56°04'	+59'	164°	55°06'	+59'	164°	54°08'	+59'	165°	53°10'	+59'	165°	52°12'	+59'	165°	51°14'	+59'	166°	50°16'	+59'	166°	9
10	57°02'	+59'	164°	56°05'	+59'	164°	55°07'	+59'	164°	54°09'	+59'	165°	53°11'	+59'	165°	52°13'	+59'	165°	51°15'	+59'	166°	10
11	58°01'	+58'	163°	57°03'	+59'	164°	56°06'	+59'	164°	55°08'	+59'	164°	54°10'	+59'	165°	53°12'	+59'	165°	52°14'	+59'	165°	11
12	58°59'	+58'	163°	58°02'	+59'	163°	57°05'	+59'	164°	56°07'	+59'	164°	55°09'	+59'	164°	54°11'	+59'	165°	53°13'	+59'	165°	12
13	59°58'	+58'	162°	59°01'	+58'	163°	58°03'	+59'	163°	57°06'	+59'	164°	56°08'	+59'	164°	55°10'	+59'	165°	54°12'	+59'	165°	13
14	60°56'	+58'	162°	59°59'	+58'	162°	59°02'	+59'	163°	58°04'	+59'	163°	57°07'	+59'	164°	56°09'	+59'	164°	55°11'	+59'	165°	14
15	61°54'	+58'	161°	60°57'	+58'	162°	60°00'	+58'	162°	59°03'	+59'	163°	58°06'	+59'	163°	57°08'	+59'	164°	56°10'	+59'	164°	15
16	62°52'	+58'	161°	61°56'	+58'	161°	60°59'	+58'	162°	60°02'	+58'	162°	59°04'	+59'	163°	58°07'	+59'	163°	57°09'	+59'	164°	16
17	63°50'	+58'	160°	62°54'	+58'	161°	61°57'	+58'	161°	61°00'	+58'	162°	60°03'	+59'	163°	59°06'	+59'	163°	58°08'	+59'	164°	17
18	64°48'	+58'	160°	63°52'	+58'	160°	62°55'	+58'	161°	61°58'	+58'	162°	61°01'	+58'	162°	60°04'	+59'	163°	59°07'	+59'	163°	18
19	65°46'	+57'	159°	64°50'	+58'	160°	63°53'	+58'	160°	62°57'	+58'	161°	62°00'	+58'	162°	61°03'	+58'	162°	60°06'	+59'	163°	19
20	66°43'	+57'	158°	65°47'	+58'	159°	64°51'	+58'	160°	63°55'	+58'	160°	62°58'	+58'	161°	62°01'	+58'	162°	61°04'	+59'	162°	20
21	67°40'	+57'	157°	66°45'	+57'	158°	65°49'	+58'	159°	64°53'	+58'	160°	63°56'	+58'	161°	63°00'	+58'	161°	62°03'	+58'	162°	21
22	68°37'	+57'	157°	67°42'	+57'	158°	66°47'	+57'	158°	65°51'	+58'	159°	64°54'	+58'	160°	63°58'	+58'	161°	63°01'	+58'	161°	22
23	69°34'	+56'	156°	68°39'	+57'	157°	67°44'	+57'	158°	66°48'	+57'	159°	65°52'	+58'	159°	64°56'	+58'	160°	63°59'	+58'	161°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

9° 351° LHA — Latitude SAME as Declination — 9° 351° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

10° 350° LHA — Latitude SAME as Declination — 10° 350° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	47°03'	+59'	165°	46°04'	+59'	166°	45°06'	+59'	166°	44°08'	+59'	166°	43°10'	+59'	166°	42°12'	+59'	166°	41°13'	+59'	167°	0
1	48°01'	+59'	165°	47°03'	+59'	165°	46°05'	+59'	166°	45°07'	+59'	166°	44°09'	+59'	166°	43°11'	+59'	166°	42°13'	+59'	166°	1
2	49°00'	+59'	165°	48°02'	+59'	165°	47°04'	+59'	165°	46°06'	+59'	166°	45°08'	+59'	166°	44°10'	+59'	166°	43°12'	+59'	166°	2
3	49°59'	+59'	164°	49°01'	+59'	165°	48°03'	+59'	165°	47°05'	+59'	165°	46°07'	+59'	166°	45°09'	+59'	166°	44°11'	+59'	166°	3
4	50°58'	+59'	164°	50°00'	+59'	164°	49°02'	+59'	165°	48°04'	+59'	165°	47°06'	+59'	165°	46°08'	+59'	166°	45°10'	+59'	166°	4
5	51°57'	+59'	164°	50°59'	+59'	164°	50°01'	+59'	164°	49°03'	+59'	165°	48°05'	+59'	165°	47°07'	+59'	165°	46°09'	+59'	166°	5
6	52°55'	+59'	163°	51°58'	+59'	164°	51°00'	+59'	164°	50°02'	+59'	164°	49°04'	+59'	165°	48°06'	+59'	165°	47°08'	+59'	165°	6
7	53°54'	+59'	163°	52°56'	+59'	163°	51°59'	+59'	164°	51°01'	+59'	164°	50°03'	+59'	164°	49°06'	+59'	165°	48°08'	+59'	165°	7
8	54°52'	+58'	163°	53°55'	+59'	163°	52°57'	+59'	163°	52°00'	+59'	164°	51°02'	+59'	164°	50°05'	+59'	164°	49°07'	+59'	165°	8
9	55°51'	+58'	162°	54°53'	+58'	163°	53°56'	+59'	163°	52°59'	+59'	163°	52°01'	+59'	164°	51°03'	+59'	164°	50°06'	+59'	164°	9
10	56°49'	+58'	162°	55°52'	+58'	162°	54°55'	+59'	163°	53°57'	+59'	163°	53°00'	+59'	163°	52°02'	+59'	164°	51°05'	+59'	164°	10
11	57°47'	+58'	161°	56°50'	+58'	162°	55°53'	+58'	162°	54°56'	+59'	163°	53°59'	+59'	163°	53°01'	+59'	164°	52°04'	+59'	164°	11
12	58°45'	+58'	161°	57°49'	+58'	161°	56°52'	+58'	162°	55°55'	+59'	162°	54°57'	+59'	163°	54°00'	+59'	163°	53°03'	+59'	164°	12
13	59°44'	+58'	160°	58°47'	+58'	161°	57°50'	+58'	161°	56°53'	+58'	162°	55°56'	+59'	162°	54°59'	+59'	163°	54°01'	+59'	163°	13
14	60°41'	+58'	160°	59°45'	+58'	160°	58°48'	+58'	161°	57°52'	+58'	162°	56°55'	+58'	162°	55°57'	+59'	162°	55°00'	+59'	163°	14
15	61°39'	+58'	159°	60°43'	+58'	160°	59°47'	+58'	161°	58°50'	+58'	161°	57°53'	+58'	162°	56°56'	+59'	162°	55°59'	+59'	163°	15
16	62°37'	+58'	159°	61°41'	+58'	159°	60°45'	+58'	160°	59°48'	+58'	161°	58°51'	+58'	161°	57°55'	+58'	162°	56°58'	+59'	162°	16
17	63°34'	+57'	158°	62°39'	+58'	159°	61°43'	+58'	159°	60°46'	+58'	160°	59°50'	+58'	161°	58°53'	+58'	161°	57°56'	+59'	162°	17
18	64°32'	+57'	157°	63°36'	+57'	158°	62°40'	+58'	159°	61°44'	+58'	160°	60°48'	+58'	160°	59°51'	+58'	161°	58°55'	+58'	161°	18
19	65°29'	+57'	157°	64°34'	+57'	158°	63°38'	+57'	158°	62°42'	+58'	159°	61°46'	+58'	160°	60°50'	+58'	160°	59°53'	+58'	161°	19
20	66°26'	+57'	156°	65°31'	+57'	157°	64°36'	+57'	158°	63°40'	+58'	158°	62°44'	+58'	159°	61°48'	+58'	160°	60°51'	+58'	160°	20
21	67°22'	+56'	155°	66°28'	+57'	156°	65°33'	+57'	157°	64°37'	+57'	158°	63°42'	+58'	159°	62°46'	+58'	159°	61°50'	+58'	160°	21
22	68°19'	+56'	154°	67°25'	+56'	155°	66°30'	+57'	156°	65°35'	+57'	157°	64°39'	+57'	158°	63°44'	+58'	159°	62°48'	+58'	159°	22
23	69°15'	+56'	153°	68°21'	+56'	154°	67°27'	+57'	155°	66°32'	+57'	156°	65°37'	+57'	157°	64°41'	+58'	158°	63°46'	+58'	159°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

10° 350° LHA — Latitude SAME as Declination — 10° 350° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

11° 349° LHA — Latitude SAME as Declination — 11° 349° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	46°51'	+59'	164°	45°53'	+59'	164°	44°55'	+59'	164°	43°57'	+59'	165°	43°00'	+59'	165°	42°02'	+59'	165°	41°04'	+59'	165°	0
1	47°49'	+59'	163°	46°52'	+59'	164°	45°54'	+59'	164°	44°56'	+59'	164°	43°59'	+59'	165°	43°01'	+59'	165°	42°03'	+59'	165°	1
2	48°48'	+59'	163°	47°50'	+59'	163°	46°53'	+59'	164°	45°55'	+59'	164°	44°57'	+59'	164°	44°00'	+59'	165°	43°02'	+59'	165°	2
3	49°46'	+59'	163°	48°49'	+59'	163°	47°52'	+59'	164°	46°54'	+59'	164°	45°56'	+59'	164°	44°59'	+59'	164°	44°01'	+59'	165°	3
4	50°45'	+58'	162°	49°48'	+59'	163°	48°50'	+59'	163°	47°53'	+59'	164°	46°55'	+59'	164°	45°58'	+59'	164°	45°00'	+59'	164°	4
5	51°43'	+58'	162°	50°46'	+58'	163°	49°49'	+59'	163°	48°52'	+59'	163°	47°54'	+59'	164°	46°57'	+59'	164°	45°59'	+59'	164°	5
6	52°42'	+58'	162°	51°45'	+58'	162°	50°48'	+59'	163°	49°50'	+59'	163°	48°53'	+59'	163°	47°55'	+59'	164°	46°58'	+59'	164°	6
7	53°40'	+58'	161°	52°43'	+58'	162°	51°46'	+58'	162°	50°49'	+59'	163°	49°52'	+59'	163°	48°54'	+59'	163°	47°57'	+59'	164°	7
8	54°38'	+58'	161°	53°42'	+58'	161°	52°45'	+58'	162°	51°48'	+59'	162°	50°50'	+59'	163°	49°53'	+59'	163°	48°56'	+59'	163°	8
9	55°36'	+58'	161°	54°40'	+58'	161°	53°43'	+58'	161°	52°46'	+58'	162°	51°49'	+59'	162°	50°52'	+59'	163°	49°54'	+59'	163°	9
10	56°34'	+58'	160°	55°38'	+58'	161°	54°41'	+58'	161°	53°44'	+58'	161°	52°48'	+59'	162°	51°50'	+59'	162°	50°53'	+59'	163°	10
11	57°32'	+58'	160°	56°36'	+58'	160°	55°40'	+58'	161°	54°43'	+58'	161°	53°46'	+58'	162°	52°49'	+59'	162°	51°52'	+59'	162°	11
12	58°30'	+58'	159°	57°34'	+58'	160°	56°38'	+58'	160°	55°41'	+58'	161°	54°44'	+58'	161°	53°48'	+58'	162°	52°51'	+59'	162°	12
13	59°28'	+58'	159°	58°32'	+58'	159°	57°36'	+58'	160°	56°39'	+58'	160°	55°43'	+58'	161°	54°46'	+58'	161°	53°49'	+59'	162°	13
14	60°25'	+57'	158°	59°30'	+58'	159°	58°34'	+58'	159°	57°38'	+58'	160°	56°41'	+58'	160°	55°45'	+58'	161°	54°48'	+58'	161°	14
15	61°23'	+57'	157°	60°27'	+57'	158°	59°32'	+58'	159°	58°36'	+58'	159°	57°39'	+58'	160°	56°43'	+58'	160°	55°46'	+58'	161°	15
16	62°20'	+57'	157°	61°25'	+57'	157°	60°29'	+58'	158°	59°33'	+58'	159°	58°37'	+58'	159°	57°41'	+58'	160°	56°45'	+58'	160°	16
17	63°17'	+57'	156°	62°22'	+57'	157°	61°27'	+57'	158°	60°31'	+58'	158°	59°35'	+58'	159°	58°39'	+58'	159°	57°43'	+58'	160°	17
18	64°14'	+57'	155°	63°19'	+57'	156°	62°24'	+57'	157°	61°29'	+57'	158°	60°33'	+58'	158°	59°37'	+58'	159°	58°41'	+58'	160°	18
19	65°11'	+56'	155°	64°16'	+57'	155°	63°21'	+57'	156°	62°26'	+57'	157°	61°31'	+58'	158°	60°35'	+58'	158°	59°39'	+58'	159°	19
20	66°07'	+56'	154°	65°13'	+56'	155°	64°18'	+57'	156°	63°24'	+57'	156°	62°28'	+57'	157°	61°33'	+58'	158°	60°37'	+58'	159°	20
21	67°03'	+56'	153°	66°09'	+56'	154°	65°15'	+57'	155°	64°21'	+57'	156°	63°26'	+57'	157°	62°31'	+57'	157°	61°35'	+58'	158°	21
22	67°59'	+55'	152°	67°05'	+56'	153°	66°12'	+56'	154°	65°18'	+57'	155°	64°23'	+57'	156°	63°28'	+57'	157°	62°33'	+58'	157°	22
23	68°54'	+55'	151°	68°01'	+55'	152°	67°08'	+56'	153°	66°14'	+56'	154°	65°20'	+57'	155°	64°25'	+57'	156°	63°30'	+57'	157°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

11° 349° LHA — Latitude SAME as Declination — 11° 349° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

12° 348° LHA — Latitude SAME as Declination — 12° 348° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	46°38'	+58'	162°	45°40'	+59'	163°	44°43'	+59'	163°	43°46'	+59'	163°	42°48'	+59'	164°	41°51'	+59'	164°	40°53'	+59'	164°	0
1	47°36'	+58'	162°	46°39'	+58'	162°	45°42'	+59'	163°	44°44'	+59'	163°	43°47'	+59'	163°	42°49'	+59'	164°	41°52'	+59'	164°	1
2	48°34'	+58'	162°	47°37'	+58'	162°	46°40'	+59'	162°	45°43'	+59'	163°	44°46'	+59'	163°	43°48'	+59'	163°	42°51'	+59'	164°	2
3	49°33'	+58'	161°	48°36'	+58'	162°	47°39'	+58'	162°	46°42'	+59'	162°	45°44'	+59'	163°	44°47'	+59'	163°	43°50'	+59'	163°	3
4	50°31'	+58'	161°	49°34'	+58'	161°	48°37'	+58'	162°	47°40'	+59'	162°	46°43'	+59'	162°	45°46'	+59'	163°	44°49'	+59'	163°	4
5	51°29'	+58'	161°	50°33'	+58'	161°	49°36'	+58'	161°	48°39'	+58'	162°	47°42'	+59'	162°	46°45'	+59'	162°	45°47'	+59'	163°	5
6	52°27'	+58'	160°	51°31'	+58'	161°	50°34'	+58'	161°	49°37'	+58'	161°	48°40'	+59'	162°	47°43'	+59'	162°	46°46'	+59'	162°	6
7	53°25'	+58'	160°	52°29'	+58'	160°	51°32'	+58'	161°	50°36'	+58'	161°	49°39'	+58'	161°	48°42'	+59'	162°	47°45'	+59'	162°	7
8	54°23'	+58'	159°	53°27'	+58'	160°	52°31'	+58'	160°	51°34'	+58'	161°	50°37'	+58'	161°	49°41'	+59'	161°	48°44'	+59'	162°	8
9	55°21'	+58'	159°	54°25'	+58'	159°	53°29'	+58'	160°	52°32'	+58'	160°	51°36'	+58'	161°	50°39'	+58'	161°	49°42'	+59'	161°	9
10	56°19'	+58'	158°	55°23'	+58'	159°	54°27'	+58'	159°	53°30'	+58'	160°	52°34'	+58'	160°	51°37'	+58'	161°	50°41'	+59'	161°	10
11	57°16'	+57'	158°	56°21'	+58'	158°	55°25'	+58'	159°	54°29'	+58'	159°	53°32'	+58'	160°	52°36'	+58'	160°	51°39'	+58'	161°	11
12	58°14'	+57'	157°	57°18'	+58'	158°	56°22'	+58'	158°	55°27'	+58'	159°	54°30'	+58'	159°	53°34'	+58'	160°	52°38'	+58'	160°	12
13	59°11'	+57'	157°	58°16'	+57'	157°	57°20'	+58'	158°	56°24'	+58'	159°	55°29'	+58'	159°	54°32'	+58'	160°	53°36'	+58'	160°	13
14	60°08'	+57'	156°	59°13'	+57'	157°	58°18'	+57'	157°	57°22'	+58'	158°	56°26'	+58'	159°	55°31'	+58'	159°	54°34'	+58'	160°	14
15	61°05'	+57'	155°	60°10'	+57'	156°	59°15'	+57'	157°	58°20'	+58'	158°	57°24'	+58'	158°	56°29'	+58'	159°	55°33'	+58'	159°	15
16	62°02'	+57'	155°	61°07'	+57'	156°	60°12'	+57'	156°	59°17'	+57'	157°	58°22'	+58'	158°	57°26'	+58'	158°	56°31'	+58'	159°	16
17	62°58'	+56'	154°	62°04'	+57'	155°	61°10'	+57'	156°	60°15'	+57'	156°	59°20'	+57'	157°	58°24'	+58'	158°	57°29'	+58'	158°	17
18	63°55'	+56'	153°	63°01'	+56'	154°	62°07'	+57'	155°	61°12'	+57'	156°	60°17'	+57'	156°	59°22'	+58'	157°	58°27'	+58'	158°	18
19	64°51'	+56'	152°	63°57'	+56'	153°	63°03'	+57'	154°	62°09'	+57'	155°	61°14'	+57'	156°	60°20'	+57'	157°	59°24'	+58'	157°	19
20	65°46'	+55'	152°	64°53'	+56'	153°	64°00'	+56'	154°	63°06'	+57'	154°	62°12'	+57'	155°	61°17'	+57'	156°	60°22'	+58'	157°	20
21	66°42'	+55'	151°	65°49'	+56'	152°	64°56'	+56'	153°	64°03'	+56'	154°	63°09'	+57'	155°	62°14'	+57'	155°	61°19'	+57'	156°	21
22	67°37'	+55'	150°	66°45'	+55'	151°	65°52'	+56'	152°	64°59'	+56'	153°	64°05'	+57'	154°	63°11'	+57'	155°	62°17'	+57'	156°	22
23	68°31'	+54'	148°	67°40'	+55'	150°	66°48'	+55'	151°	65°55'	+56'	152°	65°02'	+56'	153°	64°08'	+57'	154°	63°14'	+57'	155°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

12° 348° LHA — Latitude SAME as Declination — 12° 348° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

13° 347° LHA — Latitude SAME as Declination — 13° 347° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	46°24'	+58'	161°	45°27'	+58'	161°	44°30'	+58'	162°	43°33'	+59'	162°	42°36'	+59'	162°	41°39'	+59'	162°	40°41'	+59'	163°	0
1	47°22'	+58'	161°	46°25'	+58'	161°	45°28'	+58'	161°	44°31'	+58'	162°	43°35'	+59'	162°	42°37'	+59'	162°	41°40'	+59'	162°	1
2	48°20'	+58'	160°	47°23'	+58'	161°	46°27'	+58'	161°	45°30'	+58'	161°	44°33'	+59'	162°	43°36'	+59'	162°	42°39'	+59'	162°	2
3	49°18'	+58'	160°	48°22'	+58'	160°	47°25'	+58'	161°	46°28'	+58'	161°	45°32'	+58'	161°	44°35'	+59'	162°	43°38'	+59'	162°	3
4	50°16'	+58'	159°	49°20'	+58'	160°	48°23'	+58'	160°	47°27'	+58'	161°	46°30'	+58'	161°	45°33'	+59'	161°	44°36'	+59'	162°	4
5	51°14'	+58'	159°	50°18'	+58'	159°	49°21'	+58'	160°	48°25'	+58'	160°	47°28'	+58'	161°	46°32'	+58'	161°	45°35'	+59'	161°	5
6	52°12'	+58'	159°	51°16'	+58'	159°	50°19'	+58'	159°	49°23'	+58'	160°	48°27'	+58'	160°	47°30'	+58'	161°	46°34'	+59'	161°	6
7	53°09'	+58'	158°	52°13'	+58'	159°	51°17'	+58'	159°	50°21'	+58'	160°	49°25'	+58'	160°	48°29'	+58'	160°	47°32'	+58'	161°	7
8	54°07'	+57'	158°	53°11'	+58'	158°	52°15'	+58'	159°	51°19'	+58'	159°	50°23'	+58'	160°	49°27'	+58'	160°	48°31'	+58'	160°	8
9	55°04'	+57'	157°	54°09'	+58'	158°	53°13'	+58'	158°	52°17'	+58'	159°	51°21'	+58'	159°	50°25'	+58'	160°	49°29'	+58'	160°	9
10	56°02'	+57'	157°	55°06'	+57'	157°	54°11'	+58'	158°	53°15'	+58'	158°	52°19'	+58'	159°	51°23'	+58'	159°	50°27'	+58'	160°	10
11	56°59'	+57'	156°	56°04'	+57'	157°	55°09'	+57'	157°	54°13'	+58'	158°	53°17'	+58'	158°	52°22'	+58'	159°	51°26'	+58'	159°	11
12	57°56'	+57'	156°	57°01'	+57'	156°	56°06'	+57'	157°	55°11'	+58'	157°	54°15'	+58'	158°	53°20'	+58'	158°	52°24'	+58'	159°	12
13	58°53'	+57'	155°	57°58'	+57'	156°	57°03'	+57'	156°	56°08'	+57'	157°	55°13'	+58'	157°	54°18'	+58'	158°	53°22'	+58'	158°	13
14	59°49'	+56'	154°	58°55'	+57'	155°	58°01'	+57'	156°	57°06'	+57'	156°	56°11'	+58'	157°	55°15'	+58'	157°	54°20'	+58'	158°	14
15	60°46'	+56'	154°	59°52'	+57'	154°	58°58'	+57'	155°	58°03'	+57'	156°	57°08'	+57'	156°	56°13'	+58'	157°	55°18'	+58'	158°	15
16	61°42'	+56'	153°	60°48'	+56'	154°	59°55'	+57'	154°	59°00'	+57'	155°	58°06'	+57'	156°	57°11'	+57'	156°	56°16'	+58'	157°	16
17	62°38'	+56'	152°	61°45'	+56'	153°	60°51'	+56'	154°	59°57'	+57'	155°	59°03'	+57'	155°	58°08'	+57'	156°	57°13'	+58'	157°	17
18	63°34'	+55'	151°	62°41'	+56'	152°	61°48'	+56'	153°	60°54'	+57'	154°	60°00'	+57'	155°	59°06'	+57'	155°	58°11'	+57'	156°	18
19	64°29'	+55'	150°	63°37'	+56'	151°	62°44'	+56'	152°	61°51'	+56'	153°	60°57'	+57'	154°	60°03'	+57'	155°	59°08'	+57'	156°	19
20	65°24'	+55'	149°	64°32'	+55'	151°	63°40'	+56'	152°	62°47'	+56'	152°	61°54'	+56'	153°	61°00'	+57'	154°	60°06'	+57'	155°	20
21	66°19'	+54'	148°	65°28'	+55'	150°	64°36'	+55'	151°	63°43'	+56'	152°	62°50'	+56'	153°	61°57'	+57'	153°	61°03'	+57'	154°	21
22	67°14'	+54'	147°	66°23'	+55'	149°	65°31'	+55'	150°	64°39'	+56'	151°	63°46'	+56'	152°	62°53'	+56'	153°	62°00'	+57'	154°	22
23	68°07'	+53'	146°	67°17'	+54'	148°	66°26'	+55'	149°	65°34'	+55'	150°	64°42'	+56'	151°	63°50'	+56'	152°	62°56'	+57'	153°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

13° 347° LHA — Latitude SAME as Declination — 13° 347° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

14° 346° LHA — Latitude SAME as Declination — 14° 346° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	46°09'	+58'	160°	45°12'	+58'	160°	44°16'	+58'	160°	43°19'	+58'	161°	42°23'	+58'	161°	41°26'	+59'	161°	40°29'	+59'	161°	0
1	47°06'	+58'	159°	46°10'	+58'	160°	45°14'	+58'	160°	44°18'	+58'	160°	43°21'	+58'	161°	42°24'	+58'	161°	41°28'	+59'	161°	1
2	48°04'	+58'	159°	47°08'	+58'	159°	46°12'	+58'	160°	45°16'	+58'	160°	44°19'	+58'	160°	43°23'	+58'	161°	42°26'	+59'	161°	2
3	49°02'	+58'	158°	48°06'	+58'	159°	47°10'	+58'	159°	46°14'	+58'	160°	45°18'	+58'	160°	44°21'	+58'	160°	43°25'	+58'	161°	3
4	50°00'	+58'	158°	49°04'	+58'	158°	48°08'	+58'	159°	47°12'	+58'	159°	46°16'	+58'	160°	45°20'	+58'	160°	44°23'	+58'	160°	4
5	50°57'	+57'	158°	50°02'	+58'	158°	49°06'	+58'	158°	48°10'	+58'	159°	47°14'	+58'	159°	46°18'	+58'	160°	45°22'	+58'	160°	5
6	51°55'	+57'	157°	50°59'	+58'	158°	50°04'	+58'	158°	49°08'	+58'	158°	48°12'	+58'	159°	47°16'	+58'	159°	46°20'	+58'	160°	6
7	52°52'	+57'	157°	51°57'	+57'	157°	51°02'	+58'	158°	50°06'	+58'	158°	49°10'	+58'	158°	48°14'	+58'	159°	47°18'	+58'	159°	7
8	53°49'	+57'	156°	52°54'	+57'	157°	51°59'	+57'	157°	51°04'	+58'	158°	50°08'	+58'	158°	49°12'	+58'	158°	48°17'	+58'	159°	8
9	54°46'	+57'	156°	53°52'	+57'	156°	52°57'	+57'	157°	52°01'	+58'	157°	51°06'	+58'	158°	50°10'	+58'	158°	49°15'	+58'	159°	9
10	55°43'	+57'	155°	54°49'	+57'	156°	53°54'	+57'	156°	52°59'	+57'	157°	52°04'	+58'	157°	51°08'	+58'	158°	50°13'	+58'	158°	10
11	56°40'	+57'	154°	55°46'	+57'	155°	54°51'	+57'	156°	53°57'	+57'	156°	53°01'	+58'	157°	52°06'	+58'	157°	51°11'	+58'	158°	11
12	57°37'	+56'	154°	56°43'	+57'	154°	55°48'	+57'	155°	54°54'	+57'	156°	53°59'	+57'	156°	53°04'	+58'	157°	52°09'	+58'	157°	12
13	58°33'	+56'	153°	57°39'	+57'	154°	56°45'	+57'	155°	55°51'	+57'	155°	54°56'	+57'	156°	54°02'	+58'	156°	53°07'	+58'	157°	13
14	59°29'	+56'	152°	58°36'	+56'	153°	57°42'	+57'	154°	56°48'	+57'	155°	55°54'	+57'	155°	54°59'	+57'	156°	54°04'	+58'	156°	14
15	60°25'	+56'	152°	59°32'	+56'	153°	58°39'	+56'	153°	57°45'	+57'	154°	56°51'	+57'	155°	55°57'	+57'	155°	55°02'	+57'	156°	15
16	61°21'	+55'	151°	60°28'	+56'	152°	59°35'	+56'	153°	58°42'	+57'	153°	57°48'	+57'	154°	56°54'	+57'	155°	55°59'	+57'	155°	16
17	62°17'	+55'	150°	61°24'	+56'	151°	60°32'	+56'	152°	59°38'	+56'	153°	58°45'	+57'	154°	57°51'	+57'	154°	56°57'	+57'	155°	17
18	63°12'	+55'	149°	62°20'	+55'	150°	61°28'	+56'	151°	60°35'	+56'	152°	59°42'	+56'	153°	58°48'	+57'	154°	57°54'	+57'	154°	18
19	64°07'	+54'	148°	63°15'	+55'	149°	62°23'	+55'	150°	61°31'	+56'	151°	60°38'	+56'	152°	59°45'	+57'	153°	58°51'	+57'	154°	19
20	65°01'	+54'	147°	64°10'	+55'	149°	63°19'	+55'	150°	62°27'	+56'	151°	61°34'	+56'	151°	60°41'	+56'	152°	59°48'	+57'	153°	20
21	65°55'	+54'	146°	65°05'	+54'	148°	64°14'	+55'	149°	63°22'	+55'	150°	62°30'	+56'	151°	61°38'	+56'	152°	60°45'	+57'	152°	21
22	66°49'	+53'	145°	65°59'	+54'	147°	65°09'	+54'	148°	64°18'	+55'	149°	63°26'	+55'	150°	62°34'	+56'	151°	61°41'	+56'	152°	22
23	67°42'	+53'	144°	66°53'	+53'	145°	66°03'	+54'	147°	65°13'	+55'	148°	64°21'	+55'	149°	63°30'	+56'	150°	62°37'	+56'	151°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

14° 346° LHA — Latitude SAME as Declination — 14° 346° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

15° 345° LHA — Latitude SAME as Declination — 15° 345° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	45°53'	+58'	158°	44°57'	+58'	159°	44°01'	+58'	159°	43°05'	+58'	159°	42°09'	+58'	160°	41°12'	+58'	160°	40°16'	+58'	160°	0
1	46°50'	+58'	158°	45°55'	+58'	158°	44°59'	+58'	159°	44°03'	+58'	159°	43°07'	+58'	159°	42°11'	+58'	160°	41°14'	+58'	160°	1
2	47°48'	+57'	157°	46°52'	+58'	158°	45°57'	+58'	158°	45°01'	+58'	159°	44°05'	+58'	159°	43°09'	+58'	159°	42°13'	+58'	160°	2
3	48°45'	+57'	157°	47°50'	+58'	157°	46°54'	+58'	158°	45°59'	+58'	158°	45°03'	+58'	159°	44°07'	+58'	159°	43°11'	+58'	159°	3
4	49°42'	+57'	156°	48°47'	+57'	157°	47°52'	+58'	157°	46°57'	+58'	158°	46°01'	+58'	158°	45°05'	+58'	159°	44°09'	+58'	159°	4
5	50°40'	+57'	156°	49°45'	+57'	156°	48°50'	+58'	157°	47°54'	+58'	157°	46°59'	+58'	158°	46°03'	+58'	158°	45°07'	+58'	159°	5
6	51°37'	+57'	156°	50°42'	+57'	156°	49°47'	+57'	157°	48°52'	+58'	157°	47°57'	+58'	157°	47°01'	+58'	158°	46°06'	+58'	158°	6
7	52°34'	+57'	155°	51°39'	+57'	156°	50°45'	+57'	156°	49°50'	+57'	157°	48°54'	+58'	157°	47°59'	+58'	157°	47°04'	+58'	158°	7
8	53°31'	+57'	154°	52°36'	+57'	155°	51°42'	+57'	156°	50°47'	+57'	156°	49°52'	+58'	157°	48°57'	+58'	157°	48°02'	+58'	157°	8
9	54°27'	+57'	154°	53°33'	+57'	155°	52°39'	+57'	155°	51°44'	+57'	156°	50°50'	+57'	156°	49°55'	+58'	157°	49°00'	+58'	157°	9
10	55°24'	+56'	153°	54°30'	+57'	154°	53°36'	+57'	155°	52°42'	+57'	155°	51°47'	+57'	156°	50°52'	+58'	156°	49°57'	+58'	157°	10
11	56°20'	+56'	153°	55°27'	+56'	153°	54°33'	+57'	154°	53°39'	+57'	155°	52°45'	+57'	155°	51°50'	+57'	156°	50°55'	+58'	156°	11
12	57°16'	+56'	152°	56°23'	+56'	153°	55°30'	+57'	153°	54°36'	+57'	154°	53°42'	+57'	155°	52°47'	+57'	155°	51°53'	+58'	156°	12
13	58°12'	+56'	151°	57°19'	+56'	152°	56°26'	+56'	153°	55°33'	+57'	154°	54°39'	+57'	154°	53°45'	+57'	155°	52°50'	+57'	155°	13
14	59°08'	+55'	151°	58°16'	+56'	151°	57°23'	+56'	152°	56°29'	+57'	153°	55°36'	+57'	154°	54°42'	+57'	154°	53°48'	+57'	155°	14
15	60°04'	+55'	150°	59°11'	+56'	151°	58°19'	+56'	152°	57°26'	+56'	152°	56°33'	+57'	153°	55°39'	+57'	154°	54°45'	+57'	154°	15
16	60°59'	+55'	149°	60°07'	+55'	150°	59°15'	+56'	151°	58°22'	+56'	152°	57°29'	+56'	152°	56°36'	+57'	153°	55°42'	+57'	154°	16
17	61°54'	+55'	148°	61°02'	+55'	149°	60°11'	+56'	150°	59°18'	+56'	151°	58°26'	+56'	152°	57°33'	+57'	153°	56°39'	+57'	153°	17
18	62°48'	+54'	147°	61°58'	+55'	148°	61°06'	+55'	149°	60°14'	+56'	150°	59°22'	+56'	151°	58°29'	+56'	152°	57°36'	+57'	153°	18
19	63°43'	+54'	146°	62°52'	+54'	148°	62°01'	+55'	149°	61°10'	+55'	150°	60°18'	+56'	150°	59°26'	+56'	151°	58°33'	+57'	152°	19
20	64°36'	+53'	145°	63°47'	+54'	147°	62°56'	+55'	148°	62°05'	+55'	149°	61°14'	+56'	150°	60°22'	+56'	151°	59°29'	+56'	151°	20
21	65°30'	+53'	144°	64°41'	+54'	146°	63°51'	+54'	147°	63°00'	+55'	148°	62°09'	+55'	149°	61°18'	+56'	150°	60°26'	+56'	151°	21
22	66°23'	+52'	143°	65°34'	+53'	145°	64°45'	+54'	146°	63°55'	+54'	147°	63°04'	+55'	148°	62°13'	+55'	149°	61°22'	+56'	150°	22
23	67°15'	+52'	142°	66°27'	+53'	143°	65°39'	+53'	145°	64°49'	+54'	146°	63°59'	+55'	147°	63°09'	+55'	148°	62°17'	+56'	149°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

15° 345° LHA — Latitude SAME as Declination — 15° 345° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

16° 344° LHA — Latitude SAME as Declination — 16° 344° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	45°35'	+57'	157°	44°40'	+57'	157°	43°45'	+58'	158°	42°49'	+58'	158°	41°54'	+58'	158°	40°58'	+58'	159°	40°02'	+58'	159°	0
1	46°33'	+57'	156°	45°38'	+57'	157°	44°42'	+58'	157°	43°47'	+58'	158°	42°52'	+58'	158°	41°56'	+58'	158°	41°00'	+58'	159°	1
2	47°30'	+57'	156°	46°35'	+57'	156°	45°40'	+57'	157°	44°45'	+58'	157°	43°49'	+58'	158°	42°54'	+58'	158°	41°58'	+58'	158°	2
3	48°27'	+57'	155°	47°32'	+57'	156°	46°38'	+57'	156°	45°42'	+58'	157°	44°47'	+58'	157°	43°52'	+58'	158°	42°56'	+58'	158°	3
4	49°24'	+57'	155°	48°30'	+57'	155°	47°35'	+57'	156°	46°40'	+57'	156°	45°45'	+58'	157°	44°50'	+58'	157°	43°54'	+58'	158°	4
5	50°21'	+57'	155°	49°27'	+57'	155°	48°32'	+57'	155°	47°38'	+57'	156°	46°43'	+58'	156°	45°48'	+58'	157°	44°52'	+58'	157°	5
6	51°18'	+57'	154°	50°24'	+57'	155°	49°29'	+57'	155°	48°35'	+57'	156°	47°40'	+57'	156°	46°45'	+58'	156°	45°50'	+58'	157°	6
7	52°14'	+56'	153°	51°21'	+57'	154°	50°27'	+57'	155°	49°32'	+57'	155°	48°38'	+57'	156°	47°43'	+58'	156°	46°48'	+58'	156°	7
8	53°11'	+56'	153°	52°17'	+57'	153°	51°23'	+57'	154°	50°29'	+57'	155°	49°35'	+57'	155°	48°41'	+57'	156°	47°46'	+58'	156°	8
9	54°07'	+56'	152°	53°14'	+56'	153°	52°20'	+57'	154°	51°26'	+57'	154°	50°32'	+57'	155°	49°38'	+57'	155°	48°43'	+58'	156°	9
10	55°03'	+56'	152°	54°10'	+56'	152°	53°17'	+57'	153°	52°23'	+57'	154°	51°29'	+57'	154°	50°35'	+57'	155°	49°41'	+57'	155°	10
11	55°59'	+56'	151°	55°07'	+56'	152°	54°13'	+56'	152°	53°20'	+57'	153°	52°27'	+57'	154°	51°33'	+57'	154°	50°38'	+57'	155°	11
12	56°55'	+55'	150°	56°03'	+56'	151°	55°10'	+56'	152°	54°17'	+56'	152°	53°23'	+57'	153°	52°30'	+57'	154°	51°36'	+57'	154°	12
13	57°50'	+55'	150°	56°58'	+56'	150°	56°06'	+56'	151°	55°13'	+56'	152°	54°20'	+57'	153°	53°27'	+57'	153°	52°33'	+57'	154°	13
14	58°46'	+55'	149°	57°54'	+55'	150°	57°02'	+56'	151°	56°10'	+56'	151°	55°17'	+56'	152°	54°24'	+57'	153°	53°30'	+57'	153°	14
15	59°41'	+55'	148°	58°49'	+55'	149°	57°58'	+56'	150°	57°06'	+56'	151°	56°13'	+56'	151°	55°20'	+57'	152°	54°27'	+57'	153°	15
16	60°35'	+54'	147°	59°45'	+55'	148°	58°53'	+55'	149°	58°02'	+56'	150°	57°09'	+56'	151°	56°17'	+56'	151°	55°24'	+57'	152°	16
17	61°30'	+54'	146°	60°39'	+55'	147°	59°49'	+55'	148°	58°57'	+55'	149°	58°05'	+56'	150°	57°13'	+56'	151°	56°21'	+56'	152°	17
18	62°24'	+54'	146°	61°34'	+54'	147°	60°44'	+55'	148°	59°53'	+55'	149°	59°01'	+56'	149°	58°09'	+56'	150°	57°17'	+56'	151°	18
19	63°17'	+53'	145°	62°28'	+54'	146°	61°38'	+54'	147°	60°48'	+55'	148°	59°57'	+55'	149°	59°05'	+56'	150°	58°13'	+56'	150°	19
20	64°11'	+53'	144°	63°22'	+53'	145°	62°33'	+54'	146°	61°43'	+55'	147°	60°52'	+55'	148°	60°01'	+55'	149°	59°10'	+56'	150°	20
21	65°03'	+52'	142°	64°15'	+53'	144°	63°27'	+54'	145°	62°37'	+54'	146°	61°47'	+55'	147°	60°57'	+55'	148°	60°05'	+56'	149°	21
22	65°55'	+52'	141°	65°08'	+52'	143°	64°20'	+53'	144°	63°31'	+54'	145°	62°42'	+54'	146°	61°52'	+55'	147°	61°01'	+55'	148°	22
23	66°47'	+51'	140°	66°01'	+52'	141°	65°13'	+53'	143°	64°25'	+53'	144°	63°36'	+54'	145°	62°47'	+55'	146°	61°56'	+55'	147°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

16° 344° LHA — Latitude SAME as Declination — 16° 344° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

17° 343° LHA — Latitude SAME as Declination — 17° 343° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	45°17'	+57'	155°	44°23'	+57'	156°	43°28'	+57'	156°	42°33'	+58'	157°	41°38'	+58'	157°	40°42'	+58'	157°	39°47'	+58'	158°	0
1	46°14'	+57'	155°	45°20'	+57'	155°	44°25'	+57'	156°	43°30'	+57'	156°	42°35'	+58'	157°	41°40'	+58'	157°	40°45'	+58'	157°	1
2	47°11'	+57'	155°	46°17'	+57'	155°	45°23'	+57'	155°	44°28'	+57'	156°	43°33'	+58'	156°	42°38'	+58'	157°	41°43'	+58'	157°	2
3	48°08'	+57'	154°	47°14'	+57'	155°	46°20'	+57'	155°	45°25'	+57'	155°	44°31'	+57'	156°	43°36'	+58'	156°	42°41'	+58'	157°	3
4	49°05'	+57'	154°	48°11'	+57'	154°	47°17'	+57'	155°	46°23'	+57'	155°	45°28'	+57'	155°	44°33'	+58'	156°	43°39'	+58'	156°	4
5	50°01'	+56'	153°	49°08'	+57'	154°	48°14'	+57'	154°	47°20'	+57'	155°	46°25'	+57'	155°	45°31'	+57'	155°	44°36'	+58'	156°	5
6	50°58'	+56'	153°	50°04'	+57'	153°	49°11'	+57'	154°	48°17'	+57'	154°	47°23'	+57'	155°	46°28'	+57'	155°	45°34'	+58'	155°	6
7	51°54'	+56'	152°	51°01'	+56'	153°	50°07'	+57'	153°	49°14'	+57'	154°	48°20'	+57'	154°	47°26'	+57'	155°	46°32'	+57'	155°	7
8	52°50'	+56'	151°	51°57'	+56'	152°	51°04'	+56'	153°	50°11'	+57'	153°	49°17'	+57'	154°	48°23'	+57'	154°	47°29'	+57'	155°	8
9	53°46'	+56'	151°	52°53'	+56'	151°	52°01'	+56'	152°	51°07'	+57'	153°	50°14'	+57'	153°	49°20'	+57'	154°	48°26'	+57'	154°	9
10	54°42'	+55'	150°	53°49'	+56'	151°	52°57'	+56'	151°	52°04'	+56'	152°	51°11'	+57'	153°	50°17'	+57'	153°	49°24'	+57'	154°	10
11	55°37'	+55'	149°	54°45'	+56'	150°	53°53'	+56'	151°	53°00'	+56'	152°	52°08'	+57'	152°	51°14'	+57'	153°	50°21'	+57'	153°	11
12	56°32'	+55'	149°	55°41'	+55'	150°	54°49'	+56'	150°	53°57'	+56'	151°	53°04'	+56'	152°	52°11'	+57'	152°	51°18'	+57'	153°	12
13	57°27'	+55'	148°	56°36'	+55'	149°	55°45'	+56'	150°	54°53'	+56'	150°	54°00'	+56'	151°	53°08'	+57'	152°	52°15'	+57'	152°	13
14	58°22'	+54'	147°	57°31'	+55'	148°	56°40'	+55'	149°	55°49'	+56'	150°	54°57'	+56'	150°	54°04'	+56'	151°	53°12'	+57'	152°	14
15	59°17'	+54'	146°	58°26'	+55'	147°	57°36'	+55'	148°	56°44'	+55'	149°	55°53'	+56'	150°	55°01'	+56'	150°	54°08'	+56'	151°	15
16	60°11'	+54'	146°	59°21'	+54'	147°	58°31'	+55'	147°	57°40'	+55'	148°	56°49'	+56'	149°	55°57'	+56'	150°	55°05'	+56'	151°	16
17	61°05'	+53'	145°	60°15'	+54'	146°	59°25'	+54'	147°	58°35'	+55'	148°	57°44'	+55'	148°	56°53'	+56'	149°	56°01'	+56'	150°	17
18	61°58'	+53'	144°	61°09'	+54'	145°	60°20'	+54'	146°	59°30'	+55'	147°	58°39'	+55'	148°	57°49'	+56'	149°	56°57'	+56'	149°	18
19	62°51'	+53'	143°	62°03'	+53'	144°	61°14'	+54'	145°	60°25'	+54'	146°	59°35'	+55'	147°	58°44'	+55'	148°	57°53'	+56'	149°	19
20	63°43'	+52'	142°	62°56'	+53'	143°	62°08'	+53'	144°	61°19'	+54'	145°	60°29'	+54'	146°	59°39'	+55'	147°	58°49'	+55'	148°	20
21	64°35'	+51'	140°	63°49'	+52'	142°	63°01'	+53'	143°	62°13'	+54'	144°	61°24'	+54'	145°	60°34'	+55'	146°	59°44'	+55'	147°	21
22	65°27'	+51'	139°	64°41'	+52'	141°	63°54'	+52'	142°	63°06'	+53'	143°	62°18'	+54'	144°	61°29'	+54'	145°	60°39'	+55'	146°	22
23	66°18'	+50'	138°	65°33'	+51'	139°	64°47'	+52'	141°	64°00'	+53'	142°	63°12'	+53'	143°	62°23'	+54'	145°	61°34'	+55'	146°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

17° 343° LHA — Latitude SAME as Declination — 17° 343° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

18° 342° LHA — Latitude SAME as Declination — 18° 342° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	44°58'	+57'	154°	44°04'	+57'	155°	43°10'	+57'	155°	42°16'	+57'	155°	41°21'	+57'	156°	40°26'	+58'	156°	39°31'	+58'	156°	0
1	45°55'	+57'	154°	45°01'	+57'	154°	44°07'	+57'	155°	43°13'	+57'	155°	42°18'	+57'	155°	41°24'	+58'	156°	40°29'	+58'	156°	1
2	46°52'	+56'	153°	45°58'	+57'	154°	45°04'	+57'	154°	44°10'	+57'	154°	43°16'	+57'	155°	42°21'	+57'	155°	41°27'	+58'	156°	2
3	47°48'	+56'	153°	46°55'	+57'	153°	46°01'	+57'	154°	45°07'	+57'	154°	44°13'	+57'	154°	43°19'	+57'	155°	42°24'	+58'	155°	3
4	48°44'	+56'	152°	47°51'	+56'	153°	46°58'	+57'	153°	46°04'	+57'	154°	45°10'	+57'	154°	44°16'	+57'	155°	43°22'	+57'	155°	4
5	49°41'	+56'	152°	48°48'	+56'	152°	47°54'	+57'	153°	47°01'	+57'	153°	46°07'	+57'	154°	45°14'	+57'	154°	44°20'	+57'	155°	5
6	50°37'	+56'	151°	49°44'	+56'	152°	48°51'	+56'	152°	47°58'	+57'	153°	47°04'	+57'	153°	46°11'	+57'	154°	45°17'	+57'	154°	6
7	51°32'	+56'	150°	50°40'	+56'	151°	49°47'	+56'	152°	48°55'	+57'	152°	48°01'	+57'	153°	47°08'	+57'	153°	46°14'	+57'	154°	7
8	52°28'	+55'	150°	51°36'	+56'	150°	50°44'	+56'	151°	49°51'	+56'	152°	48°58'	+57'	152°	48°05'	+57'	153°	47°11'	+57'	153°	8
9	53°24'	+55'	149°	52°32'	+56'	150°	51°40'	+56'	151°	50°47'	+56'	151°	49°55'	+56'	152°	49°02'	+57'	152°	48°09'	+57'	153°	9
10	54°19'	+55'	149°	53°27'	+55'	149°	52°36'	+56'	150°	51°44'	+56'	151°	50°51'	+56'	151°	49°58'	+57'	152°	49°06'	+57'	152°	10
11	55°14'	+55'	148°	54°23'	+55'	149°	53°31'	+56'	149°	52°40'	+56'	150°	51°48'	+56'	151°	50°55'	+56'	151°	50°02'	+57'	152°	11
12	56°09'	+55'	147°	55°18'	+55'	148°	54°27'	+55'	149°	53°36'	+56'	149°	52°44'	+56'	150°	51°52'	+56'	151°	50°59'	+57'	151°	12
13	57°03'	+54'	146°	56°13'	+55'	147°	55°22'	+55'	148°	54°31'	+55'	149°	53°40'	+56'	149°	52°48'	+56'	150°	51°56'	+56'	151°	13
14	57°57'	+54'	146°	57°08'	+54'	146°	56°17'	+55'	147°	55°27'	+55'	148°	54°36'	+56'	149°	53°44'	+56'	150°	52°52'	+56'	150°	14
15	58°51'	+54'	145°	58°02'	+54'	146°	57°12'	+55'	147°	56°22'	+55'	147°	55°31'	+55'	148°	54°40'	+56'	149°	53°48'	+56'	150°	15
16	59°45'	+53'	144°	58°56'	+54'	145°	58°07'	+54'	146°	57°17'	+55'	147°	56°27'	+55'	147°	55°36'	+56'	148°	54°45'	+56'	149°	16
17	60°38'	+53'	143°	59°50'	+53'	144°	59°01'	+54'	145°	58°12'	+54'	146°	57°22'	+55'	147°	56°31'	+55'	148°	55°40'	+56'	148°	17
18	61°31'	+52'	142°	60°43'	+53'	143°	59°55'	+54'	144°	59°06'	+54'	145°	58°17'	+55'	146°	57°27'	+55'	147°	56°36'	+55'	148°	18
19	62°23'	+52'	141°	61°36'	+53'	142°	60°49'	+53'	143°	60°00'	+54'	144°	59°11'	+54'	145°	58°22'	+55'	146°	57°32'	+55'	147°	19
20	63°15'	+51'	140°	62°29'	+52'	141°	61°42'	+53'	142°	60°54'	+53'	143°	60°06'	+54'	144°	59°17'	+55'	145°	58°27'	+55'	146°	20
21	64°07'	+51'	139°	63°21'	+52'	140°	62°35'	+52'	141°	61°48'	+53'	142°	61°00'	+54'	143°	60°11'	+54'	145°	59°22'	+55'	146°	21
22	64°57'	+50'	137°	64°13'	+51'	139°	63°27'	+52'	140°	62°40'	+53'	141°	61°53'	+53'	143°	61°05'	+54'	144°	60°17'	+54'	145°	22
23	65°47'	+49'	136°	65°04'	+50'	138°	64°19'	+51'	139°	63°33'	+52'	140°	62°46'	+53'	142°	61°59'	+53'	143°	61°11'	+54'	144°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

18° 342° LHA — Latitude SAME as Declination — 18° 342° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

19° 341° LHA — Latitude SAME as Declination — 19° 341° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	44°38'	+56'	153°	43°45'	+57'	153°	42°51'	+57'	154°	41°57'	+57'	154°	41°03'	+57'	154°	40°09'	+57'	155°	39°15'	+58'	155°	0
1	45°35'	+56'	152°	44°42'	+56'	153°	43°48'	+57'	153°	42°54'	+57'	154°	42°01'	+57'	154°	41°07'	+57'	154°	40°12'	+57'	155°	1
2	46°31'	+56'	152°	45°38'	+56'	152°	44°45'	+57'	153°	43°51'	+57'	153°	42°58'	+57'	154°	42°04'	+57'	154°	41°10'	+57'	154°	2
3	47°27'	+56'	151°	46°34'	+56'	152°	45°41'	+56'	152°	44°48'	+57'	153°	43°55'	+57'	153°	43°01'	+57'	154°	42°07'	+57'	154°	3
4	48°23'	+56'	151°	47°31'	+56'	151°	46°38'	+56'	152°	45°45'	+57'	152°	44°52'	+57'	153°	43°58'	+57'	153°	43°05'	+57'	154°	4
5	49°19'	+56'	150°	48°27'	+56'	151°	47°34'	+56'	151°	46°41'	+56'	152°	45°48'	+57'	152°	44°55'	+57'	153°	44°02'	+57'	153°	5
6	50°15'	+55'	150°	49°23'	+56'	150°	48°30'	+56'	151°	47°38'	+56'	151°	46°45'	+57'	152°	45°52'	+57'	152°	44°59'	+57'	153°	6
7	51°10'	+55'	149°	50°18'	+56'	150°	49°26'	+56'	150°	48°34'	+56'	151°	47°42'	+56'	151°	46°49'	+57'	152°	45°56'	+57'	152°	7
8	52°05'	+55'	148°	51°14'	+55'	149°	50°22'	+56'	150°	49°30'	+56'	150°	48°38'	+56'	151°	47°46'	+57'	151°	46°53'	+57'	152°	8
9	53°00'	+55'	148°	52°09'	+55'	148°	51°18'	+56'	149°	50°26'	+56'	150°	49°35'	+56'	150°	48°42'	+56'	151°	47°50'	+57'	151°	9
10	53°55'	+55'	147°	53°05'	+55'	148°	52°14'	+55'	148°	51°22'	+56'	149°	50°31'	+56'	150°	49°39'	+56'	150°	48°46'	+57'	151°	10
11	54°50'	+54'	146°	54°00'	+55'	147°	53°09'	+55'	148°	52°18'	+55'	148°	51°27'	+56'	149°	50°35'	+56'	150°	49°43'	+56'	150°	11
12	55°44'	+54'	146°	54°54'	+54'	146°	54°04'	+55'	147°	53°13'	+55'	148°	52°22'	+56'	149°	51°31'	+56'	149°	50°39'	+56'	150°	12
13	56°38'	+54'	145°	55°49'	+54'	146°	54°59'	+55'	146°	54°09'	+55'	147°	53°18'	+55'	148°	52°27'	+56'	149°	51°36'	+56'	149°	13
14	57°32'	+53'	144°	56°43'	+54'	145°	55°54'	+54'	146°	55°04'	+55'	147°	54°14'	+55'	147°	53°23'	+56'	148°	52°32'	+56'	149°	14
15	58°25'	+53'	143°	57°37'	+54'	144°	56°48'	+54'	145°	55°59'	+55'	146°	55°09'	+55'	147°	54°18'	+55'	147°	53°28'	+56'	148°	15
16	59°18'	+53'	142°	58°30'	+53'	143°	57°42'	+54'	144°	56°53'	+54'	145°	56°04'	+55'	146°	55°14'	+55'	147°	54°23'	+56'	147°	16
17	60°11'	+52'	141°	59°24'	+53'	142°	58°36'	+53'	143°	57°47'	+54'	144°	56°58'	+54'	145°	56°09'	+55'	146°	55°19'	+55'	147°	17
18	61°03'	+52'	140°	60°16'	+52'	141°	59°29'	+53'	142°	58°41'	+54'	143°	57°53'	+54'	144°	57°04'	+55'	145°	56°14'	+55'	146°	18
19	61°55'	+51'	139°	61°09'	+52'	140°	60°22'	+53'	141°	59°35'	+53'	143°	58°47'	+54'	144°	57°58'	+54'	145°	57°09'	+55'	145°	19
20	62°46'	+51'	138°	62°01'	+51'	139°	61°15'	+52'	141°	60°28'	+53'	142°	59°41'	+53'	143°	58°53'	+54'	144°	58°04'	+55'	145°	20
21	63°37'	+50'	137°	62°52'	+51'	138°	62°07'	+52'	139°	61°21'	+52'	141°	60°34'	+53'	142°	59°47'	+54'	143°	58°59'	+54'	144°	21
22	64°27'	+49'	136°	63°43'	+50'	137°	62°59'	+51'	138°	62°14'	+52'	140°	61°27'	+53'	141°	60°41'	+53'	142°	59°53'	+54'	143°	22
23	65°16'	+49'	134°	64°33'	+50'	136°	63°50'	+51'	137°	63°05'	+51'	139°	62°20'	+52'	140°	61°34'	+53'	141°	60°47'	+54'	142°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

19° 341° LHA — Latitude SAME as Declination — 19° 341° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

20° 340° LHA — Latitude SAME as Declination — 20° 340° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	44°18'	+56'	151°	43°25'	+56'	152°	42°32'	+57'	152°	41°38'	+57'	153°	40°45'	+57'	153°	39°51'	+57'	154°	38°58'	+57'	154°	0
1	45°14'	+56'	151°	44°21'	+56'	151°	43°28'	+56'	152°	42°35'	+57'	152°	41°42'	+57'	153°	40°49'	+57'	153°	39°55'	+57'	154°	1
2	46°09'	+56'	150°	45°17'	+56'	151°	44°25'	+56'	151°	43°32'	+57'	152°	42°39'	+57'	152°	41°46'	+57'	153°	40°52'	+57'	153°	2
3	47°05'	+56'	150°	46°13'	+56'	150°	45°21'	+56'	151°	44°28'	+56'	151°	43°36'	+57'	152°	42°43'	+57'	152°	41°49'	+57'	153°	3
4	48°01'	+55'	149°	47°09'	+56'	150°	46°17'	+56'	150°	45°25'	+56'	151°	44°32'	+57'	151°	43°39'	+57'	152°	42°46'	+57'	152°	4
5	48°56'	+55'	149°	48°05'	+56'	149°	47°13'	+56'	150°	46°21'	+56'	150°	45°29'	+56'	151°	44°36'	+57'	151°	43°43'	+57'	152°	5
6	49°51'	+55'	148°	49°00'	+55'	149°	48°09'	+56'	149°	47°17'	+56'	150°	46°25'	+56'	150°	45°33'	+57'	151°	44°40'	+57'	151°	6
7	50°47'	+55'	148°	49°56'	+55'	148°	49°05'	+56'	149°	48°13'	+56'	149°	47°21'	+56'	150°	46°29'	+56'	150°	45°37'	+57'	151°	7
8	51°41'	+55'	147°	50°51'	+55'	148°	50°00'	+55'	148°	49°09'	+56'	149°	48°17'	+56'	149°	47°26'	+56'	150°	46°34'	+57'	150°	8
9	52°36'	+54'	146°	51°46'	+55'	147°	50°55'	+55'	148°	50°05'	+55'	148°	49°13'	+56'	149°	48°22'	+56'	149°	47°30'	+56'	150°	9
10	53°30'	+54'	146°	52°41'	+55'	146°	51°51'	+55'	147°	51°00'	+55'	148°	50°09'	+56'	148°	49°18'	+56'	149°	48°26'	+56'	149°	10
11	54°24'	+54'	145°	53°35'	+54'	146°	52°45'	+55'	146°	51°55'	+55'	147°	51°05'	+55'	148°	50°14'	+56'	148°	49°23'	+56'	149°	11
12	55°18'	+54'	144°	54°29'	+54'	145°	53°40'	+54'	146°	52°50'	+55'	146°	52°00'	+55'	147°	51°10'	+56'	148°	50°19'	+56'	148°	12
13	56°12'	+53'	143°	55°23'	+54'	144°	54°35'	+54'	145°	53°45'	+55'	146°	52°56'	+55'	146°	52°05'	+55'	147°	51°15'	+56'	148°	13
14	57°05'	+53'	142°	56°17'	+53'	143°	55°29'	+54'	144°	54°40'	+54'	145°	53°51'	+55'	146°	53°01'	+55'	147°	52°10'	+56'	147°	14
15	57°58'	+52'	141°	57°11'	+53'	142°	56°23'	+54'	143°	55°34'	+54'	144°	54°45'	+55'	145°	53°56'	+55'	146°	53°06'	+55'	147°	15
16	58°50'	+52'	141°	58°04'	+53'	142°	57°16'	+53'	143°	56°28'	+54'	143°	55°40'	+54'	144°	54°51'	+55'	145°	54°01'	+55'	146°	16
17	59°42'	+52'	140°	58°56'	+52'	141°	58°10'	+53'	142°	57°22'	+53'	143°	56°34'	+54'	144°	55°46'	+54'	144°	54°57'	+55'	145°	17
18	60°34'	+51'	139°	59°49'	+52'	140°	59°02'	+52'	141°	58°16'	+53'	142°	57°28'	+54'	143°	56°40'	+54'	144°	55°51'	+55'	145°	18
19	61°25'	+51'	137°	60°40'	+51'	139°	59°55'	+52'	140°	59°09'	+53'	141°	58°22'	+53'	142°	57°34'	+54'	143°	56°46'	+54'	144°	19
20	62°16'	+50'	136°	61°32'	+51'	138°	60°47'	+52'	139°	60°01'	+52'	140°	59°15'	+53'	141°	58°28'	+54'	142°	57°40'	+54'	143°	20
21	63°06'	+49'	135°	62°23'	+50'	136°	61°39'	+51'	138°	60°54'	+52'	139°	60°08'	+53'	140°	59°22'	+53'	141°	58°35'	+54'	142°	21
22	63°55'	+49'	134°	63°13'	+50'	135°	62°30'	+50'	137°	61°46'	+51'	138°	61°01'	+52'	139°	60°15'	+53'	140°	59°28'	+53'	141°	22
23	64°43'	+48'	132°	64°02'	+49'	134°	63°20'	+50'	135°	62°37'	+51'	137°	61°53'	+52'	138°	61°08'	+52'	139°	60°22'	+53'	140°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

20° 340° LHA — Latitude SAME as Declination — 20° 340° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

21° 339° LHA — Latitude SAME as Declination — 21° 339° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	43°56'	+56'	150°	43°04'	+56'	151°	42°11'	+56'	151°	41°19'	+56'	152°	40°26'	+57'	152°	39°33'	+57'	152°	38°40'	+57'	153°	0
1	44°52'	+56'	150°	44°00'	+56'	150°	43°07'	+56'	151°	42°15'	+56'	151°	41°22'	+57'	151°	40°30'	+57'	152°	39°37'	+57'	152°	1
2	45°47'	+55'	149°	44°55'	+56'	150°	44°04'	+56'	150°	43°11'	+56'	151°	42°19'	+56'	151°	41°26'	+57'	151°	40°34'	+57'	152°	2
3	46°42'	+55'	149°	45°51'	+56'	149°	44°59'	+56'	150°	44°08'	+56'	150°	43°15'	+56'	151°	42°23'	+57'	151°	41°30'	+57'	151°	3
4	47°38'	+55'	148°	46°47'	+55'	149°	45°55'	+56'	149°	45°04'	+56'	150°	44°12'	+56'	150°	43°20'	+56'	151°	42°27'	+57'	151°	4
5	48°33'	+55'	147°	47°42'	+55'	148°	46°51'	+55'	149°	46°00'	+56'	149°	45°08'	+56'	150°	44°16'	+56'	150°	43°24'	+57'	151°	5
6	49°27'	+55'	147°	48°37'	+55'	147°	47°46'	+55'	148°	46°55'	+56'	149°	46°04'	+56'	149°	45°12'	+56'	150°	44°21'	+56'	150°	6
7	50°22'	+54'	146°	49°32'	+55'	147°	48°42'	+55'	147°	47°51'	+55'	148°	47°00'	+56'	149°	46°09'	+56'	149°	45°17'	+56'	150°	7
8	51°17'	+54'	145°	50°27'	+55'	146°	49°37'	+55'	147°	48°46'	+55'	147°	47°56'	+56'	148°	47°05'	+56'	149°	46°13'	+56'	149°	8
9	52°11'	+54'	145°	51°21'	+54'	145°	50°32'	+55'	146°	49°42'	+55'	147°	48°51'	+55'	147°	48°01'	+56'	148°	47°10'	+56'	149°	9
10	53°05'	+54'	144°	52°16'	+54'	145°	51°27'	+55'	146°	50°37'	+55'	146°	49°47'	+55'	147°	48°56'	+56'	147°	48°06'	+56'	148°	10
11	53°58'	+53'	143°	53°10'	+54'	144°	52°21'	+54'	145°	51°32'	+55'	146°	50°42'	+55'	146°	49°52'	+55'	147°	49°02'	+56'	148°	11
12	54°52'	+53'	142°	54°04'	+54'	143°	53°15'	+54'	144°	52°26'	+54'	145°	51°37'	+55'	146°	50°47'	+55'	146°	49°57'	+56'	147°	12
13	55°45'	+53'	142°	54°57'	+53'	143°	54°09'	+54'	143°	53°21'	+54'	144°	52°32'	+55'	145°	51°43'	+55'	146°	50°53'	+55'	146°	13
14	56°37'	+52'	141°	55°50'	+53'	142°	55°03'	+53'	143°	54°15'	+54'	143°	53°27'	+54'	144°	52°38'	+55'	145°	51°48'	+55'	146°	14
15	57°30'	+52'	140°	56°43'	+53'	141°	55°57'	+53'	142°	55°09'	+54'	143°	54°21'	+54'	144°	53°33'	+55'	144°	52°44'	+55'	145°	15
16	58°22'	+51'	139°	57°36'	+52'	140°	56°50'	+53'	141°	56°03'	+53'	142°	55°15'	+54'	143°	54°27'	+54'	144°	53°39'	+55'	144°	16
17	59°13'	+51'	138°	58°28'	+52'	139°	57°42'	+52'	140°	56°56'	+53'	141°	56°09'	+54'	142°	55°21'	+54'	143°	54°33'	+55'	144°	17
18	60°04'	+50'	137°	59°20'	+51'	138°	58°35'	+52'	139°	57°49'	+53'	140°	57°03'	+53'	141°	56°15'	+54'	142°	55°28'	+54'	143°	18
19	60°54'	+50'	136°	60°11'	+51'	137°	59°27'	+51'	138°	58°42'	+52'	139°	57°56'	+53'	140°	57°09'	+53'	141°	56°22'	+54'	142°	19
20	61°44'	+49'	135°	61°02'	+50'	136°	60°18'	+51'	137°	59°34'	+52'	138°	58°48'	+52'	139°	58°03'	+53'	140°	57°16'	+54'	141°	20
21	62°34'	+49'	133°	61°52'	+50'	135°	61°09'	+50'	136°	60°25'	+51'	137°	59°41'	+52'	138°	58°56'	+53'	140°	58°10'	+53'	141°	21
22	63°22'	+48'	132°	62°41'	+49'	134°	62°00'	+50'	135°	61°17'	+51'	136°	60°33'	+51'	137°	59°48'	+52'	139°	59°03'	+53'	140°	22
23	64°10'	+47'	131°	63°30'	+48'	132°	62°49'	+49'	134°	62°07'	+50'	135°	61°24'	+51'	136°	60°40'	+52'	138°	59°56'	+52'	139°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

21° 339° LHA — Latitude SAME as Declination — 21° 339° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

22° 338° LHA — Latitude SAME as Declination — 22° 338° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	43°33'	+55'	149°	42°42'	+56'	149°	41°50'	+56'	150°	40°58'	+56'	150°	40°06'	+56'	151°	39°13'	+57'	151°	38°21'	+57'	151°	0
1	44°29'	+55'	148°	43°37'	+55'	149°	42°46'	+56'	149°	41°54'	+56'	150°	41°02'	+56'	150°	40°10'	+56'	151°	39°18'	+57'	151°	1
2	45°24'	+55'	148°	44°33'	+55'	148°	43°42'	+56'	149°	42°50'	+56'	149°	41°58'	+56'	150°	41°06'	+56'	150°	40°14'	+57'	151°	2
3	46°19'	+55'	147°	45°28'	+55'	148°	44°37'	+55'	148°	43°46'	+56'	149°	42°55'	+56'	149°	42°03'	+56'	150°	41°11'	+57'	150°	3
4	47°14'	+55'	147°	46°23'	+55'	147°	45°33'	+55'	148°	44°42'	+56'	148°	43°51'	+56'	149°	42°59'	+56'	149°	42°07'	+56'	150°	4
5	48°08'	+54'	146°	47°18'	+55'	147°	46°28'	+55'	147°	45°37'	+55'	148°	44°46'	+56'	148°	43°55'	+56'	149°	43°04'	+56'	149°	5
6	49°03'	+54'	145°	48°13'	+55'	146°	47°23'	+55'	147°	46°33'	+55'	147°	45°42'	+56'	148°	44°51'	+56'	148°	44°00'	+56'	149°	6
7	49°57'	+54'	145°	49°08'	+54'	145°	48°18'	+55'	146°	47°28'	+55'	147°	46°38'	+55'	147°	45°47'	+56'	148°	44°56'	+56'	148°	7
8	50°51'	+54'	144°	50°02'	+54'	145°	49°13'	+55'	145°	48°23'	+55'	146°	47°33'	+55'	147°	46°43'	+56'	147°	45°52'	+56'	148°	8
9	51°44'	+53'	143°	50°56'	+54'	144°	50°07'	+54'	145°	49°18'	+55'	145°	48°29'	+55'	146°	47°39'	+55'	147°	46°48'	+56'	147°	9
10	52°38'	+53'	143°	51°50'	+54'	143°	51°02'	+54'	144°	50°13'	+55'	145°	49°24'	+55'	145°	48°34'	+55'	146°	47°44'	+56'	147°	10
11	53°31'	+53'	142°	52°44'	+53'	143°	51°56'	+54'	143°	51°07'	+54'	144°	50°19'	+55'	145°	49°29'	+55'	146°	48°40'	+55'	146°	11
12	54°24'	+53'	141°	53°37'	+53'	142°	52°50'	+54'	143°	52°02'	+54'	143°	51°13'	+54'	144°	50°24'	+55'	145°	49°35'	+55'	146°	12
13	55°16'	+52'	140°	54°30'	+53'	141°	53°43'	+53'	142°	52°56'	+54'	143°	52°08'	+54'	144°	51°19'	+55'	144°	50°30'	+55'	145°	13
14	56°09'	+52'	139°	55°23'	+52'	140°	54°36'	+53'	141°	53°49'	+53'	142°	53°02'	+54'	143°	52°14'	+54'	144°	51°25'	+55'	144°	14
15	57°00'	+51'	138°	56°15'	+52'	139°	55°29'	+53'	140°	54°43'	+53'	141°	53°56'	+54'	142°	53°08'	+54'	143°	52°20'	+55'	144°	15
16	57°52'	+51'	137°	57°07'	+52'	138°	56°22'	+52'	139°	55°36'	+53'	140°	54°50'	+53'	141°	54°02'	+54'	142°	53°15'	+54'	143°	16
17	58°43'	+50'	136°	57°59'	+51'	137°	57°14'	+52'	139°	56°29'	+52'	140°	55°43'	+53'	141°	54°56'	+54'	141°	54°09'	+54'	142°	17
18	59°33'	+50'	135°	58°50'	+51'	136°	58°06'	+51'	138°	57°21'	+52'	139°	56°36'	+53'	140°	55°50'	+53'	141°	55°03'	+54'	142°	18
19	60°23'	+49'	134°	59°41'	+50'	135°	58°57'	+51'	137°	58°13'	+52'	138°	57°29'	+52'	139°	56°43'	+53'	140°	55°57'	+53'	141°	19
20	61°12'	+49'	133°	60°31'	+50'	134°	59°48'	+50'	136°	59°05'	+51'	137°	58°21'	+52'	138°	57°36'	+53'	139°	56°51'	+53'	140°	20
21	62°01'	+48'	132°	61°20'	+49'	133°	60°39'	+50'	134°	59°56'	+51'	136°	59°13'	+51'	137°	58°29'	+52'	138°	57°44'	+53'	139°	21
22	62°49'	+47'	131°	62°09'	+48'	132°	61°29'	+49'	133°	60°47'	+50'	135°	60°04'	+51'	136°	59°21'	+52'	137°	58°36'	+52'	138°	22
23	63°36'	+46'	129°	62°57'	+47'	131°	62°18'	+49'	132°	61°37'	+50'	133°	60°55'	+50'	135°	60°12'	+51'	136°	59°29'	+52'	137°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

22° 338° LHA — Latitude SAME as Declination — 22° 338° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

23° 337° LHA — Latitude SAME as Declination — 23° 337° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	43°10'	+55'	148°	42°19'	+55'	148°	41°28'	+56'	149°	40°37'	+56'	149°	39°45'	+56'	149°	38°53'	+56'	150°	38°01'	+57'	150°	0
1	44°05'	+55'	147°	43°14'	+55'	148°	42°23'	+55'	148°	41°32'	+56'	149°	40°41'	+56'	149°	39°50'	+56'	149°	38°58'	+56'	150°	1
2	45°00'	+55'	146°	44°09'	+55'	147°	43°19'	+55'	148°	42°28'	+56'	148°	41°37'	+56'	149°	40°46'	+56'	149°	39°54'	+56'	149°	2
3	45°54'	+54'	146°	45°04'	+55'	146°	44°14'	+55'	147°	43°24'	+55'	148°	42°33'	+56'	148°	41°42'	+56'	148°	40°51'	+56'	149°	3
4	46°49'	+54'	145°	45°59'	+55'	146°	45°09'	+55'	146°	44°19'	+55'	147°	43°29'	+56'	148°	42°38'	+56'	148°	41°47'	+56'	148°	4
5	47°43'	+54'	145°	46°54'	+54'	145°	46°04'	+55'	146°	45°14'	+55'	146°	44°24'	+55'	147°	43°34'	+56'	148°	42°43'	+56'	148°	5
6	48°37'	+54'	144°	47°48'	+54'	145°	46°59'	+55'	145°	46°09'	+55'	146°	45°20'	+55'	146°	44°29'	+56'	147°	43°39'	+56'	148°	6
7	49°31'	+54'	143°	48°42'	+54'	144°	47°53'	+54'	145°	47°04'	+55'	145°	46°15'	+55'	146°	45°25'	+55'	146°	44°35'	+56'	147°	7
8	50°24'	+53'	143°	49°36'	+54'	143°	48°48'	+54'	144°	47°59'	+55'	145°	47°10'	+55'	145°	46°20'	+55'	146°	45°31'	+56'	146°	8
9	51°17'	+53'	142°	50°30'	+53'	143°	49°42'	+54'	143°	48°54'	+54'	144°	48°05'	+55'	145°	47°16'	+55'	145°	46°26'	+55'	146°	9
10	52°10'	+53'	141°	51°23'	+53'	142°	50°36'	+54'	143°	49°48'	+54'	143°	49°00'	+55'	144°	48°11'	+55'	145°	47°22'	+55'	145°	10
11	53°03'	+52'	140°	52°17'	+53'	141°	51°30'	+53'	142°	50°42'	+54'	143°	49°54'	+54'	143°	49°06'	+55'	144°	48°17'	+55'	145°	11
12	53°55'	+52'	140°	53°10'	+53'	140°	52°23'	+53'	141°	51°36'	+54'	142°	50°48'	+54'	143°	50°00'	+54'	144°	49°12'	+55'	144°	12
13	54°47'	+52'	139°	54°02'	+52'	140°	53°16'	+53'	140°	52°30'	+53'	141°	51°42'	+54'	142°	50°55'	+54'	143°	50°07'	+55'	144°	13
14	55°39'	+51'	138°	54°54'	+52'	139°	54°09'	+52'	140°	53°23'	+53'	141°	52°36'	+54'	141°	51°49'	+54'	142°	51°02'	+54'	143°	14
15	56°30'	+51'	137°	55°46'	+51'	138°	55°01'	+52'	139°	54°16'	+53'	140°	53°30'	+53'	141°	52°43'	+54'	141°	51°56'	+54'	142°	15
16	57°21'	+50'	136°	56°38'	+51'	137°	55°53'	+52'	138°	55°09'	+52'	139°	54°23'	+53'	140°	53°37'	+53'	141°	52°50'	+54'	142°	16
17	58°11'	+50'	135°	57°29'	+51'	136°	56°45'	+51'	137°	56°01'	+52'	138°	55°16'	+53'	139°	54°30'	+53'	140°	53°44'	+54'	141°	17
18	59°01'	+49'	134°	58°19'	+50'	135°	57°37'	+51'	136°	56°53'	+52'	137°	56°09'	+52'	138°	55°24'	+53'	139°	54°38'	+53'	140°	18
19	59°51'	+49'	133°	59°09'	+50'	134°	58°27'	+50'	135°	57°44'	+51'	136°	57°01'	+52'	137°	56°16'	+52'	138°	55°31'	+53'	139°	19
20	60°39'	+48'	131°	59°59'	+49'	133°	59°18'	+50'	134°	58°36'	+51'	135°	57°53'	+51'	136°	57°09'	+52'	137°	56°24'	+53'	138°	20
21	61°27'	+47'	130°	60°48'	+48'	132°	60°08'	+49'	133°	59°26'	+50'	134°	58°44'	+51'	135°	58°01'	+52'	136°	57°17'	+52'	138°	21
22	62°14'	+47'	129°	61°36'	+48'	130°	60°57'	+49'	132°	60°16'	+50'	133°	59°35'	+50'	134°	58°52'	+51'	136°	58°09'	+52'	137°	22
23	63°01'	+46'	128°	62°24'	+47'	129°	61°45'	+48'	131°	61°06'	+49'	132°	60°25'	+50'	133°	59°44'	+51'	134°	59°01'	+51'	136°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

23° 337° LHA — Latitude SAME as Declination — 23° 337° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

24° 336° LHA — Latitude SAME as Declination — 24° 336° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	42°45'	+55'	146°	41°55'	+55'	147°	41°05'	+55'	147°	40°14'	+56'	148°	39°23'	+56'	148°	38°32'	+56'	149°	37°41'	+56'	149°	0
1	43°40'	+54'	146°	42°50'	+55'	146°	42°00'	+55'	147°	41°10'	+55'	147°	40°19'	+56'	148°	39°28'	+56'	148°	38°37'	+56'	149°	1
2	44°34'	+54'	145°	43°45'	+55'	146°	42°55'	+55'	146°	42°05'	+55'	147°	41°15'	+56'	147°	40°24'	+56'	148°	39°33'	+56'	148°	2
3	45°29'	+54'	145°	44°40'	+54'	145°	43°50'	+55'	146°	43°00'	+55'	146°	42°10'	+55'	147°	41°20'	+56'	147°	40°29'	+56'	148°	3
4	46°23'	+54'	144°	45°34'	+54'	145°	44°45'	+55'	145°	43°56'	+55'	146°	43°06'	+55'	146°	42°16'	+56'	147°	41°25'	+56'	147°	4
5	47°17'	+54'	143°	46°28'	+54'	144°	45°40'	+54'	145°	44°50'	+55'	145°	44°01'	+55'	146°	43°11'	+55'	146°	42°21'	+56'	147°	5
6	48°10'	+53'	143°	47°22'	+54'	143°	46°34'	+54'	144°	45°45'	+55'	145°	44°56'	+55'	145°	44°07'	+55'	146°	43°17'	+56'	146°	6
7	49°04'	+53'	142°	48°16'	+54'	143°	47°28'	+54'	143°	46°40'	+54'	144°	45°51'	+55'	145°	45°02'	+55'	145°	44°13'	+55'	146°	7
8	49°57'	+53'	141°	49°10'	+53'	142°	48°22'	+54'	143°	47°34'	+54'	143°	46°46'	+55'	144°	45°57'	+55'	145°	45°08'	+55'	145°	8
9	50°49'	+53'	141°	50°03'	+53'	141°	49°16'	+54'	142°	48°28'	+54'	143°	47°40'	+54'	143°	46°52'	+55'	144°	46°03'	+55'	145°	9
10	51°42'	+52'	140°	50°56'	+53'	141°	50°09'	+53'	141°	49°22'	+54'	142°	48°35'	+54'	143°	47°47'	+55'	143°	46°58'	+55'	144°	10
11	52°34'	+52'	139°	51°49'	+52'	140°	51°03'	+53'	141°	50°16'	+53'	141°	49°29'	+54'	142°	48°41'	+54'	143°	47°53'	+55'	143°	11
12	53°26'	+52'	138°	52°41'	+52'	139°	51°56'	+53'	140°	51°09'	+53'	141°	50°23'	+54'	141°	49°36'	+54'	142°	48°48'	+55'	143°	12
13	54°18'	+51'	137°	53°33'	+52'	138°	52°48'	+52'	139°	52°03'	+53'	140°	51°16'	+53'	141°	50°30'	+54'	141°	49°43'	+54'	142°	13
14	55°09'	+51'	136°	54°25'	+51'	137°	53°41'	+52'	138°	52°56'	+53'	139°	52°10'	+53'	140°	51°24'	+54'	141°	50°37'	+54'	142°	14
15	55°59'	+50'	135°	55°16'	+51'	136°	54°33'	+52'	137°	53°48'	+52'	138°	53°03'	+53'	139°	52°17'	+53'	140°	51°31'	+54'	141°	15
16	56°50'	+50'	134°	56°07'	+51'	135°	55°24'	+51'	136°	54°40'	+52'	137°	53°56'	+52'	138°	53°11'	+53'	139°	52°25'	+54'	140°	16
17	57°39'	+49'	133°	56°58'	+50'	134°	56°15'	+51'	136°	55°32'	+51'	137°	54°48'	+52'	138°	54°04'	+53'	138°	53°18'	+53'	139°	17
18	58°29'	+49'	132°	57°48'	+50'	133°	57°06'	+50'	135°	56°24'	+51'	136°	55°40'	+52'	137°	54°56'	+52'	138°	54°12'	+53'	139°	18
19	59°17'	+48'	131°	58°37'	+49'	132°	57°56'	+50'	134°	57°15'	+51'	135°	56°32'	+51'	136°	55°49'	+52'	137°	55°05'	+53'	138°	19
20	60°05'	+47'	130°	59°26'	+48'	131°	58°46'	+49'	133°	58°05'	+50'	134°	57°23'	+51'	135°	56°41'	+52'	136°	55°57'	+52'	137°	20
21	60°53'	+47'	129°	60°15'	+48'	130°	59°36'	+49'	131°	58°55'	+50'	133°	58°14'	+50'	134°	57°32'	+51'	135°	56°49'	+52'	136°	21
22	61°39'	+46'	127°	61°02'	+47'	129°	60°24'	+48'	130°	59°45'	+49'	132°	59°05'	+50'	133°	58°23'	+51'	134°	57°41'	+51'	135°	22
23	62°25'	+45'	126°	61°49'	+46'	128°	61°12'	+47'	129°	60°34'	+48'	130°	59°54'	+49'	132°	59°14'	+50'	133°	58°33'	+51'	134°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

24° 336° LHA — Latitude SAME as Declination — 24° 336° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

25° 335° LHA — Latitude SAME as Declination — 25° 335° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	42°20'	+54'	145°	41°31'	+55'	146°	40°41'	+55'	146°	39°51'	+55'	147°	39°01'	+55'	147°	38°11'	+56'	147°	37°20'	+56'	148°	0
1	43°15'	+54'	145°	42°26'	+54'	145°	41°36'	+55'	146°	40°47'	+55'	146°	39°57'	+55'	147°	39°06'	+56'	147°	38°16'	+56'	147°	1
2	44°09'	+54'	144°	43°20'	+54'	145°	42°31'	+55'	145°	41°42'	+55'	146°	40°52'	+55'	146°	40°02'	+56'	147°	39°12'	+56'	147°	2
3	45°02'	+54'	143°	44°14'	+54'	144°	43°26'	+54'	144°	42°37'	+55'	145°	41°47'	+55'	146°	40°58'	+55'	146°	40°08'	+56'	146°	3
4	45°56'	+53'	143°	45°08'	+54'	143°	44°20'	+54'	144°	43°31'	+55'	144°	42°42'	+55'	145°	41°53'	+55'	146°	41°03'	+56'	146°	4
5	46°50'	+53'	142°	46°02'	+54'	143°	45°14'	+54'	143°	44°26'	+54'	144°	43°37'	+55'	144°	42°48'	+55'	145°	41°59'	+55'	146°	5
6	47°43'	+53'	141°	46°56'	+53'	142°	46°08'	+54'	143°	45°20'	+54'	143°	44°32'	+55'	144°	43°43'	+55'	144°	42°54'	+55'	145°	6
7	48°36'	+53'	141°	47°49'	+53'	141°	47°02'	+54'	142°	46°14'	+54'	143°	45°27'	+54'	143°	44°38'	+55'	144°	43°50'	+55'	144°	7
8	49°28'	+52'	140°	48°42'	+53'	141°	47°56'	+53'	141°	47°08'	+54'	142°	46°21'	+54'	143°	45°33'	+55'	143°	44°45'	+55'	144°	8
9	50°21'	+52'	139°	49°35'	+53'	140°	48°49'	+53'	141°	48°02'	+54'	141°	47°15'	+54'	142°	46°28'	+54'	143°	45°40'	+55'	143°	9
10	51°13'	+52'	138°	50°28'	+52'	139°	49°42'	+53'	140°	48°56'	+53'	141°	48°09'	+54'	141°	47°22'	+54'	142°	46°34'	+55'	143°	10
11	52°05'	+51'	138°	51°20'	+52'	138°	50°35'	+53'	139°	49°49'	+53'	140°	49°03'	+54'	141°	48°16'	+54'	141°	47°29'	+54'	142°	11
12	52°56'	+51'	137°	52°12'	+52'	138°	51°27'	+52'	138°	50°42'	+53'	139°	49°56'	+53'	140°	49°10'	+54'	141°	48°23'	+54'	141°	12
13	53°47'	+51'	136°	53°04'	+51'	137°	52°20'	+52'	138°	51°35'	+52'	138°	50°50'	+53'	139°	50°04'	+53'	140°	49°18'	+54'	141°	13
14	54°38'	+50'	135°	53°55'	+51'	136°	53°11'	+52'	137°	52°27'	+52'	138°	51°43'	+53'	139°	50°57'	+53'	139°	50°12'	+54'	140°	14
15	55°28'	+50'	134°	54°46'	+50'	135°	54°03'	+51'	136°	53°19'	+52'	137°	52°35'	+52'	138°	51°51'	+53'	139°	51°05'	+53'	139°	15
16	56°17'	+49'	133°	55°36'	+50'	134°	54°54'	+51'	135°	54°11'	+51'	136°	53°28'	+52'	137°	52°44'	+53'	138°	51°59'	+53'	139°	16
17	57°07'	+49'	132°	56°26'	+49'	133°	55°45'	+50'	134°	55°03'	+51'	135°	54°20'	+52'	136°	53°36'	+52'	137°	52°52'	+53'	138°	17
18	57°55'	+48'	131°	57°16'	+49'	132°	56°35'	+50'	133°	55°54'	+51'	134°	55°11'	+51'	135°	54°28'	+52'	136°	53°45'	+53'	137°	18
19	58°43'	+47'	130°	58°05'	+48'	131°	57°25'	+49'	132°	56°44'	+50'	133°	56°03'	+51'	134°	55°20'	+52'	135°	54°37'	+52'	136°	19
20	59°31'	+47'	128°	58°53'	+48'	130°	58°14'	+49'	131°	57°34'	+50'	132°	56°53'	+50'	133°	56°12'	+51'	134°	55°29'	+52'	135°	20
21	60°18'	+46'	127°	59°41'	+47'	129°	59°03'	+48'	130°	58°24'	+49'	131°	57°44'	+50'	132°	57°03'	+51'	133°	56°21'	+51'	135°	21
22	61°04'	+45'	126°	60°28'	+46'	127°	59°51'	+47'	129°	59°13'	+48'	130°	58°34'	+49'	131°	57°54'	+50'	133°	57°13'	+51'	134°	22
23	61°49'	+44'	125°	61°14'	+46'	126°	60°38'	+47'	127°	60°01'	+48'	129°	59°23'	+49'	130°	58°44'	+50'	131°	58°04'	+50'	133°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

25° 335° LHA — Latitude SAME as Declination — 25° 335° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

26° 334° LHA — Latitude SAME as Declination — 26° 334° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	41°54'	+54'	144°	41°06'	+54'	144°	40°17'	+55'	145°	39°28'	+55'	145°	38°38'	+55'	146°	37°48'	+55'	146°	36°58'	+56'	147°	0
1	42°48'	+54'	143°	42°00'	+54'	144°	41°11'	+54'	144°	40°22'	+55'	145°	39°33'	+55'	145°	38°44'	+55'	146°	37°54'	+56'	146°	1
2	43°42'	+53'	143°	42°54'	+54'	143°	42°06'	+54'	144°	41°17'	+55'	144°	40°28'	+55'	145°	39°39'	+55'	145°	38°50'	+56'	146°	2
3	44°35'	+53'	142°	43°48'	+54'	143°	43°00'	+54'	143°	42°12'	+54'	144°	41°23'	+55'	144°	40°34'	+55'	145°	39°45'	+55'	145°	3
4	45°29'	+53'	141°	44°42'	+53'	142°	43°54'	+54'	143°	43°06'	+54'	143°	42°18'	+55'	144°	41°29'	+55'	144°	40°41'	+55'	145°	4
5	46°22'	+53'	141°	45°35'	+53'	141°	44°48'	+54'	142°	44°00'	+54'	143°	43°13'	+54'	143°	42°24'	+55'	144°	41°36'	+55'	144°	5
6	47°14'	+53'	140°	46°28'	+53'	141°	45°42'	+53'	141°	44°54'	+54'	142°	44°07'	+54'	143°	43°19'	+55'	143°	42°31'	+55'	144°	6
7	48°07'	+52'	139°	47°21'	+53'	140°	46°35'	+53'	141°	45°48'	+54'	141°	45°01'	+54'	142°	44°14'	+54'	143°	43°26'	+55'	143°	7
8	48°59'	+52'	139°	48°14'	+52'	139°	47°28'	+53'	140°	46°42'	+53'	141°	45°55'	+54'	141°	45°08'	+54'	142°	44°21'	+55'	143°	8
9	49°51'	+52'	138°	49°06'	+52'	139°	48°21'	+53'	139°	47°35'	+53'	140°	46°49'	+54'	141°	46°02'	+54'	141°	45°15'	+54'	142°	9
10	50°43'	+51'	137°	49°59'	+52'	138°	49°14'	+52'	139°	48°29'	+53'	139°	47°43'	+53'	140°	46°57'	+54'	141°	46°10'	+54'	141°	10
11	51°34'	+51'	136°	50°50'	+52'	137°	50°06'	+52'	138°	49°21'	+53'	139°	48°36'	+53'	139°	47°50'	+54'	140°	47°04'	+54'	141°	11
12	52°25'	+51'	135°	51°42'	+51'	136°	50°58'	+52'	137°	50°14'	+52'	138°	49°29'	+53'	139°	48°44'	+53'	139°	47°58'	+54'	140°	12
13	53°15'	+50'	134°	52°33'	+51'	135°	51°50'	+51'	136°	51°06'	+52'	137°	50°22'	+53'	138°	49°37'	+53'	139°	48°52'	+54'	140°	13
14	54°06'	+50'	134°	53°24'	+50'	134°	52°42'	+51'	135°	51°58'	+52'	136°	51°15'	+52'	137°	50°30'	+53'	138°	49°46'	+53'	139°	14
15	54°55'	+49'	133°	54°14'	+50'	134°	53°33'	+51'	135°	52°50'	+51'	135°	52°07'	+52'	136°	51°23'	+53'	137°	50°39'	+53'	138°	15
16	55°44'	+49'	132°	55°04'	+49'	133°	54°23'	+50'	134°	53°41'	+51'	135°	52°59'	+52'	136°	52°16'	+52'	136°	51°32'	+53'	137°	16
17	56°33'	+48'	130°	55°54'	+49'	132°	55°13'	+50'	133°	54°32'	+51'	134°	53°50'	+51'	135°	53°08'	+52'	136°	52°25'	+52'	137°	17
18	57°21'	+48'	129°	56°43'	+48'	131°	56°03'	+49'	132°	55°23'	+50'	133°	54°42'	+51'	134°	54°00'	+51'	135°	53°17'	+52'	136°	18
19	58°09'	+47'	128°	57°31'	+48'	129°	56°52'	+49'	131°	56°13'	+50'	132°	55°32'	+50'	133°	54°51'	+51'	134°	54°09'	+52'	135°	19
20	58°56'	+46'	127°	58°19'	+47'	128°	57°41'	+48'	130°	57°02'	+49'	131°	56°23'	+50'	132°	55°42'	+51'	133°	55°01'	+51'	134°	20
21	59°42'	+45'	126°	59°06'	+47'	127°	58°29'	+48'	128°	57°51'	+48'	130°	57°13'	+49'	131°	56°33'	+50'	132°	55°52'	+51'	133°	21
22	60°27'	+45'	124°	59°53'	+46'	126°	59°17'	+47'	127°	58°40'	+48'	129°	58°02'	+49'	130°	57°23'	+50'	131°	56°43'	+50'	132°	22
23	61°12'	+44'	123°	60°38'	+45'	125°	60°04'	+46'	126°	59°28'	+47'	127°	58°51'	+48'	129°	58°13'	+49'	130°	57°34'	+50'	131°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

26° 334° LHA — Latitude SAME as Declination — 26° 334° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

27° 333° LHA — Latitude SAME as Declination — 27° 333° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	41°28'	+53'	143°	40°40'	+54'	143°	39°52'	+54'	144°	39°03'	+55'	144°	38°14'	+55'	145°	37°25'	+55'	145°	36°36'	+55'	146°	0
1	42°21'	+53'	142°	41°34'	+54'	143°	40°46'	+54'	143°	39°58'	+54'	144°	39°09'	+55'	144°	38°20'	+55'	145°	37°31'	+55'	145°	1
2	43°15'	+53'	141°	42°27'	+53'	142°	41°40'	+54'	143°	40°52'	+54'	143°	40°04'	+55'	144°	39°16'	+55'	144°	38°27'	+55'	145°	2
3	44°08'	+53'	141°	43°21'	+53'	141°	42°34'	+54'	142°	41°46'	+54'	143°	40°59'	+54'	143°	40°10'	+55'	144°	39°22'	+55'	144°	3
4	45°01'	+53'	140°	44°14'	+53'	141°	43°28'	+53'	141°	42°40'	+54'	142°	41°53'	+54'	143°	41°05'	+55'	143°	40°17'	+55'	144°	4
5	45°53'	+52'	139°	45°07'	+53'	140°	44°21'	+53'	141°	43°34'	+54'	141°	42°47'	+54'	142°	42°00'	+54'	143°	41°12'	+55'	143°	5
6	46°45'	+52'	139°	46°00'	+53'	139°	45°14'	+53'	140°	44°28'	+53'	141°	43°41'	+54'	141°	42°54'	+54'	142°	42°07'	+55'	143°	6
7	47°38'	+52'	138°	46°53'	+52'	139°	46°07'	+53'	139°	45°21'	+53'	140°	44°35'	+54'	141°	43°49'	+54'	141°	43°02'	+54'	142°	7
8	48°29'	+51'	137°	47°45'	+52'	138°	47°00'	+53'	139°	46°15'	+53'	139°	45°29'	+53'	140°	44°43'	+54'	141°	43°56'	+54'	141°	8
9	49°21'	+51'	137°	48°37'	+52'	137°	47°53'	+52'	138°	47°08'	+53'	139°	46°22'	+53'	139°	45°37'	+54'	140°	44°50'	+54'	141°	9
10	50°12'	+51'	136°	49°29'	+51'	137°	48°45'	+52'	137°	48°01'	+53'	138°	47°16'	+53'	139°	46°30'	+53'	139°	45°44'	+54'	140°	10
11	51°03'	+50'	135°	50°20'	+51'	136°	49°37'	+52'	137°	48°53'	+52'	137°	48°09'	+53'	138°	47°24'	+53'	139°	46°38'	+54'	140°	11
12	51°53'	+50'	134°	51°11'	+51'	135°	50°29'	+51'	136°	49°45'	+52'	137°	49°01'	+52'	137°	48°17'	+53'	138°	47°32'	+53'	139°	12
13	52°43'	+50'	133°	52°02'	+50'	134°	51°20'	+51'	135°	50°37'	+52'	136°	49°54'	+52'	137°	49°10'	+53'	137°	48°26'	+53'	138°	13
14	53°33'	+49'	132°	52°52'	+50'	133°	52°11'	+51'	134°	51°29'	+51'	135°	50°46'	+52'	136°	50°03'	+52'	137°	49°19'	+53'	137°	14
15	54°22'	+49'	131°	53°42'	+49'	132°	53°01'	+50'	133°	52°20'	+51'	134°	51°38'	+52'	135°	50°55'	+52'	136°	50°12'	+53'	137°	15
16	55°11'	+48'	130°	54°32'	+49'	131°	53°52'	+50'	132°	53°11'	+50'	133°	52°29'	+51'	134°	51°47'	+52'	135°	51°04'	+52'	136°	16
17	55°59'	+48'	129°	55°21'	+48'	130°	54°41'	+49'	131°	54°01'	+50'	132°	53°21'	+51'	133°	52°39'	+51'	134°	51°57'	+52'	135°	17
18	56°46'	+47'	128°	56°09'	+48'	129°	55°31'	+49'	130°	54°51'	+50'	131°	54°11'	+50'	132°	53°30'	+51'	133°	52°49'	+52'	134°	18
19	57°33'	+46'	127°	56°57'	+47'	128°	56°19'	+48'	129°	55°41'	+49'	130°	55°02'	+50'	132°	54°21'	+51'	133°	53°40'	+51'	134°	19
20	58°20'	+46'	126°	57°44'	+47'	127°	57°08'	+48'	128°	56°30'	+49'	129°	55°51'	+49'	131°	55°12'	+50'	132°	54°32'	+51'	133°	20
21	59°05'	+45'	124°	58°31'	+46'	126°	57°55'	+47'	127°	57°19'	+48'	128°	56°41'	+49'	130°	56°02'	+50'	131°	55°23'	+50'	132°	21
22	59°50'	+44'	123°	59°17'	+45'	125°	58°42'	+46'	126°	58°06'	+47'	127°	57°30'	+48'	128°	56°52'	+49'	130°	56°13'	+50'	131°	22
23	60°34'	+43'	122°	60°02'	+44'	123°	59°29'	+46'	125°	58°54'	+47'	126°	58°18'	+48'	127°	57°41'	+49'	129°	57°03'	+50'	130°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

27° 333° LHA — Latitude SAME as Declination — 27° 333° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

28° 332° LHA — Latitude SAME as Declination — 28° 332° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	41°00'	+53'	142°	40°13'	+54'	142°	39°26'	+54'	143°	38°38'	+54'	143°	37°50'	+55'	144°	37°02'	+55'	144°	36°13'	+55'	144°	0
1	41°54'	+53'	141°	41°07'	+53'	141°	40°20'	+54'	142°	39°32'	+54'	143°	38°44'	+54'	143°	37°56'	+55'	143°	37°08'	+55'	144°	1
2	42°46'	+53'	140°	42°00'	+53'	141°	41°13'	+54'	141°	40°26'	+54'	142°	39°39'	+54'	142°	38°51'	+55'	143°	38°03'	+55'	143°	2
3	43°39'	+52'	140°	42°53'	+53'	140°	42°07'	+53'	141°	41°20'	+54'	141°	40°33'	+54'	142°	39°46'	+54'	142°	38°58'	+55'	143°	3
4	44°32'	+52'	139°	43°46'	+53'	140°	43°00'	+53'	140°	42°14'	+54'	141°	41°27'	+54'	141°	40°40'	+54'	142°	39°53'	+55'	142°	4
5	45°24'	+52'	138°	44°39'	+52'	139°	43°53'	+53'	140°	43°07'	+53'	140°	42°21'	+54'	141°	41°35'	+54'	141°	40°48'	+55'	142°	5
6	46°16'	+52'	138°	45°31'	+52'	138°	44°46'	+53'	139°	44°01'	+53'	140°	43°15'	+54'	140°	42°29'	+54'	141°	41°42'	+54'	141°	6
7	47°07'	+51'	137°	46°23'	+52'	138°	45°39'	+52'	138°	44°54'	+53'	139°	44°09'	+53'	140°	43°23'	+54'	140°	42°36'	+54'	141°	7
8	47°59'	+51'	136°	47°15'	+52'	137°	46°31'	+52'	137°	45°47'	+53'	138°	45°02'	+53'	139°	44°16'	+54'	140°	43°31'	+54'	140°	8
9	48°50'	+51'	135°	48°07'	+51'	136°	47°23'	+52'	137°	46°39'	+52'	138°	45°55'	+53'	138°	45°10'	+53'	139°	44°25'	+54'	140°	9
10	49°40'	+50'	134°	48°58'	+51'	135°	48°15'	+52'	136°	47°32'	+52'	137°	46°48'	+53'	138°	46°03'	+53'	138°	45°18'	+54'	139°	10
11	50°31'	+50'	134°	49°49'	+51'	134°	49°07'	+51'	135°	48°24'	+52'	136°	47°40'	+52'	137°	46°56'	+53'	138°	46°12'	+53'	138°	11
12	51°21'	+50'	133°	50°40'	+50'	134°	49°58'	+51'	134°	49°16'	+51'	135°	48°33'	+52'	136°	47°49'	+53'	137°	47°05'	+53'	138°	12
13	52°10'	+49'	132°	51°30'	+50'	133°	50°49'	+51'	134°	50°07'	+51'	134°	49°25'	+52'	135°	48°42'	+52'	136°	47°58'	+53'	137°	13
14	52°59'	+49'	131°	52°20'	+49'	132°	51°40'	+50'	133°	50°58'	+51'	134°	50°17'	+51'	135°	49°34'	+52'	135°	48°51'	+53'	136°	14
15	53°48'	+48'	130°	53°09'	+49'	131°	52°30'	+50'	132°	51°49'	+50'	133°	51°08'	+51'	134°	50°26'	+52'	135°	49°44'	+52'	135°	15
16	54°36'	+48'	129°	53°58'	+48'	130°	53°19'	+49'	131°	52°40'	+50'	132°	51°59'	+51'	133°	51°18'	+51'	134°	50°36'	+52'	135°	16
17	55°24'	+47'	128°	54°47'	+48'	129°	54°09'	+49'	130°	53°30'	+50'	131°	52°50'	+50'	132°	52°09'	+51'	133°	51°28'	+52'	134°	17
18	56°11'	+46'	127°	55°35'	+47'	128°	54°57'	+48'	129°	54°19'	+49'	130°	53°40'	+50'	131°	53°00'	+51'	132°	52°20'	+51'	133°	18
19	56°57'	+46'	126°	56°22'	+47'	127°	55°46'	+48'	128°	55°08'	+49'	129°	54°30'	+49'	130°	53°51'	+50'	131°	53°11'	+51'	132°	19
20	57°43'	+45'	124°	57°09'	+46'	126°	56°33'	+47'	127°	55°57'	+48'	128°	55°19'	+49'	129°	54°41'	+50'	130°	54°02'	+50'	131°	20
21	58°28'	+44'	123°	57°55'	+45'	124°	57°20'	+46'	126°	56°45'	+47'	127°	56°08'	+48'	128°	55°31'	+49'	129°	54°52'	+50'	130°	21
22	59°13'	+43'	122°	58°40'	+45'	123°	58°07'	+46'	125°	57°32'	+47'	126°	56°57'	+48'	127°	56°20'	+49'	128°	55°42'	+50'	129°	22
23	59°56'	+43'	120°	59°25'	+44'	122°	58°53'	+45'	123°	58°19'	+46'	125°	57°45'	+47'	126°	57°09'	+48'	127°	56°32'	+49'	128°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

28° 332° LHA — Latitude SAME as Declination — 28° 332° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

29° 331° LHA — Latitude SAME as Declination — 29° 331° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	40°32'	+53'	140°	39°46'	+53'	141°	38°59'	+54'	141°	38°12'	+54'	142°	37°25'	+54'	142°	36°37'	+55'	143°	35°49'	+55'	143°	0
1	41°25'	+53'	140°	40°39'	+53'	140°	39°53'	+53'	141°	39°06'	+54'	141°	38°19'	+54'	142°	37°32'	+54'	142°	36°44'	+55'	143°	1
2	42°18'	+52'	139°	41°32'	+53'	140°	40°46'	+53'	140°	40°00'	+54'	141°	39°13'	+54'	141°	38°26'	+54'	142°	37°39'	+55'	142°	2
3	43°10'	+52'	138°	42°25'	+53'	139°	41°39'	+53'	140°	40°53'	+53'	140°	40°07'	+54'	141°	39°21'	+54'	141°	38°34'	+55'	142°	3
4	44°02'	+52'	138°	43°17'	+52'	138°	42°32'	+53'	139°	41°47'	+53'	140°	41°01'	+54'	140°	40°15'	+54'	141°	39°28'	+54'	141°	4
5	44°54'	+52'	137°	44°10'	+52'	138°	43°25'	+53'	138°	42°40'	+53'	139°	41°55'	+53'	140°	41°09'	+54'	140°	40°22'	+54'	141°	5
6	45°45'	+51'	136°	45°02'	+52'	137°	44°18'	+52'	138°	43°33'	+53'	138°	42°48'	+53'	139°	42°02'	+54'	140°	41°17'	+54'	140°	6
7	46°36'	+51'	136°	45°53'	+51'	136°	45°10'	+52'	137°	44°26'	+53'	138°	43°41'	+53'	138°	42°56'	+53'	139°	42°11'	+54'	140°	7
8	47°27'	+51'	135°	46°45'	+51'	136°	46°02'	+52'	136°	45°18'	+52'	137°	44°34'	+53'	138°	43°50'	+53'	138°	43°05'	+54'	139°	8
9	48°18'	+50'	134°	47°36'	+51'	135°	46°54'	+51'	136°	46°10'	+52'	136°	45°27'	+53'	137°	44°43'	+53'	138°	43°58'	+53'	138°	9
10	49°08'	+50'	133°	48°27'	+51'	134°	47°45'	+51'	135°	47°02'	+52'	136°	46°19'	+52'	136°	45°36'	+53'	137°	44°52'	+53'	138°	10
11	49°58'	+50'	132°	49°17'	+50'	133°	48°36'	+51'	134°	47°54'	+51'	135°	47°12'	+52'	136°	46°29'	+53'	136°	45°45'	+53'	137°	11
12	50°48'	+49'	131°	50°08'	+50'	132°	49°27'	+50'	133°	48°46'	+51'	134°	48°04'	+52'	135°	47°21'	+52'	136°	46°38'	+53'	136°	12
13	51°37'	+49'	130°	50°57'	+49'	131°	50°17'	+50'	132°	49°37'	+51'	133°	48°55'	+51'	134°	48°13'	+52'	135°	47°31'	+52'	136°	13
14	52°25'	+48'	130°	51°47'	+49'	131°	51°07'	+50'	131°	50°27'	+50'	132°	49°47'	+51'	133°	49°05'	+52'	134°	48°23'	+52'	135°	14
15	53°14'	+48'	129°	52°36'	+48'	130°	51°57'	+49'	131°	51°18'	+50'	132°	50°38'	+51'	132°	49°57'	+51'	133°	49°15'	+52'	134°	15
16	54°01'	+47'	128°	53°24'	+48'	129°	52°46'	+49'	130°	52°08'	+50'	131°	51°28'	+50'	132°	50°48'	+51'	132°	50°07'	+52'	133°	16
17	54°48'	+47'	126°	54°12'	+47'	128°	53°35'	+48'	129°	52°57'	+49'	130°	52°19'	+50'	131°	51°39'	+51'	132°	50°59'	+51'	133°	17
18	55°35'	+46'	125°	55°00'	+47'	127°	54°24'	+48'	128°	53°46'	+49'	129°	53°08'	+49'	130°	52°30'	+50'	131°	51°50'	+51'	132°	18
19	56°21'	+45'	124°	55°47'	+46'	125°	55°11'	+47'	127°	54°35'	+48'	128°	53°58'	+49'	129°	53°20'	+50'	130°	52°41'	+50'	131°	19
20	57°06'	+45'	123°	56°33'	+46'	124°	55°59'	+47'	125°	55°23'	+48'	127°	54°47'	+48'	128°	54°10'	+49'	129°	53°31'	+50'	130°	20
21	57°51'	+44'	122°	57°18'	+45'	123°	56°45'	+46'	124°	56°11'	+47'	126°	55°35'	+48'	127°	54°59'	+49'	128°	54°22'	+50'	129°	21
22	58°34'	+43'	120°	58°03'	+44'	122°	57°31'	+45'	123°	56°58'	+46'	124°	56°23'	+47'	126°	55°48'	+48'	127°	55°11'	+49'	128°	22
23	59°17'	+42'	119°	58°47'	+43'	121°	58°16'	+45'	122°	57°44'	+46'	123°	57°11'	+47'	125°	56°36'	+48'	126°	56°00'	+49'	127°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

29° 331° LHA — Latitude SAME as Declination — 29° 331° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

30° 330° LHA — Latitude SAME as Declination — 30° 330° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	40°04'	+52'	139°	39°18'	+53'	140°	38°32'	+53'	140°	37°46'	+54'	141°	36°59'	+54'	141°	36°12'	+54'	142°	35°25'	+55'	142°	0
1	40°56'	+52'	139°	40°11'	+53'	139°	39°25'	+53'	140°	38°39'	+53'	140°	37°53'	+54'	141°	37°06'	+54'	141°	36°20'	+55'	142°	1
2	41°48'	+52'	138°	41°03'	+52'	138°	40°18'	+53'	139°	39°33'	+53'	140°	38°47'	+54'	140°	38°01'	+54'	141°	37°14'	+54'	141°	2
3	42°40'	+52'	137°	41°56'	+52'	138°	41°11'	+53'	138°	40°26'	+53'	139°	39°40'	+53'	140°	38°55'	+54'	140°	38°08'	+54'	141°	3
4	43°32'	+51'	137°	42°48'	+52'	137°	42°04'	+52'	138°	41°19'	+53'	138°	40°34'	+53'	139°	39°48'	+54'	140°	39°03'	+54'	140°	4
5	44°23'	+51'	136°	43°40'	+52'	136°	42°56'	+52'	137°	42°12'	+53'	138°	41°27'	+53'	138°	40°42'	+53'	139°	39°57'	+54'	139°	5
6	45°14'	+51'	135°	44°31'	+51'	136°	43°48'	+52'	136°	43°04'	+52'	137°	42°20'	+53'	138°	41°36'	+53'	138°	40°51'	+54'	139°	6
7	46°05'	+51'	134°	45°23'	+51'	135°	44°40'	+52'	136°	43°57'	+52'	136°	43°13'	+53'	137°	42°29'	+53'	138°	41°44'	+54'	138°	7
8	46°55'	+50'	134°	46°14'	+51'	134°	45°32'	+51'	135°	44°49'	+52'	136°	44°06'	+52'	136°	43°22'	+53'	137°	42°38'	+53'	138°	8
9	47°46'	+50'	133°	47°05'	+50'	134°	46°23'	+51'	134°	45°41'	+52'	135°	44°58'	+52'	136°	44°15'	+53'	136°	43°31'	+53'	137°	9
10	48°35'	+49'	132°	47°55'	+50'	133°	47°14'	+51'	134°	46°32'	+51'	134°	45°50'	+52'	135°	45°08'	+52'	136°	44°24'	+53'	136°	10
11	49°25'	+49'	131°	48°45'	+50'	132°	48°05'	+50'	133°	47°24'	+51'	134°	46°42'	+52'	134°	46°00'	+52'	135°	45°17'	+53'	136°	11
12	50°14'	+49'	130°	49°35'	+49'	131°	48°55'	+50'	132°	48°15'	+51'	133°	47°34'	+51'	134°	46°52'	+52'	134°	46°10'	+52'	135°	12
13	51°03'	+48'	129°	50°24'	+49'	130°	49°45'	+50'	131°	49°05'	+50'	132°	48°25'	+51'	133°	47°44'	+52'	134°	47°02'	+52'	134°	13
14	51°51'	+48'	128°	51°13'	+48'	129°	50°35'	+49'	130°	49°56'	+50'	131°	49°16'	+51'	132°	48°35'	+51'	133°	47°54'	+52'	134°	14
15	52°38'	+47'	127°	52°02'	+48'	128°	51°24'	+49'	129°	50°46'	+50'	130°	50°07'	+50'	131°	49°27'	+51'	132°	48°46'	+52'	133°	15
16	53°26'	+47'	126°	52°50'	+48'	127°	52°13'	+48'	128°	51°35'	+49'	129°	50°57'	+50'	130°	50°18'	+51'	131°	49°38'	+51'	132°	16
17	54°12'	+46'	125°	53°37'	+47'	126°	53°01'	+48'	127°	52°24'	+49'	128°	51°47'	+49'	129°	51°08'	+50'	130°	50°29'	+51'	131°	17
18	54°58'	+45'	124°	54°24'	+46'	125°	53°49'	+47'	126°	53°13'	+48'	127°	52°36'	+49'	128°	51°58'	+50'	129°	51°20'	+50'	130°	18
19	55°44'	+45'	123°	55°11'	+46'	124°	54°36'	+47'	125°	54°01'	+48'	126°	53°25'	+49'	128°	52°48'	+49'	129°	52°10'	+50'	130°	19
20	56°28'	+44'	122°	55°56'	+45'	123°	55°23'	+46'	124°	54°49'	+47'	125°	54°14'	+48'	127°	53°37'	+49'	128°	53°00'	+50'	129°	20
21	57°12'	+43'	120°	56°41'	+44'	122°	56°09'	+45'	123°	55°36'	+46'	124°	55°02'	+47'	125°	54°26'	+48'	127°	53°50'	+49'	128°	21
22	57°56'	+42'	119°	57°26'	+44'	121°	56°55'	+45'	122°	56°22'	+46'	123°	55°49'	+47'	124°	55°15'	+48'	126°	54°39'	+49'	127°	22
23	58°38'	+42'	118°	58°09'	+43'	119°	57°39'	+44'	121°	57°08'	+45'	122°	56°36'	+46'	123°	56°02'	+47'	125°	55°28'	+48'	126°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

30° 330° LHA — Latitude SAME as Declination — 30° 330° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

31° 329° LHA — Latitude SAME as Declination — 31° 329° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	39°34'	+52'	138°	38°49'	+52'	139°	38°04'	+53'	139°	37°19'	+53'	140°	36°33'	+54'	140°	35°46'	+54'	141°	35°00'	+54'	141°	0
1	40°26'	+52'	137°	39°42'	+52'	138°	38°57'	+53'	139°	38°12'	+53'	139°	37°26'	+53'	140°	36°40'	+54'	140°	35°54'	+54'	141°	1
2	41°18'	+52'	137°	40°34'	+52'	137°	39°50'	+52'	138°	39°05'	+53'	138°	38°20'	+53'	139°	37°34'	+54'	140°	36°49'	+54'	140°	2
3	42°09'	+51'	136°	41°26'	+52'	137°	40°42'	+52'	137°	39°58'	+53'	138°	39°13'	+53'	138°	38°28'	+54'	139°	37°43'	+54'	139°	3
4	43°01'	+51'	135°	42°18'	+52'	136°	41°34'	+52'	137°	40°50'	+52'	137°	40°06'	+53'	138°	39°22'	+53'	138°	38°37'	+54'	139°	4
5	43°52'	+51'	135°	43°09'	+51'	135°	42°26'	+52'	136°	41°43'	+52'	137°	40°59'	+53'	137°	40°15'	+53'	138°	39°30'	+54'	138°	5
6	44°42'	+50'	134°	44°00'	+51'	135°	43°18'	+52'	135°	42°35'	+52'	136°	41°52'	+53'	137°	41°08'	+53'	137°	40°24'	+53'	138°	6
7	45°33'	+50'	133°	44°51'	+51'	134°	44°10'	+51'	135°	43°27'	+52'	135°	42°44'	+52'	136°	42°01'	+53'	137°	41°17'	+53'	137°	7
8	46°23'	+50'	132°	45°42'	+50'	133°	45°01'	+51'	134°	44°19'	+52'	135°	43°37'	+52'	135°	42°54'	+53'	136°	42°11'	+53'	137°	8
9	47°13'	+49'	132°	46°32'	+50'	132°	45°52'	+51'	133°	45°10'	+51'	134°	44°29'	+52'	135°	43°46'	+52'	135°	43°04'	+53'	136°	9
10	48°02'	+49'	131°	47°22'	+50'	131°	46°42'	+50'	132°	46°02'	+51'	133°	45°20'	+52'	134°	44°39'	+52'	135°	43°56'	+53'	135°	10
11	48°51'	+49'	130°	48°12'	+49'	131°	47°33'	+50'	131°	46°53'	+51'	132°	46°12'	+51'	133°	45°31'	+52'	134°	44°49'	+52'	135°	11
12	49°40'	+48'	129°	49°01'	+49'	130°	48°23'	+50'	131°	47°43'	+50'	132°	47°03'	+51'	132°	46°22'	+51'	133°	45°41'	+52'	134°	12
13	50°28'	+48'	128°	49°50'	+48'	129°	49°12'	+49'	130°	48°34'	+50'	131°	47°54'	+51'	132°	47°14'	+51'	132°	46°33'	+52'	133°	13
14	51°15'	+47'	127°	50°39'	+48'	128°	50°02'	+49'	129°	49°23'	+50'	130°	48°45'	+50'	131°	48°05'	+51'	132°	47°25'	+51'	132°	14
15	52°03'	+47'	126°	51°27'	+48'	127°	50°50'	+48'	128°	50°13'	+49'	129°	49°35'	+50'	130°	48°56'	+51'	131°	48°17'	+51'	132°	15
16	52°49'	+46'	125°	52°14'	+47'	126°	51°39'	+48'	127°	51°02'	+49'	128°	50°25'	+49'	129°	49°47'	+50'	130°	49°08'	+51'	131°	16
17	53°35'	+46'	124°	53°01'	+46'	125°	52°27'	+47'	126°	51°51'	+48'	127°	51°14'	+49'	128°	50°37'	+50'	129°	49°59'	+50'	130°	17
18	54°21'	+45'	123°	53°48'	+46'	124°	53°14'	+47'	125°	52°39'	+48'	126°	52°03'	+49'	127°	51°27'	+49'	128°	50°49'	+50'	129°	18
19	55°06'	+44'	122°	54°34'	+45'	123°	54°01'	+46'	124°	53°27'	+47'	125°	52°52'	+48'	126°	52°16'	+49'	127°	51°39'	+50'	128°	19
20	55°50'	+44'	120°	55°19'	+45'	122°	54°47'	+46'	123°	54°14'	+47'	124°	53°40'	+48'	125°	53°05'	+48'	126°	52°29'	+49'	127°	20
21	56°34'	+43'	119°	56°04'	+44'	121°	55°33'	+45'	122°	55°01'	+46'	123°	54°27'	+47'	124°	53°53'	+48'	125°	53°18'	+49'	126°	21
22	57°17'	+42'	118°	56°48'	+43'	119°	56°18'	+44'	121°	55°47'	+45'	122°	55°14'	+46'	123°	54°41'	+47'	124°	54°07'	+48'	125°	22
23	57°58'	+41'	117°	57°31'	+42'	118°	57°02'	+44'	119°	56°32'	+45'	121°	56°01'	+46'	122°	55°28'	+47'	123°	54°55'	+48'	124°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

31° 329° LHA — Latitude SAME as Declination — 31° 329° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

32° 328° LHA — Latitude SAME as Declination — 32° 328° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	39°04'	+52'	137°	38°20'	+52'	138°	37°36'	+53'	138°	36°51'	+53'	139°	36°06'	+53'	139°	35°20'	+54'	139°	34°34'	+54'	140°	0
1	39°56'	+51'	136°	39°12'	+52'	137°	38°28'	+52'	137°	37°44'	+53'	138°	36°59'	+53'	138°	36°14'	+54'	139°	35°28'	+54'	139°	1
2	40°47'	+51'	136°	40°04'	+52'	136°	39°20'	+52'	137°	38°36'	+53'	137°	37°52'	+53'	138°	37°07'	+53'	138°	36°22'	+54'	139°	2
3	41°38'	+51'	135°	40°55'	+51'	136°	40°12'	+52'	136°	39°29'	+52'	137°	38°45'	+53'	137°	38°01'	+53'	138°	37°16'	+54'	138°	3
4	42°29'	+51'	134°	41°47'	+51'	135°	41°04'	+52'	135°	40°21'	+52'	136°	39°38'	+53'	137°	38°54'	+53'	137°	38°10'	+53'	138°	4
5	43°20'	+50'	133°	42°38'	+51'	134°	41°56'	+51'	135°	41°13'	+52'	135°	40°30'	+52'	136°	39°47'	+53'	137°	39°03'	+53'	137°	5
6	44°10'	+50'	133°	43°29'	+51'	133°	42°47'	+51'	134°	42°05'	+52'	135°	41°23'	+52'	135°	40°40'	+53'	136°	39°57'	+53'	137°	6
7	45°00'	+50'	132°	44°19'	+50'	133°	43°38'	+51'	133°	42°57'	+51'	134°	42°15'	+52'	135°	41°33'	+52'	135°	40°50'	+53'	136°	7
8	45°49'	+49'	131°	45°10'	+50'	132°	44°29'	+51'	133°	43°48'	+51'	133°	43°07'	+52'	134°	42°25'	+52'	135°	41°43'	+53'	135°	8
9	46°39'	+49'	130°	46°00'	+50'	131°	45°20'	+50'	132°	44°40'	+51'	133°	43°59'	+51'	133°	43°17'	+52'	134°	42°35'	+52'	135°	9
10	47°28'	+49'	129°	46°49'	+49'	130°	46°10'	+50'	131°	45°30'	+51'	132°	44°50'	+51'	133°	44°09'	+52'	133°	43°28'	+52'	134°	10
11	48°16'	+48'	129°	47°39'	+49'	129°	47°00'	+50'	130°	46°21'	+50'	131°	45°41'	+51'	132°	45°01'	+51'	133°	44°20'	+52'	133°	11
12	49°05'	+48'	128°	48°27'	+48'	129°	47°50'	+49'	129°	47°11'	+50'	130°	46°32'	+51'	131°	45°52'	+51'	132°	45°12'	+52'	133°	12
13	49°52'	+47'	127°	49°16'	+48'	128°	48°39'	+49'	129°	48°01'	+50'	129°	47°23'	+50'	130°	46°43'	+51'	131°	46°04'	+51'	132°	13
14	50°40'	+47'	126°	50°04'	+48'	127°	49°28'	+48'	128°	48°51'	+49'	129°	48°13'	+50'	130°	47°34'	+50'	130°	46°55'	+51'	131°	14
15	51°26'	+46'	125°	50°52'	+47'	126°	50°16'	+48'	127°	49°40'	+49'	128°	49°03'	+49'	129°	48°25'	+50'	130°	47°46'	+51'	130°	15
16	52°13'	+46'	124°	51°39'	+47'	125°	51°04'	+47'	126°	50°28'	+48'	127°	49°52'	+49'	128°	49°15'	+50'	129°	48°37'	+50'	130°	16
17	52°58'	+45'	123°	52°25'	+46'	124°	51°51'	+47'	125°	51°17'	+48'	126°	50°41'	+49'	127°	50°05'	+49'	128°	49°28'	+50'	129°	17
18	53°43'	+44'	122°	53°11'	+45'	123°	52°38'	+46'	124°	52°05'	+47'	125°	51°30'	+48'	126°	50°54'	+49'	127°	50°18'	+50'	128°	18
19	54°28'	+44'	120°	53°57'	+45'	122°	53°25'	+46'	123°	52°52'	+47'	124°	52°18'	+48'	125°	51°43'	+49'	126°	51°07'	+49'	127°	19
20	55°12'	+43'	119°	54°42'	+44'	121°	54°11'	+45'	122°	53°39'	+46'	123°	53°06'	+47'	124°	52°32'	+48'	125°	51°57'	+49'	126°	20
21	55°55'	+42'	118°	55°26'	+43'	119°	54°56'	+45'	121°	54°25'	+46'	122°	53°53'	+47'	123°	53°20'	+48'	124°	52°45'	+48'	125°	21
22	56°37'	+41'	117°	56°09'	+43'	118°	55°40'	+44'	119°	55°10'	+45'	121°	54°39'	+46'	122°	54°07'	+47'	123°	53°34'	+48'	124°	22
23	57°18'	+41'	115°	56°52'	+42'	117°	56°24'	+43'	118°	55°55'	+44'	119°	55°25'	+45'	121°	54°54'	+46'	122°	54°22'	+47'	123°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

32° 328° LHA — Latitude SAME as Declination — 32° 328° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

33° 327° LHA — Latitude SAME as Declination — 33° 327° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	38°33'	+51'	136°	37°50'	+52'	136°	37°06'	+52'	137°	36°22'	+53'	137°	35°38'	+53'	138°	34°53'	+53'	138°	34°08'	+54'	139°	0
1	39°24'	+51'	135°	38°42'	+51'	136°	37°59'	+52'	136°	37°15'	+52'	137°	36°31'	+53'	137°	35°47'	+53'	138°	35°02'	+54'	138°	1
2	40°15'	+51'	135°	39°33'	+51'	135°	38°50'	+52'	136°	38°07'	+52'	136°	37°24'	+53'	137°	36°40'	+53'	137°	35°56'	+54'	138°	2
3	41°06'	+50'	134°	40°24'	+51'	134°	39°42'	+52'	135°	39°00'	+52'	136°	38°17'	+52'	136°	37°33'	+53'	137°	36°49'	+53'	137°	3
4	41°57'	+50'	133°	41°15'	+51'	134°	40°34'	+51'	134°	39°52'	+52'	135°	39°09'	+52'	136°	38°26'	+53'	136°	37°43'	+53'	137°	4
5	42°47'	+50'	132°	42°06'	+50'	133°	41°25'	+51'	134°	40°43'	+52'	134°	40°01'	+52'	135°	39°19'	+53'	135°	38°36'	+53'	136°	5
6	43°37'	+50'	132°	42°57'	+50'	132°	42°16'	+51'	133°	41°35'	+51'	134°	40°53'	+52'	134°	40°11'	+52'	135°	39°29'	+53'	135°	6
7	44°26'	+49'	131°	43°47'	+50'	132°	43°07'	+50'	132°	42°26'	+51'	133°	41°45'	+52'	134°	41°04'	+52'	134°	40°21'	+53'	135°	7
8	45°16'	+49'	130°	44°37'	+50'	131°	43°57'	+50'	131°	43°17'	+51'	132°	42°37'	+51'	133°	41°56'	+52'	134°	41°14'	+52'	134°	8
9	46°05'	+49'	129°	45°26'	+49'	130°	44°47'	+50'	131°	44°08'	+50'	131°	43°28'	+51'	132°	42°48'	+52'	133°	42°06'	+52'	134°	9
10	46°53'	+48'	128°	46°16'	+49'	129°	45°37'	+50'	130°	44°59'	+50'	131°	44°19'	+51'	131°	43°39'	+51'	132°	42°59'	+52'	133°	10
11	47°41'	+48'	127°	47°04'	+48'	128°	46°27'	+49'	129°	45°49'	+50'	130°	45°10'	+50'	131°	44°30'	+51'	131°	43°51'	+52'	132°	11
12	48°29'	+47'	127°	47°53'	+48'	127°	47°16'	+49'	128°	46°39'	+49'	129°	46°00'	+50'	130°	45°22'	+51'	131°	44°42'	+51'	131°	12
13	49°16'	+47'	126°	48°41'	+48'	127°	48°05'	+48'	127°	47°28'	+49'	128°	46°51'	+50'	129°	46°12'	+50'	130°	45°34'	+51'	131°	13
14	50°03'	+46'	125°	49°29'	+47'	126°	48°53'	+48'	127°	48°17'	+49'	127°	47°40'	+49'	128°	47°03'	+50'	129°	46°25'	+51'	130°	14
15	50°49'	+46'	124°	50°16'	+47'	125°	49°41'	+48'	126°	49°06'	+48'	127°	48°30'	+49'	127°	47°53'	+50'	128°	47°15'	+50'	129°	15
16	51°35'	+45'	123°	51°02'	+46'	124°	50°29'	+47'	125°	49°54'	+48'	126°	49°19'	+49'	127°	48°43'	+49'	127°	48°06'	+50'	128°	16
17	52°20'	+45'	122°	51°49'	+46'	123°	51°16'	+47'	124°	50°42'	+47'	125°	50°08'	+48'	126°	49°32'	+49'	127°	48°56'	+50'	128°	17
18	53°05'	+44'	120°	52°34'	+45'	122°	52°02'	+46'	123°	51°29'	+47'	124°	50°56'	+48'	125°	50°21'	+49'	126°	49°46'	+49'	127°	18
19	53°49'	+43'	119°	53°19'	+44'	120°	52°48'	+45'	122°	52°16'	+46'	123°	51°43'	+47'	124°	51°10'	+48'	125°	50°35'	+49'	126°	19
20	54°32'	+43'	118°	54°04'	+44'	119°	53°34'	+45'	120°	53°03'	+46'	122°	52°31'	+47'	123°	51°58'	+48'	124°	51°24'	+48'	125°	20
21	55°15'	+42'	117°	54°47'	+43'	118°	54°18'	+44'	119°	53°48'	+45'	121°	53°17'	+46'	122°	52°45'	+47'	123°	52°12'	+48'	124°	21
22	55°57'	+41'	116°	55°30'	+42'	117°	55°03'	+43'	118°	54°34'	+45'	119°	54°04'	+46'	121°	53°33'	+47'	122°	53°00'	+47'	123°	22
23	56°38'	+40'	114°	56°13'	+41'	116°	55°46'	+43'	117°	55°18'	+44'	118°	54°49'	+45'	120°	54°19'	+46'	121°	53°48'	+47'	122°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

33° 327° LHA — Latitude SAME as Declination — 33° 327° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

34° 326° LHA — Latitude SAME as Declination — 34° 326° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	38°02'	+51'	135°	37°19'	+51'	135°	36°37'	+52'	136°	35°53'	+52'	136°	35°10'	+53'	137°	34°26'	+53'	137°	33°42'	+54'	138°	0
1	38°53'	+51'	134°	38°11'	+51'	135°	37°28'	+52'	135°	36°46'	+52'	136°	36°02'	+53'	136°	35°19'	+53'	137°	34°35'	+53'	137°	1
2	39°43'	+50'	133°	39°02'	+51'	134°	38°20'	+51'	135°	37°38'	+52'	135°	36°55'	+52'	136°	36°12'	+53'	136°	35°28'	+53'	137°	2
3	40°34'	+50'	133°	39°53'	+51'	133°	39°11'	+51'	134°	38°30'	+52'	134°	37°47'	+52'	135°	37°05'	+53'	136°	36°22'	+53'	136°	3
4	41°24'	+50'	132°	40°43'	+50'	133°	40°03'	+51'	133°	39°21'	+51'	134°	38°39'	+52'	134°	37°57'	+52'	135°	37°15'	+53'	136°	4
5	42°14'	+50'	131°	41°34'	+50'	132°	40°54'	+51'	133°	40°13'	+51'	133°	39°31'	+52'	134°	38°50'	+52'	134°	38°08'	+53'	135°	5
6	43°03'	+49'	130°	42°24'	+50'	131°	41°44'	+50'	132°	41°04'	+51'	132°	40°23'	+51'	133°	39°42'	+52'	134°	39°00'	+52'	134°	6
7	43°52'	+49'	130°	43°14'	+49'	130°	42°35'	+50'	131°	41°55'	+51'	132°	41°15'	+51'	132°	40°34'	+52'	133°	39°53'	+52'	134°	7
8	44°41'	+49'	129°	44°03'	+49'	130°	43°25'	+50'	130°	42°46'	+50'	131°	42°06'	+51'	132°	41°26'	+52'	132°	40°45'	+52'	133°	8
9	45°30'	+48'	128°	44°52'	+49'	129°	44°14'	+49'	130°	43°36'	+50'	130°	42°57'	+51'	131°	42°17'	+51'	132°	41°37'	+52'	132°	9
10	46°18'	+48'	127°	45°41'	+48'	128°	45°04'	+49'	129°	44°26'	+50'	130°	43°48'	+50'	130°	43°09'	+51'	131°	42°29'	+52'	132°	10
11	47°06'	+47'	126°	46°30'	+48'	127°	45°53'	+49'	128°	45°16'	+49'	129°	44°38'	+50'	130°	44°00'	+51'	130°	43°20'	+51'	131°	11
12	47°53'	+47'	125°	47°18'	+48'	126°	46°42'	+48'	127°	46°05'	+49'	128°	45°28'	+50'	129°	44°50'	+50'	130°	44°12'	+51'	130°	12
13	48°40'	+46'	124°	48°05'	+47'	125°	47°30'	+48'	126°	46°54'	+49'	127°	46°18'	+49'	128°	45°41'	+50'	129°	45°03'	+51'	130°	13
14	49°26'	+46'	123°	48°53'	+47'	124°	48°18'	+48'	125°	47°43'	+48'	126°	47°07'	+49'	127°	46°31'	+50'	128°	45°54'	+50'	129°	14
15	50°12'	+45'	122°	49°39'	+46'	123°	49°06'	+47'	124°	48°32'	+48'	125°	47°56'	+49'	126°	47°21'	+49'	127°	46°44'	+50'	128°	15
16	50°57'	+45'	121°	50°26'	+46'	122°	49°53'	+47'	123°	49°19'	+47'	124°	48°45'	+48'	125°	48°10'	+49'	126°	47°34'	+50'	127°	16
17	51°42'	+44'	120°	51°11'	+45'	121°	50°40'	+46'	122°	50°07'	+47'	123°	49°33'	+48'	124°	48°59'	+49'	125°	48°24'	+49'	126°	17
18	52°26'	+44'	119°	51°57'	+45'	120°	51°26'	+46'	121°	50°54'	+46'	123°	50°21'	+47'	124°	49°48'	+48'	125°	49°13'	+49'	125°	18
19	53°10'	+43'	118°	52°41'	+44'	119°	52°11'	+45'	120°	51°40'	+46'	122°	51°09'	+47'	123°	50°36'	+48'	124°	50°02'	+49'	125°	19
20	53°53'	+42'	117°	53°25'	+43'	118°	52°56'	+44'	119°	52°26'	+45'	120°	51°55'	+46'	122°	51°24'	+47'	123°	50°51'	+48'	124°	20
21	54°35'	+41'	116°	54°08'	+43'	117°	53°41'	+44'	118°	53°12'	+45'	119°	52°42'	+46'	121°	52°11'	+47'	122°	51°39'	+48'	123°	21
22	55°16'	+41'	114°	54°51'	+42'	116°	54°24'	+43'	117°	53°57'	+44'	118°	53°28'	+45'	119°	52°58'	+46'	121°	52°26'	+47'	122°	22
23	55°57'	+40'	113°	55°33'	+41'	115°	55°07'	+42'	116°	54°41'	+43'	117°	54°13'	+45'	118°	53°44'	+46'	120°	53°14'	+47'	121°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

34° 326° LHA — Latitude SAME as Declination — 34° 326° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

35° 325° LHA — Latitude SAME as Declination — 35° 325° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	37°30'	+50'	134°	36°48'	+51'	134°	36°06'	+51'	135°	35°24'	+52'	135°	34°41'	+52'	136°	33°58'	+53'	136°	33°14'	+53'	137°	0
1	38°20'	+50'	133°	37°39'	+51'	134°	36°58'	+51'	134°	36°16'	+52'	135°	35°33'	+52'	135°	34°51'	+53'	136°	34°08'	+53'	136°	1
2	39°11'	+50'	132°	38°30'	+51'	133°	37°49'	+51'	133°	37°07'	+52'	134°	36°26'	+52'	135°	35°43'	+52'	135°	35°01'	+53'	136°	2
3	40°01'	+50'	132°	39°21'	+50'	132°	38°40'	+51'	133°	37°59'	+51'	133°	37°18'	+52'	134°	36°36'	+52'	134°	35°54'	+53'	135°	3
4	40°50'	+49'	131°	40°11'	+50'	132°	39°31'	+51'	132°	38°50'	+51'	133°	38°09'	+52'	133°	37°28'	+52'	134°	36°46'	+53'	134°	4
5	41°40'	+49'	130°	41°01'	+50'	131°	40°21'	+50'	131°	39°41'	+51'	132°	39°01'	+51'	133°	38°20'	+52'	133°	37°39'	+52'	134°	5
6	42°29'	+49'	129°	41°51'	+49'	130°	41°12'	+50'	131°	40°32'	+51'	131°	39°52'	+51'	132°	39°12'	+52'	133°	38°31'	+52'	133°	6
7	43°18'	+48'	129°	42°40'	+49'	129°	42°02'	+50'	130°	41°23'	+50'	131°	40°44'	+51'	131°	40°04'	+51'	132°	39°23'	+52'	133°	7
8	44°06'	+48'	128°	43°29'	+49'	128°	42°52'	+49'	129°	42°13'	+50'	130°	41°35'	+51'	131°	40°55'	+51'	131°	40°15'	+52'	132°	8
9	44°54'	+48'	127°	44°18'	+48'	128°	43°41'	+49'	128°	43°03'	+50'	129°	42°25'	+50'	130°	41°46'	+51'	131°	41°07'	+52'	131°	9
10	45°42'	+47'	126°	45°06'	+48'	127°	44°30'	+49'	128°	43°53'	+49'	128°	43°16'	+50'	129°	42°37'	+51'	130°	41°59'	+51'	131°	10
11	46°29'	+47'	125°	45°54'	+48'	126°	45°19'	+48'	127°	44°43'	+49'	128°	44°06'	+50'	128°	43°28'	+50'	129°	42°50'	+51'	130°	11
12	47°16'	+46'	124°	46°42'	+47'	125°	46°07'	+48'	126°	45°32'	+49'	127°	44°55'	+49'	128°	44°18'	+50'	128°	43°41'	+51'	129°	12
13	48°03'	+46'	123°	47°29'	+47'	124°	46°55'	+48'	125°	46°20'	+48'	126°	45°45'	+49'	127°	45°09'	+50'	128°	44°32'	+50'	128°	13
14	48°49'	+45'	122°	48°16'	+46'	123°	47°43'	+47'	124°	47°09'	+48'	125°	46°34'	+49'	126°	45°58'	+49'	127°	45°22'	+50'	128°	14
15	49°34'	+45'	121°	49°03'	+46'	122°	48°30'	+47'	123°	47°57'	+48'	124°	47°23'	+48'	125°	46°48'	+49'	126°	46°12'	+50'	127°	15
16	50°19'	+44'	120°	49°48'	+45'	121°	49°17'	+46'	122°	48°44'	+47'	123°	48°11'	+48'	124°	47°37'	+49'	125°	47°02'	+49'	126°	16
17	51°03'	+44'	119°	50°34'	+45'	120°	50°03'	+46'	121°	49°31'	+47'	122°	48°59'	+47'	123°	48°25'	+48'	124°	47°51'	+49'	125°	17
18	51°47'	+43'	118°	51°18'	+44'	119°	50°49'	+45'	120°	50°18'	+46'	121°	49°46'	+47'	122°	49°14'	+48'	123°	48°40'	+49'	124°	18
19	52°30'	+42'	117°	52°03'	+44'	118°	51°34'	+45'	119°	51°04'	+46'	120°	50°33'	+46'	121°	50°02'	+47'	122°	49°29'	+48'	123°	19
20	53°13'	+42'	116°	52°46'	+43'	117°	52°18'	+44'	118°	51°50'	+45'	119°	51°20'	+46'	120°	50°49'	+47'	121°	50°17'	+48'	122°	20
21	53°55'	+41'	115°	53°29'	+42'	116°	53°02'	+43'	117°	52°35'	+44'	118°	52°06'	+45'	119°	51°36'	+46'	120°	51°05'	+47'	122°	21
22	54°36'	+40'	113°	54°11'	+41'	115°	53°46'	+43'	116°	53°19'	+44'	117°	52°51'	+45'	118°	52°22'	+46'	119°	51°52'	+47'	121°	22
23	55°16'	+39'	112°	54°53'	+41'	113°	54°28'	+42'	115°	54°03'	+43'	116°	53°36'	+44'	117°	53°08'	+45'	118°	52°39'	+46'	120°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

35° 325° LHA — Latitude SAME as Declination — 35° 325° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

36° 324° LHA — Latitude SAME as Declination — 36° 324° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	36°57'	+50'	133°	36°17'	+51'	133°	35°35'	+51'	134°	34°54'	+52'	134°	34°12'	+52'	135°	33°29'	+53'	135°	32°46'	+53'	136°	0
1	37°48'	+50'	132°	37°07'	+50'	133°	36°26'	+51'	133°	35°45'	+51'	134°	35°04'	+52'	134°	34°22'	+52'	135°	33°39'	+53'	135°	1
2	38°37'	+50'	131°	37°58'	+50'	132°	37°17'	+51'	132°	36°37'	+51'	133°	35°56'	+52'	133°	35°14'	+52'	134°	34°32'	+53'	135°	2
3	39°27'	+49'	131°	38°48'	+50'	131°	38°08'	+50'	132°	37°28'	+51'	132°	36°47'	+52'	133°	36°06'	+52'	133°	35°25'	+52'	134°	3
4	40°16'	+49'	130°	39°38'	+50'	130°	38°59'	+50'	131°	38°19'	+51'	132°	37°39'	+51'	132°	36°58'	+52'	133°	36°17'	+52'	133°	4
5	41°05'	+49'	129°	40°27'	+49'	130°	39°49'	+50'	130°	39°10'	+51'	131°	38°30'	+51'	132°	37°50'	+52'	132°	37°10'	+52'	133°	5
6	41°54'	+48'	128°	41°17'	+49'	129°	40°39'	+50'	130°	40°00'	+50'	130°	39°21'	+51'	131°	38°42'	+51'	131°	38°02'	+52'	132°	6
7	42°43'	+48'	127°	42°06'	+49'	128°	41°28'	+49'	129°	40°51'	+50'	130°	40°12'	+51'	130°	39°33'	+51'	131°	38°54'	+52'	131°	7
8	43°31'	+48'	127°	42°55'	+48'	127°	42°18'	+49'	128°	41°40'	+50'	129°	41°03'	+50'	129°	40°24'	+51'	130°	39°45'	+51'	131°	8
9	44°18'	+47'	126°	43°43'	+48'	127°	43°07'	+49'	127°	42°30'	+49'	128°	41°53'	+50'	129°	41°15'	+51'	129°	40°37'	+51'	130°	9
10	45°06'	+47'	125°	44°31'	+48'	126°	43°56'	+48'	127°	43°20'	+49'	127°	42°43'	+50'	128°	42°06'	+50'	129°	41°28'	+51'	129°	10
11	45°53'	+47'	124°	45°19'	+47'	125°	44°44'	+48'	126°	44°09'	+49'	126°	43°33'	+49'	127°	42°56'	+50'	128°	42°19'	+51'	129°	11
12	46°39'	+46'	123°	46°06'	+47'	124°	45°32'	+48'	125°	44°57'	+48'	126°	44°22'	+49'	126°	43°46'	+50'	127°	43°10'	+50'	128°	12
13	47°25'	+46'	122°	46°53'	+46'	123°	46°20'	+47'	124°	45°46'	+48'	125°	45°11'	+49'	126°	44°36'	+49'	126°	44°00'	+50'	127°	13
14	48°11'	+45'	121°	47°39'	+46'	122°	47°07'	+47'	123°	46°34'	+48'	124°	46°00'	+48'	125°	45°25'	+49'	126°	44°50'	+50'	126°	14
15	48°56'	+45'	120°	48°25'	+45'	121°	47°54'	+46'	122°	47°21'	+47'	123°	46°48'	+48'	124°	46°14'	+49'	125°	45°40'	+49'	126°	15
16	49°40'	+44'	119°	49°11'	+45'	120°	48°40'	+46'	121°	48°09'	+47'	122°	47°36'	+48'	123°	47°03'	+48'	124°	46°29'	+49'	125°	16
17	50°24'	+43'	118°	49°56'	+44'	119°	49°26'	+45'	120°	48°55'	+46'	121°	48°24'	+47'	122°	47°51'	+48'	123°	47°18'	+49'	124°	17
18	51°08'	+43'	117°	50°40'	+44'	118°	50°11'	+45'	119°	49°41'	+46'	120°	49°11'	+47'	121°	48°39'	+47'	122°	48°07'	+48'	123°	18
19	51°51'	+42'	116°	51°24'	+43'	117°	50°56'	+44'	118°	50°27'	+45'	119°	49°57'	+46'	120°	49°27'	+47'	121°	48°55'	+48'	122°	19
20	52°33'	+41'	115°	52°07'	+43'	116°	51°40'	+44'	117°	51°12'	+45'	118°	50°44'	+46'	119°	50°14'	+47'	120°	49°43'	+47'	121°	20
21	53°14'	+41'	114°	52°49'	+42'	115°	52°24'	+43'	116°	51°57'	+44'	117°	51°29'	+45'	118°	51°00'	+46'	119°	50°30'	+47'	120°	21
22	53°55'	+40'	112°	53°31'	+41'	114°	53°07'	+42'	115°	52°41'	+43'	116°	52°14'	+44'	117°	51°46'	+45'	118°	51°17'	+46'	119°	22
23	54°34'	+39'	111°	54°12'	+40'	112°	53°49'	+42'	114°	53°24'	+43'	115°	52°59'	+44'	116°	52°32'	+45'	117°	52°04'	+46'	118°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

36° 324° LHA — Latitude SAME as Declination — 36° 324° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

37° 323° LHA — Latitude SAME as Declination — 37° 323° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	36°24'	+50'	132°	35°44'	+50'	132°	35°04'	+51'	133°	34°23'	+51'	133°	33°42'	+52'	134°	33°00'	+52'	134°	32°18'	+53'	135°	0
1	37°14'	+50'	131°	36°35'	+50'	131°	35°55'	+51'	132°	35°14'	+51'	133°	34°34'	+52'	133°	33°52'	+52'	134°	33°11'	+53'	134°	1
2	38°04'	+49'	130°	37°25'	+50'	131°	36°45'	+50'	131°	36°05'	+51'	132°	35°25'	+51'	132°	34°44'	+52'	133°	34°03'	+52'	133°	2
3	38°53'	+49'	129°	38°14'	+50'	130°	37°36'	+50'	131°	36°56'	+51'	131°	36°17'	+51'	132°	35°36'	+52'	132°	34°56'	+52'	133°	3
4	39°42'	+49'	129°	39°04'	+49'	129°	38°26'	+50'	130°	37°47'	+50'	131°	37°08'	+51'	131°	36°28'	+51'	132°	35°48'	+52'	132°	4
5	40°31'	+48'	128°	39°53'	+49'	129°	39°16'	+50'	129°	38°37'	+50'	130°	37°59'	+51'	130°	37°20'	+51'	131°	36°40'	+52'	132°	5
6	41°19'	+48'	127°	40°42'	+49'	128°	40°05'	+49'	129°	39°28'	+50'	129°	38°49'	+51'	130°	38°11'	+51'	130°	37°32'	+52'	131°	6
7	42°07'	+48'	126°	41°31'	+48'	127°	40°55'	+49'	128°	40°18'	+50'	128°	39°40'	+50'	129°	39°02'	+51'	130°	38°23'	+51'	130°	7
8	42°55'	+47'	126°	42°19'	+48'	126°	41°44'	+49'	127°	41°07'	+49'	128°	40°30'	+50'	128°	39°53'	+51'	129°	39°15'	+51'	130°	8
9	43°42'	+47'	125°	43°07'	+48'	125°	42°32'	+48'	126°	41°57'	+49'	127°	41°20'	+50'	128°	40°43'	+50'	128°	40°06'	+51'	129°	9
10	44°29'	+47'	124°	43°55'	+47'	125°	43°21'	+48'	125°	42°46'	+49'	126°	42°10'	+49'	127°	41°34'	+50'	128°	40°57'	+51'	128°	10
11	45°15'	+46'	123°	44°42'	+47'	124°	44°09'	+48'	125°	43°34'	+48'	125°	42°59'	+49'	126°	42°24'	+50'	127°	41°47'	+50'	128°	11
12	46°02'	+46'	122°	45°29'	+46'	123°	44°56'	+47'	124°	44°23'	+48'	125°	43°48'	+49'	125°	43°13'	+49'	126°	42°38'	+50'	127°	12
13	46°47'	+45'	121°	46°16'	+46'	122°	45°44'	+47'	123°	45°11'	+48'	124°	44°37'	+48'	125°	44°03'	+49'	125°	43°28'	+50'	126°	13
14	47°32'	+45'	120°	47°02'	+46'	121°	46°31'	+46'	122°	45°58'	+47'	123°	45°25'	+48'	124°	44°52'	+49'	125°	44°17'	+49'	125°	14
15	48°17'	+44'	119°	47°47'	+45'	120°	47°17'	+46'	121°	46°46'	+47'	122°	46°13'	+48'	123°	45°41'	+48'	124°	45°07'	+49'	125°	15
16	49°01'	+44'	118°	48°33'	+45'	119°	48°03'	+45'	120°	47°32'	+46'	121°	47°01'	+47'	122°	46°29'	+48'	123°	45°56'	+49'	124°	16
17	49°45'	+43'	117°	49°17'	+44'	118°	48°48'	+45'	119°	48°19'	+46'	120°	47°48'	+47'	121°	47°17'	+48'	122°	46°45'	+48'	123°	17
18	50°28'	+42'	116°	50°01'	+43'	117°	49°33'	+44'	118°	49°05'	+45'	119°	48°35'	+46'	120°	48°04'	+47'	121°	47°33'	+48'	122°	18
19	51°10'	+42'	115°	50°44'	+43'	116°	50°18'	+44'	117°	49°50'	+45'	118°	49°21'	+46'	119°	48°52'	+47'	120°	48°21'	+48'	121°	19
20	51°52'	+41'	114°	51°27'	+42'	115°	51°02'	+43'	116°	50°35'	+44'	117°	50°07'	+45'	118°	49°38'	+46'	119°	49°09'	+47'	120°	20
21	52°33'	+40'	112°	52°09'	+41'	114°	51°45'	+43'	115°	51°19'	+44'	116°	50°52'	+45'	117°	50°24'	+46'	118°	49°56'	+47'	119°	21
22	53°13'	+39'	111°	52°51'	+41'	112°	52°27'	+42'	114°	52°03'	+43'	115°	51°37'	+44'	116°	51°10'	+45'	117°	50°42'	+46'	118°	22
23	53°53'	+39'	110°	53°32'	+40'	111°	53°09'	+41'	113°	52°46'	+42'	114°	52°21'	+43'	115°	51°55'	+44'	116°	51°28'	+45'	117°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

37° 323° LHA — Latitude SAME as Declination — 37° 323° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

38° 322° LHA — Latitude SAME as Declination — 38° 322° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	35°51'	+49'	131°	35°12'	+50'	131°	34°32'	+50'	132°	33°52'	+51'	132°	33°11'	+51'	133°	32°30'	+52'	133°	31°49'	+52'	134°	0
1	36°40'	+49'	130°	36°01'	+50'	130°	35°22'	+50'	131°	34°43'	+51'	132°	34°03'	+51'	132°	33°22'	+52'	133°	32°42'	+52'	133°	1
2	37°29'	+49'	129°	36°51'	+49'	130°	36°13'	+50'	130°	35°34'	+51'	131°	34°54'	+51'	131°	34°14'	+52'	132°	33°34'	+52'	132°	2
3	38°18'	+49'	128°	37°41'	+49'	129°	37°03'	+50'	130°	36°24'	+50'	130°	35°45'	+51'	131°	35°06'	+51'	131°	34°26'	+52'	132°	3
4	39°07'	+48'	128°	38°30'	+49'	128°	37°52'	+50'	129°	37°14'	+50'	130°	36°36'	+51'	130°	35°57'	+51'	131°	35°18'	+52'	131°	4
5	39°55'	+48'	127°	39°19'	+49'	128°	38°42'	+49'	128°	38°05'	+50'	129°	37°27'	+50'	129°	36°48'	+51'	130°	36°10'	+52'	131°	5
6	40°43'	+48'	126°	40°07'	+48'	127°	39°31'	+49'	127°	38°54'	+50'	128°	38°17'	+50'	129°	37°39'	+51'	129°	37°01'	+51'	130°	6
7	41°31'	+47'	125°	40°56'	+48'	126°	40°20'	+49'	127°	39°44'	+49'	127°	39°07'	+50'	128°	38°30'	+51'	129°	37°52'	+51'	129°	7
8	42°18'	+47'	124°	41°44'	+48'	125°	41°09'	+48'	126°	40°33'	+49'	127°	39°57'	+50'	127°	39°21'	+50'	128°	38°43'	+51'	129°	8
9	43°05'	+47'	124°	42°31'	+47'	124°	41°57'	+48'	125°	41°22'	+49'	126°	40°47'	+49'	127°	40°11'	+50'	127°	39°34'	+51'	128°	9
10	43°52'	+46'	123°	43°19'	+47'	124°	42°45'	+48'	124°	42°11'	+48'	125°	41°36'	+49'	126°	41°01'	+50'	127°	40°25'	+50'	127°	10
11	44°38'	+46'	122°	44°06'	+47'	123°	43°33'	+47'	124°	43°00'	+48'	124°	42°25'	+49'	125°	41°51'	+49'	126°	41°15'	+50'	126°	11
12	45°24'	+45'	121°	44°52'	+46'	122°	44°20'	+47'	123°	43°48'	+48'	123°	43°14'	+48'	124°	42°40'	+49'	125°	42°05'	+50'	126°	12
13	46°09'	+45'	120°	45°38'	+46'	121°	45°07'	+46'	122°	44°35'	+47'	123°	44°03'	+48'	123°	43°29'	+49'	124°	42°55'	+49'	125°	13
14	46°54'	+44'	119°	46°24'	+45'	120°	45°54'	+46'	121°	45°23'	+47'	122°	44°51'	+48'	123°	44°18'	+48'	123°	43°44'	+49'	124°	14
15	47°38'	+44'	118°	47°09'	+45'	119°	46°40'	+46'	120°	46°09'	+46'	121°	45°38'	+47'	122°	45°06'	+48'	123°	44°34'	+49'	123°	15
16	48°22'	+43'	117°	47°54'	+44'	118°	47°25'	+45'	119°	46°56'	+46'	120°	46°25'	+47'	121°	45°54'	+48'	122°	45°22'	+48'	123°	16
17	49°05'	+43'	116°	48°38'	+44'	117°	48°10'	+45'	118°	47°42'	+46'	119°	47°12'	+46'	120°	46°42'	+47'	121°	46°11'	+48'	122°	17
18	49°48'	+42'	115°	49°22'	+43'	116°	48°55'	+44'	117°	48°27'	+45'	118°	47°59'	+46'	119°	47°29'	+47'	120°	46°59'	+48'	121°	18
19	50°30'	+41'	114°	50°05'	+42'	115°	49°39'	+43'	116°	49°12'	+44'	117°	48°45'	+45'	118°	48°16'	+46'	119°	47°46'	+47'	120°	19
20	51°11'	+41'	113°	50°47'	+42'	114°	50°23'	+43'	115°	49°57'	+44'	116°	49°30'	+45'	117°	49°02'	+46'	118°	48°34'	+47'	119°	20
21	51°52'	+40'	111°	51°29'	+41'	113°	51°05'	+42'	114°	50°41'	+43'	115°	50°15'	+44'	116°	49°48'	+45'	117°	49°20'	+46'	118°	21
22	52°32'	+39'	110°	52°10'	+40'	111°	51°48'	+42'	113°	51°24'	+43'	114°	50°59'	+44'	115°	50°33'	+45'	116°	50°07'	+46'	117°	22
23	53°11'	+38'	109°	52°51'	+40'	110°	52°29'	+41'	111°	52°07'	+42'	113°	51°43'	+43'	114°	51°18'	+44'	115°	50°52'	+45'	116°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

38° 322° LHA — Latitude SAME as Declination — 38° 322° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

39° 321° LHA — Latitude SAME as Declination — 39° 321° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	35°17'	+49'	130°	34°38'	+50'	130°	33°59'	+50'	131°	33°20'	+51'	131°	32°40'	+51'	132°	32°00'	+52'	132°	31°20'	+52'	133°	0
1	36°06'	+49'	129°	35°28'	+49'	129°	34°49'	+50'	130°	34°11'	+50'	130°	33°32'	+51'	131°	32°52'	+51'	131°	32°12'	+52'	132°	1
2	36°54'	+49'	128°	36°17'	+49'	129°	35°39'	+50'	129°	35°01'	+50'	130°	34°23'	+51'	130°	33°44'	+51'	131°	33°04'	+52'	131°	2
3	37°43'	+48'	127°	37°06'	+49'	128°	36°29'	+49'	129°	35°51'	+50'	129°	35°13'	+51'	130°	34°35'	+51'	130°	33°56'	+52'	131°	3
4	38°31'	+48'	127°	37°55'	+49'	127°	37°19'	+49'	128°	36°42'	+50'	128°	36°04'	+50'	129°	35°26'	+51'	130°	34°47'	+51'	130°	4
5	39°19'	+48'	126°	38°44'	+48'	127°	38°08'	+49'	127°	37°31'	+50'	128°	36°54'	+50'	128°	36°17'	+51'	129°	35°39'	+51'	130°	5
6	40°07'	+47'	125°	39°32'	+48'	126°	38°57'	+49'	126°	38°21'	+49'	127°	37°44'	+50'	128°	37°08'	+50'	128°	36°30'	+51'	129°	6
7	40°54'	+47'	124°	40°20'	+48'	125°	39°45'	+48'	126°	39°10'	+49'	126°	38°34'	+50'	127°	37°58'	+50'	128°	37°21'	+51'	128°	7
8	41°41'	+47'	123°	41°08'	+47'	124°	40°34'	+48'	125°	39°59'	+49'	126°	39°24'	+49'	126°	38°48'	+50'	127°	38°12'	+51'	128°	8
9	42°28'	+46'	123°	41°55'	+47'	123°	41°22'	+48'	124°	40°48'	+48'	125°	40°13'	+49'	126°	39°38'	+50'	126°	39°02'	+50'	127°	9
10	43°14'	+46'	122°	42°42'	+47'	123°	42°09'	+47'	123°	41°36'	+48'	124°	41°02'	+49'	125°	40°28'	+49'	125°	39°53'	+50'	126°	10
11	44°00'	+45'	121°	43°29'	+46'	122°	42°57'	+47'	122°	42°24'	+48'	123°	41°51'	+48'	124°	41°17'	+49'	125°	40°43'	+50'	125°	11
12	44°45'	+45'	120°	44°15'	+46'	121°	43°44'	+47'	122°	43°12'	+47'	122°	42°39'	+48'	123°	42°06'	+49'	124°	41°32'	+49'	125°	12
13	45°30'	+44'	119°	45°01'	+45'	120°	44°30'	+46'	121°	43°59'	+47'	122°	43°28'	+48'	122°	42°55'	+48'	123°	42°22'	+49'	124°	13
14	46°14'	+44'	118°	45°46'	+45'	119°	45°16'	+46'	120°	44°46'	+47'	121°	44°15'	+47'	122°	43°44'	+48'	122°	43°11'	+49'	123°	14
15	46°58'	+43'	117°	46°31'	+44'	118°	46°02'	+45'	119°	45°33'	+46'	120°	45°03'	+47'	121°	44°32'	+48'	121°	44°00'	+48'	122°	15
16	47°42'	+43'	116°	47°15'	+44'	117°	46°47'	+45'	118°	46°19'	+46'	119°	45°50'	+47'	120°	45°19'	+47'	121°	44°48'	+48'	122°	16
17	48°25'	+42'	115°	47°59'	+43'	116°	47°32'	+44'	117°	47°05'	+45'	118°	46°36'	+46'	119°	46°07'	+47'	120°	45°36'	+48'	121°	17
18	49°07'	+42'	114°	48°42'	+43'	115°	48°16'	+44'	116°	47°50'	+45'	117°	47°22'	+46'	118°	46°54'	+46'	119°	46°24'	+47'	120°	18
19	49°49'	+41'	113°	49°25'	+42'	114°	49°00'	+43'	115°	48°34'	+44'	116°	48°08'	+45'	117°	47°40'	+46'	118°	47°11'	+47'	119°	19
20	50°30'	+40'	112°	50°07'	+41'	113°	49°43'	+43'	114°	49°19'	+44'	115°	48°53'	+45'	116°	48°26'	+46'	117°	47°58'	+46'	118°	20
21	51°10'	+40'	110°	50°48'	+41'	112°	50°26'	+42'	113°	50°02'	+43'	114°	49°37'	+44'	115°	49°12'	+45'	116°	48°45'	+46'	117°	21
22	51°50'	+39'	109°	51°29'	+40'	110°	51°08'	+41'	112°	50°45'	+42'	113°	50°21'	+43'	114°	49°56'	+44'	115°	49°31'	+45'	116°	22
23	52°28'	+38'	108°	52°09'	+39'	109°	51°49'	+40'	110°	51°27'	+42'	112°	51°05'	+43'	113°	50°41'	+44'	114°	50°16'	+45'	115°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

39° 321° LHA — Latitude SAME as Declination — 39° 321° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

40° 320° LHA — Latitude SAME as Declination — 40° 320° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	34°42'	+49'	129°	34°04'	+49'	129°	33°26'	+50'	130°	32°48'	+50'	130°	32°09'	+51'	131°	31°30'	+51'	131°	30°50'	+52'	132°	0
1	35°31'	+48'	128°	34°54'	+49'	128°	34°16'	+50'	129°	33°38'	+50'	129°	33°00'	+51'	130°	32°21'	+51'	130°	31°42'	+52'	131°	1
2	36°19'	+48'	127°	35°43'	+49'	128°	35°06'	+49'	128°	34°28'	+50'	129°	33°51'	+50'	129°	33°12'	+51'	130°	32°34'	+52'	130°	2
3	37°07'	+48'	126°	36°32'	+49'	127°	35°55'	+49'	128°	35°18'	+50'	128°	34°41'	+50'	129°	34°03'	+51'	129°	33°25'	+51'	130°	3
4	37°55'	+48'	126°	37°20'	+48'	126°	36°44'	+49'	127°	36°08'	+49'	127°	35°31'	+50'	128°	34°54'	+51'	129°	34°17'	+51'	129°	4
5	38°43'	+47'	125°	38°08'	+48'	125°	37°33'	+49'	126°	36°58'	+49'	127°	36°21'	+50'	127°	35°45'	+50'	128°	35°08'	+51'	128°	5
6	39°30'	+47'	124°	38°56'	+48'	125°	38°22'	+48'	125°	37°47'	+49'	126°	37°11'	+50'	127°	36°35'	+50'	127°	35°59'	+51'	128°	6
7	40°17'	+47'	123°	39°44'	+47'	124°	39°10'	+48'	125°	38°36'	+49'	125°	38°01'	+49'	126°	37°25'	+50'	127°	36°49'	+50'	127°	7
8	41°04'	+46'	122°	40°31'	+47'	123°	39°58'	+48'	124°	39°24'	+48'	125°	38°50'	+49'	125°	38°15'	+50'	126°	37°40'	+50'	126°	8
9	41°50'	+46'	122°	41°18'	+47'	122°	40°46'	+47'	123°	40°13'	+48'	124°	39°39'	+49'	124°	39°05'	+49'	125°	38°30'	+50'	126°	9
10	42°36'	+45'	121°	42°05'	+46'	121°	41°33'	+47'	122°	41°01'	+48'	123°	40°28'	+48'	124°	39°54'	+49'	124°	39°20'	+50'	125°	10
11	43°21'	+45'	120°	42°51'	+46'	121°	42°20'	+47'	121°	41°49'	+47'	122°	41°16'	+48'	123°	40°43'	+49'	124°	40°10'	+49'	124°	11
12	44°06'	+45'	119°	43°37'	+45'	120°	43°07'	+46'	121°	42°36'	+47'	121°	42°04'	+48'	122°	41°32'	+48'	123°	40°59'	+49'	124°	12
13	44°51'	+44'	118°	44°22'	+45'	119°	43°53'	+46'	120°	43°23'	+47'	120°	42°52'	+47'	121°	42°21'	+48'	122°	41°48'	+49'	123°	13
14	45°35'	+44'	117°	45°07'	+45'	118°	44°39'	+45'	119°	44°10'	+46'	120°	43°39'	+47'	120°	43°09'	+48'	121°	42°37'	+49'	122°	14
15	46°19'	+43'	116°	45°52'	+44'	117°	45°24'	+45'	118°	44°56'	+46'	119°	44°27'	+47'	120°	43°57'	+47'	120°	43°26'	+48'	121°	15
16	47°02'	+43'	115°	46°36'	+43'	116°	46°09'	+44'	117°	45°42'	+45'	118°	45°13'	+46'	119°	44°44'	+47'	120°	44°14'	+48'	120°	16
17	47°44'	+42'	114°	47°19'	+43'	115°	46°54'	+44'	116°	46°27'	+45'	117°	45°59'	+46'	118°	45°31'	+47'	119°	45°02'	+47'	120°	17
18	48°26'	+41'	113°	48°02'	+42'	114°	47°37'	+43'	115°	47°12'	+44'	116°	46°45'	+45'	117°	46°18'	+46'	118°	45°49'	+47'	119°	18
19	49°07'	+41'	112°	48°45'	+42'	113°	48°21'	+43'	114°	47°56'	+44'	115°	47°30'	+45'	116°	47°04'	+46'	117°	46°36'	+47'	118°	19
20	49°48'	+40'	111°	49°26'	+41'	112°	49°04'	+42'	113°	48°40'	+43'	114°	48°15'	+44'	115°	47°49'	+45'	116°	47°23'	+46'	117°	20
21	50°28'	+39'	109°	50°07'	+40'	111°	49°46'	+42'	112°	49°23'	+43'	113°	48°59'	+44'	114°	48°35'	+45'	115°	48°09'	+46'	116°	21
22	51°07'	+39'	108°	50°48'	+40'	109°	50°27'	+41'	111°	50°06'	+42'	112°	49°43'	+43'	113°	49°19'	+44'	114°	48°54'	+45'	115°	22
23	51°46'	+38'	107°	51°28'	+39'	108°	51°08'	+40'	109°	50°48'	+41'	111°	50°26'	+42'	112°	50°03'	+44'	113°	49°40'	+45'	114°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

40° 320° LHA — Latitude SAME as Declination — 40° 320° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

41° 319° LHA — Latitude SAME as Declination — 41° 319° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	34°07'	+48'	128°	33°30'	+49'	128°	32°53'	+50'	129°	32°15'	+50'	129°	31°37'	+51'	130°	30°59'	+51'	130°	30°20'	+52'	131°	0
1	34°55'	+48'	127°	34°19'	+49'	127°	33°42'	+49'	128°	33°05'	+50'	128°	32°28'	+50'	129°	31°50'	+51'	129°	31°11'	+51'	130°	1
2	35°43'	+48'	126°	35°08'	+48'	127°	34°32'	+49'	127°	33°55'	+50'	128°	33°18'	+50'	128°	32°41'	+51'	129°	32°03'	+51'	129°	2
3	36°31'	+48'	125°	35°56'	+48'	126°	35°21'	+49'	127°	34°45'	+49'	127°	34°08'	+50'	128°	33°31'	+51'	128°	32°54'	+51'	129°	3
4	37°19'	+47'	125°	36°44'	+48'	125°	36°10'	+49'	126°	35°34'	+49'	126°	34°58'	+50'	127°	34°22'	+50'	128°	33°45'	+51'	128°	4
5	38°06'	+47'	124°	37°32'	+48'	124°	36°58'	+48'	125°	36°23'	+49'	126°	35°48'	+50'	126°	35°12'	+50'	127°	34°36'	+51'	127°	5
6	38°53'	+47'	123°	38°20'	+47'	124°	37°46'	+48'	124°	37°12'	+49'	125°	36°38'	+49'	126°	36°02'	+50'	126°	35°27'	+50'	127°	6
7	39°40'	+46'	122°	39°07'	+47'	123°	38°34'	+48'	124°	38°01'	+48'	124°	37°27'	+49'	125°	36°52'	+50'	126°	36°17'	+50'	126°	7
8	40°26'	+46'	121°	39°54'	+47'	122°	39°22'	+47'	123°	38°49'	+48'	124°	38°16'	+49'	124°	37°42'	+49'	125°	37°07'	+50'	125°	8
9	41°12'	+46'	121°	40°41'	+46'	121°	40°09'	+47'	122°	39°37'	+48'	123°	39°05'	+48'	123°	38°31'	+49'	124°	37°57'	+50'	125°	9
10	41°57'	+45'	120°	41°27'	+46'	120°	40°56'	+47'	121°	40°25'	+47'	122°	39°53'	+48'	123°	39°20'	+49'	123°	38°47'	+49'	124°	10
11	42°42'	+45'	119°	42°13'	+46'	120°	41°43'	+46'	120°	41°12'	+47'	121°	40°41'	+48'	122°	40°09'	+48'	123°	39°36'	+49'	123°	11
12	43°27'	+44'	118°	42°59'	+45'	119°	42°29'	+46'	120°	41°59'	+47'	120°	41°29'	+47'	121°	40°58'	+48'	122°	40°26'	+49'	123°	12
13	44°11'	+44'	117°	43°44'	+45'	118°	43°15'	+45'	119°	42°46'	+46'	119°	42°16'	+47'	120°	41°46'	+48'	121°	41°14'	+49'	122°	13
14	44°55'	+43'	116°	44°28'	+44'	117°	44°01'	+45'	118°	43°32'	+46'	119°	43°03'	+47'	119°	42°34'	+47'	120°	42°03'	+48'	121°	14
15	45°38'	+43'	115°	45°12'	+44'	116°	44°46'	+45'	117°	44°18'	+45'	118°	43°50'	+46'	119°	43°21'	+47'	119°	42°51'	+48'	120°	15
16	46°21'	+42'	114°	45°56'	+43'	115°	45°30'	+44'	116°	45°04'	+45'	117°	44°36'	+46'	118°	44°08'	+47'	119°	43°39'	+48'	119°	16
17	47°03'	+42'	113°	46°39'	+43'	114°	46°15'	+44'	115°	45°49'	+45'	116°	45°22'	+45'	117°	44°55'	+46'	118°	44°27'	+47'	119°	17
18	47°45'	+41'	112°	47°22'	+42'	113°	46°58'	+43'	114°	46°33'	+44'	115°	46°08'	+45'	116°	45°41'	+46'	117°	45°14'	+47'	118°	18
19	48°26'	+40'	111°	48°04'	+41'	112°	47°41'	+42'	113°	47°17'	+44'	114°	46°53'	+44'	115°	46°27'	+45'	116°	46°00'	+46'	117°	19
20	49°06'	+40'	110°	48°45'	+41'	111°	48°24'	+42'	112°	48°01'	+43'	113°	47°37'	+44'	114°	47°12'	+45'	115°	46°47'	+46'	116°	20
21	49°46'	+39'	109°	49°26'	+40'	110°	49°06'	+41'	111°	48°44'	+42'	112°	48°21'	+43'	113°	47°57'	+44'	114°	47°33'	+45'	115°	21
22	50°25'	+38'	107°	50°06'	+39'	108°	49°47'	+41'	110°	49°26'	+42'	111°	49°04'	+43'	112°	48°42'	+44'	113°	48°18'	+45'	114°	22
23	51°03'	+37'	106°	50°46'	+39'	107°	50°27'	+40'	108°	50°08'	+41'	110°	49°47'	+42'	111°	49°26'	+43'	112°	49°03'	+44'	113°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

41° 319° LHA — Latitude SAME as Declination — 41° 319° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

42° 318° LHA — Latitude SAME as Declination — 42° 318° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	33°31'	+48'	127°	32°55'	+49'	127°	32°19'	+49'	128°	31°42'	+50'	128°	31°05'	+50'	129°	30°27'	+51'	129°	29°49'	+51'	130°	0
1	34°19'	+48'	126°	33°44'	+48'	126°	33°08'	+49'	127°	32°32'	+50'	127°	31°55'	+50'	128°	31°18'	+51'	128°	30°40'	+51'	129°	1
2	35°07'	+48'	125°	34°32'	+48'	126°	33°57'	+49'	126°	33°21'	+49'	127°	32°45'	+50'	127°	32°09'	+50'	128°	31°32'	+51'	128°	2
3	35°55'	+47'	124°	35°20'	+48'	125°	34°46'	+48'	126°	34°11'	+49'	126°	33°35'	+50'	127°	32°59'	+50'	127°	32°23'	+51'	128°	3
4	36°42'	+47'	124°	36°08'	+48'	124°	35°34'	+48'	125°	35°00'	+49'	125°	34°25'	+49'	126°	33°49'	+50'	127°	33°13'	+51'	127°	4
5	37°29'	+47'	123°	36°56'	+47'	123°	36°23'	+48'	124°	35°49'	+49'	125°	35°14'	+49'	125°	34°39'	+50'	126°	34°04'	+50'	126°	5
6	38°15'	+46'	122°	37°43'	+47'	123°	37°11'	+48'	123°	36°37'	+48'	124°	36°03'	+49'	125°	35°29'	+50'	125°	34°54'	+50'	126°	6
7	39°02'	+46'	121°	38°30'	+47'	122°	37°58'	+47'	123°	37°26'	+48'	123°	36°52'	+49'	124°	36°19'	+49'	124°	35°44'	+50'	125°	7
8	39°48'	+46'	120°	39°17'	+46'	121°	38°46'	+47'	122°	38°14'	+48'	122°	37°41'	+48'	123°	37°08'	+49'	124°	36°34'	+50'	124°	8
9	40°33'	+45'	120°	40°03'	+46'	120°	39°33'	+47'	121°	39°01'	+47'	122°	38°30'	+48'	122°	37°57'	+49'	123°	37°24'	+49'	124°	9
10	41°18'	+45'	119°	40°49'	+46'	119°	40°19'	+46'	120°	39°49'	+47'	121°	39°18'	+48'	122°	38°46'	+49'	122°	38°14'	+49'	123°	10
11	42°03'	+44'	118°	41°35'	+45'	119°	41°06'	+46'	119°	40°36'	+47'	120°	40°05'	+47'	121°	39°34'	+48'	122°	39°03'	+49'	122°	11
12	42°47'	+44'	117°	42°20'	+45'	118°	41°52'	+46'	119°	41°23'	+46'	119°	40°53'	+47'	120°	40°23'	+48'	121°	39°52'	+49'	121°	12
13	43°31'	+43'	116°	43°05'	+44'	117°	42°37'	+45'	118°	42°09'	+46'	118°	41°40'	+47'	119°	41°10'	+48'	120°	40°40'	+48'	121°	13
14	44°15'	+43'	115°	43°49'	+44'	116°	43°22'	+45'	117°	42°55'	+46'	118°	42°27'	+46'	118°	41°58'	+47'	119°	41°28'	+48'	120°	14
15	44°58'	+42'	114°	44°33'	+43'	115°	44°07'	+44'	116°	43°41'	+45'	117°	43°13'	+46'	118°	42°45'	+47'	118°	42°16'	+48'	119°	15
16	45°40'	+42'	113°	45°16'	+43'	114°	44°51'	+44'	115°	44°26'	+45'	116°	43°59'	+46'	117°	43°32'	+46'	117°	43°04'	+47'	118°	16
17	46°22'	+41'	112°	45°59'	+42'	113°	45°35'	+43'	114°	45°10'	+44'	115°	44°45'	+45'	116°	44°18'	+46'	117°	43°51'	+47'	117°	17
18	47°03'	+41'	111°	46°41'	+42'	112°	46°19'	+43'	113°	45°55'	+44'	114°	45°30'	+45'	115°	45°04'	+46'	116°	44°38'	+46'	117°	18
19	47°44'	+40'	110°	47°23'	+41'	111°	47°01'	+42'	112°	46°38'	+43'	113°	46°15'	+44'	114°	45°50'	+45'	115°	45°24'	+46'	116°	19
20	48°24'	+39'	109°	48°04'	+41'	110°	47°43'	+42'	111°	47°22'	+43'	112°	46°59'	+44'	113°	46°35'	+45'	114°	46°10'	+46'	115°	20
21	49°04'	+39'	108°	48°45'	+40'	109°	48°25'	+41'	110°	48°04'	+42'	111°	47°43'	+43'	112°	47°20'	+44'	113°	46°56'	+45'	114°	21
22	49°42'	+38'	106°	49°25'	+39'	108°	49°06'	+40'	109°	48°46'	+41'	110°	48°26'	+43'	111°	48°04'	+44'	112°	47°41'	+45'	113°	22
23	50°20'	+37'	105°	50°04'	+38'	106°	49°46'	+40'	107°	49°28'	+41'	109°	49°08'	+42'	110°	48°47'	+43'	111°	48°26'	+44'	112°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

42° 318° LHA — Latitude SAME as Declination — 42° 318° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

43° 317° LHA — Latitude SAME as Declination — 43° 317° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	32°55'	+48'	126°	32°20'	+48'	126°	31°45'	+49'	127°	31°08'	+49'	127°	30°32'	+50'	128°	29°55'	+51'	128°	29°18'	+51'	129°	0
1	33°43'	+47'	125°	33°08'	+48'	125°	32°33'	+49'	126°	31°58'	+49'	127°	31°22'	+50'	127°	30°46'	+50'	127°	30°09'	+51'	128°	1
2	34°30'	+47'	124°	33°57'	+48'	125°	33°22'	+48'	125°	32°47'	+49'	126°	32°12'	+50'	126°	31°36'	+50'	127°	31°00'	+51'	127°	2
3	35°18'	+47'	123°	34°44'	+48'	124°	34°11'	+48'	125°	33°36'	+49'	125°	33°01'	+49'	126°	32°26'	+50'	126°	31°51'	+51'	127°	3
4	36°05'	+47'	123°	35°32'	+47'	123°	34°59'	+48'	124°	34°25'	+49'	124°	33°51'	+49'	125°	33°16'	+50'	126°	32°41'	+50'	126°	4
5	36°51'	+46'	122°	36°19'	+47'	123°	35°47'	+48'	123°	35°14'	+48'	124°	34°40'	+49'	124°	34°06'	+50'	125°	33°31'	+50'	125°	5
6	37°37'	+46'	121°	37°06'	+47'	122°	36°34'	+47'	122°	36°02'	+48'	123°	35°29'	+49'	124°	34°55'	+49'	124°	34°22'	+50'	125°	6
7	38°23'	+46'	120°	37°53'	+46'	121°	37°22'	+47'	122°	36°50'	+48'	122°	36°18'	+48'	123°	35°45'	+49'	123°	35°11'	+50'	124°	7
8	39°09'	+45'	119°	38°39'	+46'	120°	38°09'	+47'	121°	37°38'	+47'	121°	37°06'	+48'	122°	36°34'	+49'	123°	36°01'	+49'	123°	8
9	39°54'	+45'	119°	39°25'	+46'	119°	38°55'	+46'	120°	38°25'	+47'	121°	37°54'	+48'	121°	37°23'	+49'	122°	36°50'	+49'	123°	9
10	40°39'	+44'	118°	40°11'	+45'	118°	39°42'	+46'	119°	39°12'	+47'	120°	38°42'	+48'	121°	38°11'	+48'	121°	37°40'	+49'	122°	10
11	41°23'	+44'	117°	40°56'	+45'	118°	40°28'	+46'	118°	39°59'	+46'	119°	39°29'	+47'	120°	38°59'	+48'	121°	38°29'	+49'	121°	11
12	42°07'	+44'	116°	41°41'	+44'	117°	41°14'	+45'	118°	40°45'	+46'	118°	40°17'	+47'	119°	39°47'	+48'	120°	39°17'	+48'	120°	12
13	42°51'	+43'	115°	42°25'	+44'	116°	41°59'	+45'	117°	41°32'	+46'	117°	41°04'	+46'	118°	40°35'	+47'	119°	40°05'	+48'	120°	13
14	43°34'	+43'	114°	43°09'	+44'	115°	42°44'	+44'	116°	42°17'	+45'	117°	41°50'	+46'	117°	41°22'	+47'	118°	40°53'	+48'	119°	14
15	44°17'	+42'	113°	43°53'	+43'	114°	43°28'	+44'	115°	43°03'	+45'	116°	42°36'	+46'	116°	42°09'	+47'	117°	41°41'	+47'	118°	15
16	44°59'	+42'	112°	44°36'	+43'	113°	44°12'	+44'	114°	43°47'	+44'	115°	43°22'	+45'	116°	42°56'	+46'	116°	42°28'	+47'	117°	16
17	45°41'	+41'	111°	45°19'	+42'	112°	44°56'	+43'	113°	44°32'	+44'	114°	44°07'	+45'	115°	43°42'	+46'	116°	43°15'	+47'	116°	17
18	46°22'	+40'	110°	46°01'	+41'	111°	45°39'	+42'	112°	45°16'	+43'	113°	44°52'	+44'	114°	44°27'	+45'	115°	44°02'	+46'	116°	18
19	47°02'	+40'	109°	46°42'	+41'	110°	46°21'	+42'	111°	45°59'	+43'	112°	45°36'	+44'	113°	45°13'	+45'	114°	44°48'	+46'	115°	19
20	47°42'	+39'	108°	47°23'	+40'	109°	47°03'	+41'	110°	46°42'	+42'	111°	46°20'	+43'	112°	45°58'	+44'	113°	45°34'	+45'	114°	20
21	48°21'	+38'	107°	48°03'	+40'	108°	47°44'	+41'	109°	47°25'	+42'	110°	47°04'	+43'	111°	46°42'	+44'	112°	46°19'	+45'	113°	21
22	48°59'	+38'	105°	48°43'	+39'	107°	48°25'	+40'	108°	48°06'	+41'	109°	47°47'	+42'	110°	47°26'	+43'	111°	47°04'	+44'	112°	22
23	49°37'	+37'	104°	49°22'	+38'	105°	49°05'	+39'	107°	48°48'	+41'	108°	48°29'	+42'	109°	48°09'	+43'	110°	47°48'	+44'	111°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

43° 317° LHA — Latitude SAME as Declination — 43° 317° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

44° 316° LHA — Latitude SAME as Declination — 44° 316° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	32°19'	+47'	125°	31°45'	+48'	125°	31°10'	+49'	126°	30°34'	+49'	126°	29°59'	+50'	127°	29°23'	+50'	127°	28°46'	+51'	128°	0
1	33°06'	+47'	124°	32°33'	+48'	125°	31°58'	+48'	125°	31°24'	+49'	126°	30°49'	+50'	126°	30°13'	+50'	127°	29°37'	+51'	127°	1
2	33°53'	+47'	123°	33°20'	+48'	124°	32°47'	+48'	124°	32°13'	+49'	125°	31°38'	+49'	125°	31°03'	+50'	126°	30°28'	+50'	126°	2
3	34°40'	+47'	122°	34°08'	+47'	123°	33°35'	+48'	124°	33°01'	+49'	124°	32°27'	+49'	125°	31°53'	+50'	125°	31°18'	+50'	126°	3
4	35°27'	+46'	122°	34°55'	+47'	122°	34°23'	+48'	123°	33°50'	+48'	123°	33°16'	+49'	124°	32°43'	+49'	125°	32°08'	+50'	125°	4
5	36°13'	+46'	121°	35°42'	+47'	122°	35°10'	+47'	122°	34°38'	+48'	123°	34°05'	+49'	123°	33°32'	+49'	124°	32°58'	+50'	124°	5
6	36°59'	+46'	120°	36°29'	+46'	121°	35°58'	+47'	121°	35°26'	+48'	122°	34°54'	+48'	123°	34°21'	+49'	123°	33°48'	+50'	124°	6
7	37°45'	+45'	119°	37°15'	+46'	120°	36°45'	+47'	121°	36°14'	+47'	121°	35°42'	+48'	122°	35°10'	+49'	122°	34°38'	+49'	123°	7
8	38°30'	+45'	118°	38°01'	+46'	119°	37°31'	+46'	120°	37°01'	+47'	121°	36°31'	+48'	121°	35°59'	+49'	122°	35°27'	+49'	122°	8
9	39°15'	+45'	118°	38°47'	+45'	118°	38°18'	+46'	119°	37°48'	+47'	120°	37°18'	+48'	120°	36°48'	+48'	121°	36°16'	+49'	122°	9
10	39°59'	+44'	117°	39°32'	+45'	118°	39°04'	+46'	118°	38°35'	+47'	119°	38°06'	+47'	120°	37°36'	+48'	120°	37°05'	+49'	121°	10
11	40°43'	+44'	116°	40°17'	+45'	117°	39°50'	+45'	117°	39°22'	+46'	118°	38°53'	+47'	119°	38°24'	+48'	120°	37°54'	+48'	120°	11
12	41°27'	+43'	115°	41°02'	+44'	116°	40°35'	+45'	117°	40°08'	+46'	117°	39°40'	+47'	118°	39°12'	+47'	119°	38°42'	+48'	119°	12
13	42°10'	+43'	114°	41°46'	+44'	115°	41°20'	+45'	116°	40°54'	+45'	116°	40°27'	+46'	117°	39°59'	+47'	118°	39°30'	+48'	119°	13
14	42°53'	+42'	113°	42°29'	+43'	114°	42°05'	+44'	115°	41°39'	+45'	116°	41°13'	+46'	116°	40°46'	+47'	117°	40°18'	+47'	118°	14
15	43°36'	+42'	112°	43°13'	+43'	113°	42°49'	+44'	114°	42°24'	+45'	115°	41°59'	+45'	115°	41°32'	+46'	116°	41°06'	+47'	117°	15
16	44°17'	+41'	111°	43°55'	+42'	112°	43°32'	+43'	113°	43°09'	+44'	114°	42°44'	+45'	115°	42°19'	+46'	115°	41°53'	+47'	116°	16
17	44°59'	+41'	110°	44°38'	+42'	111°	44°16'	+43'	112°	43°53'	+44'	113°	43°29'	+45'	114°	43°05'	+45'	115°	42°39'	+46'	115°	17
18	45°39'	+40'	109°	45°19'	+41'	110°	44°58'	+42'	111°	44°37'	+43'	112°	44°14'	+44'	113°	43°50'	+45'	114°	43°26'	+46'	115°	18
19	46°20'	+40'	108°	46°01'	+41'	109°	45°41'	+42'	110°	45°20'	+43'	111°	44°58'	+44'	112°	44°35'	+45'	113°	44°11'	+45'	114°	19
20	46°59'	+39'	107°	46°41'	+40'	108°	46°22'	+41'	109°	46°02'	+42'	110°	45°41'	+43'	111°	45°20'	+44'	112°	44°57'	+45'	113°	20
21	47°38'	+38'	106°	47°21'	+39'	107°	47°03'	+40'	108°	46°44'	+42'	109°	46°25'	+43'	110°	46°04'	+44'	111°	45°42'	+45'	112°	21
22	48°16'	+38'	105°	48°01'	+39'	106°	47°44'	+40'	107°	47°26'	+41'	108°	47°07'	+42'	109°	46°47'	+43'	110°	46°26'	+44'	111°	22
23	48°54'	+37'	103°	48°39'	+38'	105°	48°24'	+39'	106°	48°07'	+40'	107°	47°49'	+41'	108°	47°30'	+42'	109°	47°11'	+44'	110°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

44° 316° LHA — Latitude SAME as Declination — 44° 316° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

45° 315° LHA — Latitude SAME as Declination — 45° 315° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	31°42'	+47'	124°	31°08'	+48'	124°	30°34'	+48'	125°	30°00'	+49'	125°	29°25'	+49'	126°	28°50'	+50'	126°	28°14'	+51'	127°	0
1	32°29'	+47'	123°	31°56'	+47'	124°	31°23'	+48'	124°	30°49'	+49'	125°	30°15'	+49'	125°	29°40'	+50'	126°	29°05'	+50'	126°	1
2	33°16'	+47'	122°	32°44'	+47'	123°	32°11'	+48'	123°	31°38'	+48'	124°	31°04'	+49'	124°	30°30'	+50'	125°	29°55'	+50'	125°	2
3	34°02'	+46'	122°	33°31'	+47'	122°	32°59'	+48'	123°	32°26'	+48'	123°	31°53'	+49'	124°	31°19'	+49'	124°	30°45'	+50'	125°	3
4	34°49'	+46'	121°	34°18'	+47'	121°	33°46'	+47'	122°	33°14'	+48'	123°	32°42'	+49'	123°	32°09'	+49'	124°	31°35'	+50'	124°	4
5	35°35'	+46'	120°	35°04'	+46'	121°	34°34'	+47'	121°	34°02'	+48'	122°	33°30'	+48'	122°	32°58'	+49'	123°	32°25'	+50'	123°	5
6	36°20'	+45'	119°	35°51'	+46'	120°	35°21'	+47'	120°	34°50'	+47'	121°	34°19'	+48'	122°	33°47'	+49'	122°	33°15'	+49'	123°	6
7	37°06'	+45'	118°	36°37'	+46'	119°	36°07'	+46'	120°	35°37'	+47'	120°	35°07'	+48'	121°	34°36'	+48'	122°	34°04'	+49'	122°	7
8	37°51'	+45'	118°	37°22'	+45'	118°	36°54'	+46'	119°	36°25'	+47'	120°	35°55'	+48'	120°	35°24'	+48'	121°	34°53'	+49'	121°	8
9	38°35'	+44'	117°	38°08'	+45'	117°	37°40'	+46'	118°	37°11'	+47'	119°	36°42'	+47'	119°	36°12'	+48'	120°	35°42'	+49'	121°	9
10	39°19'	+44'	116°	38°53'	+45'	117°	38°26'	+45'	117°	37°58'	+46'	118°	37°30'	+47'	119°	37°00'	+48'	119°	36°31'	+48'	120°	10
11	40°03'	+43'	115°	39°38'	+44'	116°	39°11'	+45'	116°	38°44'	+46'	117°	38°16'	+47'	118°	37°48'	+47'	119°	37°19'	+48'	119°	11
12	40°47'	+43'	114°	40°22'	+44'	115°	39°56'	+45'	116°	39°30'	+46'	116°	39°03'	+46'	117°	38°35'	+47'	118°	38°07'	+48'	118°	12
13	41°30'	+43'	113°	41°06'	+43'	114°	40°41'	+44'	115°	40°16'	+45'	115°	39°49'	+46'	116°	39°23'	+47'	117°	38°55'	+47'	118°	13
14	42°12'	+42'	112°	41°49'	+43'	113°	41°25'	+44'	114°	41°01'	+45'	115°	40°35'	+46'	115°	40°09'	+46'	116°	39°42'	+47'	117°	14
15	42°54'	+42'	111°	42°32'	+43'	112°	42°09'	+43'	113°	41°45'	+44'	114°	41°21'	+45'	115°	40°56'	+46'	115°	40°30'	+47'	116°	15
16	43°36'	+41'	110°	43°15'	+42'	111°	42°53'	+43'	112°	42°30'	+44'	113°	42°06'	+45'	114°	41°42'	+46'	114°	41°16'	+46'	115°	16
17	44°17'	+40'	109°	43°57'	+41'	110°	43°36'	+42'	111°	43°14'	+43'	112°	42°51'	+44'	113°	42°27'	+45'	114°	42°03'	+46'	114°	17
18	44°57'	+40'	108°	44°38'	+41'	109°	44°18'	+42'	110°	43°57'	+43'	111°	43°35'	+44'	112°	43°12'	+45'	113°	42°49'	+46'	114°	18
19	45°37'	+39'	107°	45°19'	+40'	108°	45°00'	+41'	109°	44°40'	+42'	110°	44°19'	+43'	111°	43°57'	+44'	112°	43°35'	+45'	113°	19
20	46°16'	+39'	106°	45°59'	+40'	107°	45°41'	+41'	108°	45°22'	+42'	109°	45°02'	+43'	110°	44°42'	+44'	111°	44°20'	+45'	112°	20
21	46°55'	+38'	105°	46°39'	+39'	106°	46°22'	+40'	107°	46°04'	+41'	108°	45°45'	+42'	109°	45°25'	+43'	110°	45°05'	+44'	111°	21
22	47°33'	+37'	104°	47°18'	+38'	105°	47°02'	+40'	106°	46°46'	+41'	107°	46°28'	+42'	108°	46°09'	+43'	109°	45°49'	+44'	110°	22
23	48°10'	+37'	103°	47°57'	+38'	104°	47°42'	+39'	105°	47°26'	+40'	106°	47°09'	+41'	107°	46°52'	+42'	108°	46°33'	+43'	109°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

45° 315° LHA — Latitude SAME as Declination — 45° 315° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

46° 314° LHA — Latitude SAME as Declination — 46° 314° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	31°05'	+47'	123°	30°32'	+47'	123°	29°59'	+48'	124°	29°25'	+49'	124°	28°51'	+49'	125°	28°17'	+50'	125°	27°42'	+50'	126°	0
1	31°52'	+46'	122°	31°19'	+47'	123°	30°47'	+48'	123°	30°14'	+48'	124°	29°40'	+49'	124°	29°06'	+50'	125°	28°32'	+50'	125°	1
2	32°38'	+46'	121°	32°07'	+47'	122°	31°35'	+48'	122°	31°02'	+48'	123°	30°29'	+49'	123°	29°56'	+49'	124°	29°22'	+50'	124°	2
3	33°24'	+46'	121°	32°53'	+47'	121°	32°22'	+47'	122°	31°50'	+48'	122°	31°18'	+49'	123°	30°45'	+49'	123°	30°12'	+50'	124°	3
4	34°10'	+46'	120°	33°40'	+46'	120°	33°09'	+47'	121°	32°38'	+48'	122°	32°07'	+48'	122°	31°35'	+49'	123°	31°02'	+50'	123°	4
5	34°56'	+45'	119°	34°26'	+46'	120°	33°56'	+47'	120°	33°26'	+47'	121°	32°55'	+48'	121°	32°23'	+49'	122°	31°51'	+49'	122°	5
6	35°41'	+45'	118°	35°12'	+46'	119°	34°43'	+46'	119°	34°13'	+47'	120°	33°43'	+48'	121°	33°12'	+48'	121°	32°41'	+49'	122°	6
7	36°26'	+45'	117°	35°58'	+45'	118°	35°30'	+46'	119°	35°01'	+47'	119°	34°31'	+48'	120°	34°01'	+48'	121°	33°30'	+49'	121°	7
8	37°11'	+44'	117°	36°44'	+45'	117°	36°16'	+46'	118°	35°47'	+47'	119°	35°18'	+47'	119°	34°49'	+48'	120°	34°19'	+49'	120°	8
9	37°55'	+44'	116°	37°29'	+45'	116°	37°02'	+46'	117°	36°34'	+46'	118°	36°06'	+47'	118°	35°37'	+48'	119°	35°07'	+48'	120°	9
10	38°39'	+44'	115°	38°13'	+44'	116°	37°47'	+45'	116°	37°20'	+46'	117°	36°53'	+47'	118°	36°25'	+47'	118°	35°56'	+48'	119°	10
11	39°23'	+43'	114°	38°58'	+44'	115°	38°32'	+45'	115°	38°06'	+46'	116°	37°39'	+46'	117°	37°12'	+47'	118°	36°44'	+48'	118°	11
12	40°06'	+43'	113°	39°42'	+44'	114°	39°17'	+44'	115°	38°52'	+45'	115°	38°26'	+46'	116°	37°59'	+47'	117°	37°32'	+48'	117°	12
13	40°48'	+42'	112°	40°25'	+43'	113°	40°02'	+44'	114°	39°37'	+45'	115°	39°12'	+46'	115°	38°46'	+46'	116°	38°19'	+47'	117°	13
14	41°31'	+42'	111°	41°09'	+43'	112°	40°46'	+44'	113°	40°22'	+44'	114°	39°58'	+45'	114°	39°32'	+46'	115°	39°07'	+47'	116°	14
15	42°12'	+41'	110°	41°51'	+42'	111°	41°29'	+43'	112°	41°06'	+44'	113°	40°43'	+45'	114°	40°19'	+46'	114°	39°53'	+47'	115°	15
16	42°54'	+41'	109°	42°34'	+42'	110°	42°12'	+43'	111°	41°51'	+44'	112°	41°28'	+45'	113°	41°04'	+45'	113°	40°40'	+46'	114°	16
17	43°35'	+40'	108°	43°15'	+41'	109°	42°55'	+42'	110°	42°34'	+43'	111°	42°12'	+44'	112°	41°50'	+45'	113°	41°26'	+46'	113°	17
18	44°15'	+40'	107°	43°56'	+41'	108°	43°37'	+42'	109°	43°17'	+43'	110°	42°56'	+44'	111°	42°35'	+45'	112°	42°12'	+45'	113°	18
19	44°54'	+39'	106°	44°37'	+40'	107°	44°19'	+41'	108°	44°00'	+42'	109°	43°40'	+43'	110°	43°19'	+44'	111°	42°57'	+45'	112°	19
20	45°33'	+38'	105°	45°17'	+40'	106°	45°00'	+41'	107°	44°42'	+42'	108°	44°23'	+43'	109°	44°03'	+44'	110°	43°42'	+45'	111°	20
21	46°12'	+38'	104°	45°57'	+39'	105°	45°41'	+40'	106°	45°24'	+41'	107°	45°06'	+42'	108°	44°47'	+43'	109°	44°27'	+44'	110°	21
22	46°50'	+37'	103°	46°36'	+38'	104°	46°21'	+39'	105°	46°05'	+40'	106°	45°48'	+42'	107°	45°30'	+43'	108°	45°11'	+44'	109°	22
23	47°27'	+36'	102°	47°14'	+38'	103°	47°00'	+39'	104°	46°45'	+40'	105°	46°29'	+41'	106°	46°12'	+42'	107°	45°55'	+43'	108°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

46° 314° LHA — Latitude SAME as Declination — 46° 314° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

47° 313° LHA — Latitude SAME as Declination — 47° 313° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	30°27'	+46'	122°	29°55'	+47'	122°	29°23'	+48'	123°	28°50'	+48'	123°	28°17'	+49'	124°	27°43'	+49'	124°	27°09'	+50'	125°	0
1	31°14'	+46'	121°	30°42'	+47'	122°	30°10'	+47'	122°	29°38'	+48'	123°	29°06'	+49'	123°	28°33'	+49'	124°	27°59'	+50'	124°	1
2	32°00'	+46'	120°	31°29'	+47'	121°	30°58'	+47'	122°	30°26'	+48'	122°	29°54'	+49'	123°	29°22'	+49'	123°	28°49'	+50'	123°	2
3	32°46'	+46'	120°	32°16'	+46'	120°	31°45'	+47'	121°	31°14'	+48'	121°	30°43'	+48'	122°	30°11'	+49'	122°	29°39'	+49'	123°	3
4	33°31'	+45'	119°	33°02'	+46'	120°	32°32'	+47'	120°	32°02'	+47'	121°	31°31'	+48'	121°	31°00'	+49'	122°	30°28'	+49'	122°	4
5	34°17'	+45'	118°	33°48'	+46'	119°	33°19'	+46'	119°	32°49'	+47'	120°	32°19'	+48'	120°	31°49'	+48'	121°	31°17'	+49'	122°	5
6	35°02'	+45'	117°	34°34'	+45'	118°	34°05'	+46'	119°	33°37'	+47'	119°	33°07'	+48'	120°	32°37'	+48'	120°	32°07'	+49'	121°	6
7	35°46'	+44'	117°	35°19'	+45'	117°	34°52'	+46'	118°	34°23'	+47'	118°	33°55'	+47'	119°	33°25'	+48'	120°	32°55'	+49'	120°	7
8	36°31'	+44'	116°	36°04'	+45'	116°	35°38'	+46'	117°	35°10'	+46'	118°	34°42'	+47'	118°	34°13'	+48'	119°	33°44'	+48'	119°	8
9	37°15'	+44'	115°	36°49'	+44'	116°	36°23'	+45'	116°	35°56'	+46'	117°	35°29'	+47'	117°	35°01'	+47'	118°	34°32'	+48'	119°	9
10	37°58'	+43'	114°	37°34'	+44'	115°	37°08'	+45'	115°	36°42'	+46'	116°	36°16'	+46'	117°	35°48'	+47'	117°	35°21'	+48'	118°	10
11	38°42'	+43'	113°	38°18'	+44'	114°	37°53'	+45'	115°	37°28'	+45'	115°	37°02'	+46'	116°	36°36'	+47'	117°	36°08'	+48'	117°	11
12	39°25'	+42'	112°	39°02'	+43'	113°	38°38'	+44'	114°	38°13'	+45'	114°	37°48'	+46'	115°	37°22'	+47'	116°	36°56'	+47'	116°	12
13	40°07'	+42'	111°	39°45'	+43'	112°	39°22'	+44'	113°	38°58'	+45'	114°	38°34'	+45'	114°	38°09'	+46'	115°	37°43'	+47'	116°	13
14	40°49'	+42'	110°	40°28'	+42'	111°	40°06'	+43'	112°	39°43'	+44'	113°	39°19'	+45'	113°	38°55'	+46'	114°	38°30'	+47'	115°	14
15	41°31'	+41'	109°	41°10'	+42'	110°	40°49'	+43'	111°	40°27'	+44'	112°	40°05'	+45'	113°	39°41'	+46'	113°	39°17'	+46'	114°	15
16	42°12'	+41'	108°	41°52'	+41'	109°	41°32'	+42'	110°	41°11'	+43'	111°	40°49'	+44'	112°	40°27'	+45'	113°	40°03'	+46'	113°	16
17	42°52'	+40'	107°	42°34'	+41'	108°	42°14'	+42'	109°	41°54'	+43'	110°	41°33'	+44'	111°	41°12'	+45'	112°	40°49'	+46'	112°	17
18	43°32'	+39'	106°	43°15'	+40'	107°	42°56'	+41'	108°	42°37'	+42'	109°	42°17'	+43'	110°	41°56'	+44'	111°	41°35'	+45'	112°	18
19	44°11'	+39'	105°	43°55'	+40'	106°	43°38'	+41'	107°	43°20'	+42'	108°	43°01'	+43'	109°	42°41'	+44'	110°	42°20'	+45'	111°	19
20	44°50'	+38'	104°	44°35'	+39'	105°	44°19'	+40'	106°	44°02'	+41'	107°	43°44'	+42'	108°	43°25'	+43'	109°	43°05'	+44'	110°	20
21	45°29'	+38'	103°	45°14'	+39'	104°	44°59'	+40'	105°	44°43'	+41'	106°	44°26'	+42'	107°	44°08'	+43'	108°	43°49'	+44'	109°	21
22	46°06'	+37'	102°	45°53'	+38'	103°	45°39'	+39'	104°	45°24'	+40'	105°	45°08'	+41'	106°	44°51'	+42'	107°	44°33'	+43'	108°	22
23	46°43'	+36'	101°	46°31'	+37'	102°	46°18'	+39'	103°	46°04'	+40'	104°	45°49'	+41'	105°	45°33'	+42'	106°	45°16'	+43'	107°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

47° 313° LHA — Latitude SAME as Declination — 47° 313° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

48° 312° LHA — Latitude SAME as Declination — 48° 312° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	29°49'	+46'	121°	29°18'	+47'	122°	28°46'	+47'	122°	28°14'	+48'	122°	27°42'	+49'	123°	27°09'	+49'	123°	26°36'	+50'	124°	0
1	30°35'	+46'	120°	30°05'	+47'	121°	29°34'	+47'	121°	29°02'	+48'	122°	28°31'	+48'	122°	27°58'	+49'	123°	27°26'	+50'	123°	1
2	31°21'	+46'	120°	30°51'	+46'	120°	30°21'	+47'	121°	29°50'	+48'	121°	29°19'	+48'	122°	28°47'	+49'	122°	28°15'	+49'	123°	2
3	32°07'	+45'	119°	31°38'	+46'	119°	31°08'	+47'	120°	30°38'	+47'	120°	30°07'	+48'	121°	29°36'	+49'	121°	29°05'	+49'	122°	3
4	32°52'	+45'	118°	32°24'	+46'	119°	31°55'	+46'	119°	31°25'	+47'	120°	30°55'	+48'	120°	30°25'	+48'	121°	29°54'	+49'	121°	4
5	33°37'	+45'	117°	33°09'	+45'	118°	32°41'	+46'	118°	32°12'	+47'	119°	31°43'	+48'	120°	31°13'	+48'	120°	30°43'	+49'	121°	5
6	34°22'	+44'	116°	33°55'	+45'	117°	33°27'	+46'	118°	32°59'	+47'	118°	32°31'	+47'	119°	32°02'	+48'	119°	31°32'	+49'	120°	6
7	35°06'	+44'	116°	34°40'	+45'	116°	34°13'	+46'	117°	33°46'	+46'	117°	33°18'	+47'	118°	32°49'	+48'	119°	32°20'	+48'	119°	7
8	35°50'	+44'	115°	35°25'	+45'	115°	34°59'	+45'	116°	34°32'	+46'	117°	34°05'	+47'	117°	33°37'	+47'	118°	33°09'	+48'	118°	8
9	36°34'	+43'	114°	36°10'	+44'	115°	35°44'	+45'	115°	35°18'	+46'	116°	34°52'	+46'	117°	34°25'	+47'	117°	33°57'	+48'	118°	9
10	37°18'	+43'	113°	36°54'	+44'	114°	36°29'	+45'	114°	36°04'	+45'	115°	35°38'	+46'	116°	35°12'	+47'	116°	34°45'	+48'	117°	10
11	38°01'	+43'	112°	37°38'	+43'	113°	37°14'	+44'	114°	36°50'	+45'	114°	36°24'	+46'	115°	35°59'	+47'	116°	35°33'	+47'	116°	11
12	38°43'	+42'	111°	38°21'	+43'	112°	37°58'	+44'	113°	37°35'	+45'	113°	37°10'	+46'	114°	36°45'	+46'	115°	36°20'	+47'	116°	12
13	39°25'	+42'	110°	39°04'	+43'	111°	38°42'	+44'	112°	38°19'	+44'	113°	37°56'	+45'	113°	37°32'	+46'	114°	37°07'	+47'	115°	13
14	40°07'	+41'	109°	39°47'	+42'	110°	39°26'	+43'	111°	39°04'	+44'	112°	38°41'	+45'	113°	38°18'	+46'	113°	37°54'	+46'	114°	14
15	40°48'	+41'	108°	40°29'	+42'	109°	40°09'	+43'	110°	39°48'	+44'	111°	39°26'	+44'	112°	39°03'	+45'	112°	38°40'	+46'	113°	15
16	41°29'	+40'	108°	41°11'	+41'	108°	40°51'	+42'	109°	40°31'	+43'	110°	40°10'	+44'	111°	39°49'	+45'	112°	39°26'	+46'	112°	16
17	42°09'	+40'	107°	41°52'	+41'	107°	41°34'	+42'	108°	41°14'	+43'	109°	40°54'	+44'	110°	40°34'	+44'	111°	40°12'	+45'	111°	17
18	42°49'	+39'	106°	42°33'	+40'	106°	42°15'	+41'	107°	41°57'	+42'	108°	41°38'	+43'	109°	41°18'	+44'	110°	40°57'	+45'	111°	18
19	43°28'	+39'	104°	43°13'	+40'	105°	42°57'	+41'	106°	42°39'	+42'	107°	42°21'	+43'	108°	42°02'	+44'	109°	41°42'	+45'	110°	19
20	44°07'	+38'	103°	43°53'	+39'	104°	43°37'	+40'	105°	43°21'	+41'	106°	43°04'	+42'	107°	42°46'	+43'	108°	42°27'	+44'	109°	20
21	44°45'	+37'	102°	44°32'	+39'	103°	44°17'	+40'	104°	44°02'	+41'	105°	43°46'	+42'	106°	43°29'	+43'	107°	43°11'	+44'	108°	21
22	45°22'	+37'	101°	45°10'	+38'	102°	44°57'	+39'	103°	44°43'	+40'	104°	44°28'	+41'	105°	44°12'	+42'	106°	43°55'	+43'	107°	22
23	45°59'	+36'	100°	45°48'	+37'	101°	45°36'	+38'	102°	45°23'	+40'	103°	45°09'	+41'	104°	44°54'	+42'	105°	44°38'	+43'	106°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

48° 312° LHA — Latitude SAME as Declination — 48° 312° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

49° 311° LHA — Latitude SAME as Declination — 49° 311° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	29°11'	+46'	120°	28°40'	+47'	121°	28°10'	+47'	121°	27°38'	+48'	122°	27°07'	+48'	122°	26°35'	+49'	122°	26°02'	+50'	123°	0
1	29°57'	+46'	119°	29°27'	+46'	120°	28°57'	+47'	120°	28°26'	+48'	121°	27°55'	+48'	121°	27°24'	+49'	122°	26°52'	+49'	122°	1
2	30°42'	+45'	119°	30°13'	+46'	119°	29°44'	+47'	120°	29°14'	+47'	120°	28°43'	+48'	121°	28°13'	+49'	121°	27°41'	+49'	122°	2
3	31°28'	+45'	118°	30°59'	+46'	118°	30°30'	+46'	119°	30°01'	+47'	119°	29°31'	+48'	120°	29°01'	+48'	120°	28°30'	+49'	121°	3
4	32°13'	+45'	117°	31°45'	+46'	118°	31°17'	+46'	118°	30°48'	+47'	119°	30°19'	+48'	119°	29°50'	+48'	120°	29°19'	+49'	120°	4
5	32°57'	+44'	116°	32°31'	+45'	117°	32°03'	+46'	117°	31°35'	+47'	118°	31°07'	+47'	119°	30°38'	+48'	119°	30°08'	+49'	120°	5
6	33°42'	+44'	116°	33°16'	+45'	116°	32°49'	+46'	117°	32°22'	+46'	117°	31°54'	+47'	118°	31°26'	+48'	118°	30°57'	+48'	119°	6
7	34°26'	+44'	115°	34°01'	+45'	115°	33°35'	+45'	116°	33°08'	+46'	117°	32°41'	+47'	117°	32°13'	+47'	118°	31°45'	+48'	118°	7
8	35°10'	+43'	114°	34°45'	+44'	115°	34°20'	+45'	115°	33°54'	+46'	116°	33°28'	+47'	116°	33°01'	+47'	117°	32°33'	+48'	118°	8
9	35°53'	+43'	113°	35°30'	+44'	114°	35°05'	+45'	114°	34°40'	+46'	115°	34°14'	+46'	116°	33°48'	+47'	116°	33°21'	+48'	117°	9
10	36°36'	+43'	112°	36°13'	+44'	113°	35°50'	+44'	114°	35°26'	+45'	114°	35°01'	+46'	115°	34°35'	+47'	115°	34°09'	+47'	116°	10
11	37°19'	+42'	111°	36°57'	+43'	112°	36°34'	+44'	113°	36°11'	+45'	113°	35°47'	+46'	114°	35°22'	+46'	115°	34°56'	+47'	115°	11
12	38°02'	+42'	110°	37°40'	+43'	111°	37°18'	+44'	112°	36°56'	+44'	113°	36°32'	+45'	113°	36°08'	+46'	114°	35°44'	+47'	115°	12
13	38°43'	+41'	110°	38°23'	+42'	110°	38°02'	+43'	111°	37°40'	+44'	112°	37°17'	+45'	112°	36°54'	+46'	113°	36°30'	+47'	114°	13
14	39°25'	+41'	109°	39°05'	+42'	109°	38°45'	+43'	110°	38°24'	+44'	111°	38°02'	+45'	112°	37°40'	+45'	112°	37°17'	+46'	113°	14
15	40°06'	+41'	108°	39°47'	+42'	108°	39°28'	+42'	109°	39°08'	+43'	110°	38°47'	+44'	111°	38°25'	+45'	111°	38°03'	+46'	112°	15
16	40°47'	+40'	107°	40°29'	+41'	107°	40°10'	+42'	108°	39°51'	+43'	109°	39°31'	+44'	110°	39°10'	+45'	111°	38°49'	+46'	111°	16
17	41°27'	+40'	106°	41°10'	+41'	107°	40°52'	+42'	107°	40°34'	+42'	108°	40°15'	+43'	109°	39°55'	+44'	110°	39°34'	+45'	111°	17
18	42°06'	+39'	105°	41°51'	+40'	106°	41°34'	+41'	106°	41°17'	+42'	107°	40°58'	+43'	108°	40°39'	+44'	109°	40°20'	+45'	110°	18
19	42°45'	+38'	104°	42°31'	+39'	105°	42°15'	+41'	105°	41°59'	+42'	106°	41°41'	+42'	107°	41°23'	+43'	108°	41°04'	+44'	109°	19
20	43°24'	+38'	103°	43°10'	+39'	104°	42°56'	+40'	104°	42°40'	+41'	105°	42°24'	+42'	106°	42°07'	+43'	107°	41°49'	+44'	108°	20
21	44°01'	+37'	102°	43°49'	+38'	102°	43°36'	+39'	103°	43°21'	+40'	104°	43°06'	+42'	105°	42°50'	+42'	106°	42°33'	+43'	107°	21
22	44°39'	+37'	100°	44°27'	+38'	101°	44°15'	+39'	102°	44°02'	+40'	103°	43°47'	+41'	104°	43°32'	+42'	105°	43°16'	+43'	106°	22
23	45°15'	+36'	99°	45°05'	+37'	100°	44°54'	+38'	101°	44°42'	+39'	102°	44°28'	+40'	103°	44°14'	+41'	104°	43°59'	+42'	105°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

49° 311° LHA — Latitude SAME as Declination — 49° 311° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

50° 310° LHA — Latitude SAME as Declination — 50° 310° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	28°32'	+46'	119°	28°02'	+46'	120°	27°32'	+47'	120°	27°02'	+48'	121°	26°31'	+48'	121°	26°00'	+49'	122°	25°28'	+49'	122°	0
1	29°18'	+45'	119°	28°49'	+46'	119°	28°19'	+47'	120°	27°50'	+47'	120°	27°19'	+48'	120°	26°49'	+49'	121°	26°18'	+49'	121°	1
2	30°03'	+45'	118°	29°35'	+46'	118°	29°06'	+46'	119°	28°37'	+47'	119°	28°07'	+48'	120°	27°37'	+48'	120°	27°07'	+49'	121°	2
3	30°48'	+45'	117°	30°20'	+46'	118°	29°52'	+46'	118°	29°24'	+47'	119°	28°55'	+48'	119°	28°26'	+48'	120°	27°56'	+49'	120°	3
4	31°33'	+45'	116°	31°06'	+45'	117°	30°39'	+46'	117°	30°11'	+47'	118°	29°43'	+47'	118°	29°14'	+48'	119°	28°45'	+49'	119°	4
5	32°17'	+44'	115°	31°51'	+45'	116°	31°25'	+46'	117°	30°58'	+46'	117°	30°30'	+47'	118°	30°02'	+48'	118°	29°33'	+48'	119°	5
6	33°02'	+44'	115°	32°36'	+45'	115°	32°10'	+45'	116°	31°44'	+46'	116°	31°17'	+47'	117°	30°50'	+48'	117°	30°22'	+48'	118°	6
7	33°45'	+44'	114°	33°21'	+44'	114°	32°56'	+45'	115°	32°30'	+46'	116°	32°04'	+47'	116°	31°37'	+47'	117°	31°10'	+48'	117°	7
8	34°29'	+43'	113°	34°05'	+44'	114°	33°41'	+45'	114°	33°16'	+46'	115°	32°50'	+46'	115°	32°24'	+47'	116°	31°58'	+48'	117°	8
9	35°12'	+43'	112°	34°49'	+44'	113°	34°26'	+44'	113°	34°01'	+45'	114°	33°37'	+46'	115°	33°11'	+47'	115°	32°45'	+47'	116°	9
10	35°55'	+42'	111°	35°33'	+43'	112°	35°10'	+44'	113°	34°47'	+45'	113°	34°23'	+46'	114°	33°58'	+46'	115°	33°33'	+47'	115°	10
11	36°38'	+42'	110°	36°16'	+43'	111°	35°54'	+44'	112°	35°32'	+45'	112°	35°08'	+45'	113°	34°44'	+46'	114°	34°20'	+47'	114°	11
12	37°20'	+42'	110°	36°59'	+43'	110°	36°38'	+43'	111°	36°16'	+44'	112°	35°54'	+45'	112°	35°31'	+46'	113°	35°07'	+47'	114°	12
13	38°01'	+41'	109°	37°42'	+42'	109°	37°21'	+43'	110°	37°01'	+44'	111°	36°39'	+45'	112°	36°17'	+46'	112°	35°54'	+46'	113°	13
14	38°43'	+41'	108°	38°24'	+42'	108°	38°05'	+43'	109°	37°44'	+44'	110°	37°24'	+44'	111°	37°02'	+45'	111°	36°40'	+46'	112°	14
15	39°23'	+40'	107°	39°06'	+41'	108°	38°47'	+42'	108°	38°28'	+43'	109°	38°08'	+44'	110°	37°47'	+45'	111°	37°26'	+46'	111°	15
16	40°04'	+40'	106°	39°47'	+41'	107°	39°29'	+42'	107°	39°11'	+43'	108°	38°52'	+44'	109°	38°32'	+44'	110°	38°11'	+45'	110°	16
17	40°44'	+39'	105°	40°28'	+40'	106°	40°11'	+41'	106°	39°54'	+42'	107°	39°36'	+43'	108°	39°17'	+44'	109°	38°57'	+45'	110°	17
18	41°23'	+39'	104°	41°08'	+40'	105°	40°53'	+41'	106°	40°36'	+42'	106°	40°19'	+43'	107°	40°01'	+44'	108°	39°42'	+45'	109°	18
19	42°02'	+38'	103°	41°48'	+39'	104°	41°33'	+40'	105°	41°18'	+41'	105°	41°01'	+42'	106°	40°44'	+43'	107°	40°26'	+44'	108°	19
20	42°40'	+38'	102°	42°27'	+39'	103°	42°14'	+40'	104°	41°59'	+41'	104°	41°44'	+42'	105°	41°28'	+43'	106°	41°10'	+44'	107°	20
21	43°18'	+37'	101°	43°06'	+38'	102°	42°54'	+39'	103°	42°40'	+40'	103°	42°26'	+41'	104°	42°10'	+42'	105°	41°54'	+43'	106°	21
22	43°55'	+36'	100°	43°44'	+38'	101°	43°33'	+39'	102°	43°20'	+40'	102°	43°07'	+41'	103°	42°53'	+42'	104°	42°37'	+43'	105°	22
23	44°31'	+36'	99°	44°22'	+37'	99°	44°11'	+38'	100°	44°00'	+39'	101°	43°48'	+40'	102°	43°34'	+41'	103°	43°20'	+42'	104°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

50° 310° LHA — Latitude SAME as Declination — 50° 310° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

51° 309° LHA — Latitude SAME as Declination — 51° 309° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	27°53'	+45'	118°	27°24'	+46'	119°	26°55'	+47'	119°	26°25'	+47'	120°	25°55'	+48'	120°	25°25'	+48'	121°	24°54'	+49'	121°	0
1	28°38'	+45'	118°	28°10'	+46'	118°	27°42'	+46'	119°	27°13'	+47'	119°	26°43'	+48'	120°	26°13'	+48'	120°	25°43'	+49'	120°	1
2	29°23'	+45'	117°	28°56'	+46'	117°	28°28'	+46'	118°	28°00'	+47'	118°	27°31'	+48'	119°	27°02'	+48'	119°	26°32'	+49'	120°	2
3	30°08'	+45'	116°	29°41'	+45'	117°	29°14'	+46'	117°	28°47'	+47'	118°	28°18'	+47'	118°	27°50'	+48'	119°	27°21'	+49'	119°	3
4	30°53'	+44'	115°	30°27'	+45'	116°	30°00'	+46'	116°	29°33'	+46'	117°	29°06'	+47'	117°	28°38'	+48'	118°	28°10'	+48'	118°	4
5	31°37'	+44'	115°	31°12'	+45'	115°	30°46'	+45'	116°	30°20'	+46'	116°	29°53'	+47'	117°	29°26'	+48'	117°	28°58'	+48'	118°	5
6	32°21'	+44'	114°	31°56'	+44'	114°	31°31'	+45'	115°	31°06'	+46'	115°	30°40'	+47'	116°	30°13'	+47'	117°	29°46'	+48'	117°	6
7	33°05'	+43'	113°	32°41'	+44'	114°	32°16'	+45'	114°	31°52'	+46'	115°	31°26'	+46'	115°	31°00'	+47'	116°	30°34'	+48'	116°	7
8	33°48'	+43'	112°	33°25'	+44'	113°	33°01'	+45'	113°	32°37'	+45'	114°	32°13'	+46'	115°	31°47'	+47'	115°	31°22'	+47'	116°	8
9	34°31'	+43'	111°	34°09'	+43'	112°	33°46'	+44'	113°	33°23'	+45'	113°	32°59'	+46'	114°	32°34'	+47'	114°	32°09'	+47'	115°	9
10	35°13'	+42'	110°	34°52'	+43'	111°	34°30'	+44'	112°	34°08'	+45'	112°	33°44'	+45'	113°	33°21'	+46'	114°	32°56'	+47'	114°	10
11	35°56'	+42'	110°	35°35'	+43'	110°	35°14'	+44'	111°	34°52'	+44'	112°	34°30'	+45'	112°	34°07'	+46'	113°	33°43'	+47'	113°	11
12	36°38'	+41'	109°	36°18'	+42'	109°	35°58'	+43'	110°	35°37'	+44'	111°	35°15'	+45'	111°	34°53'	+46'	112°	34°30'	+46'	113°	12
13	37°19'	+41'	108°	37°00'	+42'	109°	36°41'	+43'	109°	36°21'	+44'	110°	36°00'	+45'	111°	35°38'	+45'	111°	35°16'	+46'	112°	13
14	38°00'	+41'	107°	37°42'	+42'	108°	37°24'	+42'	108°	37°04'	+43'	109°	36°44'	+44'	110°	36°24'	+45'	110°	36°02'	+46'	111°	14
15	38°41'	+40'	106°	38°24'	+41'	107°	38°06'	+42'	107°	37°48'	+43'	108°	37°29'	+44'	109°	37°09'	+45'	110°	36°48'	+45'	110°	15
16	39°21'	+40'	105°	39°05'	+41'	106°	38°48'	+42'	107°	38°31'	+43'	107°	38°12'	+43'	108°	37°53'	+44'	109°	37°34'	+45'	110°	16
17	40°00'	+39'	104°	39°45'	+40'	105°	39°30'	+41'	106°	39°13'	+42'	106°	38°56'	+43'	107°	38°38'	+44'	108°	38°19'	+45'	109°	17
18	40°40'	+39'	103°	40°26'	+40'	104°	40°11'	+41'	105°	39°55'	+42'	105°	39°39'	+43'	106°	39°22'	+43'	107°	39°04'	+44'	108°	18
19	41°18'	+38'	102°	41°05'	+39'	103°	40°51'	+40'	104°	40°37'	+41'	105°	40°21'	+42'	105°	40°05'	+43'	106°	39°48'	+44'	107°	19
20	41°56'	+38'	101°	41°44'	+39'	102°	41°32'	+40'	103°	41°18'	+41'	104°	41°04'	+42'	104°	40°48'	+43'	105°	40°32'	+44'	106°	20
21	42°34'	+37'	100°	42°23'	+38'	101°	42°11'	+39'	102°	41°59'	+40'	103°	41°45'	+41'	103°	41°31'	+42'	104°	41°15'	+43'	105°	21
22	43°11'	+36'	99°	43°01'	+37'	100°	42°50'	+39'	101°	42°39'	+40'	102°	42°26'	+41'	102°	42°13'	+42'	103°	41°59'	+43'	104°	22
23	43°47'	+36'	98°	43°38'	+37'	99°	43°29'	+38'	100°	43°18'	+39'	101°	43°07'	+40'	101°	42°55'	+41'	102°	42°41'	+42'	103°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

51° 309° LHA — Latitude SAME as Declination — 51° 309° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

52° 308° LHA — Latitude SAME as Declination — 52° 308° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	27°14'	+45'	118°	26°46'	+46'	118°	26°17'	+46'	118°	25°48'	+47'	119°	25°19'	+48'	119°	24°50'	+48'	120°	24°20'	+49'	120°	0
1	27°59'	+45'	117°	27°31'	+45'	117°	27°04'	+46'	118°	26°35'	+47'	118°	26°07'	+47'	119°	25°38'	+48'	119°	25°09'	+49'	120°	1
2	28°43'	+45'	116°	28°17'	+45'	117°	27°50'	+46'	117°	27°22'	+47'	118°	26°54'	+47'	118°	26°26'	+48'	118°	25°57'	+49'	119°	2
3	29°28'	+44'	115°	29°02'	+45'	116°	28°36'	+46'	116°	28°09'	+46'	117°	27°42'	+47'	117°	27°14'	+48'	118°	26°46'	+48'	118°	3
4	30°12'	+44'	115°	29°47'	+45'	115°	29°21'	+45'	116°	28°55'	+46'	116°	28°29'	+47'	117°	28°02'	+47'	117°	27°34'	+48'	118°	4
5	30°56'	+44'	114°	30°32'	+44'	114°	30°07'	+45'	115°	29°41'	+46'	115°	29°15'	+47'	116°	28°49'	+47'	116°	28°22'	+48'	117°	5
6	31°40'	+43'	113°	31°16'	+44'	114°	30°52'	+45'	114°	30°27'	+46'	115°	30°02'	+46'	115°	29°36'	+47'	116°	29°10'	+48'	116°	6
7	32°23'	+43'	112°	32°00'	+44'	113°	31°37'	+45'	113°	31°13'	+45'	114°	30°48'	+46'	114°	30°23'	+47'	115°	29°58'	+47'	115°	7
8	33°06'	+43'	111°	32°44'	+44'	112°	32°22'	+44'	113°	31°58'	+45'	113°	31°35'	+46'	114°	31°10'	+47'	114°	30°45'	+47'	115°	8
9	33°49'	+42'	110°	33°28'	+43'	111°	33°06'	+44'	112°	32°43'	+45'	112°	32°20'	+46'	113°	31°57'	+46'	113°	31°33'	+47'	114°	9
10	34°32'	+42'	110°	34°11'	+43'	110°	33°50'	+44'	111°	33°28'	+44'	112°	33°06'	+45'	112°	32°43'	+46'	113°	32°20'	+47'	113°	10
11	35°14'	+42'	109°	34°54'	+43'	109°	34°34'	+43'	110°	34°13'	+44'	111°	33°51'	+45'	111°	33°29'	+46'	112°	33°06'	+46'	113°	11
12	35°55'	+41'	108°	35°36'	+42'	109°	35°17'	+43'	109°	34°57'	+44'	110°	34°36'	+45'	111°	34°15'	+45'	111°	33°53'	+46'	112°	12
13	36°36'	+41'	107°	36°19'	+42'	108°	36°00'	+43'	108°	35°41'	+43'	109°	35°21'	+44'	110°	35°00'	+45'	110°	34°39'	+46'	111°	13
14	37°17'	+40'	106°	37°00'	+41'	107°	36°43'	+42'	107°	36°24'	+43'	108°	36°05'	+44'	109°	35°45'	+45'	110°	35°25'	+46'	110°	14
15	37°58'	+40'	105°	37°42'	+41'	106°	37°25'	+42'	107°	37°07'	+43'	107°	36°49'	+44'	108°	36°30'	+44'	109°	36°11'	+45'	109°	15
16	38°38'	+39'	104°	38°23'	+40'	105°	38°07'	+41'	106°	37°50'	+42'	106°	37°33'	+43'	107°	37°15'	+44'	108°	36°56'	+45'	109°	16
17	39°17'	+39'	103°	39°03'	+40'	104°	38°48'	+41'	105°	38°32'	+42'	106°	38°16'	+43'	106°	37°59'	+44'	107°	37°41'	+45'	108°	17
18	39°56'	+38'	102°	39°43'	+39'	103°	39°29'	+40'	104°	39°14'	+41'	105°	38°59'	+42'	105°	38°42'	+43'	106°	38°25'	+44'	107°	18
19	40°35'	+38'	101°	40°22'	+39'	102°	40°09'	+40'	103°	39°56'	+41'	104°	39°41'	+42'	104°	39°26'	+43'	105°	39°09'	+44'	106°	19
20	41°12'	+37'	100°	41°01'	+38'	101°	40°49'	+39'	102°	40°37'	+41'	103°	40°23'	+41'	104°	40°09'	+42'	104°	39°53'	+43'	105°	20
21	41°50'	+37'	99°	41°40'	+38'	100°	41°29'	+39'	101°	41°17'	+40'	102°	41°05'	+41'	103°	40°51'	+42'	103°	40°37'	+43'	104°	21
22	42°27'	+36'	98°	42°18'	+37'	99°	42°08'	+38'	100°	41°57'	+39'	101°	41°46'	+41'	102°	41°33'	+42'	103°	41°20'	+42'	103°	22
23	43°03'	+36'	97°	42°55'	+37'	98°	42°46'	+38'	99°	42°37'	+39'	100°	42°26'	+40'	101°	42°15'	+41'	102°	42°02'	+42'	102°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

52° 308° LHA — Latitude SAME as Declination — 52° 308° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

53° 307° LHA — Latitude SAME as Declination — 53° 307° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	26°34'	+45'	117°	26°07'	+45'	117°	25°39'	+46'	118°	25°11'	+47'	118°	24°43'	+47'	118°	24°14'	+48'	119°	23°45'	+49'	119°	0
1	27°19'	+45'	116°	26°52'	+45'	116°	26°25'	+46'	117°	25°58'	+47'	117°	25°30'	+47'	118°	25°02'	+48'	118°	24°33'	+48'	119°	1
2	28°03'	+44'	115°	27°37'	+45'	116°	27°11'	+46'	116°	26°44'	+46'	117°	26°17'	+47'	117°	25°50'	+48'	118°	25°22'	+48'	118°	2
3	28°48'	+44'	114°	28°22'	+45'	115°	27°57'	+45'	115°	27°31'	+46'	116°	27°04'	+47'	116°	26°38'	+47'	117°	26°10'	+48'	117°	3
4	29°32'	+44'	114°	29°07'	+44'	114°	28°42'	+45'	115°	28°17'	+46'	115°	27°51'	+47'	116°	27°25'	+47'	116°	26°58'	+48'	117°	4
5	30°15'	+43'	113°	29°52'	+44'	113°	29°28'	+45'	114°	29°03'	+46'	114°	28°38'	+46'	115°	28°12'	+47'	115°	27°46'	+48'	116°	5
6	30°59'	+43'	112°	30°36'	+44'	113°	30°13'	+45'	113°	29°49'	+45'	114°	29°24'	+46'	114°	28°59'	+47'	115°	28°34'	+48'	115°	6
7	31°42'	+43'	111°	31°20'	+44'	112°	30°57'	+44'	112°	30°34'	+45'	113°	30°10'	+46'	114°	29°46'	+47'	114°	29°21'	+47'	115°	7
8	32°25'	+43'	110°	32°03'	+43'	111°	31°42'	+44'	112°	31°19'	+45'	112°	30°56'	+46'	113°	30°33'	+46'	113°	30°09'	+47'	114°	8
9	33°07'	+42'	110°	32°47'	+43'	110°	32°26'	+44'	111°	32°04'	+45'	111°	31°42'	+45'	112°	31°19'	+46'	113°	30°56'	+47'	113°	9
10	33°49'	+42'	109°	33°30'	+43'	109°	33°10'	+43'	110°	32°49'	+44'	111°	32°27'	+45'	111°	32°05'	+46'	112°	31°43'	+47'	112°	10
11	34°31'	+41'	108°	34°12'	+42'	109°	33°53'	+43'	109°	33°33'	+44'	110°	33°12'	+45'	110°	32°51'	+46'	111°	32°29'	+46'	112°	11
12	35°13'	+41'	107°	34°55'	+42'	108°	34°36'	+43'	108°	34°17'	+44'	109°	33°57'	+44'	110°	33°37'	+45'	110°	33°15'	+46'	111°	12
13	35°54'	+41'	106°	35°37'	+42'	107°	35°19'	+42'	108°	35°01'	+43'	108°	34°41'	+44'	109°	34°22'	+45'	109°	34°01'	+46'	110°	13
14	36°34'	+40'	105°	36°18'	+41'	106°	36°01'	+42'	107°	35°44'	+43'	107°	35°26'	+44'	108°	35°07'	+45'	109°	34°47'	+45'	109°	14
15	37°15'	+40'	104°	36°59'	+41'	105°	36°43'	+42'	106°	36°27'	+43'	106°	36°09'	+43'	107°	35°51'	+44'	108°	35°33'	+45'	109°	15
16	37°54'	+39'	103°	37°40'	+40'	104°	37°25'	+41'	105°	37°09'	+42'	106°	36°53'	+43'	106°	36°36'	+44'	107°	36°18'	+45'	108°	16
17	38°34'	+39'	102°	38°20'	+40'	103°	38°06'	+41'	104°	37°51'	+42'	105°	37°36'	+43'	105°	37°19'	+44'	106°	37°02'	+44'	107°	17
18	39°12'	+38'	101°	39°00'	+39'	102°	38°47'	+40'	103°	38°33'	+41'	104°	38°18'	+42'	105°	38°03'	+43'	105°	37°47'	+44'	106°	18
19	39°51'	+38'	100°	39°39'	+39'	101°	39°27'	+40'	102°	39°14'	+41'	103°	39°01'	+42'	104°	38°46'	+43'	104°	38°31'	+44'	105°	19
20	40°29'	+37'	99°	40°18'	+38'	100°	40°07'	+39'	101°	39°55'	+40'	102°	39°42'	+41'	103°	39°29'	+42'	104°	39°14'	+43'	104°	20
21	41°06'	+37'	98°	40°57'	+38'	99°	40°47'	+39'	100°	40°36'	+40'	101°	40°24'	+41'	102°	40°11'	+42'	103°	39°58'	+43'	103°	21
22	41°42'	+36'	97°	41°34'	+37'	98°	41°25'	+38'	99°	41°15'	+39'	100°	41°05'	+40'	101°	40°53'	+41'	102°	40°40'	+42'	102°	22
23	42°19'	+35'	96°	42°12'	+37'	97°	42°04'	+38'	98°	41°55'	+39'	99°	41°45'	+40'	100°	41°34'	+41'	101°	41°23'	+42'	102°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

53° 307° LHA — Latitude SAME as Declination — 53° 307° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

54° 306° LHA — Latitude SAME as Declination — 54° 306° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	25°54'	+45'	116°	25°28'	+45'	116°	25°01'	+46'	117°	24°34'	+47'	117°	24°06'	+47'	118°	23°38'	+48'	118°	23°10'	+48'	118°	0
1	26°39'	+44'	115°	26°13'	+45'	116°	25°47'	+46'	116°	25°20'	+46'	116°	24°53'	+47'	117°	24°26'	+48'	117°	23°58'	+48'	118°	1
2	27°23'	+44'	114°	26°58'	+45'	115°	26°32'	+45'	115°	26°06'	+46'	116°	25°40'	+47'	116°	25°13'	+47'	117°	24°46'	+48'	117°	2
3	28°07'	+44'	114°	27°43'	+45'	114°	27°18'	+45'	115°	26°53'	+46'	115°	26°27'	+47'	116°	26°01'	+47'	116°	25°34'	+48'	116°	3
4	28°51'	+43'	113°	28°27'	+44'	113°	28°03'	+45'	114°	27°38'	+46'	114°	27°14'	+46'	115°	26°48'	+47'	115°	26°22'	+48'	116°	4
5	29°34'	+43'	112°	29°11'	+44'	113°	28°48'	+45'	113°	28°24'	+45'	114°	28°00'	+46'	114°	27°35'	+47'	115°	27°10'	+48'	115°	5
6	30°17'	+43'	111°	29°55'	+44'	112°	29°33'	+44'	112°	29°10'	+45'	113°	28°46'	+46'	113°	28°22'	+47'	114°	27°58'	+47'	114°	6
7	31°00'	+43'	110°	30°39'	+43'	111°	30°17'	+44'	112°	29°55'	+45'	112°	29°32'	+46'	113°	29°09'	+46'	113°	28°45'	+47'	114°	7
8	31°43'	+42'	110°	31°22'	+43'	110°	31°01'	+44'	111°	30°40'	+45'	111°	30°18'	+45'	112°	29°55'	+46'	112°	29°32'	+47'	113°	8
9	32°25'	+42'	109°	32°05'	+43'	109°	31°45'	+44'	110°	31°24'	+44'	111°	31°03'	+45'	111°	30°41'	+46'	112°	30°19'	+47'	112°	9
10	33°07'	+42'	108°	32°48'	+42'	109°	32°29'	+43'	109°	32°09'	+44'	110°	31°48'	+45'	110°	31°27'	+46'	111°	31°05'	+46'	112°	10
11	33°49'	+41'	107°	33°31'	+42'	108°	33°12'	+43'	108°	32°53'	+44'	109°	32°33'	+45'	110°	32°13'	+45'	110°	31°52'	+46'	111°	11
12	34°30'	+41'	106°	34°13'	+42'	107°	33°55'	+43'	108°	33°37'	+43'	108°	33°18'	+44'	109°	32°58'	+45'	109°	32°38'	+46'	110°	12
13	35°11'	+40'	105°	34°55'	+41'	106°	34°38'	+42'	107°	34°20'	+43'	107°	34°02'	+44'	108°	33°43'	+45'	109°	33°24'	+46'	109°	13
14	35°51'	+40'	104°	35°36'	+41'	105°	35°20'	+42'	106°	35°03'	+43'	106°	34°46'	+44'	107°	34°28'	+44'	108°	34°09'	+45'	108°	14
15	36°31'	+40'	103°	36°17'	+41'	104°	36°02'	+41'	105°	35°46'	+42'	106°	35°29'	+43'	106°	35°12'	+44'	107°	34°54'	+45'	108°	15
16	37°11'	+39'	103°	36°57'	+40'	103°	36°43'	+41'	104°	36°28'	+42'	105°	36°13'	+43'	105°	35°56'	+44'	106°	35°39'	+45'	107°	16
17	37°50'	+39'	102°	37°38'	+40'	102°	37°24'	+41'	103°	37°10'	+42'	104°	36°56'	+42'	105°	36°40'	+43'	105°	36°24'	+44'	106°	17
18	38°29'	+38'	101°	38°17'	+39'	101°	38°05'	+40'	102°	37°52'	+41'	103°	37°38'	+42'	104°	37°23'	+43'	104°	37°08'	+44'	105°	18
19	39°07'	+38'	100°	38°56'	+39'	100°	38°45'	+40'	101°	38°33'	+41'	102°	38°20'	+42'	103°	38°06'	+43'	104°	37°52'	+43'	104°	19
20	39°44'	+37'	99°	39°35'	+38'	99°	39°25'	+39'	100°	39°14'	+40'	101°	39°02'	+41'	102°	38°49'	+42'	103°	38°35'	+43'	103°	20
21	40°22'	+37'	98°	40°13'	+38'	98°	40°04'	+39'	99°	39°54'	+40'	100°	39°43'	+41'	101°	39°31'	+42'	102°	39°19'	+43'	103°	21
22	40°58'	+36'	97°	40°51'	+37'	97°	40°43'	+38'	98°	40°34'	+39'	99°	40°24'	+40'	100°	40°13'	+41'	101°	40°01'	+42'	102°	22
23	41°34'	+35'	95°	41°28'	+37'	96°	41°21'	+38'	97°	41°13'	+39'	98°	41°04'	+40'	99°	40°54'	+41'	100°	40°43'	+42'	101°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

54° 306° LHA — Latitude SAME as Declination — 54° 306° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

55° 305° LHA — Latitude SAME as Declination — 55° 305° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	25°14'	+44'	115°	24°48'	+45'	116°	24°22'	+46'	116°	23°56'	+46'	116°	23°29'	+47'	117°	23°02'	+48'	117°	22°34'	+48'	117°	0
1	25°58'	+44'	114°	25°33'	+45'	115°	25°08'	+45'	115°	24°42'	+46'	116°	24°16'	+47'	116°	23°49'	+47'	116°	23°22'	+48'	117°	1
2	26°42'	+44'	114°	26°18'	+45'	114°	25°53'	+45'	115°	25°28'	+46'	115°	25°03'	+47'	115°	24°37'	+47'	116°	24°10'	+48'	116°	2
3	27°26'	+44'	113°	27°02'	+44'	113°	26°38'	+45'	114°	26°14'	+46'	114°	25°49'	+46'	115°	25°24'	+47'	115°	24°58'	+48'	116°	3
4	28°09'	+43'	112°	27°47'	+44'	113°	27°23'	+45'	113°	27°00'	+45'	113°	26°36'	+46'	114°	26°11'	+47'	114°	25°46'	+48'	115°	4
5	28°53'	+43'	111°	28°31'	+44'	112°	28°08'	+45'	112°	27°45'	+45'	113°	27°22'	+46'	113°	26°58'	+47'	114°	26°33'	+47'	114°	5
6	29°36'	+43'	110°	29°14'	+43'	111°	28°53'	+44'	112°	28°30'	+45'	112°	28°08'	+46'	113°	27°44'	+46'	113°	27°21'	+47'	113°	6
7	30°18'	+42'	110°	29°58'	+43'	110°	29°37'	+44'	111°	29°15'	+45'	111°	28°53'	+45'	112°	28°31'	+46'	112°	28°08'	+47'	113°	7
8	31°01'	+42'	109°	30°41'	+43'	109°	30°21'	+44'	110°	30°00'	+44'	110°	29°39'	+45'	111°	29°17'	+46'	112°	28°55'	+47'	112°	8
9	31°43'	+42'	108°	31°24'	+43'	109°	31°05'	+43'	109°	30°45'	+44'	110°	30°24'	+45'	110°	30°03'	+46'	111°	29°41'	+46'	111°	9
10	32°25'	+41'	107°	32°07'	+42'	108°	31°48'	+43'	108°	31°29'	+44'	109°	31°09'	+45'	110°	30°49'	+45'	110°	30°28'	+46'	111°	10
11	33°06'	+41'	106°	32°49'	+42'	107°	32°31'	+43'	108°	32°13'	+44'	108°	31°54'	+44'	109°	31°34'	+45'	109°	31°14'	+46'	110°	11
12	33°47'	+41'	105°	33°31'	+42'	106°	33°14'	+42'	107°	32°56'	+43'	107°	32°38'	+44'	108°	32°19'	+45'	109°	32°00'	+46'	109°	12
13	34°28'	+40'	105°	34°12'	+41'	105°	33°56'	+42'	106°	33°40'	+43'	106°	33°22'	+44'	107°	33°04'	+45'	108°	32°46'	+45'	108°	13
14	35°08'	+40'	104°	34°53'	+41'	104°	34°38'	+42'	105°	34°22'	+43'	106°	34°06'	+43'	106°	33°49'	+44'	107°	33°31'	+45'	108°	14
15	35°48'	+39'	103°	35°34'	+40'	103°	35°20'	+41'	104°	35°05'	+42'	105°	34°49'	+43'	105°	34°33'	+44'	106°	34°16'	+45'	107°	15
16	36°27'	+39'	102°	36°15'	+40'	102°	36°01'	+41'	103°	35°47'	+42'	104°	35°32'	+43'	105°	35°17'	+44'	105°	35°01'	+44'	106°	16
17	37°06'	+39'	101°	36°55'	+40'	102°	36°42'	+40'	102°	36°29'	+41'	103°	36°15'	+42'	104°	36°01'	+43'	104°	35°45'	+44'	105°	17
18	37°45'	+38'	100°	37°34'	+39'	101°	37°23'	+40'	101°	37°10'	+41'	102°	36°57'	+42'	103°	36°44'	+43'	104°	36°29'	+44'	104°	18
19	38°23'	+38'	99°	38°13'	+39'	100°	38°03'	+40'	100°	37°51'	+41'	101°	37°39'	+42'	102°	37°27'	+42'	103°	37°13'	+43'	103°	19
20	39°00'	+37'	98°	38°52'	+38'	99°	38°42'	+39'	99°	38°32'	+40'	100°	38°21'	+41'	101°	38°09'	+42'	102°	37°56'	+43'	103°	20
21	39°37'	+36'	97°	39°30'	+38'	98°	39°21'	+39'	98°	39°12'	+40'	99°	39°02'	+41'	100°	38°51'	+42'	101°	38°39'	+43'	102°	21
22	40°14'	+36'	96°	40°07'	+37'	97°	40°00'	+38'	97°	39°52'	+39'	98°	39°43'	+40'	99°	39°33'	+41'	100°	39°22'	+42'	101°	22
23	40°50'	+35'	95°	40°44'	+36'	96°	40°38'	+38'	96°	40°31'	+39'	97°	40°23'	+40'	98°	40°14'	+41'	99°	40°04'	+42'	100°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

55° 305° LHA — Latitude SAME as Declination — 55° 305° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

56° 304° LHA — Latitude SAME as Declination — 56° 304° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	24°33'	+44'	114°	24°08'	+45'	115°	23°43'	+45'	115°	23°17'	+46'	115°	22°51'	+47'	116°	22°25'	+47'	116°	21°58'	+48'	117°	0
1	25°17'	+44'	114°	24°53'	+45'	114°	24°29'	+45'	114°	24°04'	+46'	115°	23°38'	+47'	115°	23°12'	+47'	116°	22°46'	+48'	116°	1
2	26°01'	+44'	113°	25°38'	+44'	113°	25°14'	+45'	114°	24°49'	+46'	114°	24°25'	+46'	115°	24°00'	+47'	115°	23°34'	+48'	115°	2
3	26°45'	+43'	112°	26°22'	+44'	112°	25°59'	+45'	113°	25°35'	+45'	113°	25°11'	+46'	114°	24°47'	+47'	114°	24°22'	+48'	115°	3
4	27°28'	+43'	111°	27°06'	+44'	112°	26°44'	+45'	112°	26°21'	+45'	113°	25°57'	+46'	113°	25°34'	+47'	114°	25°09'	+47'	114°	4
5	28°11'	+43'	110°	27°50'	+44'	111°	27°28'	+44'	111°	27°06'	+45'	112°	26°43'	+46'	112°	26°20'	+46'	113°	25°57'	+47'	113°	5
6	28°54'	+42'	110°	28°33'	+43'	110°	28°12'	+44'	111°	27°51'	+45'	111°	27°29'	+46'	112°	27°07'	+46'	112°	26°44'	+47'	113°	6
7	29°36'	+42'	109°	29°17'	+43'	109°	28°56'	+44'	110°	28°36'	+45'	110°	28°15'	+45'	111°	27°53'	+46'	111°	27°31'	+47'	112°	7
8	30°18'	+42'	108°	30°00'	+43'	109°	29°40'	+43'	109°	29°20'	+44'	110°	29°00'	+45'	110°	28°39'	+46'	111°	28°17'	+46'	111°	8
9	31°00'	+42'	107°	30°42'	+42'	108°	30°24'	+43'	108°	30°05'	+44'	109°	29°45'	+45'	109°	29°25'	+46'	110°	29°04'	+46'	110°	9
10	31°42'	+41'	106°	31°25'	+42'	107°	31°07'	+43'	108°	30°49'	+44'	108°	30°30'	+44'	109°	30°10'	+45'	109°	29°50'	+46'	110°	10
11	32°23'	+41'	105°	32°07'	+42'	106°	31°50'	+43'	107°	31°32'	+43'	107°	31°14'	+44'	108°	30°55'	+45'	108°	30°36'	+46'	109°	11
12	33°04'	+40'	105°	32°48'	+41'	105°	32°32'	+42'	106°	32°16'	+43'	106°	31°58'	+44'	107°	31°40'	+45'	108°	31°22'	+45'	108°	12
13	33°44'	+40'	104°	33°30'	+41'	104°	33°15'	+42'	105°	32°59'	+43'	106°	32°42'	+44'	106°	32°25'	+44'	107°	32°07'	+45'	107°	13
14	34°25'	+40'	103°	34°11'	+41'	103°	33°57'	+42'	104°	33°42'	+42'	105°	33°26'	+43'	105°	33°10'	+44'	106°	32°53'	+45'	107°	14
15	35°04'	+39'	102°	34°51'	+40'	103°	34°38'	+41'	103°	34°24'	+42'	104°	34°09'	+43'	105°	33°54'	+44'	105°	33°38'	+45'	106°	15
16	35°44'	+39'	101°	35°32'	+40'	102°	35°19'	+41'	102°	35°06'	+42'	103°	34°52'	+43'	104°	34°37'	+43'	104°	34°22'	+44'	105°	16
17	36°22'	+38'	100°	36°12'	+39'	101°	36°00'	+40'	101°	35°48'	+41'	102°	35°35'	+42'	103°	35°21'	+43'	104°	35°06'	+44'	104°	17
18	37°01'	+38'	99°	36°51'	+39'	100°	36°40'	+40'	101°	36°29'	+41'	101°	36°17'	+42'	102°	36°04'	+43'	103°	35°50'	+44'	103°	18
19	37°39'	+37'	98°	37°30'	+38'	99°	37°20'	+39'	100°	37°10'	+40'	100°	36°59'	+41'	101°	36°47'	+42'	102°	36°34'	+43'	103°	19
20	38°16'	+37'	97°	38°08'	+38'	98°	38°00'	+39'	99°	37°50'	+40'	99°	37°40'	+41'	100°	37°29'	+42'	101°	37°17'	+43'	102°	20
21	38°53'	+36'	96°	38°46'	+37'	97°	38°39'	+38'	98°	38°30'	+40'	99°	38°21'	+41'	99°	38°11'	+41'	100°	38°00'	+42'	101°	21
22	39°29'	+36'	95°	39°24'	+37'	96°	39°17'	+38'	97°	39°10'	+39'	98°	39°01'	+40'	98°	38°52'	+41'	99°	38°42'	+42'	100°	22
23	40°05'	+35'	94°	40°01'	+36'	95°	39°55'	+37'	96°	39°49'	+39'	97°	39°41'	+40'	97°	39°33'	+41'	98°	39°24'	+42'	99°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

56° 304° LHA — Latitude SAME as Declination — 56° 304° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

57° 303° LHA — Latitude SAME as Declination — 57° 303° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	23°53'	+44'	113°	23°28'	+45'	114°	23°04'	+45'	114°	22°39'	+46'	115°	22°14'	+47'	115°	21°48'	+47'	115°	21°22'	+48'	116°	0
1	24°36'	+44'	113°	24°13'	+44'	113°	23°49'	+45'	114°	23°25'	+46'	114°	23°00'	+46'	114°	22°35'	+47'	115°	22°10'	+48'	115°	1
2	25°20'	+43'	112°	24°57'	+44'	112°	24°34'	+45'	113°	24°11'	+45'	113°	23°47'	+46'	114°	23°22'	+47'	114°	22°58'	+47'	114°	2
3	26°03'	+43'	111°	25°41'	+44'	112°	25°19'	+45'	112°	24°56'	+45'	113°	24°33'	+46'	113°	24°09'	+47'	113°	23°45'	+47'	114°	3
4	26°46'	+43'	110°	26°25'	+44'	111°	26°03'	+44'	111°	25°41'	+45'	112°	25°19'	+46'	112°	24°56'	+46'	113°	24°33'	+47'	113°	4
5	27°29'	+43'	110°	27°09'	+43'	110°	26°48'	+44'	111°	26°26'	+45'	111°	26°05'	+46'	112°	25°42'	+46'	112°	25°20'	+47'	112°	5
6	28°12'	+42'	109°	27°52'	+43'	109°	27°32'	+44'	110°	27°11'	+45'	110°	26°50'	+45'	111°	26°29'	+46'	111°	26°07'	+47'	112°	6
7	28°54'	+42'	108°	28°35'	+43'	109°	28°16'	+44'	109°	27°56'	+44'	110°	27°36'	+45'	110°	27°15'	+46'	111°	26°53'	+47'	111°	7
8	29°36'	+42'	107°	29°18'	+43'	108°	28°59'	+43'	108°	28°40'	+44'	109°	28°21'	+45'	109°	28°01'	+46'	110°	27°40'	+46'	110°	8
9	30°18'	+41'	106°	30°00'	+42'	107°	29°43'	+43'	107°	29°24'	+44'	108°	29°06'	+45'	109°	28°46'	+45'	109°	28°26'	+46'	110°	9
10	30°59'	+41'	106°	30°43'	+42'	106°	30°26'	+43'	107°	30°08'	+44'	107°	29°50'	+44'	108°	29°31'	+45'	108°	29°12'	+46'	109°	10
11	31°40'	+41'	105°	31°25'	+42'	105°	31°08'	+42'	106°	30°52'	+43'	106°	30°34'	+44'	107°	30°17'	+45'	108°	29°58'	+46'	108°	11
12	32°21'	+40'	104°	32°06'	+41'	104°	31°51'	+42'	105°	31°35'	+43'	106°	31°18'	+44'	106°	31°01'	+45'	107°	30°44'	+45'	107°	12
13	33°01'	+40'	103°	32°47'	+41'	104°	32°33'	+42'	104°	32°18'	+43'	105°	32°02'	+43'	105°	31°46'	+44'	106°	31°29'	+45'	107°	13
14	33°41'	+40'	102°	33°28'	+40'	103°	33°15'	+41'	103°	33°00'	+42'	104°	32°46'	+43'	105°	32°30'	+44'	105°	32°14'	+45'	106°	14
15	34°21'	+39'	101°	34°09'	+40'	102°	33°56'	+41'	102°	33°43'	+42'	103°	33°29'	+43'	104°	33°14'	+44'	104°	32°59'	+44'	105°	15
16	35°00'	+39'	100°	34°49'	+40'	101°	34°37'	+41'	102°	34°25'	+42'	102°	34°11'	+42'	103°	33°58'	+43'	104°	33°43'	+44'	104°	16
17	35°38'	+38'	99°	35°28'	+39'	100°	35°18'	+40'	101°	35°06'	+41'	101°	34°54'	+42'	102°	34°41'	+43'	103°	34°27'	+44'	103°	17
18	36°17'	+38'	98°	36°08'	+39'	99°	35°58'	+40'	100°	35°47'	+41'	100°	35°36'	+42'	101°	35°24'	+43'	102°	35°11'	+43'	103°	18
19	36°55'	+37'	97°	36°46'	+38'	98°	36°38'	+39'	99°	36°28'	+40'	100°	36°18'	+41'	100°	36°06'	+42'	101°	35°55'	+43'	102°	19
20	37°32'	+37'	96°	37°25'	+38'	97°	37°17'	+39'	98°	37°08'	+40'	99°	36°59'	+41'	99°	36°49'	+42'	100°	36°38'	+43'	101°	20
21	38°09'	+36'	95°	38°03'	+37'	96°	37°56'	+38'	97°	37°48'	+39'	98°	37°40'	+40'	98°	37°30'	+41'	99°	37°20'	+42'	100°	21
22	38°45'	+36'	94°	38°40'	+37'	95°	38°34'	+38'	96°	38°28'	+39'	97°	38°20'	+40'	98°	38°12'	+41'	98°	38°03'	+42'	99°	22
23	39°21'	+35'	93°	39°17'	+36'	94°	39°12'	+37'	95°	39°07'	+38'	96°	39°00'	+39'	97°	38°53'	+40'	97°	38°45'	+41'	98°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

57° 303° LHA — Latitude SAME as Declination — 57° 303° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

58° 302° LHA — Latitude SAME as Declination — 58° 302° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	23°11'	+44'	113°	22°48'	+44'	113°	22°24'	+45'	113°	22°00'	+46'	114°	21°36'	+46'	114°	21°11'	+47'	115°	20°46'	+48'	115°	0
1	23°55'	+43'	112°	23°32'	+44'	112°	23°09'	+45'	113°	22°46'	+45'	113°	22°22'	+46'	114°	21°58'	+47'	114°	21°34'	+47'	114°	1
2	24°38'	+43'	111°	24°17'	+44'	112°	23°54'	+45'	112°	23°32'	+45'	112°	23°08'	+46'	113°	22°45'	+47'	113°	22°21'	+47'	114°	2
3	25°22'	+43'	110°	25°00'	+44'	111°	24°39'	+44'	111°	24°17'	+45'	112°	23°54'	+46'	112°	23°32'	+46'	113°	23°08'	+47'	113°	3
4	26°04'	+43'	110°	25°44'	+43'	110°	25°23'	+44'	111°	25°02'	+45'	111°	24°40'	+46'	111°	24°18'	+46'	112°	23°56'	+47'	112°	4
5	26°47'	+42'	109°	26°27'	+43'	109°	26°07'	+44'	110°	25°47'	+45'	110°	25°26'	+45'	111°	25°04'	+46'	111°	24°43'	+47'	112°	5
6	27°29'	+42'	108°	27°11'	+43'	109°	26°51'	+44'	109°	26°31'	+44'	110°	26°11'	+45'	110°	25°50'	+46'	110°	25°29'	+47'	111°	6
7	28°11'	+42'	107°	27°53'	+43'	108°	27°35'	+43'	108°	27°16'	+44'	109°	26°56'	+45'	109°	26°36'	+46'	110°	26°16'	+46'	110°	7
8	28°53'	+41'	106°	28°36'	+42'	107°	28°18'	+43'	107°	28°00'	+44'	108°	27°41'	+45'	108°	27°22'	+45'	109°	27°02'	+46'	109°	8
9	29°35'	+41'	106°	29°18'	+42'	106°	29°01'	+43'	107°	28°44'	+44'	107°	28°26'	+44'	108°	28°07'	+45'	108°	27°48'	+46'	109°	9
10	30°16'	+41'	105°	30°00'	+42'	105°	29°44'	+43'	106°	29°28'	+43'	106°	29°10'	+44'	107°	28°53'	+45'	107°	28°34'	+46'	108°	10
11	30°57'	+41'	104°	30°42'	+41'	104°	30°27'	+42'	105°	30°11'	+43'	106°	29°54'	+44'	106°	29°37'	+45'	107°	29°20'	+45'	107°	11
12	31°37'	+40'	103°	31°23'	+41'	104°	31°09'	+42'	104°	30°54'	+43'	105°	30°38'	+44'	105°	30°22'	+44'	106°	30°05'	+45'	107°	12
13	32°18'	+40'	102°	32°05'	+41'	103°	31°51'	+42'	103°	31°37'	+42'	104°	31°22'	+43'	105°	31°07'	+44'	105°	30°51'	+45'	106°	13
14	32°57'	+39'	101°	32°45'	+40'	102°	32°33'	+41'	103°	32°19'	+42'	103°	32°05'	+43'	104°	31°51'	+44'	104°	31°35'	+45'	105°	14
15	33°37'	+39'	100°	33°26'	+40'	101°	33°14'	+41'	102°	33°01'	+42'	102°	32°48'	+43'	103°	32°34'	+43'	104°	32°20'	+44'	104°	15
16	34°16'	+39'	99°	34°06'	+40'	100°	33°55'	+40'	101°	33°43'	+41'	101°	33°31'	+42'	102°	33°18'	+43'	103°	33°04'	+44'	103°	16
17	34°54'	+38'	99°	34°45'	+39'	99°	34°35'	+40'	100°	34°24'	+41'	101°	34°13'	+42'	101°	34°01'	+43'	102°	33°48'	+44'	103°	17
18	35°33'	+38'	98°	35°24'	+39'	98°	35°15'	+40'	99°	35°05'	+41'	100°	34°55'	+42'	100°	34°44'	+42'	101°	34°32'	+43'	102°	18
19	36°10'	+37'	97°	36°03'	+38'	97°	35°55'	+39'	98°	35°46'	+40'	99°	35°37'	+41'	100°	35°26'	+42'	100°	35°15'	+43'	101°	19
20	36°48'	+37'	96°	36°41'	+38'	96°	36°34'	+39'	97°	36°26'	+40'	98°	36°18'	+41'	99°	36°08'	+42'	99°	35°58'	+43'	100°	20
21	37°24'	+36'	95°	37°19'	+37'	95°	37°13'	+38'	96°	37°06'	+39'	97°	36°58'	+40'	98°	36°50'	+41'	98°	36°41'	+42'	99°	21
22	38°01'	+36'	94°	37°56'	+37'	94°	37°51'	+38'	95°	37°45'	+39'	96°	37°39'	+40'	97°	37°31'	+41'	98°	37°23'	+42'	98°	22
23	38°36'	+35'	93°	38°33'	+36'	93°	38°29'	+37'	94°	38°24'	+38'	95°	38°19'	+39'	96°	38°12'	+40'	97°	38°05'	+41'	97°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

58° 302° LHA — Latitude SAME as Declination — 58° 302° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

59° 301° LHA — Latitude SAME as Declination — 59° 301° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	22°30'	+43'	112°	22°08'	+44'	112°	21°45'	+45'	113°	21°21'	+45'	113°	20°58'	+46'	113°	20°34'	+47'	114°	20°10'	+47'	114°	0
1	23°14'	+43'	111°	22°52'	+44'	112°	22°30'	+45'	112°	22°07'	+45'	112°	21°44'	+46'	113°	21°21'	+47'	113°	20°57'	+47'	113°	1
2	23°57'	+43'	110°	23°36'	+44'	111°	23°14'	+44'	111°	22°52'	+45'	112°	22°30'	+46'	112°	22°07'	+46'	112°	21°44'	+47'	113°	2
3	24°40'	+43'	110°	24°19'	+43'	110°	23°58'	+44'	110°	23°37'	+45'	111°	23°16'	+46'	111°	22°54'	+46'	112°	22°31'	+47'	112°	3
4	25°22'	+42'	109°	25°03'	+43'	109°	24°43'	+44'	110°	24°22'	+45'	110°	24°01'	+45'	111°	23°40'	+46'	111°	23°18'	+47'	111°	4
5	26°05'	+42'	108°	25°46'	+43'	109°	25°27'	+44'	109°	25°07'	+44'	109°	24°47'	+45'	110°	24°26'	+46'	110°	24°05'	+47'	111°	5
6	26°47'	+42'	107°	26°29'	+43'	108°	26°10'	+43'	108°	25°51'	+44'	109°	25°32'	+45'	109°	25°12'	+46'	110°	24°52'	+46'	110°	6
7	27°29'	+42'	106°	27°12'	+42'	107°	26°54'	+43'	107°	26°36'	+44'	108°	26°17'	+45'	108°	25°58'	+45'	109°	25°38'	+46'	109°	7
8	28°10'	+41'	106°	27°54'	+42'	106°	27°37'	+43'	107°	27°20'	+44'	107°	27°02'	+45'	108°	26°43'	+45'	108°	26°24'	+46'	109°	8
9	28°52'	+41'	105°	28°36'	+42'	105°	28°20'	+43'	106°	28°03'	+43'	106°	27°46'	+44'	107°	27°28'	+45'	107°	27°10'	+46'	108°	9
10	29°33'	+41'	104°	29°18'	+42'	105°	29°03'	+42'	105°	28°47'	+43'	106°	28°30'	+44'	106°	28°13'	+45'	107°	27°56'	+46'	107°	10
11	30°13'	+40'	103°	30°00'	+41'	104°	29°45'	+42'	104°	29°30'	+43'	105°	29°14'	+44'	105°	28°58'	+45'	106°	28°41'	+45'	106°	11
12	30°54'	+40'	102°	30°41'	+41'	103°	30°27'	+42'	103°	30°13'	+43'	104°	29°58'	+43'	105°	29°43'	+44'	105°	29°27'	+45'	106°	12
13	31°34'	+40'	101°	31°22'	+41'	102°	31°09'	+41'	103°	30°56'	+42'	103°	30°42'	+43'	104°	30°27'	+44'	104°	30°12'	+45'	105°	13
14	32°14'	+39'	101°	32°02'	+40'	101°	31°50'	+41'	102°	31°38'	+42'	102°	31°25'	+43'	103°	31°11'	+44'	104°	30°57'	+44'	104°	14
15	32°53'	+39'	100°	32°42'	+40'	100°	32°31'	+41'	101°	32°20'	+42'	102°	32°07'	+43'	102°	31°55'	+43'	103°	31°41'	+44'	103°	15
16	33°32'	+38'	99°	33°22'	+39'	99°	33°12'	+40'	100°	33°01'	+41'	101°	32°50'	+42'	101°	32°38'	+43'	102°	32°25'	+44'	103°	16
17	34°10'	+38'	98°	34°02'	+39'	98°	33°53'	+40'	99°	33°43'	+41'	100°	33°32'	+42'	100°	33°21'	+43'	101°	33°09'	+44'	102°	17
18	34°48'	+38'	97°	34°41'	+39'	98°	34°33'	+40'	98°	34°24'	+41'	99°	34°14'	+41'	100°	34°04'	+42'	100°	33°53'	+43'	101°	18
19	35°26'	+37'	96°	35°19'	+38'	97°	35°12'	+39'	97°	35°04'	+40'	98°	34°55'	+41'	99°	34°46'	+42'	99°	34°36'	+43'	100°	19
20	36°03'	+37'	95°	35°58'	+38'	96°	35°51'	+39'	96°	35°44'	+40'	97°	35°36'	+41'	98°	35°28'	+42'	99°	35°19'	+42'	99°	20
21	36°40'	+36'	94°	36°35'	+37'	95°	36°30'	+38'	95°	36°24'	+39'	96°	36°17'	+40'	97°	36°09'	+41'	98°	36°01'	+42'	98°	21
22	37°16'	+36'	93°	37°13'	+37'	94°	37°08'	+38'	94°	37°03'	+39'	95°	36°57'	+40'	96°	36°51'	+41'	97°	36°43'	+42'	97°	22
23	37°52'	+35'	92°	37°49'	+36'	93°	37°46'	+37'	94°	37°42'	+38'	94°	37°37'	+39'	95°	37°31'	+40'	96°	37°25'	+41'	97°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

59° 301° LHA — Latitude SAME as Declination — 59° 301° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

60° 300° LHA — Latitude SAME as Declination — 60° 300° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	21°49'	+43'	111°	21°27'	+44'	111°	21°05'	+45'	112°	20°42'	+45'	112°	20°19'	+46'	113°	19°56'	+47'	113°	19°33'	+47'	113°	0
1	22°32'	+43'	110°	22°11'	+44'	111°	21°49'	+44'	111°	21°28'	+45'	112°	21°05'	+46'	112°	20°43'	+46'	112°	20°20'	+47'	113°	1
2	23°15'	+43'	110°	22°54'	+43'	110°	22°34'	+44'	110°	22°13'	+45'	111°	21°51'	+46'	111°	21°29'	+46'	112°	21°07'	+47'	112°	2
3	23°58'	+42'	109°	23°38'	+43'	109°	23°18'	+44'	110°	22°58'	+45'	110°	22°37'	+45'	110°	22°16'	+46'	111°	21°54'	+47'	111°	3
4	24°40'	+42'	108°	24°21'	+43'	109°	24°02'	+44'	109°	23°42'	+45'	109°	23°22'	+45'	110°	23°02'	+46'	110°	22°41'	+47'	111°	4
5	25°22'	+42'	107°	25°04'	+43'	108°	24°46'	+44'	108°	24°27'	+44'	109°	24°07'	+45'	109°	23°48'	+46'	109°	23°27'	+46'	110°	5
6	26°04'	+42'	106°	25°47'	+43'	107°	25°29'	+43'	107°	25°11'	+44'	108°	24°52'	+45'	108°	24°33'	+46'	109°	24°14'	+46'	109°	6
7	26°46'	+41'	106°	26°29'	+42'	106°	26°13'	+43'	107°	25°55'	+44'	107°	25°37'	+45'	108°	25°19'	+45'	108°	25°00'	+46'	108°	7
8	27°27'	+41'	105°	27°12'	+42'	105°	26°56'	+43'	106°	26°39'	+44'	106°	26°22'	+44'	107°	26°04'	+45'	107°	25°46'	+46'	108°	8
9	28°09'	+41'	104°	27°54'	+42'	105°	27°38'	+43'	105°	27°23'	+43'	106°	27°06'	+44'	106°	26°49'	+45'	107°	26°32'	+46'	107°	9
10	28°49'	+41'	103°	28°35'	+41'	104°	28°21'	+42'	104°	28°06'	+43'	105°	27°50'	+44'	105°	27°34'	+45'	106°	27°18'	+45'	106°	10
11	29°30'	+40'	102°	29°17'	+41'	103°	29°03'	+42'	103°	28°49'	+43'	104°	28°34'	+44'	105°	28°19'	+44'	105°	28°03'	+45'	106°	11
12	30°10'	+40'	102°	29°58'	+41'	102°	29°45'	+42'	103°	29°32'	+42'	103°	29°18'	+43'	104°	29°03'	+44'	104°	28°48'	+45'	105°	12
13	30°50'	+40'	101°	30°39'	+40'	101°	30°27'	+41'	102°	30°14'	+42'	102°	30°01'	+43'	103°	29°47'	+44'	104°	29°33'	+45'	104°	13
14	31°30'	+39'	100°	31°19'	+40'	100°	31°08'	+41'	101°	30°56'	+42'	102°	30°44'	+43'	102°	30°31'	+44'	103°	30°18'	+44'	103°	14
15	32°09'	+39'	99°	31°59'	+40'	100°	31°49'	+41'	100°	31°38'	+42'	101°	31°27'	+42'	101°	31°15'	+43'	102°	31°02'	+44'	103°	15
16	32°48'	+38'	98°	32°39'	+39'	99°	32°30'	+40'	99°	32°20'	+41'	100°	32°09'	+42'	100°	31°58'	+43'	101°	31°46'	+44'	102°	16
17	33°26'	+38'	97°	33°18'	+39'	98°	33°10'	+40'	98°	33°01'	+41'	99°	32°51'	+42'	100°	32°41'	+43'	100°	32°30'	+43'	101°	17
18	34°04'	+38'	96°	33°57'	+39'	97°	33°50'	+39'	97°	33°42'	+40'	98°	33°33'	+41'	99°	33°23'	+42'	99°	33°13'	+43'	100°	18
19	34°42'	+37'	95°	34°36'	+38'	96°	34°29'	+39'	97°	34°22'	+40'	97°	34°14'	+41'	98°	34°06'	+42'	99°	33°56'	+43'	99°	19
20	35°19'	+37'	94°	35°14'	+38'	95°	35°08'	+39'	96°	35°02'	+40'	96°	34°55'	+41'	97°	34°47'	+41'	98°	34°39'	+42'	98°	20
21	35°55'	+36'	93°	35°52'	+37'	94°	35°47'	+38'	95°	35°42'	+39'	95°	35°36'	+40'	96°	35°29'	+41'	97°	35°21'	+42'	98°	21
22	36°32'	+36'	92°	36°29'	+37'	93°	36°25'	+38'	94°	36°21'	+39'	94°	36°16'	+40'	95°	36°10'	+41'	96°	36°03'	+42'	97°	22
23	37°07'	+35'	91°	37°05'	+36'	92°	37°03'	+37'	93°	37°00'	+38'	94°	36°56'	+39'	94°	36°51'	+40'	95°	36°45'	+41'	96°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

60° 300° LHA — Latitude SAME as Declination — 60° 300° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

61° 299° LHA — Latitude SAME as Declination — 61° 299° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	21°07'	+43'	110°	20°46'	+44'	111°	20°25'	+44'	111°	20°03'	+45'	111°	19°41'	+46'	112°	19°18'	+46'	112°	18°56'	+47'	112°	0
1	21°50'	+43'	110°	21°30'	+43'	110°	21°09'	+44'	110°	20°48'	+45'	111°	20°27'	+46'	111°	20°05'	+46'	111°	19°43'	+47'	112°	1
2	22°33'	+43'	109°	22°13'	+43'	109°	21°53'	+44'	110°	21°33'	+45'	110°	21°12'	+45'	110°	20°51'	+46'	111°	20°30'	+47'	111°	2
3	23°15'	+42'	108°	22°56'	+43'	108°	22°37'	+44'	109°	22°18'	+45'	109°	21°58'	+45'	110°	21°37'	+46'	110°	21°17'	+47'	110°	3
4	23°58'	+42'	107°	23°39'	+43'	108°	23°21'	+44'	108°	23°02'	+44'	109°	22°43'	+45'	109°	22°23'	+46'	109°	22°03'	+46'	110°	4
5	24°40'	+42'	107°	24°22'	+43'	107°	24°05'	+43'	107°	23°46'	+44'	108°	23°28'	+45'	108°	23°09'	+46'	109°	22°50'	+46'	109°	5
6	25°21'	+42'	106°	25°05'	+42'	106°	24°48'	+43'	107°	24°31'	+44'	107°	24°13'	+45'	107°	23°55'	+45'	108°	23°36'	+46'	108°	6
7	26°03'	+41'	105°	25°47'	+42'	105°	25°31'	+43'	106°	25°14'	+44'	106°	24°57'	+44'	107°	24°40'	+45'	107°	24°22'	+46'	108°	7
8	26°44'	+41'	104°	26°29'	+42'	105°	26°14'	+43'	105°	25°58'	+43'	106°	25°42'	+44'	106°	25°25'	+45'	106°	25°08'	+46'	107°	8
9	27°25'	+41'	103°	27°11'	+42'	104°	26°57'	+42'	104°	26°42'	+43'	105°	26°26'	+44'	105°	26°10'	+45'	106°	25°53'	+45'	106°	9
10	28°06'	+40'	102°	27°53'	+41'	103°	27°39'	+42'	103°	27°25'	+43'	104°	27°10'	+44'	105°	26°55'	+44'	105°	26°39'	+45'	105°	10
11	28°46'	+40'	102°	28°34'	+41'	102°	28°21'	+42'	103°	28°08'	+43'	103°	27°54'	+43'	104°	27°39'	+44'	104°	27°24'	+45'	105°	11
12	29°26'	+40'	101°	29°15'	+41'	101°	29°03'	+42'	102°	28°50'	+42'	102°	28°37'	+43'	103°	28°23'	+44'	103°	28°09'	+45'	104°	12
13	30°06'	+39'	100°	29°56'	+40'	100°	29°44'	+41'	101°	29°33'	+42'	102°	29°20'	+43'	102°	29°07'	+44'	103°	28°54'	+44'	103°	13
14	30°46'	+39'	99°	30°36'	+40'	100°	30°26'	+41'	100°	30°15'	+42'	101°	30°03'	+43'	101°	29°51'	+43'	102°	29°38'	+44'	102°	14
15	31°25'	+39'	98°	31°16'	+40'	99°	31°06'	+41'	99°	30°56'	+41'	100°	30°46'	+42'	101°	30°34'	+43'	101°	30°23'	+44'	102°	15
16	32°03'	+38'	97°	31°56'	+39'	98°	31°47'	+40'	98°	31°38'	+41'	99°	31°28'	+42'	100°	31°18'	+43'	100°	31°07'	+44'	101°	16
17	32°42'	+38'	96°	32°35'	+39'	97°	32°27'	+40'	98°	32°19'	+41'	98°	32°10'	+42'	99°	32°00'	+42'	99°	31°50'	+43'	100°	17
18	33°20'	+37'	95°	33°14'	+38'	96°	33°07'	+39'	97°	33°00'	+40'	97°	32°52'	+41'	98°	32°43'	+42'	99°	32°34'	+43'	99°	18
19	33°57'	+37'	94°	33°52'	+38'	95°	33°46'	+39'	96°	33°40'	+40'	96°	33°33'	+41'	97°	33°25'	+42'	98°	33°17'	+43'	98°	19
20	34°34'	+37'	94°	34°30'	+38'	94°	34°25'	+39'	95°	34°20'	+40'	96°	34°14'	+40'	96°	34°07'	+41'	97°	33°59'	+42'	98°	20
21	35°11'	+36'	93°	35°08'	+37'	93°	35°04'	+38'	94°	34°59'	+39'	95°	34°54'	+40'	95°	34°48'	+41'	96°	34°42'	+42'	97°	21
22	35°47'	+36'	92°	35°45'	+37'	92°	35°42'	+38'	93°	35°39'	+39'	94°	35°34'	+40'	94°	35°29'	+41'	95°	35°24'	+42'	96°	22
23	36°23'	+35'	91°	36°22'	+36'	91°	36°20'	+37'	92°	36°17'	+38'	93°	36°14'	+39'	94°	36°10'	+40'	94°	36°05'	+41'	95°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

61° 299° LHA — Latitude SAME as Declination — 61° 299° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

62° 298° LHA — Latitude SAME as Declination — 62° 298° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	20°25'	+43'	110°	20°05'	+43'	110°	19°44'	+44'	110°	19°23'	+45'	111°	19°02'	+46'	111°	18°40'	+46'	111°	18°19'	+47'	112°	0
1	21°08'	+43'	109°	20°48'	+43'	109°	20°28'	+44'	110°	20°08'	+45'	110°	19°48'	+45'	110°	19°27'	+46'	111°	19°05'	+47'	111°	1
2	21°50'	+42'	108°	21°32'	+43'	108°	21°12'	+44'	109°	20°53'	+45'	109°	20°33'	+45'	110°	20°13'	+46'	110°	19°52'	+47'	110°	2
3	22°33'	+42'	107°	22°15'	+43'	108°	21°56'	+44'	108°	21°37'	+44'	108°	21°18'	+45'	109°	20°59'	+46'	109°	20°39'	+46'	110°	3
4	23°15'	+42'	107°	22°58'	+43'	107°	22°40'	+43'	107°	22°22'	+44'	108°	22°03'	+45'	108°	21°44'	+46'	109°	21°25'	+46'	109°	4
5	23°57'	+42'	106°	23°40'	+42'	106°	23°23'	+43'	107°	23°06'	+44'	107°	22°48'	+45'	107°	22°30'	+45'	108°	22°12'	+46'	108°	5
6	24°38'	+41'	105°	24°23'	+42'	105°	24°07'	+43'	106°	23°50'	+44'	106°	23°33'	+44'	107°	23°15'	+45'	107°	22°58'	+46'	108°	6
7	25°20'	+41'	104°	25°05'	+42'	105°	24°50'	+43'	105°	24°34'	+44'	106°	24°17'	+44'	106°	24°01'	+45'	106°	23°44'	+46'	107°	7
8	26°01'	+41'	103°	25°47'	+42'	104°	25°32'	+42'	104°	25°17'	+43'	105°	25°02'	+44'	105°	24°46'	+45'	106°	24°29'	+46'	106°	8
9	26°42'	+41'	103°	26°29'	+41'	103°	26°15'	+42'	104°	26°00'	+43'	104°	25°46'	+44'	104°	25°31'	+45'	105°	25°15'	+45'	105°	9
10	27°22'	+40'	102°	27°10'	+41'	102°	26°57'	+42'	103°	26°44'	+43'	103°	26°30'	+44'	104°	26°15'	+44'	104°	26°00'	+45'	105°	10
11	28°03'	+40'	101°	27°51'	+41'	101°	27°39'	+42'	102°	27°26'	+43'	102°	27°13'	+43'	103°	26°59'	+44'	103°	26°45'	+45'	104°	11
12	28°43'	+40'	100°	28°32'	+41'	101°	28°21'	+41'	101°	28°09'	+42'	102°	27°56'	+43'	102°	27°44'	+44'	103°	27°30'	+45'	103°	12
13	29°22'	+39'	99°	29°12'	+40'	100°	29°02'	+41'	100°	28°51'	+42'	101°	28°39'	+43'	101°	28°27'	+44'	102°	28°15'	+44'	102°	13
14	30°02'	+39'	98°	29°53'	+40'	99°	29°43'	+41'	99°	29°33'	+42'	100°	29°22'	+42'	101°	29°11'	+43'	101°	28°59'	+44'	102°	14
15	30°41'	+39'	97°	30°32'	+40'	98°	30°24'	+40'	99°	30°15'	+41'	99°	30°05'	+42'	100°	29°54'	+43'	100°	29°43'	+44'	101°	15
16	31°19'	+38'	97°	31°12'	+39'	97°	31°04'	+40'	98°	30°56'	+41'	98°	30°47'	+42'	99°	30°37'	+43'	100°	30°27'	+44'	100°	16
17	31°57'	+38'	96°	31°51'	+39'	96°	31°44'	+40'	97°	31°37'	+41'	97°	31°29'	+42'	98°	31°20'	+42'	99°	31°11'	+43'	99°	17
18	32°35'	+37'	95°	32°30'	+38'	95°	32°24'	+39'	96°	32°17'	+40'	97°	32°10'	+41'	97°	32°02'	+42'	98°	31°54'	+43'	98°	18
19	33°13'	+37'	94°	33°08'	+38'	94°	33°03'	+39'	95°	32°58'	+40'	96°	32°51'	+41'	96°	32°44'	+42'	97°	32°37'	+43'	98°	19
20	33°50'	+37'	93°	33°46'	+38'	93°	33°42'	+39'	94°	33°38'	+40'	95°	33°32'	+40'	95°	33°26'	+41'	96°	33°19'	+42'	97°	20
21	34°26'	+36'	92°	34°24'	+37'	93°	34°21'	+38'	93°	34°17'	+39'	94°	34°13'	+40'	95°	34°08'	+41'	95°	34°02'	+42'	96°	21
22	35°02'	+36'	91°	35°01'	+37'	92°	34°59'	+38'	92°	34°56'	+39'	93°	34°53'	+40'	94°	34°49'	+41'	94°	34°44'	+42'	95°	22
23	35°38'	+35'	90°	35°38'	+36'	91°	35°37'	+37'	91°	35°35'	+38'	92°	35°32'	+39'	93°	35°29'	+40'	93°	35°25'	+41'	94°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

62° 298° LHA — Latitude SAME as Declination — 62° 298° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

63° 297° LHA — Latitude SAME as Declination — 63° 297° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	19°43'	+43'	109°	19°24'	+43'	109°	19°04'	+44'	109°	18°43'	+45'	110°	18°23'	+45'	110°	18°02'	+46'	110°	17°41'	+47'	111°	0
1	20°26'	+42'	108°	20°07'	+43'	108°	19°48'	+44'	109°	19°28'	+45'	109°	19°08'	+45'	109°	18°48'	+46'	110°	18°28'	+47'	110°	1
2	21°08'	+42'	107°	20°50'	+43'	108°	20°32'	+44'	108°	20°13'	+44'	108°	19°54'	+45'	109°	19°34'	+46'	109°	19°14'	+46'	109°	2
3	21°50'	+42'	107°	21°33'	+43'	107°	21°15'	+43'	107°	20°57'	+44'	108°	20°39'	+45'	108°	20°20'	+46'	108°	20°01'	+46'	109°	3
4	22°32'	+42'	106°	22°16'	+42'	106°	21°59'	+43'	107°	21°41'	+44'	107°	21°24'	+45'	107°	21°06'	+45'	108°	20°47'	+46'	108°	4
5	23°14'	+41'	105°	22°58'	+42'	105°	22°42'	+43'	106°	22°25'	+44'	106°	22°08'	+45'	107°	21°51'	+45'	107°	21°33'	+46'	107°	5
6	23°55'	+41'	104°	23°40'	+42'	105°	23°25'	+43'	105°	23°09'	+44'	105°	22°53'	+44'	106°	22°36'	+45'	106°	22°19'	+46'	107°	6
7	24°36'	+41'	103°	24°22'	+42'	104°	24°08'	+43'	104°	23°53'	+43'	105°	23°37'	+44'	105°	23°21'	+45'	106°	23°05'	+46'	106°	7
8	25°17'	+41'	103°	25°04'	+42'	103°	24°50'	+42'	104°	24°36'	+43'	104°	24°21'	+44'	104°	24°06'	+45'	105°	23°51'	+45'	105°	8
9	25°58'	+40'	102°	25°46'	+41'	102°	25°33'	+42'	103°	25°19'	+43'	103°	25°05'	+44'	104°	24°51'	+44'	104°	24°36'	+45'	105°	9
10	26°39'	+40'	101°	26°27'	+41'	101°	26°15'	+42'	102°	26°02'	+43'	102°	25°49'	+43'	103°	25°35'	+44'	103°	25°21'	+45'	104°	10
11	27°19'	+40'	100°	27°08'	+41'	101°	26°57'	+42'	101°	26°45'	+42'	102°	26°32'	+43'	102°	26°20'	+44'	103°	26°06'	+45'	103°	11
12	27°59'	+40'	99°	27°49'	+40'	100°	27°38'	+41'	100°	27°27'	+42'	101°	27°16'	+43'	101°	27°04'	+44'	102°	26°51'	+45'	102°	12
13	28°38'	+39'	98°	28°29'	+40'	99°	28°19'	+41'	100°	28°09'	+42'	100°	27°59'	+43'	101°	27°47'	+43'	101°	27°35'	+44'	102°	13
14	29°17'	+39'	98°	29°09'	+40'	98°	29°00'	+41'	99°	28°51'	+42'	99°	28°41'	+42'	100°	28°31'	+43'	100°	28°20'	+44'	101°	14
15	29°56'	+39'	97°	29°49'	+39'	97°	29°41'	+40'	98°	29°33'	+41'	98°	29°24'	+42'	99°	29°14'	+43'	100°	29°04'	+44'	100°	15
16	30°35'	+38'	96°	30°28'	+39'	96°	30°21'	+40'	97°	30°14'	+41'	98°	30°06'	+42'	98°	29°57'	+43'	99°	29°48'	+43'	99°	16
17	31°13'	+38'	95°	31°08'	+39'	96°	31°01'	+40'	96°	30°55'	+41'	97°	30°47'	+41'	97°	30°40'	+42'	98°	30°31'	+43'	98°	17
18	31°51'	+37'	94°	31°46'	+38'	95°	31°41'	+39'	95°	31°35'	+40'	96°	31°29'	+41'	96°	31°22'	+42'	97°	31°14'	+43'	98°	18
19	32°28'	+37'	93°	32°25'	+38'	94°	32°20'	+39'	94°	32°16'	+40'	95°	32°10'	+41'	96°	32°04'	+42'	96°	31°57'	+43'	97°	19
20	33°05'	+37'	92°	33°03'	+38'	93°	32°59'	+39'	93°	32°55'	+39'	94°	32°51'	+40'	95°	32°45'	+41'	95°	32°40'	+42'	96°	20
21	33°42'	+36'	91°	33°40'	+37'	92°	33°38'	+38'	93°	33°35'	+39'	93°	33°31'	+40'	94°	33°27'	+41'	95°	33°22'	+42'	95°	21
22	34°18'	+36'	90°	34°17'	+37'	91°	34°16'	+38'	92°	34°14'	+39'	92°	34°11'	+40'	93°	34°08'	+41'	94°	34°04'	+41'	94°	22
23	34°53'	+35'	89°	34°54'	+36'	90°	34°54'	+37'	91°	34°53'	+38'	91°	34°51'	+39'	92°	34°48'	+40'	93°	34°45'	+41'	93°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

63° 297° LHA — Latitude SAME as Declination — 63° 297° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

64° 296° LHA — Latitude SAME as Declination — 64° 296° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	19°01'	+42'	108°	18°42'	+43'	108°	18°23'	+44'	109°	18°03'	+45'	109°	17°44'	+45'	109°	17°24'	+46'	110°	17°03'	+47'	110°	0
1	19°43'	+42'	107°	19°25'	+43'	108°	19°07'	+44'	108°	18°48'	+44'	108°	18°29'	+45'	109°	18°10'	+46'	109°	17°50'	+46'	109°	1
2	20°25'	+42'	107°	20°08'	+43'	107°	19°50'	+43'	107°	19°32'	+44'	108°	19°14'	+45'	108°	18°55'	+46'	108°	18°36'	+46'	109°	2
3	21°07'	+42'	106°	20°51'	+43'	106°	20°34'	+43'	107°	20°17'	+44'	107°	19°59'	+45'	107°	19°41'	+45'	108°	19°23'	+46'	108°	3
4	21°49'	+42'	105°	21°33'	+42'	105°	21°17'	+43'	106°	21°01'	+44'	106°	20°44'	+45'	107°	20°27'	+45'	107°	20°09'	+46'	107°	4
5	22°31'	+41'	104°	22°16'	+42'	105°	22°00'	+43'	105°	21°45'	+44'	105°	21°28'	+44'	106°	21°12'	+45'	106°	20°55'	+46'	107°	5
6	23°12'	+41'	103°	22°58'	+42'	104°	22°43'	+43'	104°	22°28'	+43'	105°	22°13'	+44'	105°	21°57'	+45'	105°	21°41'	+46'	106°	6
7	23°53'	+41'	103°	23°40'	+42'	103°	23°26'	+42'	104°	23°12'	+43'	104°	22°57'	+44'	104°	22°42'	+45'	105°	22°26'	+45'	105°	7
8	24°34'	+41'	102°	24°21'	+41'	102°	24°08'	+42'	103°	23°55'	+43'	103°	23°41'	+44'	104°	23°27'	+45'	104°	23°12'	+45'	104°	8
9	25°15'	+40'	101°	25°03'	+41'	102°	24°51'	+42'	102°	24°38'	+43'	102°	24°25'	+44'	103°	24°11'	+44'	103°	23°57'	+45'	104°	9
10	25°55'	+40'	100°	25°44'	+41'	101°	25°33'	+42'	101°	25°21'	+43'	102°	25°08'	+43'	102°	24°55'	+44'	103°	24°42'	+45'	103°	10
11	26°35'	+40'	99°	26°25'	+41'	100°	26°14'	+41'	100°	26°03'	+42'	101°	25°52'	+43'	101°	25°40'	+44'	102°	25°27'	+45'	102°	11
12	27°15'	+39'	99°	27°05'	+40'	99°	26°56'	+41'	100°	26°45'	+42'	100°	26°35'	+43'	101°	26°23'	+44'	101°	26°12'	+44'	102°	12
13	27°54'	+39'	98°	27°46'	+40'	98°	27°37'	+41'	99°	27°27'	+42'	99°	27°18'	+43'	100°	27°07'	+43'	100°	26°56'	+44'	101°	13
14	28°33'	+39'	97°	28°26'	+40'	97°	28°18'	+41'	98°	28°09'	+41'	98°	28°00'	+42'	99°	27°50'	+43'	100°	27°40'	+44'	100°	14
15	29°12'	+38'	96°	29°05'	+39'	97°	28°58'	+40'	97°	28°51'	+41'	98°	28°42'	+42'	98°	28°34'	+43'	99°	28°24'	+44'	99°	15
16	29°50'	+38'	95°	29°45'	+39'	96°	29°39'	+40'	96°	29°32'	+41'	97°	29°24'	+42'	97°	29°16'	+43'	98°	29°08'	+43'	98°	16
17	30°29'	+38'	94°	30°24'	+39'	95°	30°19'	+40'	95°	30°13'	+40'	96°	30°06'	+41'	97°	29°59'	+42'	97°	29°51'	+43'	98°	17
18	31°06'	+37'	93°	31°03'	+38'	94°	30°58'	+39'	95°	30°53'	+40'	95°	30°47'	+41'	96°	30°41'	+42'	96°	30°34'	+43'	97°	18
19	31°44'	+37'	92°	31°41'	+38'	93°	31°37'	+39'	94°	31°33'	+40'	94°	31°28'	+41'	95°	31°23'	+42'	95°	31°17'	+42'	96°	19
20	32°21'	+37'	91°	32°19'	+38'	92°	32°16'	+38'	93°	32°13'	+39'	93°	32°09'	+40'	94°	32°05'	+41'	95°	32°00'	+42'	95°	20
21	32°57'	+36'	91°	32°56'	+37'	91°	32°55'	+38'	92°	32°52'	+39'	92°	32°50'	+40'	93°	32°46'	+41'	94°	32°42'	+42'	94°	21
22	33°33'	+36'	90°	33°33'	+37'	90°	33°33'	+38'	91°	33°31'	+39'	92°	33°29'	+40'	92°	33°27'	+41'	93°	33°23'	+41'	94°	22
23	34°09'	+35'	89°	34°10'	+36'	89°	34°10'	+37'	90°	34°10'	+38'	91°	34°09'	+39'	91°	34°07'	+40'	92°	34°05'	+41'	93°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

64° 296° LHA — Latitude SAME as Declination — 64° 296° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

65° 295° LHA — Latitude SAME as Declination — 65° 295° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	18°18'	+42'	107°	18°00'	+43'	108°	17°42'	+44'	108°	17°23'	+44'	108°	17°04'	+45'	109°	16°45'	+46'	109°	16°26'	+46'	109°	0
1	19°00'	+42'	107°	18°43'	+43'	107°	18°26'	+44'	107°	18°08'	+44'	108°	17°49'	+45'	108°	17°31'	+46'	108°	17°12'	+46'	108°	1
2	19°42'	+42'	106°	19°26'	+43'	106°	19°09'	+43'	106°	18°52'	+44'	107°	18°34'	+45'	107°	18°16'	+45'	107°	17°58'	+46'	108°	2
3	20°24'	+42'	105°	20°09'	+42'	105°	19°52'	+43'	106°	19°36'	+44'	106°	19°19'	+45'	106°	19°02'	+45'	107°	18°44'	+46'	107°	3
4	21°06'	+41'	104°	20°51'	+42'	105°	20°36'	+43'	105°	20°20'	+44'	105°	20°04'	+44'	106°	19°47'	+45'	106°	19°30'	+46'	106°	4
5	21°47'	+41'	104°	21°33'	+42'	104°	21°19'	+43'	104°	21°04'	+44'	105°	20°48'	+44'	105°	20°32'	+45'	105°	20°16'	+46'	106°	5
6	22°29'	+41'	103°	22°15'	+42'	103°	22°01'	+43'	104°	21°47'	+43'	104°	21°32'	+44'	104°	21°17'	+45'	105°	21°02'	+46'	105°	6
7	23°09'	+41'	102°	22°57'	+42'	102°	22°44'	+42'	103°	22°30'	+43'	103°	22°17'	+44'	104°	22°02'	+45'	104°	21°48'	+45'	104°	7
8	23°50'	+40'	101°	23°38'	+41'	102°	23°26'	+42'	102°	23°13'	+43'	102°	23°00'	+44'	103°	22°47'	+44'	103°	22°33'	+45'	104°	8
9	24°31'	+40'	100°	24°20'	+41'	101°	24°08'	+42'	101°	23°56'	+43'	102°	23°44'	+43'	102°	23°31'	+44'	103°	23°18'	+45'	103°	9
10	25°11'	+40'	100°	25°01'	+41'	100°	24°50'	+42'	100°	24°39'	+42'	101°	24°27'	+43'	101°	24°15'	+44'	102°	24°03'	+45'	102°	10
11	25°51'	+40'	99°	25°42'	+41'	99°	25°32'	+41'	100°	25°21'	+42'	100°	25°11'	+43'	101°	24°59'	+44'	101°	24°48'	+45'	101°	11
12	26°30'	+39'	98°	26°22'	+40'	98°	26°13'	+41'	99°	26°04'	+42'	99°	25°54'	+43'	100°	25°43'	+44'	100°	25°32'	+44'	101°	12
13	27°10'	+39'	97°	27°02'	+40'	98°	26°54'	+41'	98°	26°46'	+42'	99°	26°36'	+42'	99°	26°27'	+43'	99°	26°17'	+44'	100°	13
14	27°49'	+39'	96°	27°42'	+40'	97°	27°35'	+40'	97°	27°27'	+41'	98°	27°19'	+42'	98°	27°10'	+43'	99°	27°01'	+44'	99°	14
15	28°28'	+38'	95°	28°22'	+39'	96°	28°15'	+40'	96°	28°09'	+41'	97°	28°01'	+42'	97°	27°53'	+43'	98°	27°45'	+44'	98°	15
16	29°06'	+38'	94°	29°01'	+39'	95°	28°56'	+40'	96°	28°50'	+41'	96°	28°43'	+42'	97°	28°36'	+42'	97°	28°28'	+43'	98°	16
17	29°44'	+38'	94°	29°40'	+39'	94°	29°36'	+40'	95°	29°30'	+40'	95°	29°25'	+41'	96°	29°18'	+42'	96°	29°11'	+43'	97°	17
18	30°22'	+37'	93°	30°19'	+38'	93°	30°15'	+39'	94°	30°11'	+40'	94°	30°06'	+41'	95°	30°00'	+42'	96°	29°54'	+43'	96°	18
19	30°59'	+37'	92°	30°57'	+38'	92°	30°54'	+39'	93°	30°51'	+40'	93°	30°47'	+41'	94°	30°42'	+42'	95°	30°37'	+42'	95°	19
20	31°36'	+37'	91°	31°35'	+37'	91°	31°33'	+38'	92°	31°31'	+39'	93°	31°28'	+40'	93°	31°24'	+41'	94°	31°20'	+42'	94°	20
21	32°13'	+36'	90°	32°12'	+37'	90°	32°12'	+38'	91°	32°10'	+39'	92°	32°08'	+40'	92°	32°05'	+41'	93°	32°02'	+42'	94°	21
22	32°49'	+36'	89°	32°49'	+37'	90°	32°50'	+38'	90°	32°49'	+39'	91°	32°48'	+40'	91°	32°46'	+40'	92°	32°43'	+41'	93°	22
23	33°24'	+35'	88°	33°26'	+36'	89°	33°27'	+37'	89°	33°28'	+38'	90°	33°27'	+39'	91°	33°26'	+40'	91°	33°25'	+41'	92°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

65° 295° LHA — Latitude SAME as Declination — 65° 295° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

66° 294° LHA — Latitude SAME as Declination — 66° 294° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	17°36'	+42'	107°	17°18'	+43'	107°	17°01'	+44'	107°	16°43'	+44'	107°	16°25'	+45'	108°	16°06'	+46'	108°	15°48'	+46'	108°	0
1	18°18'	+42'	106°	18°01'	+43'	106°	17°44'	+43'	106°	17°27'	+44'	107°	17°10'	+45'	107°	16°52'	+45'	107°	16°34'	+46'	108°	1
2	19°00'	+42'	105°	18°44'	+42'	105°	18°28'	+43'	106°	18°11'	+44'	106°	17°54'	+45'	106°	17°37'	+45'	107°	17°20'	+46'	107°	2
3	19°41'	+41'	104°	19°26'	+42'	105°	19°11'	+43'	105°	18°55'	+44'	105°	18°39'	+44'	106°	18°23'	+45'	106°	18°06'	+46'	106°	3
4	20°23'	+41'	104°	20°08'	+42'	104°	19°54'	+43'	104°	19°39'	+44'	105°	19°24'	+44'	105°	19°08'	+45'	105°	18°52'	+46'	106°	4
5	21°04'	+41'	103°	20°50'	+42'	103°	20°37'	+43'	104°	20°22'	+43'	104°	20°08'	+44'	104°	19°53'	+45'	105°	19°38'	+46'	105°	5
6	21°45'	+41'	102°	21°32'	+42'	102°	21°19'	+42'	103°	21°06'	+43'	103°	20°52'	+44'	104°	20°38'	+45'	104°	20°23'	+45'	104°	6
7	22°26'	+41'	101°	22°14'	+41'	102°	22°02'	+42'	102°	21°49'	+43'	102°	21°36'	+44'	103°	21°22'	+44'	103°	21°09'	+45'	104°	7
8	23°06'	+40'	100°	22°55'	+41'	101°	22°44'	+42'	101°	22°32'	+43'	102°	22°20'	+44'	102°	22°07'	+44'	102°	21°54'	+45'	103°	8
9	23°47'	+40'	100°	23°37'	+41'	100°	23°26'	+42'	100°	23°15'	+43'	101°	23°03'	+43'	101°	22°51'	+44'	102°	22°39'	+45'	102°	9
10	24°27'	+40'	99°	24°17'	+41'	99°	24°08'	+42'	100°	23°57'	+42'	100°	23°47'	+43'	101°	23°35'	+44'	101°	23°24'	+45'	101°	10
11	25°07'	+40'	98°	24°58'	+40'	98°	24°49'	+41'	99°	24°40'	+42'	99°	24°30'	+43'	100°	24°19'	+44'	100°	24°08'	+44'	101°	11
12	25°46'	+39'	97°	25°39'	+40'	98°	25°30'	+41'	98°	25°22'	+42'	99°	25°13'	+43'	99°	25°03'	+43'	99°	24°53'	+44'	100°	12
13	26°26'	+39'	96°	26°19'	+40'	97°	26°11'	+41'	97°	26°04'	+42'	98°	25°55'	+42'	98°	25°46'	+43'	99°	25°37'	+44'	99°	13
14	27°05'	+39'	95°	26°59'	+40'	96°	26°52'	+40'	96°	26°45'	+41'	97°	26°38'	+42'	97°	26°30'	+43'	98°	26°21'	+44'	98°	14
15	27°43'	+38'	95°	27°38'	+39'	95°	27°33'	+40'	96°	27°26'	+41'	96°	27°20'	+42'	97°	27°13'	+43'	97°	27°05'	+43'	98°	15
16	28°22'	+38'	94°	28°17'	+39'	94°	28°13'	+40'	95°	28°07'	+41'	95°	28°02'	+42'	96°	27°55'	+42'	96°	27°48'	+43'	97°	16
17	29°00'	+38'	93°	28°56'	+39'	93°	28°52'	+39'	94°	28°48'	+40'	94°	28°43'	+41'	95°	28°38'	+42'	96°	28°32'	+43'	96°	17
18	29°37'	+37'	92°	29°35'	+38'	92°	29°32'	+39'	93°	29°28'	+40'	94°	29°24'	+41'	94°	29°20'	+42'	95°	29°14'	+43'	95°	18
19	30°14'	+37'	91°	30°13'	+38'	92°	30°11'	+39'	92°	30°09'	+40'	93°	30°05'	+41'	93°	30°02'	+42'	94°	29°57'	+42'	94°	19
20	30°51'	+37'	90°	30°51'	+37'	91°	30°50'	+38'	91°	30°48'	+39'	92°	30°46'	+40'	92°	30°43'	+41'	93°	30°39'	+42'	94°	20
21	31°28'	+36'	89°	31°28'	+37'	90°	31°28'	+38'	90°	31°28'	+39'	91°	31°26'	+40'	92°	31°24'	+41'	92°	31°22'	+42'	93°	21
22	32°04'	+36'	88°	32°06'	+37'	89°	32°06'	+38'	89°	32°07'	+39'	90°	32°06'	+40'	91°	32°05'	+40'	91°	32°03'	+41'	92°	22
23	32°40'	+35'	87°	32°42'	+36'	88°	32°44'	+37'	89°	32°45'	+38'	89°	32°46'	+39'	90°	32°46'	+40'	91°	32°45'	+41'	91°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

66° 294° LHA — Latitude SAME as Declination — 66° 294° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

67° 293° LHA — Latitude SAME as Declination — 67° 293° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	16°53'	+42'	106°	16°36'	+43'	106°	16°19'	+43'	106°	16°02'	+44'	107°	15°45'	+45'	107°	15°27'	+45'	107°	15°09'	+46'	108°	0
1	17°35'	+42'	105°	17°19'	+42'	105°	17°03'	+43'	106°	16°46'	+44'	106°	16°30'	+45'	106°	16°13'	+45'	107°	15°56'	+46'	107°	1
2	18°16'	+42'	104°	18°01'	+42'	105°	17°46'	+43'	105°	17°30'	+44'	105°	17°14'	+44'	106°	16°58'	+45'	106°	16°42'	+46'	106°	2
3	18°58'	+41'	104°	18°44'	+42'	104°	18°29'	+43'	104°	18°14'	+44'	105°	17°59'	+44'	105°	17°43'	+45'	105°	17°27'	+46'	106°	3
4	19°39'	+41'	103°	19°26'	+42'	103°	19°12'	+43'	104°	18°58'	+43'	104°	18°43'	+44'	104°	18°28'	+45'	105°	18°13'	+46'	105°	4
5	20°20'	+41'	102°	20°08'	+42'	102°	19°55'	+43'	103°	19°41'	+43'	103°	19°27'	+44'	103°	19°13'	+45'	104°	18°59'	+45'	104°	5
6	21°01'	+41'	101°	20°49'	+42'	102°	20°37'	+42'	102°	20°24'	+43'	102°	20°11'	+44'	103°	19°58'	+45'	103°	19°44'	+45'	103°	6
7	21°42'	+40'	100°	21°31'	+41'	101°	21°19'	+42'	101°	21°08'	+43'	102°	20°55'	+44'	102°	20°43'	+44'	102°	20°29'	+45'	103°	7
8	22°23'	+40'	100°	22°12'	+41'	100°	22°01'	+42'	100°	21°50'	+43'	101°	21°39'	+43'	101°	21°27'	+44'	102°	21°15'	+45'	102°	8
9	23°03'	+40'	99°	22°53'	+41'	99°	22°43'	+42'	100°	22°33'	+42'	100°	22°22'	+43'	101°	22°11'	+44'	101°	22°00'	+45'	101°	9
10	23°43'	+40'	98°	23°34'	+41'	98°	23°25'	+41'	99°	23°16'	+42'	99°	23°06'	+43'	100°	22°55'	+44'	100°	22°44'	+45'	101°	10
11	24°23'	+39'	97°	24°15'	+40'	98°	24°06'	+41'	98°	23°58'	+42'	99°	23°49'	+43'	99°	23°39'	+44'	99°	23°29'	+44'	100°	11
12	25°02'	+39'	96°	24°55'	+40'	97°	24°48'	+41'	97°	24°40'	+42'	98°	24°31'	+43'	98°	24°23'	+43'	99°	24°13'	+44'	99°	12
13	25°41'	+39'	96°	25°35'	+40'	96°	25°29'	+41'	97°	25°21'	+41'	97°	25°14'	+42'	97°	25°06'	+43'	98°	24°57'	+44'	98°	13
14	26°20'	+39'	95°	26°15'	+39'	95°	26°09'	+40'	96°	26°03'	+41'	96°	25°56'	+42'	97°	25°49'	+43'	97°	25°41'	+44'	98°	14
15	26°59'	+38'	94°	26°54'	+39'	94°	26°50'	+40'	95°	26°44'	+41'	95°	26°38'	+42'	96°	26°32'	+43'	96°	26°25'	+43'	97°	15
16	27°37'	+38'	93°	27°34'	+39'	94°	27°30'	+40'	94°	27°25'	+41'	95°	27°20'	+42'	95°	27°14'	+42'	96°	27°08'	+43'	96°	16
17	28°15'	+38'	92°	28°12'	+39'	93°	28°09'	+39'	93°	28°06'	+40'	94°	28°02'	+41'	94°	27°57'	+42'	95°	27°52'	+43'	95°	17
18	28°53'	+37'	91°	28°51'	+38'	92°	28°49'	+39'	92°	28°46'	+40'	93°	28°43'	+41'	93°	28°39'	+42'	94°	28°34'	+43'	95°	18
19	29°30'	+37'	90°	29°29'	+38'	91°	29°28'	+39'	91°	29°26'	+40'	92°	29°24'	+41'	93°	29°21'	+41'	93°	29°17'	+42'	94°	19
20	30°07'	+37'	89°	30°07'	+37'	90°	30°07'	+38'	91°	30°06'	+39'	91°	30°04'	+40'	92°	30°02'	+41'	92°	29°59'	+42'	93°	20
21	30°43'	+36'	89°	30°45'	+37'	89°	30°45'	+38'	90°	30°45'	+39'	90°	30°45'	+40'	91°	30°43'	+41'	91°	30°41'	+42'	92°	21
22	31°19'	+36'	88°	31°22'	+37'	88°	31°23'	+38'	89°	31°24'	+39'	89°	31°24'	+40'	90°	31°24'	+40'	91°	31°23'	+41'	91°	22
23	31°55'	+35'	87°	31°58'	+36'	87°	32°01'	+37'	88°	32°03'	+38'	89°	32°04'	+39'	89°	32°05'	+40'	90°	32°05'	+41'	90°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

67° 293° LHA — Latitude SAME as Declination — 67° 293° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

68° 292° LHA — Latitude SAME as Declination — 68° 292° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	16°10'	+42'	105°	15°54'	+42'	105°	15°38'	+43'	106°	15°22'	+44'	106°	15°05'	+45'	106°	14°48'	+45'	106°	14°31'	+46'	107°	0
1	16°52'	+42'	104°	16°37'	+42'	105°	16°21'	+43'	105°	16°06'	+44'	105°	15°50'	+45'	106°	15°33'	+45'	106°	15°17'	+46'	106°	1
2	17°33'	+41'	104°	17°19'	+42'	104°	17°04'	+43'	104°	16°49'	+44'	105°	16°34'	+44'	105°	16°19'	+45'	105°	16°03'	+46'	105°	2
3	18°14'	+41'	103°	18°01'	+42'	103°	17°47'	+43'	103°	17°33'	+43'	104°	17°19'	+44'	104°	17°04'	+45'	104°	16°49'	+46'	105°	3
4	18°56'	+41'	102°	18°43'	+42'	102°	18°30'	+43'	103°	18°16'	+43'	103°	18°03'	+44'	103°	17°49'	+45'	104°	17°34'	+45'	104°	4
5	19°37'	+41'	101°	19°25'	+42'	102°	19°12'	+42'	102°	19°00'	+43'	102°	18°47'	+44'	103°	18°33'	+45'	103°	18°20'	+45'	103°	5
6	20°18'	+41'	101°	20°06'	+41'	101°	19°55'	+42'	101°	19°43'	+43'	102°	19°31'	+44'	102°	19°18'	+44'	102°	19°05'	+45'	103°	6
7	20°58'	+40'	100°	20°48'	+41'	100°	20°37'	+42'	101°	20°26'	+43'	101°	20°14'	+44'	101°	20°03'	+44'	102°	19°50'	+45'	102°	7
8	21°39'	+40'	99°	21°29'	+41'	99°	21°19'	+42'	100°	21°09'	+43'	100°	20°58'	+43'	100°	20°47'	+44'	101°	20°35'	+45'	101°	8
9	22°19'	+40'	98°	22°10'	+41'	99°	22°01'	+42'	99°	21°51'	+42'	99°	21°41'	+43'	100°	21°31'	+44'	100°	21°20'	+45'	101°	9
10	22°59'	+40'	97°	22°51'	+41'	98°	22°42'	+41'	98°	22°34'	+42'	99°	22°24'	+43'	99°	22°15'	+44'	99°	22°05'	+44'	100°	10
11	23°38'	+39'	97°	23°31'	+40'	97°	23°24'	+41'	97°	23°16'	+42'	98°	23°07'	+43'	98°	22°59'	+44'	99°	22°49'	+44'	99°	11
12	24°18'	+39'	96°	24°11'	+40'	96°	24°05'	+41'	97°	23°58'	+42'	97°	23°50'	+42'	97°	23°42'	+43'	98°	23°34'	+44'	98°	12
13	24°57'	+39'	95°	24°51'	+40'	95°	24°46'	+41'	96°	24°39'	+41'	96°	24°33'	+42'	97°	24°25'	+43'	97°	24°18'	+44'	98°	13
14	25°36'	+39'	94°	25°31'	+39'	95°	25°26'	+40'	95°	25°21'	+41'	95°	25°15'	+42'	96°	25°08'	+43'	96°	25°01'	+44'	97°	14
15	26°14'	+38'	93°	26°11'	+39'	94°	26°07'	+40'	94°	26°02'	+41'	95°	25°57'	+42'	95°	25°51'	+43'	96°	25°45'	+43'	96°	15
16	26°52'	+38'	92°	26°50'	+39'	93°	26°47'	+40'	93°	26°43'	+41'	94°	26°39'	+41'	94°	26°34'	+42'	95°	26°28'	+43'	95°	16
17	27°30'	+38'	91°	27°29'	+39'	92°	27°26'	+39'	92°	27°23'	+40'	93°	27°20'	+41'	94°	27°16'	+42'	94°	27°12'	+43'	95°	17
18	28°08'	+37'	91°	28°07'	+38'	91°	28°06'	+39'	92°	28°04'	+40'	92°	28°01'	+41'	93°	27°58'	+42'	93°	27°54'	+43'	94°	18
19	28°45'	+37'	90°	28°45'	+38'	90°	28°45'	+39'	91°	28°44'	+40'	91°	28°42'	+41'	92°	28°40'	+41'	92°	28°37'	+42'	93°	19
20	29°22'	+37'	89°	29°23'	+37'	89°	29°24'	+38'	90°	29°23'	+39'	90°	29°23'	+40'	91°	29°21'	+41'	92°	29°19'	+42'	92°	20
21	29°59'	+36'	88°	30°01'	+37'	88°	30°02'	+38'	89°	30°03'	+39'	90°	30°03'	+40'	90°	30°02'	+41'	91°	30°01'	+42'	91°	21
22	30°35'	+36'	87°	30°38'	+37'	88°	30°40'	+38'	88°	30°42'	+39'	89°	30°43'	+40'	89°	30°43'	+40'	90°	30°43'	+41'	90°	22
23	31°11'	+35'	86°	31°15'	+36'	87°	31°18'	+37'	87°	31°20'	+38'	88°	31°22'	+39'	88°	31°24'	+40'	89°	31°24'	+41'	90°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

68° 292° LHA — Latitude SAME as Declination — 68° 292° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

69° 291° LHA — Latitude SAME as Declination — 69° 291° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	15°27'	+42'	104°	15°12'	+42'	105°	14°56'	+43'	105°	14°41'	+44'	105°	14°25'	+45'	105°	14°09'	+45'	106°	13°52'	+46'	106°	0
1	16°08'	+41'	104°	15°54'	+42'	104°	15°39'	+43'	104°	15°25'	+44'	104°	15°09'	+44'	105°	14°54'	+45'	105°	14°38'	+46'	105°	1
2	16°50'	+41'	103°	16°36'	+42'	103°	16°22'	+43'	103°	16°08'	+44'	104°	15°54'	+44'	104°	15°39'	+45'	104°	15°24'	+46'	105°	2
3	17°31'	+41'	102°	17°18'	+42'	102°	17°05'	+43'	103°	16°52'	+43'	103°	16°38'	+44'	103°	16°24'	+45'	104°	16°10'	+46'	104°	3
4	18°12'	+41'	101°	18°00'	+42'	102°	17°48'	+42'	102°	17°35'	+43'	102°	17°22'	+44'	103°	17°09'	+45'	103°	16°55'	+45'	103°	4
5	18°53'	+41'	101°	18°42'	+41'	101°	18°30'	+42'	101°	18°18'	+43'	102°	18°06'	+44'	102°	17°53'	+45'	102°	17°41'	+45'	103°	5
6	19°34'	+40'	100°	19°23'	+41'	100°	19°12'	+42'	101°	19°01'	+43'	101°	18°50'	+44'	101°	18°38'	+44'	102°	18°26'	+45'	102°	6
7	20°14'	+40'	99°	20°05'	+41'	99°	19°55'	+42'	100°	19°44'	+43'	100°	19°33'	+43'	100°	19°22'	+44'	101°	19°11'	+45'	101°	7
8	20°54'	+40'	98°	20°46'	+41'	99°	20°36'	+42'	99°	20°27'	+42'	99°	20°17'	+43'	100°	20°07'	+44'	100°	19°56'	+45'	100°	8
9	21°34'	+40'	97°	21°27'	+41'	98°	21°18'	+41'	98°	21°09'	+42'	99°	21°00'	+43'	99°	20°51'	+44'	99°	20°41'	+45'	100°	9
10	22°14'	+40'	97°	22°07'	+40'	97°	22°00'	+41'	97°	21°52'	+42'	98°	21°43'	+43'	98°	21°34'	+44'	99°	21°25'	+44'	99°	10
11	22°54'	+39'	96°	22°48'	+40'	96°	22°41'	+41'	97°	22°34'	+42'	97°	22°26'	+43'	97°	22°18'	+43'	98°	22°10'	+44'	98°	11
12	23°33'	+39'	95°	23°28'	+40'	95°	23°22'	+41'	96°	23°16'	+42'	96°	23°09'	+42'	97°	23°01'	+43'	97°	22°54'	+44'	98°	12
13	24°12'	+39'	94°	24°08'	+40'	95°	24°03'	+41'	95°	23°57'	+41'	96°	23°51'	+42'	96°	23°45'	+43'	96°	23°38'	+44'	97°	13
14	24°51'	+39'	93°	24°47'	+39'	94°	24°43'	+40'	94°	24°38'	+41'	95°	24°33'	+42'	95°	24°28'	+43'	96°	24°22'	+44'	96°	14
15	25°30'	+38'	92°	25°27'	+39'	93°	25°23'	+40'	93°	25°20'	+41'	94°	25°15'	+42'	94°	25°10'	+43'	95°	25°05'	+43'	95°	15
16	26°08'	+38'	92°	26°06'	+39'	92°	26°03'	+40'	93°	26°00'	+41'	93°	25°57'	+41'	94°	25°53'	+42'	94°	25°48'	+43'	95°	16
17	26°46'	+38'	91°	26°45'	+39'	91°	26°43'	+39'	92°	26°41'	+40'	92°	26°38'	+41'	93°	26°35'	+42'	93°	26°32'	+43'	94°	17
18	27°23'	+37'	90°	27°23'	+38'	90°	27°23'	+39'	91°	27°21'	+40'	91°	27°20'	+41'	92°	27°17'	+42'	92°	27°14'	+43'	93°	18
19	28°01'	+37'	89°	28°01'	+38'	90°	28°02'	+39'	90°	28°01'	+40'	91°	28°00'	+41'	91°	27°59'	+41'	92°	27°57'	+42'	92°	19
20	28°38'	+37'	88°	28°39'	+38'	89°	28°40'	+38'	89°	28°41'	+39'	90°	28°41'	+40'	90°	28°40'	+41'	91°	28°39'	+42'	91°	20
21	29°14'	+36'	87°	29°17'	+37'	88°	29°19'	+38'	88°	29°20'	+39'	89°	29°21'	+40'	89°	29°21'	+41'	90°	29°21'	+42'	91°	21
22	29°50'	+36'	86°	29°54'	+37'	87°	29°57'	+38'	87°	29°59'	+39'	88°	30°01'	+40'	89°	30°02'	+40'	89°	30°03'	+41'	90°	22
23	30°26'	+35'	85°	30°31'	+36'	86°	30°35'	+37'	87°	30°38'	+38'	87°	30°41'	+39'	88°	30°43'	+40'	88°	30°44'	+41'	89°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

69° 291° LHA — Latitude SAME as Declination — 69° 291° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

70° 290° LHA — Latitude SAME as Declination — 70° 290° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	14°43'	+41'	104°	14°29'	+42'	104°	14°15'	+43'	104°	14°00'	+44'	104°	13°45'	+44'	105°	13°29'	+45'	105°	13°14'	+46'	105°	0
1	15°25'	+41'	103°	15°11'	+42'	103°	14°57'	+43'	103°	14°43'	+44'	104°	14°29'	+44'	104°	14°14'	+45'	104°	14°00'	+46'	104°	1
2	16°06'	+41'	102°	15°53'	+42'	102°	15°40'	+43'	103°	15°27'	+43'	103°	15°13'	+44'	103°	14°59'	+45'	104°	14°45'	+46'	104°	2
3	16°47'	+41'	101°	16°35'	+42'	102°	16°23'	+43'	102°	16°10'	+43'	102°	15°57'	+44'	103°	15°44'	+45'	103°	15°31'	+45'	103°	3
4	17°28'	+41'	101°	17°17'	+42'	101°	17°05'	+42'	101°	16°54'	+43'	102°	16°41'	+44'	102°	16°29'	+45'	102°	16°16'	+45'	102°	4
5	18°09'	+41'	100°	17°59'	+41'	100°	17°48'	+42'	101°	17°37'	+43'	101°	17°25'	+44'	101°	17°13'	+44'	101°	17°01'	+45'	102°	5
6	18°50'	+40'	99°	18°40'	+41'	99°	18°30'	+42'	100°	18°20'	+43'	100°	18°09'	+44'	100°	17°58'	+44'	101°	17°47'	+45'	101°	6
7	19°30'	+40'	98°	19°21'	+41'	99°	19°12'	+42'	99°	19°02'	+43'	99°	18°52'	+43'	100°	18°42'	+44'	100°	18°31'	+45'	100°	7
8	20°10'	+40'	98°	20°02'	+41'	98°	19°54'	+42'	98°	19°45'	+42'	99°	19°36'	+43'	99°	19°26'	+44'	99°	19°16'	+45'	100°	8
9	20°50'	+40'	97°	20°43'	+41'	97°	20°35'	+41'	97°	20°27'	+42'	98°	20°19'	+43'	98°	20°10'	+44'	99°	20°01'	+44'	99°	9
10	21°30'	+40'	96°	21°24'	+40'	96°	21°17'	+41'	97°	21°10'	+42'	97°	21°02'	+43'	97°	20°54'	+44'	98°	20°45'	+44'	98°	10
11	22°10'	+39'	95°	22°04'	+40'	96°	21°58'	+41'	96°	21°52'	+42'	96°	21°45'	+43'	97°	21°37'	+43'	97°	21°30'	+44'	98°	11
12	22°49'	+39'	94°	22°44'	+40'	95°	22°39'	+41'	95°	22°33'	+42'	96°	22°27'	+42'	96°	22°21'	+43'	96°	22°14'	+44'	97°	12
13	23°28'	+39'	93°	23°24'	+40'	94°	23°20'	+40'	94°	23°15'	+41'	95°	23°10'	+42'	95°	23°04'	+43'	96°	22°58'	+44'	96°	13
14	24°07'	+38'	93°	24°04'	+39'	93°	24°00'	+40'	94°	23°56'	+41'	94°	23°52'	+42'	94°	23°47'	+43'	95°	23°42'	+44'	95°	14
15	24°45'	+38'	92°	24°43'	+39'	92°	24°40'	+40'	93°	24°37'	+41'	93°	24°34'	+42'	94°	24°30'	+42'	94°	24°25'	+43'	95°	15
16	25°23'	+38'	91°	25°22'	+39'	91°	25°20'	+40'	92°	25°18'	+41'	92°	25°15'	+41'	93°	25°12'	+42'	93°	25°08'	+43'	94°	16
17	26°01'	+38'	90°	26°01'	+39'	91°	26°00'	+39'	91°	25°59'	+40'	92°	25°57'	+41'	92°	25°54'	+42'	93°	25°51'	+43'	93°	17
18	26°39'	+37'	89°	26°39'	+38'	90°	26°39'	+39'	90°	26°39'	+40'	91°	26°38'	+41'	91°	26°36'	+42'	92°	26°34'	+43'	92°	18
19	27°16'	+37'	88°	27°18'	+38'	89°	27°19'	+39'	89°	27°19'	+40'	90°	27°19'	+41'	90°	27°18'	+41'	91°	27°17'	+42'	91°	19
20	27°53'	+37'	87°	27°55'	+38'	88°	27°57'	+38'	89°	27°59'	+39'	89°	27°59'	+40'	90°	27°59'	+41'	90°	27°59'	+42'	91°	20
21	28°30'	+36'	87°	28°33'	+37'	87°	28°36'	+38'	88°	28°38'	+39'	88°	28°40'	+40'	89°	28°41'	+41'	89°	28°41'	+42'	90°	21
22	29°06'	+36'	86°	29°10'	+37'	86°	29°14'	+38'	87°	29°17'	+39'	87°	29°19'	+40'	88°	29°21'	+41'	88°	29°23'	+41'	89°	22
23	29°42'	+35'	85°	29°47'	+36'	85°	29°52'	+37'	86°	29°56'	+38'	86°	29°59'	+39'	87°	30°02'	+40'	88°	30°04'	+41'	88°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

70° 290° LHA — Latitude SAME as Declination — 70° 290° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

71° 289° LHA — Latitude SAME as Declination — 71° 289° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	14°00'	+41'	103°	13°46'	+42'	103°	13°33'	+43'	103°	13°19'	+44'	104°	13°04'	+44'	104°	12°50'	+45'	104°	12°35'	+46'	104°	0
1	14°41'	+41'	102°	14°29'	+42'	102°	14°15'	+43'	103°	14°02'	+43'	103°	13°49'	+44'	103°	13°35'	+45'	103°	13°21'	+46'	104°	1
2	15°23'	+41'	101°	15°10'	+42'	102°	14°58'	+43'	102°	14°46'	+43'	102°	14°33'	+44'	103°	14°20'	+45'	103°	14°06'	+45'	103°	2
3	16°04'	+41'	101°	15°52'	+42'	101°	15°41'	+42'	101°	15°29'	+43'	102°	15°17'	+44'	102°	15°04'	+45'	102°	14°52'	+45'	102°	3
4	16°44'	+41'	100°	16°34'	+41'	100°	16°23'	+42'	101°	16°12'	+43'	101°	16°01'	+44'	101°	15°49'	+44'	101°	15°37'	+45'	102°	4
5	17°25'	+41'	99°	17°15'	+41'	99°	17°05'	+42'	100°	16°55'	+43'	100°	16°44'	+44'	100°	16°33'	+44'	101°	16°22'	+45'	101°	5
6	18°06'	+40'	98°	17°57'	+41'	99°	17°47'	+42'	99°	17°38'	+43'	99°	17°28'	+43'	100°	17°18'	+44'	100°	17°07'	+45'	100°	6
7	18°46'	+40'	98°	18°38'	+41'	98°	18°29'	+42'	98°	18°20'	+43'	99°	18°11'	+43'	99°	18°02'	+44'	99°	17°52'	+45'	100°	7
8	19°26'	+40'	97°	19°19'	+41'	97°	19°11'	+42'	98°	19°03'	+42'	98°	18°55'	+43'	98°	18°46'	+44'	99°	18°37'	+45'	99°	8
9	20°06'	+40'	96°	19°59'	+41'	96°	19°53'	+41'	97°	19°45'	+42'	97°	19°38'	+43'	97°	19°30'	+44'	98°	19°21'	+44'	98°	9
10	20°46'	+39'	95°	20°40'	+40'	96°	20°34'	+41'	96°	20°27'	+42'	96°	20°21'	+43'	97°	20°13'	+43'	97°	20°06'	+44'	97°	10
11	21°25'	+39'	94°	21°20'	+40'	95°	21°15'	+41'	95°	21°09'	+42'	96°	21°03'	+43'	96°	20°57'	+43'	96°	20°50'	+44'	97°	11
12	22°04'	+39'	94°	22°00'	+40'	94°	21°56'	+41'	94°	21°51'	+42'	95°	21°46'	+42'	95°	21°40'	+43'	96°	21°34'	+44'	96°	12
13	22°43'	+39'	93°	22°40'	+40'	93°	22°37'	+40'	94°	22°33'	+41'	94°	22°28'	+42'	94°	22°23'	+43'	95°	22°18'	+44'	95°	13
14	23°22'	+38'	92°	23°20'	+39'	92°	23°17'	+40'	93°	23°14'	+41'	93°	23°10'	+42'	94°	23°06'	+43'	94°	23°02'	+43'	95°	14
15	24°01'	+38'	91°	23°59'	+39'	92°	23°57'	+40'	92°	23°55'	+41'	92°	23°52'	+42'	93°	23°49'	+42'	93°	23°45'	+43'	94°	15
16	24°39'	+38'	90°	24°38'	+39'	91°	24°37'	+40'	91°	24°36'	+41'	92°	24°34'	+41'	92°	24°31'	+42'	93°	24°28'	+43'	93°	16
17	25°17'	+38'	89°	25°17'	+39'	90°	25°17'	+39'	90°	25°16'	+40'	91°	25°15'	+41'	91°	25°13'	+42'	92°	25°11'	+43'	92°	17
18	25°54'	+37'	89°	25°56'	+38'	89°	25°56'	+39'	90°	25°56'	+40'	90°	25°56'	+41'	91°	25°55'	+42'	91°	25°54'	+43'	91°	18
19	26°32'	+37'	88°	26°34'	+38'	88°	26°35'	+39'	89°	26°36'	+40'	89°	26°37'	+41'	90°	26°37'	+41'	90°	26°37'	+42'	91°	19
20	27°09'	+37'	87°	27°12'	+38'	87°	27°14'	+38'	88°	27°16'	+39'	88°	27°18'	+40'	89°	27°19'	+41'	89°	27°19'	+42'	90°	20
21	27°45'	+36'	86°	27°49'	+37'	86°	27°53'	+38'	87°	27°56'	+39'	88°	27°58'	+40'	88°	28°00'	+41'	89°	28°01'	+42'	89°	21
22	28°22'	+36'	85°	28°26'	+37'	86°	28°31'	+38'	86°	28°35'	+39'	87°	28°38'	+40'	87°	28°40'	+41'	88°	28°43'	+41'	88°	22
23	28°57'	+36'	84°	29°03'	+37'	85°	29°09'	+37'	85°	29°13'	+38'	86°	29°17'	+39'	86°	29°21'	+40'	87°	29°24'	+41'	87°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

71° 289° LHA — Latitude SAME as Declination — 71° 289° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

72° 288° LHA — Latitude SAME as Declination — 72° 288° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	13°17'	+41'	102°	13°04'	+42'	102°	12°51'	+43'	103°	12°37'	+43'	103°	12°24'	+44'	103°	12°10'	+45'	103°	11°56'	+46'	104°	0
1	13°58'	+41'	102°	13°46'	+42'	102°	13°33'	+43'	102°	13°21'	+43'	102°	13°08'	+44'	102°	12°55'	+45'	103°	12°42'	+45'	103°	1
2	14°39'	+41'	101°	14°27'	+42'	101°	14°16'	+42'	101°	14°04'	+43'	102°	13°52'	+44'	102°	13°40'	+45'	102°	13°27'	+45'	102°	2
3	15°20'	+41'	100°	15°09'	+42'	100°	14°58'	+42'	101°	14°47'	+43'	101°	14°36'	+44'	101°	14°24'	+44'	101°	14°12'	+45'	102°	3
4	16°00'	+41'	99°	15°51'	+41'	100°	15°41'	+42'	100°	15°30'	+43'	100°	15°20'	+44'	100°	15°09'	+44'	101°	14°57'	+45'	101°	4
5	16°41'	+40'	98°	16°32'	+41'	99°	16°23'	+42'	99°	16°13'	+43'	99°	16°03'	+44'	100°	15°53'	+44'	100°	15°43'	+45'	100°	5
6	17°21'	+40'	98°	17°13'	+41'	98°	17°05'	+42'	98°	16°56'	+43'	99°	16°47'	+43'	99°	16°37'	+44'	99°	16°28'	+45'	100°	6
7	18°02'	+40'	97°	17°54'	+41'	97°	17°47'	+42'	98°	17°38'	+42'	98°	17°30'	+43'	98°	17°21'	+44'	99°	17°12'	+45'	99°	7
8	18°42'	+40'	96°	18°35'	+41'	96°	18°28'	+41'	97°	18°21'	+42'	97°	18°13'	+43'	97°	18°05'	+44'	98°	17°57'	+45'	98°	8
9	19°22'	+40'	95°	19°16'	+40'	96°	19°10'	+41'	96°	19°03'	+42'	96°	18°56'	+43'	97°	18°49'	+44'	97°	18°42'	+44'	97°	9
10	20°01'	+39'	95°	19°56'	+40'	95°	19°51'	+41'	95°	19°45'	+42'	96°	19°39'	+43'	96°	19°33'	+43'	96°	19°26'	+44'	97°	10
11	20°41'	+39'	94°	20°37'	+40'	94°	20°32'	+41'	94°	20°27'	+42'	95°	20°22'	+42'	95°	20°16'	+43'	96°	20°10'	+44'	96°	11
12	21°20'	+39'	93°	21°17'	+40'	93°	21°13'	+41'	94°	21°09'	+41'	94°	21°04'	+42'	94°	20°59'	+43'	95°	20°54'	+44'	95°	12
13	21°59'	+39'	92°	21°56'	+40'	93°	21°54'	+40'	93°	21°50'	+41'	93°	21°47'	+42'	94°	21°42'	+43'	94°	21°38'	+44'	95°	13
14	22°38'	+38'	91°	22°36'	+39'	92°	22°34'	+40'	92°	22°31'	+41'	93°	22°29'	+42'	93°	22°25'	+43'	93°	22°22'	+43'	94°	14
15	23°16'	+38'	90°	23°15'	+39'	91°	23°14'	+40'	91°	23°12'	+41'	92°	23°10'	+42'	92°	23°08'	+42'	93°	23°05'	+43'	93°	15
16	23°54'	+38'	90°	23°54'	+39'	90°	23°54'	+40'	91°	23°53'	+41'	91°	23°52'	+41'	91°	23°50'	+42'	92°	23°48'	+43'	92°	16
17	24°32'	+38'	89°	24°33'	+39'	89°	24°34'	+39'	90°	24°34'	+40'	90°	24°33'	+41'	91°	24°33'	+42'	91°	24°31'	+43'	92°	17
18	25°10'	+37'	88°	25°12'	+38'	88°	25°13'	+39'	89°	25°14'	+40'	89°	25°15'	+41'	90°	25°14'	+42'	90°	25°14'	+43'	91°	18
19	25°47'	+37'	87°	25°50'	+38'	88°	25°52'	+39'	88°	25°54'	+40'	88°	25°55'	+41'	89°	25°56'	+41'	89°	25°56'	+42'	90°	19
20	26°24'	+37'	86°	26°28'	+38'	87°	26°31'	+39'	87°	26°34'	+39'	88°	26°36'	+40'	88°	26°38'	+41'	89°	26°39'	+42'	89°	20
21	27°01'	+36'	85°	27°05'	+37'	86°	27°10'	+38'	86°	27°13'	+39'	87°	27°16'	+40'	87°	27°19'	+41'	88°	27°21'	+42'	88°	21
22	27°37'	+36'	84°	27°43'	+37'	85°	27°48'	+38'	85°	27°52'	+39'	86°	27°56'	+40'	86°	28°00'	+41'	87°	28°02'	+41'	88°	22
23	28°13'	+36'	83°	28°20'	+37'	84°	28°26'	+38'	85°	28°31'	+38'	85°	28°36'	+39'	86°	28°40'	+40'	86°	28°44'	+41'	87°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

72° 288° LHA — Latitude SAME as Declination — 72° 288° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

73° 287° LHA — Latitude SAME as Declination — 73° 287° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	12°33'	+41'	102°	12°21'	+42'	102°	12°08'	+43'	102°	11°56'	+43'	102°	11°43'	+44'	102°	11°30'	+45'	103°	11°17'	+45'	103°	0
1	13°14'	+41'	101°	13°03'	+42'	101°	12°51'	+42'	101°	12°39'	+43'	101°	12°27'	+44'	102°	12°15'	+45'	102°	12°02'	+45'	102°	1
2	13°55'	+41'	100°	13°44'	+42'	100°	13°33'	+42'	101°	13°22'	+43'	101°	13°11'	+44'	101°	12°59'	+45'	101°	12°48'	+45'	101°	2
3	14°36'	+41'	99°	14°26'	+41'	100°	14°16'	+42'	100°	14°05'	+43'	100°	13°55'	+44'	100°	13°44'	+44'	101°	13°33'	+45'	101°	3
4	15°16'	+40'	99°	15°07'	+41'	99°	14°58'	+42'	99°	14°48'	+43'	99°	14°39'	+44'	100°	14°28'	+44'	100°	14°18'	+45'	100°	4
5	15°57'	+40'	98°	15°49'	+41'	98°	15°40'	+42'	98°	15°31'	+43'	99°	15°22'	+43'	99°	15°13'	+44'	99°	15°03'	+45'	99°	5
6	16°37'	+40'	97°	16°30'	+41'	97°	16°22'	+42'	98°	16°14'	+43'	98°	16°06'	+43'	98°	15°57'	+44'	98°	15°48'	+45'	99°	6
7	17°17'	+40'	96°	17°11'	+41'	97°	17°04'	+42'	97°	16°56'	+42'	97°	16°49'	+43'	97°	16°41'	+44'	98°	16°33'	+45'	98°	7
8	17°57'	+40'	95°	17°51'	+41'	96°	17°45'	+41'	96°	17°39'	+42'	96°	17°32'	+43'	97°	17°25'	+44'	97°	17°17'	+44'	97°	8
9	18°37'	+40'	95°	18°32'	+40'	95°	18°27'	+41'	95°	18°21'	+42'	96°	18°15'	+43'	96°	18°08'	+44'	96°	18°02'	+44'	97°	9
10	19°17'	+39'	94°	19°13'	+40'	94°	19°08'	+41'	95°	19°03'	+42'	95°	18°58'	+43'	95°	18°52'	+43'	96°	18°46'	+44'	96°	10
11	19°56'	+39'	93°	19°53'	+40'	93°	19°49'	+41'	94°	19°45'	+42'	94°	19°40'	+42'	95°	19°35'	+43'	95°	19°30'	+44'	95°	11
12	20°35'	+39'	92°	20°33'	+40'	93°	20°30'	+41'	93°	20°26'	+41'	93°	20°23'	+42'	94°	20°19'	+43'	94°	20°14'	+44'	94°	12
13	21°14'	+39'	91°	21°13'	+40'	92°	21°10'	+40'	92°	21°08'	+41'	93°	21°05'	+42'	93°	21°02'	+43'	93°	20°58'	+44'	94°	13
14	21°53'	+38'	91°	21°52'	+39'	91°	21°51'	+40'	91°	21°49'	+41'	92°	21°47'	+42'	92°	21°44'	+43'	93°	21°41'	+43'	93°	14
15	22°31'	+38'	90°	22°31'	+39'	90°	22°31'	+40'	91°	22°30'	+41'	91°	22°29'	+42'	91°	22°27'	+42'	92°	22°25'	+43'	92°	15
16	23°10'	+38'	89°	23°10'	+39'	89°	23°11'	+40'	90°	23°11'	+41'	90°	23°10'	+41'	91°	23°09'	+42'	91°	23°08'	+43'	92°	16
17	23°48'	+38'	88°	23°49'	+39'	89°	23°51'	+39'	89°	23°51'	+40'	89°	23°52'	+41'	90°	23°52'	+42'	90°	23°51'	+43'	91°	17
18	24°25'	+37'	87°	24°28'	+38'	88°	24°30'	+39'	88°	24°32'	+40'	89°	24°33'	+41'	89°	24°34'	+42'	90°	24°34'	+43'	90°	18
19	25°03'	+37'	86°	25°06'	+38'	87°	25°09'	+39'	87°	25°12'	+40'	88°	25°14'	+41'	88°	25°15'	+41'	89°	25°16'	+42'	89°	19
20	25°40'	+37'	86°	25°44'	+38'	86°	25°48'	+39'	86°	25°51'	+39'	87°	25°54'	+40'	87°	25°57'	+41'	88°	25°59'	+42'	88°	20
21	26°16'	+36'	85°	26°22'	+37'	85°	26°27'	+38'	86°	26°31'	+39'	86°	26°35'	+40'	87°	26°38'	+41'	87°	26°41'	+42'	88°	21
22	26°53'	+36'	84°	26°59'	+37'	84°	27°05'	+38'	85°	27°10'	+39'	85°	27°15'	+40'	86°	27°19'	+41'	86°	27°22'	+41'	87°	22
23	27°29'	+36'	83°	27°36'	+37'	83°	27°43'	+38'	84°	27°49'	+39'	84°	27°54'	+39'	85°	27°59'	+40'	85°	28°04'	+41'	86°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

73° 287° LHA — Latitude SAME as Declination — 73° 287° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

74° 286° LHA — Latitude SAME as Declination — 74° 286° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	11°49'	+41'	101°	11°38'	+42'	101°	11°26'	+42'	101°	11°14'	+43'	101°	11°02'	+44'	102°	10°50'	+45'	102°	10°38'	+45'	102°	0
1	12°30'	+41'	100°	12°20'	+42'	100°	12°09'	+42'	101°	11°58'	+43'	101°	11°46'	+44'	101°	11°35'	+45'	101°	11°23'	+45'	101°	1
2	13°11'	+41'	99°	13°01'	+41'	100°	12°51'	+42'	100°	12°41'	+43'	100°	12°30'	+44'	100°	12°19'	+44'	100°	12°08'	+45'	101°	2
3	13°52'	+41'	99°	13°43'	+41'	99°	13°33'	+42'	99°	13°24'	+43'	99°	13°14'	+44'	100°	13°04'	+44'	100°	12°53'	+45'	100°	3
4	14°32'	+40'	98°	14°24'	+41'	98°	14°15'	+42'	98°	14°06'	+43'	99°	13°57'	+43'	99°	13°48'	+44'	99°	13°38'	+45'	99°	4
5	15°13'	+40'	97°	15°05'	+41'	97°	14°57'	+42'	98°	14°49'	+43'	98°	14°41'	+43'	98°	14°32'	+44'	98°	14°23'	+45'	99°	5
6	15°53'	+40'	96°	15°46'	+41'	97°	15°39'	+42'	97°	15°32'	+42'	97°	15°24'	+43'	97°	15°16'	+44'	98°	15°08'	+45'	98°	6
7	16°33'	+40'	96°	16°27'	+41'	96°	16°21'	+42'	96°	16°14'	+42'	96°	16°07'	+43'	97°	16°00'	+44'	97°	15°53'	+45'	97°	7
8	17°13'	+40'	95°	17°08'	+41'	95°	17°02'	+41'	95°	16°57'	+42'	96°	16°50'	+43'	96°	16°44'	+44'	96°	16°37'	+44'	97°	8
9	17°53'	+40'	94°	17°48'	+40'	94°	17°44'	+41'	95°	17°39'	+42'	95°	17°33'	+43'	95°	17°28'	+44'	96°	17°22'	+44'	96°	9
10	18°32'	+39'	93°	18°29'	+40'	94°	18°25'	+41'	94°	18°21'	+42'	94°	18°16'	+43'	95°	18°11'	+43'	95°	18°06'	+44'	95°	10
11	19°12'	+39'	92°	19°09'	+40'	93°	19°06'	+41'	93°	19°02'	+42'	93°	18°59'	+42'	94°	18°55'	+43'	94°	18°50'	+44'	94°	11
12	19°51'	+39'	92°	19°49'	+40'	92°	19°47'	+41'	92°	19°44'	+41'	93°	19°41'	+42'	93°	19°38'	+43'	93°	19°34'	+44'	94°	12
13	20°30'	+39'	91°	20°29'	+40'	91°	20°27'	+40'	92°	20°25'	+41'	92°	20°23'	+42'	92°	20°21'	+43'	93°	20°18'	+44'	93°	13
14	21°08'	+38'	90°	21°08'	+39'	90°	21°08'	+40'	91°	21°07'	+41'	91°	21°05'	+42'	91°	21°04'	+43'	92°	21°01'	+43'	92°	14
15	21°47'	+38'	89°	21°48'	+39'	90°	21°48'	+40'	90°	21°48'	+41'	90°	21°47'	+42'	91°	21°46'	+42'	91°	21°45'	+43'	92°	15
16	22°25'	+38'	88°	22°27'	+39'	89°	22°28'	+40'	89°	22°28'	+41'	90°	22°29'	+41'	90°	22°29'	+42'	90°	22°28'	+43'	91°	16
17	23°03'	+38'	87°	23°05'	+39'	88°	23°07'	+39'	88°	23°09'	+40'	89°	23°10'	+41'	89°	23°11'	+42'	90°	23°11'	+43'	90°	17
18	23°41'	+37'	87°	23°44'	+38'	87°	23°47'	+39'	87°	23°49'	+40'	88°	23°51'	+41'	88°	23°53'	+42'	89°	23°54'	+43'	89°	18
19	24°18'	+37'	86°	24°22'	+38'	86°	24°26'	+39'	87°	24°29'	+40'	87°	24°32'	+41'	88°	24°34'	+41'	88°	24°36'	+42'	88°	19
20	24°55'	+37'	85°	25°00'	+38'	85°	25°05'	+39'	86°	25°09'	+39'	86°	25°13'	+40'	87°	25°16'	+41'	87°	25°18'	+42'	88°	20
21	25°32'	+36'	84°	25°38'	+37'	84°	25°43'	+38'	85°	25°49'	+39'	85°	25°53'	+40'	86°	25°57'	+41'	86°	26°01'	+42'	87°	21
22	26°08'	+36'	83°	26°15'	+37'	84°	26°22'	+38'	84°	26°28'	+39'	85°	26°33'	+40'	85°	26°38'	+41'	86°	26°42'	+41'	86°	22
23	26°45'	+36'	82°	26°52'	+37'	83°	27°00'	+38'	83°	27°07'	+39'	84°	27°13'	+39'	84°	27°19'	+40'	85°	27°24'	+41'	85°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

74° 286° LHA — Latitude SAME as Declination — 74° 286° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

75° 285° LHA — Latitude SAME as Declination — 75° 285° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	11°05'	+41'	100°	10°55'	+42'	100°	10°44'	+42'	101°	10°33'	+43'	101°	10°21'	+44'	101°	10°10'	+45'	101°	9°58'	+45'	101°	0
1	11°46'	+41'	99°	11°36'	+42'	100°	11°26'	+42'	100°	11°16'	+43'	100°	11°05'	+44'	100°	10°55'	+44'	100°	10°44'	+45'	101°	1
2	12°27'	+41'	99°	12°18'	+41'	99°	12°08'	+42'	99°	11°59'	+43'	99°	11°49'	+44'	100°	11°39'	+44'	100°	11°29'	+45'	100°	2
3	13°08'	+40'	98°	12°59'	+41'	98°	12°51'	+42'	98°	12°42'	+43'	99°	12°33'	+44'	99°	12°23'	+44'	99°	12°14'	+45'	99°	3
4	13°48'	+40'	97°	13°40'	+41'	97°	13°33'	+42'	98°	13°25'	+43'	98°	13°16'	+43'	98°	13°08'	+44'	98°	12°59'	+45'	99°	4
5	14°28'	+40'	96°	14°22'	+41'	97°	14°15'	+42'	97°	14°07'	+43'	97°	14°00'	+43'	97°	13°52'	+44'	98°	13°44'	+45'	98°	5
6	15°09'	+40'	96°	15°03'	+41'	96°	14°56'	+42'	96°	14°50'	+42'	96°	14°43'	+43'	97°	14°36'	+44'	97°	14°28'	+45'	97°	6
7	15°49'	+40'	95°	15°43'	+41'	95°	15°38'	+41'	95°	15°32'	+42'	96°	15°26'	+43'	96°	15°20'	+44'	96°	15°13'	+44'	97°	7
8	16°28'	+40'	94°	16°24'	+41'	94°	16°19'	+41'	95°	16°14'	+42'	95°	16°09'	+43'	95°	16°03'	+44'	96°	15°57'	+44'	96°	8
9	17°08'	+40'	93°	17°05'	+40'	94°	17°01'	+41'	94°	16°56'	+42'	94°	16°52'	+43'	95°	16°47'	+43'	95°	16°42'	+44'	95°	9
10	17°48'	+39'	92°	17°45'	+40'	93°	17°42'	+41'	93°	17°38'	+42'	93°	17°35'	+43'	94°	17°30'	+43'	94°	17°26'	+44'	94°	10
11	18°27'	+39'	92°	18°25'	+40'	92°	18°23'	+41'	92°	18°20'	+42'	93°	18°17'	+42'	93°	18°14'	+43'	93°	18°10'	+44'	94°	11
12	19°06'	+39'	91°	19°05'	+40'	91°	19°04'	+41'	92°	19°02'	+41'	92°	18°59'	+42'	92°	18°57'	+43'	93°	18°54'	+44'	93°	12
13	19°45'	+39'	90°	19°45'	+40'	90°	19°44'	+40'	91°	19°43'	+41'	91°	19°42'	+42'	92°	19°40'	+43'	92°	19°38'	+44'	92°	13
14	20°24'	+38'	89°	20°24'	+39'	90°	20°24'	+40'	90°	20°24'	+41'	90°	20°24'	+42'	91°	20°23'	+43'	91°	20°21'	+43'	92°	14
15	21°02'	+38'	88°	21°04'	+39'	89°	21°05'	+40'	89°	21°05'	+41'	90°	21°05'	+42'	90°	21°05'	+42'	90°	21°05'	+43'	91°	15
16	21°40'	+38'	88°	21°43'	+39'	88°	21°45'	+40'	88°	21°46'	+41'	89°	21°47'	+41'	89°	21°48'	+42'	90°	21°48'	+43'	90°	16
17	22°18'	+38'	87°	22°22'	+39'	87°	22°24'	+39'	88°	22°27'	+40'	88°	22°28'	+41'	88°	22°30'	+42'	89°	22°31'	+43'	89°	17
18	22°56'	+37'	86°	23°00'	+38'	86°	23°04'	+39'	87°	23°07'	+40'	87°	23°10'	+41'	88°	23°12'	+42'	88°	23°14'	+43'	89°	18
19	23°34'	+37'	85°	23°38'	+38'	86°	23°43'	+39'	86°	23°47'	+40'	86°	23°50'	+41'	87°	23°53'	+41'	87°	23°56'	+42'	88°	19
20	24°11'	+37'	84°	24°17'	+38'	85°	24°22'	+39'	85°	24°27'	+40'	86°	24°31'	+40'	86°	24°35'	+41'	87°	24°38'	+42'	87°	20
21	24°48'	+37'	83°	24°54'	+37'	84°	25°01'	+38'	84°	25°06'	+39'	85°	25°11'	+40'	85°	25°16'	+41'	86°	25°20'	+42'	86°	21
22	25°24'	+36'	83°	25°32'	+37'	83°	25°39'	+38'	83°	25°45'	+39'	84°	25°52'	+40'	84°	25°57'	+41'	85°	26°02'	+42'	85°	22
23	26°00'	+36'	82°	26°09'	+37'	82°	26°17'	+38'	83°	26°24'	+39'	83°	26°31'	+40'	84°	26°38'	+40'	84°	26°44'	+41'	85°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

75° 285° LHA — Latitude SAME as Declination — 75° 285° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

76° 284° LHA — Latitude SAME as Declination — 76° 284° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	10°21'	+41'	99°	10°11'	+42'	100°	10°01'	+42'	100°	9°51'	+43'	100°	9°40'	+44'	100°	9°30'	+44'	100°	9°19'	+45'	100°	0
1	11°02'	+41'	99°	10°53'	+41'	99°	10°44'	+42'	99°	10°34'	+43'	99°	10°24'	+44'	99°	10°14'	+44'	100°	10°04'	+45'	100°	1
2	11°43'	+41'	98°	11°34'	+41'	98°	11°26'	+42'	98°	11°17'	+43'	99°	11°08'	+44'	99°	10°59'	+44'	99°	10°49'	+45'	99°	2
3	12°23'	+40'	97°	12°16'	+41'	97°	12°08'	+42'	98°	12°00'	+43'	98°	11°51'	+43'	98°	11°43'	+44'	98°	11°34'	+45'	98°	3
4	13°04'	+40'	96°	12°57'	+41'	97°	12°50'	+42'	97°	12°42'	+43'	97°	12°35'	+43'	97°	12°27'	+44'	98°	12°19'	+45'	98°	4
5	13°44'	+40'	96°	13°38'	+41'	96°	13°32'	+42'	96°	13°25'	+42'	96°	13°18'	+43'	97°	13°11'	+44'	97°	13°04'	+45'	97°	5
6	14°24'	+40'	95°	14°19'	+41'	95°	14°13'	+42'	95°	14°08'	+42'	96°	14°01'	+43'	96°	13°55'	+44'	96°	13°48'	+45'	96°	6
7	15°04'	+40'	94°	15°00'	+41'	94°	14°55'	+41'	95°	14°50'	+42'	95°	14°45'	+43'	95°	14°39'	+44'	95°	14°33'	+44'	96°	7
8	15°44'	+40'	93°	15°40'	+40'	94°	15°36'	+41'	94°	15°32'	+42'	94°	15°27'	+43'	95°	15°23'	+44'	95°	15°17'	+44'	95°	8
9	16°24'	+39'	93°	16°21'	+40'	93°	16°18'	+41'	93°	16°14'	+42'	93°	16°10'	+43'	94°	16°06'	+43'	94°	16°02'	+44'	94°	9
10	17°03'	+39'	92°	17°01'	+40'	92°	16°59'	+41'	92°	16°56'	+42'	93°	16°53'	+43'	93°	16°50'	+43'	93°	16°46'	+44'	94°	10
11	17°42'	+39'	91°	17°41'	+40'	91°	17°40'	+41'	92°	17°38'	+42'	92°	17°35'	+42'	92°	17°33'	+43'	93°	17°30'	+44'	93°	11
12	18°22'	+39'	90°	18°21'	+40'	91°	18°20'	+41'	91°	18°19'	+41'	91°	18°18'	+42'	92°	18°16'	+43'	92°	18°14'	+44'	92°	12
13	19°00'	+39'	89°	19°01'	+40'	90°	19°01'	+40'	90°	19°01'	+41'	90°	19°00'	+42'	91°	18°59'	+43'	91°	18°58'	+44'	91°	13
14	19°39'	+38'	89°	19°40'	+39'	89°	19°41'	+40'	89°	19°42'	+41'	90°	19°42'	+42'	90°	19°42'	+43'	90°	19°41'	+43'	91°	14
15	20°18'	+38'	88°	20°20'	+39'	88°	20°21'	+40'	89°	20°23'	+41'	89°	20°24'	+42'	89°	20°24'	+42'	90°	20°24'	+43'	90°	15
16	20°56'	+38'	87°	20°59'	+39'	87°	21°01'	+40'	88°	21°04'	+41'	88°	21°05'	+41'	89°	21°07'	+42'	89°	21°08'	+43'	89°	16
17	21°34'	+38'	86°	21°38'	+39'	87°	21°41'	+39'	87°	21°44'	+40'	87°	21°47'	+41'	88°	21°49'	+42'	88°	21°51'	+43'	89°	17
18	22°12'	+38'	85°	22°16'	+38'	86°	22°21'	+39'	86°	22°24'	+40'	87°	22°28'	+41'	87°	22°31'	+42'	87°	22°33'	+43'	88°	18
19	22°49'	+37'	84°	22°55'	+38'	85°	23°00'	+39'	85°	23°05'	+40'	86°	23°09'	+41'	86°	23°13'	+42'	87°	23°16'	+42'	87°	19
20	23°26'	+37'	84°	23°33'	+38'	84°	23°39'	+39'	84°	23°44'	+40'	85°	23°50'	+40'	85°	23°54'	+41'	86°	23°58'	+42'	86°	20
21	24°03'	+37'	83°	24°11'	+38'	83°	24°18'	+38'	84°	24°24'	+39'	84°	24°30'	+40'	85°	24°35'	+41'	85°	24°40'	+42'	85°	21
22	24°40'	+36'	82°	24°48'	+37'	82°	24°56'	+38'	83°	25°03'	+39'	83°	25°10'	+40'	84°	25°16'	+41'	84°	25°22'	+42'	85°	22
23	25°16'	+36'	81°	25°26'	+37'	81°	25°34'	+38'	82°	25°42'	+39'	82°	25°50'	+40'	83°	25°57'	+40'	83°	26°04'	+41'	84°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

76° 284° LHA — Latitude SAME as Declination — 76° 284° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

77° 283° LHA — Latitude SAME as Declination — 77° 283° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	9°37'	+41'	99°	9°28'	+41'	99°	9°19'	+42'	99°	9°09'	+43'	99°	8°59'	+44'	99°	8°49'	+44'	100°	8°39'	+45'	100°	0
1	10°18'	+41'	98°	10°10'	+41'	98°	10°01'	+42'	98°	9°52'	+43'	99°	9°43'	+44'	99°	9°34'	+44'	99°	9°24'	+45'	99°	1
2	10°59'	+40'	97°	10°51'	+41'	97°	10°43'	+42'	98°	10°35'	+43'	98°	10°27'	+43'	98°	10°18'	+44'	98°	10°09'	+45'	98°	2
3	11°39'	+40'	97°	11°32'	+41'	97°	11°25'	+42'	97°	11°18'	+43'	97°	11°10'	+43'	97°	11°02'	+44'	98°	10°54'	+45'	98°	3
4	12°19'	+40'	96°	12°13'	+41'	96°	12°07'	+42'	96°	12°00'	+43'	96°	11°54'	+43'	97°	11°46'	+44'	97°	11°39'	+45'	97°	4
5	13°00'	+40'	95°	12°54'	+41'	95°	12°49'	+42'	95°	12°43'	+42'	96°	12°37'	+43'	96°	12°30'	+44'	96°	12°24'	+45'	96°	5
6	13°40'	+40'	94°	13°35'	+41'	94°	13°30'	+42'	95°	13°25'	+42'	95°	13°20'	+43'	95°	13°14'	+44'	95°	13°09'	+45'	96°	6
7	14°20'	+40'	93°	14°16'	+41'	94°	14°12'	+41'	94°	14°08'	+42'	94°	14°03'	+43'	94°	13°58'	+44'	95°	13°53'	+44'	95°	7
8	14°59'	+40'	93°	14°56'	+40'	93°	14°53'	+41'	93°	14°50'	+42'	94°	14°46'	+43'	94°	14°42'	+44'	94°	14°37'	+44'	94°	8
9	15°39'	+39'	92°	15°37'	+40'	92°	15°34'	+41'	92°	15°32'	+42'	93°	15°29'	+43'	93°	15°25'	+43'	93°	15°22'	+44'	94°	9
10	16°19'	+39'	91°	16°17'	+40'	91°	16°16'	+41'	92°	16°14'	+42'	92°	16°11'	+42'	92°	16°09'	+43'	93°	16°06'	+44'	93°	10
11	16°58'	+39'	90°	16°57'	+40'	91°	16°56'	+41'	91°	16°55'	+42'	91°	16°54'	+42'	92°	16°52'	+43'	92°	16°50'	+44'	92°	11
12	17°37'	+39'	90°	17°37'	+40'	90°	17°37'	+41'	90°	17°37'	+41'	91°	17°36'	+42'	91°	17°35'	+43'	91°	17°34'	+44'	91°	12
13	18°16'	+39'	89°	18°17'	+40'	89°	18°18'	+40'	89°	18°18'	+41'	90°	18°18'	+42'	90°	18°18'	+43'	90°	18°17'	+44'	91°	13
14	18°55'	+39'	88°	18°57'	+39'	88°	18°58'	+40'	89°	18°59'	+41'	89°	19°00'	+42'	89°	19°01'	+43'	90°	19°01'	+43'	90°	14
15	19°33'	+38'	87°	19°36'	+39'	87°	19°38'	+40'	88°	19°40'	+41'	88°	19°42'	+42'	89°	19°43'	+42'	89°	19°44'	+43'	89°	15
16	20°11'	+38'	86°	20°15'	+39'	87°	20°18'	+40'	87°	20°21'	+41'	87°	20°24'	+41'	88°	20°26'	+42'	88°	20°28'	+43'	89°	16
17	20°49'	+38'	86°	20°54'	+39'	86°	20°58'	+40'	86°	21°02'	+40'	87°	21°05'	+41'	87°	21°08'	+42'	87°	21°11'	+43'	88°	17
18	21°27'	+38'	85°	21°33'	+38'	85°	21°38'	+39'	85°	21°42'	+40'	86°	21°46'	+41'	86°	21°50'	+42'	87°	21°53'	+43'	87°	18
19	22°05'	+37'	84°	22°11'	+38'	84°	22°17'	+39'	85°	22°22'	+40'	85°	22°27'	+41'	85°	22°32'	+42'	86°	22°36'	+42'	86°	19
20	22°42'	+37'	83°	22°49'	+38'	83°	22°56'	+39'	84°	23°02'	+40'	84°	23°08'	+40'	85°	23°13'	+41'	85°	23°18'	+42'	86°	20
21	23°19'	+37'	82°	23°27'	+38'	83°	23°35'	+39'	83°	23°42'	+39'	83°	23°48'	+40'	84°	23°55'	+41'	84°	24°00'	+42'	85°	21
22	23°56'	+36'	81°	24°05'	+37'	82°	24°13'	+38'	82°	24°21'	+39'	83°	24°29'	+40'	83°	24°36'	+41'	83°	24°42'	+42'	84°	22
23	24°32'	+36'	80°	24°42'	+37'	81°	24°52'	+38'	81°	25°00'	+39'	82°	25°09'	+40'	82°	25°17'	+41'	83°	25°24'	+41'	83°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

77° 283° LHA — Latitude SAME as Declination — 77° 283° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

78° 282° LHA — Latitude SAME as Declination — 78° 282° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	8°53'	+41'	98°	8°45'	+41'	98°	8°36'	+42'	98°	8°27'	+43'	99°	8°18'	+44'	99°	8°09'	+44'	99°	8°00'	+45'	99°	0
1	9°34'	+40'	97°	9°26'	+41'	98°	9°18'	+42'	98°	9°10'	+43'	98°	9°02'	+44'	98°	8°53'	+44'	98°	8°45'	+45'	98°	1
2	10°14'	+40'	97°	10°07'	+41'	97°	10°00'	+42'	97°	9°53'	+43'	97°	9°45'	+43'	97°	9°38'	+44'	97°	9°30'	+45'	98°	2
3	10°55'	+40'	96°	10°49'	+41'	96°	10°42'	+42'	96°	10°36'	+43'	96°	10°29'	+43'	97°	10°22'	+44'	97°	10°15'	+45'	97°	3
4	11°35'	+40'	95°	11°30'	+41'	95°	11°24'	+42'	95°	11°18'	+42'	96°	11°12'	+43'	96°	11°06'	+44'	96°	10°59'	+45'	96°	4
5	12°15'	+40'	94°	12°11'	+41'	95°	12°06'	+42'	95°	12°01'	+42'	95°	11°55'	+43'	95°	11°50'	+44'	95°	11°44'	+45'	96°	5
6	12°55'	+40'	94°	12°51'	+41'	94°	12°47'	+41'	94°	12°43'	+42'	94°	12°38'	+43'	94°	12°34'	+44'	95°	12°29'	+44'	95°	6
7	13°35'	+40'	93°	13°32'	+41'	93°	13°29'	+41'	93°	13°25'	+42'	94°	13°21'	+43'	94°	13°17'	+44'	94°	13°13'	+44'	94°	7
8	14°15'	+40'	92°	14°13'	+40'	92°	14°10'	+41'	93°	14°07'	+42'	93°	14°04'	+43'	93°	14°01'	+44'	93°	13°57'	+44'	94°	8
9	14°55'	+39'	91°	14°53'	+40'	92°	14°51'	+41'	92°	14°49'	+42'	92°	14°47'	+43'	92°	14°44'	+43'	93°	14°42'	+44'	93°	9
10	15°34'	+39'	90°	15°33'	+40'	91°	15°32'	+41'	91°	15°31'	+42'	91°	15°30'	+42'	92°	15°28'	+43'	92°	15°26'	+44'	92°	10
11	16°13'	+39'	90°	16°13'	+40'	90°	16°13'	+41'	90°	16°13'	+42'	91°	16°12'	+42'	91°	16°11'	+43'	91°	16°10'	+44'	91°	11
12	16°52'	+39'	89°	16°53'	+40'	89°	16°54'	+41'	90°	16°54'	+41'	90°	16°54'	+42'	90°	16°54'	+43'	90°	16°54'	+44'	91°	12
13	17°31'	+39'	88°	17°33'	+40'	88°	17°35'	+40'	89°	17°36'	+41'	89°	17°37'	+42'	89°	17°37'	+43'	90°	17°37'	+44'	90°	13
14	18°10'	+39'	87°	18°13'	+39'	88°	18°15'	+40'	88°	18°17'	+41'	88°	18°19'	+42'	89°	18°20'	+43'	89°	18°21'	+43'	89°	14
15	18°49'	+38'	86°	18°52'	+39'	87°	18°55'	+40'	87°	18°58'	+41'	88°	19°00'	+42'	88°	19°02'	+42'	88°	19°04'	+43'	89°	15
16	19°27'	+38'	86°	19°31'	+39'	86°	19°35'	+40'	86°	19°39'	+41'	87°	19°42'	+41'	87°	19°45'	+42'	87°	19°47'	+43'	88°	16
17	20°05'	+38'	85°	20°10'	+39'	85°	20°15'	+40'	86°	20°19'	+40'	86°	20°23'	+41'	86°	20°27'	+42'	87°	20°30'	+43'	87°	17
18	20°43'	+38'	84°	20°49'	+39'	84°	20°55'	+39'	85°	21°00'	+40'	85°	21°05'	+41'	86°	21°09'	+42'	86°	21°13'	+43'	86°	18
19	21°21'	+37'	83°	21°27'	+38'	84°	21°34'	+39'	84°	21°40'	+40'	84°	21°46'	+41'	85°	21°51'	+42'	85°	21°56'	+42'	86°	19
20	21°58'	+37'	82°	22°06'	+38'	83°	22°13'	+39'	83°	22°20'	+40'	84°	22°27'	+41'	84°	22°33'	+41'	84°	22°38'	+42'	85°	20
21	22°35'	+37'	82°	22°44'	+38'	82°	22°52'	+39'	82°	23°00'	+39'	83°	23°07'	+40'	83°	23°14'	+41'	84°	23°20'	+42'	84°	21
22	23°12'	+37'	81°	23°21'	+37'	81°	23°31'	+38'	81°	23°39'	+39'	82°	23°47'	+40'	82°	23°55'	+41'	83°	24°02'	+42'	83°	22
23	23°48'	+36'	80°	23°59'	+37'	80°	24°09'	+38'	81°	24°18'	+39'	81°	24°27'	+40'	82°	24°36'	+41'	82°	24°44'	+41'	82°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

78° 282° LHA — Latitude SAME as Declination — 78° 282° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

79° 281° LHA — Latitude SAME as Declination — 79° 281° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	8°09'	+41'	97°	8°01'	+41'	98°	7°53'	+42'	98°	7°45'	+43'	98°	7°37'	+44'	98°	7°29'	+44'	98°	7°20'	+45'	98°	0
1	8°50'	+40'	97°	8°43'	+41'	97°	8°35'	+42'	97°	8°28'	+43'	97°	8°21'	+43'	97°	8°13'	+44'	97°	8°05'	+45'	98°	1
2	9°30'	+40'	96°	9°24'	+41'	96°	9°17'	+42'	96°	9°11'	+43'	96°	9°04'	+43'	97°	8°57'	+44'	97°	8°50'	+45'	97°	2
3	10°10'	+40'	95°	10°05'	+41'	95°	9°59'	+42'	96°	9°53'	+43'	96°	9°47'	+43'	96°	9°41'	+44'	96°	9°35'	+45'	96°	3
4	10°51'	+40'	94°	10°46'	+41'	95°	10°41'	+42'	95°	10°36'	+42'	95°	10°31'	+43'	95°	10°25'	+44'	95°	10°19'	+45'	96°	4
5	11°31'	+40'	94°	11°27'	+41'	94°	11°23'	+42'	94°	11°18'	+42'	94°	11°14'	+43'	94°	11°09'	+44'	95°	11°04'	+45'	95°	5
6	12°11'	+40'	93°	12°08'	+41'	93°	12°04'	+41'	93°	12°01'	+42'	94°	11°57'	+43'	94°	11°53'	+44'	94°	11°49'	+44'	94°	6
7	12°51'	+40'	92°	12°48'	+41'	92°	12°46'	+41'	93°	12°43'	+42'	93°	12°40'	+43'	93°	12°37'	+44'	93°	12°33'	+44'	93°	7
8	13°30'	+40'	91°	13°29'	+40'	92°	13°27'	+41'	92°	13°25'	+42'	92°	13°23'	+43'	92°	13°20'	+43'	93°	13°17'	+44'	93°	8
9	14°10'	+39'	91°	14°09'	+40'	91°	14°08'	+41'	91°	14°07'	+42'	91°	14°05'	+43'	92°	14°04'	+43'	92°	14°02'	+44'	92°	9
10	14°49'	+39'	90°	14°49'	+40'	90°	14°49'	+41'	90°	14°49'	+42'	91°	14°48'	+42'	91°	14°47'	+43'	91°	14°46'	+44'	91°	10
11	15°29'	+39'	89°	15°30'	+40'	89°	15°30'	+41'	90°	15°30'	+42'	90°	15°30'	+42'	90°	15°30'	+43'	90°	15°30'	+44'	91°	11
12	16°08'	+39'	88°	16°10'	+40'	89°	16°11'	+41'	89°	16°12'	+41'	89°	16°13'	+42'	89°	16°13'	+43'	90°	16°13'	+44'	90°	12
13	16°47'	+39'	87°	16°49'	+40'	88°	16°51'	+40'	88°	16°53'	+41'	88°	16°55'	+42'	89°	16°56'	+43'	89°	16°57'	+44'	89°	13
14	17°26'	+39'	87°	17°29'	+39'	87°	17°32'	+40'	87°	17°35'	+41'	88°	17°37'	+42'	88°	17°39'	+43'	88°	17°41'	+43'	89°	14
15	18°04'	+38'	86°	18°08'	+39'	86°	18°12'	+40'	86°	18°16'	+41'	87°	18°19'	+42'	87°	18°22'	+42'	87°	18°24'	+43'	88°	15
16	18°42'	+38'	85°	18°47'	+39'	85°	18°52'	+40'	86°	18°56'	+41'	86°	19°00'	+41'	86°	19°04'	+42'	87°	19°07'	+43'	87°	16
17	19°21'	+38'	84°	19°27'	+39'	85°	19°32'	+40'	85°	19°37'	+40'	85°	19°42'	+41'	86°	19°46'	+42'	86°	19°50'	+43'	86°	17
18	19°59'	+38'	83°	20°05'	+39'	84°	20°12'	+39'	84°	20°18'	+40'	84°	20°23'	+41'	85°	20°28'	+42'	85°	20°33'	+43'	86°	18
19	20°36'	+37'	83°	20°44'	+38'	83°	20°51'	+39'	83°	20°58'	+40'	84°	21°04'	+41'	84°	21°10'	+42'	84°	21°16'	+42'	85°	19
20	21°14'	+37'	82°	21°22'	+38'	82°	21°30'	+39'	82°	21°38'	+40'	83°	21°45'	+41'	83°	21°52'	+41'	84°	21°58'	+42'	84°	20
21	21°51'	+37'	81°	22°00'	+38'	81°	22°09'	+39'	82°	22°18'	+40'	82°	22°26'	+40'	82°	22°33'	+41'	83°	22°41'	+42'	83°	21
22	22°28'	+37'	80°	22°38'	+38'	80°	22°48'	+38'	81°	22°57'	+39'	81°	23°06'	+40'	82°	23°15'	+41'	82°	23°23'	+42'	83°	22
23	23°05'	+36'	79°	23°16'	+37'	80°	23°26'	+38'	80°	23°37'	+39'	80°	23°46'	+40'	81°	23°56'	+41'	81°	24°04'	+42'	82°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

79° 281° LHA — Latitude SAME as Declination — 79° 281° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

80° 280° LHA — Latitude SAME as Declination — 80° 280° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	7°25'	+40'	97°	7°18'	+41'	97°	7°11'	+42'	97°	7°03'	+43'	97°	6°56'	+43'	97°	6°48'	+44'	97°	6°40'	+45'	97°	0
1	8°05'	+40'	96°	7°59'	+41'	96°	7°53'	+42'	96°	7°46'	+43'	96°	7°39'	+43'	97°	7°32'	+44'	97°	7°25'	+45'	97°	1
2	8°46'	+40'	95°	8°40'	+41'	95°	8°34'	+42'	96°	8°29'	+43'	96°	8°23'	+43'	96°	8°16'	+44'	96°	8°10'	+45'	96°	2
3	9°26'	+40'	94°	9°21'	+41'	95°	9°16'	+42'	95°	9°11'	+42'	95°	9°06'	+43'	95°	9°00'	+44'	95°	8°55'	+45'	95°	3
4	10°06'	+40'	94°	10°02'	+41'	94°	9°58'	+42'	94°	9°54'	+42'	94°	9°49'	+43'	94°	9°44'	+44'	95°	9°39'	+45'	95°	4
5	10°46'	+40'	93°	10°43'	+41'	93°	10°40'	+42'	93°	10°36'	+42'	94°	10°32'	+43'	94°	10°28'	+44'	94°	10°24'	+44'	94°	5
6	11°26'	+40'	92°	11°24'	+41'	92°	11°21'	+41'	93°	11°18'	+42'	93°	11°15'	+43'	93°	11°12'	+44'	93°	11°09'	+44'	93°	6
7	12°06'	+40'	91°	12°04'	+41'	92°	12°03'	+41'	92°	12°00'	+42'	92°	11°58'	+43'	92°	11°56'	+44'	93°	11°53'	+44'	93°	7
8	12°46'	+40'	91°	12°45'	+40'	91°	12°44'	+41'	91°	12°43'	+42'	91°	12°41'	+43'	92°	12°39'	+43'	92°	12°37'	+44'	92°	8
9	13°25'	+39'	90°	13°25'	+40'	90°	13°25'	+41'	90°	13°25'	+42'	91°	13°24'	+43'	91°	13°23'	+43'	91°	13°21'	+44'	91°	9
10	14°05'	+39'	89°	14°06'	+40'	89°	14°06'	+41'	90°	14°06'	+42'	90°	14°06'	+42'	90°	14°06'	+43'	90°	14°05'	+44'	91°	10
11	14°44'	+39'	88°	14°46'	+40'	89°	14°47'	+41'	89°	14°48'	+42'	89°	14°49'	+42'	89°	14°49'	+43'	90°	14°49'	+44'	90°	11
12	15°23'	+39'	88°	15°26'	+40'	88°	15°28'	+41'	88°	15°30'	+41'	88°	15°31'	+42'	89°	15°32'	+43'	89°	15°33'	+44'	89°	12
13	16°02'	+39'	87°	16°05'	+40'	87°	16°08'	+40'	87°	16°11'	+41'	88°	16°13'	+42'	88°	16°15'	+43'	88°	16°17'	+44'	89°	13
14	16°41'	+39'	86°	16°45'	+39'	86°	16°49'	+40'	87°	16°52'	+41'	87°	16°55'	+42'	87°	16°58'	+43'	87°	17°01'	+43'	88°	14
15	17°20'	+38'	85°	17°25'	+39'	85°	17°29'	+40'	86°	17°33'	+41'	86°	17°37'	+42'	86°	17°41'	+42'	87°	17°44'	+43'	87°	15
16	17°58'	+38'	84°	18°04'	+39'	85°	18°09'	+40'	85°	18°14'	+41'	85°	18°19'	+42'	86°	18°23'	+42'	86°	18°27'	+43'	86°	16
17	18°36'	+38'	84°	18°43'	+39'	84°	18°49'	+40'	84°	18°55'	+41'	85°	19°00'	+41'	85°	19°05'	+42'	85°	19°10'	+43'	86°	17
18	19°14'	+38'	83°	19°22'	+39'	83°	19°29'	+39'	83°	19°35'	+40'	84°	19°42'	+41'	84°	19°48'	+42'	85°	19°53'	+43'	85°	18
19	19°52'	+38'	82°	20°00'	+38'	82°	20°08'	+39'	83°	20°16'	+40'	83°	20°23'	+41'	83°	20°30'	+42'	84°	20°36'	+43'	84°	19
20	20°30'	+37'	81°	20°39'	+38'	81°	20°47'	+39'	82°	20°56'	+40'	82°	21°04'	+41'	83°	21°11'	+42'	83°	21°18'	+42'	83°	20
21	21°07'	+37'	80°	21°17'	+38'	81°	21°27'	+39'	81°	21°36'	+40'	81°	21°44'	+40'	82°	21°53'	+41'	82°	22°01'	+42'	83°	21
22	21°44'	+37'	79°	21°55'	+38'	80°	22°05'	+39'	80°	22°15'	+39'	81°	22°25'	+40'	81°	22°34'	+41'	81°	22°43'	+42'	82°	22
23	22°21'	+37'	79°	22°33'	+37'	79°	22°44'	+38'	79°	22°55'	+39'	80°	23°05'	+40'	80°	23°15'	+41'	81°	23°25'	+42'	81°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

80° 280° LHA — Latitude SAME as Declination — 80° 280° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

81° 279° LHA — Latitude SAME as Declination — 81° 279° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	6°41'	+40'	96°	6°34'	+41'	96°	6°28'	+42'	96°	6°21'	+43'	96°	6°14'	+43'	96°	6°07'	+44'	97°	6°01'	+45'	97°	0
1	7°21'	+40'	95°	7°15'	+41'	95°	7°10'	+42'	96°	7°04'	+43'	96°	6°58'	+43'	96°	6°52'	+44'	96°	6°45'	+45'	96°	1
2	8°01'	+40'	95°	7°56'	+41'	95°	7°51'	+42'	95°	7°46'	+43'	95°	7°41'	+43'	95°	7°36'	+44'	95°	7°30'	+45'	95°	2
3	8°41'	+40'	94°	8°37'	+41'	94°	8°33'	+42'	94°	8°29'	+42'	94°	8°24'	+43'	94°	8°20'	+44'	95°	8°15'	+45'	95°	3
4	9°22'	+40'	93°	9°18'	+41'	93°	9°15'	+42'	93°	9°11'	+42'	94°	9°07'	+43'	94°	9°04'	+44'	94°	8°59'	+45'	94°	4
5	10°02'	+40'	92°	9°59'	+41'	92°	9°56'	+42'	93°	9°54'	+42'	93°	9°51'	+43'	93°	9°47'	+44'	93°	9°44'	+44'	93°	5
6	10°42'	+40'	92°	10°40'	+41'	92°	10°38'	+41'	92°	10°36'	+42'	92°	10°34'	+43'	92°	10°31'	+44'	92°	10°28'	+44'	93°	6
7	11°21'	+40'	91°	11°21'	+41'	91°	11°19'	+41'	91°	11°18'	+42'	91°	11°17'	+43'	92°	11°15'	+44'	92°	11°13'	+44'	92°	7
8	12°01'	+40'	90°	12°01'	+40'	90°	12°01'	+41'	90°	12°00'	+42'	91°	11°59'	+43'	91°	11°58'	+43'	91°	11°57'	+44'	91°	8
9	12°41'	+39'	89°	12°41'	+40'	89°	12°42'	+41'	90°	12°42'	+42'	90°	12°42'	+43'	90°	12°42'	+43'	90°	12°41'	+44'	91°	9
10	13°20'	+39'	88°	13°22'	+40'	89°	13°23'	+41'	89°	13°24'	+42'	89°	13°25'	+42'	89°	13°25'	+43'	90°	13°25'	+44'	90°	10
11	14°00'	+39'	88°	14°02'	+40'	88°	14°04'	+41'	88°	14°06'	+42'	88°	14°07'	+42'	89°	14°08'	+43'	89°	14°09'	+44'	89°	11
12	14°39'	+39'	87°	14°42'	+40'	87°	14°45'	+41'	87°	14°47'	+41'	88°	14°49'	+42'	88°	14°51'	+43'	88°	14°53'	+44'	88°	12
13	15°18'	+39'	86°	15°22'	+40'	86°	15°25'	+40'	87°	15°29'	+41'	87°	15°32'	+42'	87°	15°34'	+43'	88°	15°37'	+44'	88°	13
14	15°57'	+39'	85°	16°01'	+39'	86°	16°06'	+40'	86°	16°10'	+41'	86°	16°14'	+42'	86°	16°17'	+43'	87°	16°20'	+43'	87°	14
15	16°35'	+38'	85°	16°41'	+39'	85°	16°46'	+40'	85°	16°51'	+41'	85°	16°56'	+42'	86°	17°00'	+43'	86°	17°04'	+43'	86°	15
16	17°14'	+38'	84°	17°20'	+39'	84°	17°26'	+40'	84°	17°32'	+41'	85°	17°37'	+42'	85°	17°42'	+42'	85°	17°47'	+43'	86°	16
17	17°52'	+38'	83°	17°59'	+39'	83°	18°06'	+40'	84°	18°13'	+41'	84°	18°19'	+41'	84°	18°25'	+42'	85°	18°30'	+43'	85°	17
18	18°30'	+38'	82°	18°38'	+39'	82°	18°46'	+40'	83°	18°53'	+40'	83°	19°00'	+41'	83°	19°07'	+42'	84°	19°13'	+43'	84°	18
19	19°08'	+38'	81°	19°17'	+39'	82°	19°25'	+39'	82°	19°34'	+40'	82°	19°41'	+41'	83°	19°49'	+42'	83°	19°56'	+43'	83°	19
20	19°46'	+37'	80°	19°55'	+38'	81°	20°05'	+39'	81°	20°14'	+40'	82°	20°22'	+41'	82°	20°31'	+42'	82°	20°39'	+42'	83°	20
21	20°23'	+37'	80°	20°34'	+38'	80°	20°44'	+39'	80°	20°54'	+40'	81°	21°03'	+41'	81°	21°12'	+41'	82°	21°21'	+42'	82°	21
22	21°00'	+37'	79°	21°12'	+38'	79°	21°23'	+39'	80°	21°33'	+40'	80°	21°44'	+40'	80°	21°54'	+41'	81°	22°03'	+42'	81°	22
23	21°37'	+37'	78°	21°50'	+38'	78°	22°01'	+38'	79°	22°13'	+39'	79°	22°24'	+40'	80°	22°35'	+41'	80°	22°45'	+42'	80°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

81° 279° LHA — Latitude SAME as Declination — 81° 279° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

82° 278° LHA — Latitude SAME as Declination — 82° 278° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	5°56'	+40'	95°	5°51'	+41'	95°	5°45'	+42'	96°	5°39'	+43'	96°	5°33'	+43'	96°	5°27'	+44'	96°	5°21'	+45'	96°	0
1	6°37'	+40'	95°	6°32'	+41'	95°	6°27'	+42'	95°	6°21'	+43'	95°	6°16'	+43'	95°	6°11'	+44'	95°	6°05'	+45'	95°	1
2	7°17'	+40'	94°	7°13'	+41'	94°	7°08'	+42'	94°	7°04'	+42'	94°	6°59'	+43'	94°	6°55'	+44'	95°	6°50'	+45'	95°	2
3	7°57'	+40'	93°	7°54'	+41'	93°	7°50'	+42'	93°	7°46'	+42'	94°	7°43'	+43'	94°	7°39'	+44'	94°	7°35'	+45'	94°	3
4	8°37'	+40'	92°	8°35'	+41'	93°	8°32'	+42'	93°	8°29'	+42'	93°	8°26'	+43'	93°	8°23'	+44'	93°	8°19'	+45'	93°	4
5	9°17'	+40'	92°	9°15'	+41'	92°	9°13'	+41'	92°	9°11'	+42'	92°	9°09'	+43'	92°	9°06'	+44'	92°	9°04'	+44'	93°	5
6	9°57'	+40'	91°	9°56'	+41'	91°	9°55'	+41'	91°	9°53'	+42'	91°	9°52'	+43'	92°	9°50'	+44'	92°	9°48'	+44'	92°	6
7	10°37'	+40'	90°	10°37'	+41'	90°	10°36'	+41'	90°	10°36'	+42'	91°	10°35'	+43'	91°	10°34'	+44'	91°	10°33'	+44'	91°	7
8	11°17'	+40'	89°	11°17'	+40'	90°	11°18'	+41'	90°	11°18'	+42'	90°	11°18'	+43'	90°	11°17'	+43'	90°	11°17'	+44'	91°	8
9	11°56'	+39'	89°	11°58'	+40'	89°	11°59'	+41'	89°	12°00'	+42'	89°	12°00'	+43'	89°	12°01'	+43'	90°	12°01'	+44'	90°	9
10	12°36'	+39'	88°	12°38'	+40'	88°	12°40'	+41'	88°	12°41'	+42'	88°	12°43'	+42'	89°	12°44'	+43'	89°	12°45'	+44'	89°	10
11	13°15'	+39'	87°	13°18'	+40'	87°	13°21'	+41'	88°	13°23'	+42'	88°	13°25'	+42'	88°	13°27'	+43'	88°	13°29'	+44'	88°	11
12	13°54'	+39'	86°	13°58'	+40'	87°	14°02'	+41'	87°	14°05'	+41'	87°	14°08'	+42'	87°	14°11'	+43'	88°	14°13'	+44'	88°	12
13	14°33'	+39'	85°	14°38'	+40'	86°	14°42'	+41'	86°	14°46'	+41'	86°	14°50'	+42'	87°	14°54'	+43'	87°	14°57'	+44'	87°	13
14	15°12'	+39'	85°	15°18'	+40'	85°	15°23'	+40'	85°	15°28'	+41'	86°	15°32'	+42'	86°	15°36'	+43'	86°	15°40'	+43'	86°	14
15	15°51'	+39'	84°	15°57'	+39'	84°	16°03'	+40'	84°	16°09'	+41'	85°	16°14'	+42'	85°	16°19'	+43'	85°	16°24'	+43'	86°	15
16	16°29'	+38'	83°	16°36'	+39'	83°	16°43'	+40'	84°	16°50'	+41'	84°	16°56'	+42'	84°	17°02'	+42'	85°	17°07'	+43'	85°	16
17	17°08'	+38'	82°	17°16'	+39'	83°	17°23'	+40'	83°	17°31'	+41'	83°	17°37'	+41'	84°	17°44'	+42'	84°	17°50'	+43'	84°	17
18	17°46'	+38'	81°	17°55'	+39'	82°	18°03'	+40'	82°	18°11'	+40'	82°	18°19'	+41'	83°	18°26'	+42'	83°	18°33'	+43'	83°	18
19	18°24'	+38'	81°	18°34'	+39'	81°	18°43'	+39'	81°	18°52'	+40'	82°	19°00'	+41'	82°	19°08'	+42'	82°	19°16'	+43'	83°	19
20	19°02'	+38'	80°	19°12'	+38'	80°	19°22'	+39'	81°	19°32'	+40'	81°	19°41'	+41'	81°	19°50'	+42'	82°	19°59'	+42'	82°	20
21	19°39'	+37'	79°	19°51'	+38'	79°	20°01'	+39'	80°	20°12'	+40'	80°	20°22'	+41'	80°	20°32'	+41'	81°	20°41'	+42'	81°	21
22	20°17'	+37'	78°	20°29'	+38'	79°	20°40'	+39'	79°	20°52'	+40'	79°	21°03'	+40'	80°	21°13'	+41'	80°	21°23'	+42'	80°	22
23	20°54'	+37'	77°	21°07'	+38'	78°	21°19'	+39'	78°	21°31'	+39'	78°	21°43'	+40'	79°	21°55'	+41'	79°	22°06'	+42'	80°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

82° 278° LHA — Latitude SAME as Declination — 82° 278° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

83° 277° LHA — Latitude SAME as Declination — 83° 277° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	5°12'	+40'	95°	5°07'	+41'	95°	5°02'	+42'	95°	4°57'	+43'	95°	4°51'	+43'	95°	4°46'	+44'	95°	4°41'	+45'	95°	0
1	5°52'	+40'	94°	5°48'	+41'	94°	5°44'	+42'	94°	5°39'	+43'	94°	5°35'	+43'	94°	5°30'	+44'	94°	5°25'	+45'	95°	1
2	6°32'	+40'	93°	6°29'	+41'	93°	6°25'	+42'	93°	6°22'	+42'	94°	6°18'	+43'	94°	6°14'	+44'	94°	6°10'	+45'	94°	2
3	7°12'	+40'	92°	7°10'	+41'	93°	7°07'	+42'	93°	7°04'	+42'	93°	7°01'	+43'	93°	6°58'	+44'	93°	6°55'	+45'	93°	3
4	7°53'	+40'	92°	7°51'	+41'	92°	7°49'	+42'	92°	7°47'	+42'	92°	7°44'	+43'	92°	7°42'	+44'	92°	7°39'	+45'	93°	4
5	8°33'	+40'	91°	8°31'	+41'	91°	8°30'	+41'	91°	8°29'	+42'	91°	8°27'	+43'	92°	8°26'	+44'	92°	8°24'	+44'	92°	5
6	9°12'	+40'	90°	9°12'	+41'	90°	9°12'	+41'	91°	9°11'	+42'	91°	9°10'	+43'	91°	9°09'	+44'	91°	9°08'	+44'	91°	6
7	9°52'	+40'	89°	9°53'	+41'	90°	9°53'	+41'	90°	9°53'	+42'	90°	9°53'	+43'	90°	9°53'	+44'	90°	9°53'	+44'	90°	7
8	10°32'	+40'	89°	10°33'	+40'	89°	10°34'	+41'	89°	10°35'	+42'	89°	10°36'	+43'	89°	10°36'	+43'	90°	10°37'	+44'	90°	8
9	11°12'	+39'	88°	11°14'	+40'	88°	11°16'	+41'	88°	11°17'	+42'	89°	11°19'	+43'	89°	11°20'	+43'	89°	11°21'	+44'	89°	9
10	11°51'	+39'	87°	11°54'	+40'	87°	11°57'	+41'	88°	11°59'	+42'	88°	12°01'	+42'	88°	12°03'	+43'	88°	12°05'	+44'	88°	10
11	12°30'	+39'	86°	12°34'	+40'	87°	12°38'	+41'	87°	12°41'	+42'	87°	12°44'	+42'	87°	12°47'	+43'	87°	12°49'	+44'	88°	11
12	13°10'	+39'	86°	13°14'	+40'	86°	13°18'	+41'	86°	13°22'	+41'	86°	13°26'	+42'	87°	13°30'	+43'	87°	13°33'	+44'	87°	12
13	13°49'	+39'	85°	13°54'	+40'	85°	13°59'	+41'	85°	14°04'	+41'	86°	14°08'	+42'	86°	14°13'	+43'	86°	14°17'	+44'	86°	13
14	14°28'	+39'	84°	14°34'	+40'	84°	14°40'	+40'	85°	14°45'	+41'	85°	14°51'	+42'	85°	14°56'	+43'	85°	15°00'	+43'	86°	14
15	15°07'	+39'	83°	15°13'	+39'	84°	15°20'	+40'	84°	15°26'	+41'	84°	15°33'	+42'	84°	15°38'	+43'	85°	15°44'	+43'	85°	15
16	15°45'	+38'	82°	15°53'	+39'	83°	16°00'	+40'	83°	16°08'	+41'	83°	16°14'	+42'	84°	16°21'	+42'	84°	16°27'	+43'	84°	16
17	16°24'	+38'	82°	16°32'	+39'	82°	16°40'	+40'	82°	16°48'	+41'	83°	16°56'	+42'	83°	17°03'	+42'	83°	17°10'	+43'	83°	17
18	17°02'	+38'	81°	17°11'	+39'	81°	17°20'	+40'	81°	17°29'	+41'	82°	17°38'	+41'	82°	17°46'	+42'	82°	17°53'	+43'	83°	18
19	17°40'	+38'	80°	17°50'	+39'	80°	18°00'	+40'	81°	18°10'	+40'	81°	18°19'	+41'	81°	18°28'	+42'	82°	18°36'	+43'	82°	19
20	18°18'	+38'	79°	18°29'	+39'	80°	18°40'	+39'	80°	18°50'	+40'	80°	19°00'	+41'	81°	19°10'	+42'	81°	19°19'	+43'	81°	20
21	18°56'	+37'	78°	19°07'	+38'	79°	19°19'	+39'	79°	19°30'	+40'	79°	19°41'	+41'	80°	19°51'	+42'	80°	20°02'	+42'	80°	21
22	19°33'	+37'	78°	19°46'	+38'	78°	19°58'	+39'	78°	20°10'	+40'	79°	20°22'	+41'	79°	20°33'	+41'	79°	20°44'	+42'	80°	22
23	20°10'	+37'	77°	20°24'	+38'	77°	20°37'	+39'	77°	20°50'	+40'	78°	21°02'	+40'	78°	21°14'	+41'	79°	21°26'	+42'	79°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

83° 277° LHA — Latitude SAME as Declination — 83° 277° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

84° 276° LHA — Latitude SAME as Declination — 84° 276° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	4°27'	+40'	94°	4°23'	+41'	94°	4°19'	+42'	94°	4°14'	+43'	94°	4°10'	+43'	94°	4°05'	+44'	94°	4°01'	+45'	94°	0
1	5°08'	+40'	93°	5°04'	+41'	93°	5°01'	+42'	93°	4°57'	+42'	94°	4°53'	+43'	94°	4°49'	+44'	94°	4°45'	+45'	94°	1
2	5°48'	+40'	93°	5°45'	+41'	93°	5°42'	+42'	93°	5°39'	+42'	93°	5°36'	+43'	93°	5°33'	+44'	93°	5°30'	+45'	93°	2
3	6°28'	+40'	92°	6°26'	+41'	92°	6°24'	+42'	92°	6°22'	+42'	92°	6°19'	+43'	92°	6°17'	+44'	92°	6°15'	+45'	92°	3
4	7°08'	+40'	91°	7°07'	+41'	91°	7°06'	+42'	91°	7°04'	+42'	91°	7°03'	+43'	92°	7°01'	+44'	92°	6°59'	+44'	92°	4
5	7°48'	+40'	90°	7°48'	+41'	90°	7°47'	+41'	91°	7°46'	+42'	91°	7°46'	+43'	91°	7°45'	+44'	91°	7°44'	+44'	91°	5
6	8°28'	+40'	90°	8°28'	+41'	90°	8°29'	+41'	90°	8°29'	+42'	90°	8°29'	+43'	90°	8°28'	+44'	90°	8°28'	+44'	90°	6
7	9°08'	+40'	89°	9°09'	+41'	89°	9°10'	+41'	89°	9°11'	+42'	89°	9°11'	+43'	89°	9°12'	+44'	90°	9°12'	+44'	90°	7
8	9°47'	+40'	88°	9°49'	+40'	88°	9°51'	+41'	88°	9°53'	+42'	89°	9°54'	+43'	89°	9°56'	+43'	89°	9°57'	+44'	89°	8
9	10°27'	+40'	87°	10°30'	+40'	87°	10°32'	+41'	88°	10°35'	+42'	88°	10°37'	+43'	88°	10°39'	+43'	88°	10°41'	+44'	88°	9
10	11°07'	+39'	86°	11°10'	+40'	87°	11°14'	+41'	87°	11°17'	+42'	87°	11°20'	+43'	87°	11°22'	+43'	87°	11°25'	+44'	88°	10
11	11°46'	+39'	86°	11°50'	+40'	86°	11°55'	+41'	86°	11°58'	+42'	86°	12°02'	+42'	87°	12°06'	+43'	87°	12°09'	+44'	87°	11
12	12°25'	+39'	85°	12°30'	+40'	85°	12°35'	+41'	85°	12°40'	+42'	86°	12°45'	+42'	86°	12°49'	+43'	86°	12°53'	+44'	86°	12
13	13°04'	+39'	84°	13°10'	+40'	84°	13°16'	+41'	85°	13°22'	+41'	85°	13°27'	+42'	85°	13°32'	+43'	85°	13°37'	+44'	86°	13
14	13°43'	+39'	83°	13°50'	+40'	84°	13°57'	+40'	84°	14°03'	+41'	84°	14°09'	+42'	84°	14°15'	+43'	85°	14°20'	+44'	85°	14
15	14°22'	+39'	83°	14°30'	+40'	83°	14°37'	+40'	83°	14°44'	+41'	83°	14°51'	+42'	84°	14°58'	+43'	84°	15°04'	+43'	84°	15
16	15°01'	+39'	82°	15°09'	+39'	82°	15°18'	+40'	82°	15°25'	+41'	83°	15°33'	+42'	83°	15°40'	+43'	83°	15°47'	+43'	83°	16
17	15°40'	+38'	81°	15°49'	+39'	81°	15°58'	+40'	82°	16°06'	+41'	82°	16°15'	+42'	82°	16°23'	+42'	82°	16°31'	+43'	83°	17
18	16°18'	+38'	80°	16°28'	+39'	81°	16°38'	+40'	81°	16°47'	+41'	81°	16°56'	+41'	81°	17°05'	+42'	82°	17°14'	+43'	82°	18
19	16°56'	+38'	79°	17°07'	+39'	80°	17°18'	+40'	80°	17°28'	+40'	80°	17°38'	+41'	81°	17°47'	+42'	81°	17°57'	+43'	81°	19
20	17°34'	+38'	79°	17°46'	+39'	79°	17°57'	+39'	79°	18°08'	+40'	80°	18°19'	+41'	80°	18°29'	+42'	80°	18°39'	+43'	81°	20
21	18°12'	+38'	78°	18°24'	+38'	78°	18°37'	+39'	78°	18°49'	+40'	79°	19°00'	+41'	79°	19°11'	+42'	79°	19°22'	+42'	80°	21
22	18°50'	+37'	77°	19°03'	+38'	77°	19°16'	+39'	78°	19°29'	+40'	78°	19°41'	+41'	78°	19°53'	+41'	79°	20°04'	+42'	79°	22
23	19°27'	+37'	76°	19°41'	+38'	76°	19°55'	+39'	77°	20°08'	+40'	77°	20°22'	+40'	78°	20°34'	+41'	78°	20°47'	+42'	78°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

84° 276° LHA — Latitude SAME as Declination — 84° 276° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

85° 275° LHA — Latitude SAME as Declination — 85° 275° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	3°43'	+40'	93°	3°39'	+41'	93°	3°36'	+42'	93°	3°32'	+42'	94°	3°28'	+43'	94°	3°24'	+44'	94°	3°21'	+45'	94°	0
1	4°23'	+40'	93°	4°20'	+41'	93°	4°17'	+42'	93°	4°14'	+42'	93°	4°11'	+43'	93°	4°08'	+44'	93°	4°05'	+45'	93°	1
2	5°03'	+40'	92°	5°01'	+41'	92°	4°59'	+42'	92°	4°57'	+42'	92°	4°55'	+43'	92°	4°52'	+44'	92°	4°50'	+45'	92°	2
3	5°43'	+40'	91°	5°42'	+41'	91°	5°41'	+42'	91°	5°39'	+42'	91°	5°38'	+43'	92°	5°36'	+44'	92°	5°34'	+45'	92°	3
4	6°23'	+40'	90°	6°23'	+41'	90°	6°22'	+42'	91°	6°22'	+42'	91°	6°21'	+43'	91°	6°20'	+44'	91°	6°19'	+44'	91°	4
5	7°03'	+40'	90°	7°04'	+41'	90°	7°04'	+41'	90°	7°04'	+42'	90°	7°04'	+43'	90°	7°04'	+44'	90°	7°03'	+44'	90°	5
6	7°43'	+40'	89°	7°44'	+41'	89°	7°45'	+41'	89°	7°46'	+42'	89°	7°47'	+43'	89°	7°47'	+44'	90°	7°48'	+44'	90°	6
7	8°23'	+40'	88°	8°25'	+41'	88°	8°27'	+41'	88°	8°28'	+42'	89°	8°30'	+43'	89°	8°31'	+44'	89°	8°32'	+44'	89°	7
8	9°03'	+40'	87°	9°06'	+40'	88°	9°08'	+41'	88°	9°10'	+42'	88°	9°13'	+43'	88°	9°15'	+43'	88°	9°17'	+44'	88°	8
9	9°43'	+40'	87°	9°46'	+40'	87°	9°49'	+41'	87°	9°52'	+42'	87°	9°55'	+43'	87°	9°58'	+43'	87°	10°01'	+44'	88°	9
10	10°22'	+39'	86°	10°26'	+40'	86°	10°30'	+41'	86°	10°34'	+42'	86°	10°38'	+43'	87°	10°42'	+43'	87°	10°45'	+44'	87°	10
11	11°02'	+39'	85°	11°07'	+40'	85°	11°11'	+41'	85°	11°16'	+42'	86°	11°21'	+42'	86°	11°25'	+43'	86°	11°29'	+44'	86°	11
12	11°41'	+39'	84°	11°47'	+40'	84°	11°52'	+41'	85°	11°58'	+42'	85°	12°03'	+42'	85°	12°08'	+43'	85°	12°13'	+44'	86°	12
13	12°20'	+39'	84°	12°27'	+40'	84°	12°33'	+41'	84°	12°39'	+41'	84°	12°45'	+42'	84°	12°51'	+43'	85°	12°57'	+44'	85°	13
14	12°59'	+39'	83°	13°07'	+40'	83°	13°14'	+41'	83°	13°21'	+41'	83°	13°28'	+42'	84°	13°34'	+43'	84°	13°40'	+44'	84°	14
15	13°38'	+39'	82°	13°46'	+40'	82°	13°54'	+40'	82°	14°02'	+41'	83°	14°10'	+42'	83°	14°17'	+43'	83°	14°24'	+43'	83°	15
16	14°17'	+39'	81°	14°26'	+39'	81°	14°35'	+40'	82°	14°43'	+41'	82°	14°52'	+42'	82°	15°00'	+43'	82°	15°07'	+43'	83°	16
17	14°56'	+38'	80°	15°05'	+39'	81°	15°15'	+40'	81°	15°24'	+41'	81°	15°33'	+42'	81°	15°42'	+42'	82°	15°51'	+43'	82°	17
18	15°34'	+38'	80°	15°45'	+39'	80°	15°55'	+40'	80°	16°05'	+41'	80°	16°15'	+42'	81°	16°25'	+42'	81°	16°34'	+43'	81°	18
19	16°12'	+38'	79°	16°24'	+39'	79°	16°35'	+40'	79°	16°46'	+41'	80°	16°57'	+41'	80°	17°07'	+42'	80°	17°17'	+43'	81°	19
20	16°50'	+38'	78°	17°03'	+39'	78°	17°15'	+40'	79°	17°27'	+40'	79°	17°38'	+41'	79°	17°49'	+42'	80°	18°00'	+43'	80°	20
21	17°28'	+38'	77°	17°42'	+39'	77°	17°54'	+39'	78°	18°07'	+40'	78°	18°19'	+41'	78°	18°31'	+42'	79°	18°43'	+43'	79°	21
22	18°06'	+38'	76°	18°20'	+38'	77°	18°34'	+39'	77°	18°47'	+40'	77°	19°00'	+41'	78°	19°13'	+42'	78°	19°25'	+42'	78°	22
23	18°44'	+37'	76°	18°58'	+38'	76°	19°13'	+39'	76°	19°27'	+40'	77°	19°41'	+41'	77°	19°54'	+41'	77°	20°07'	+42'	78°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

85° 275° LHA — Latitude SAME as Declination — 85° 275° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

86° 274° LHA — Latitude SAME as Declination — 86° 274° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	2°58'	+40'	93°	2°55'	+41'	93°	2°53'	+42'	93°	2°50'	+42'	93°	2°47'	+43'	93°	2°44'	+44'	93°	2°41'	+45'	93°	0
1	3°38'	+40'	92°	3°36'	+41'	92°	3°34'	+42'	92°	3°32'	+42'	92°	3°30'	+43'	92°	3°28'	+44'	92°	3°25'	+45'	92°	1
2	4°19'	+40'	91°	4°17'	+41'	91°	4°16'	+42'	91°	4°15'	+42'	91°	4°13'	+43'	91°	4°11'	+44'	92°	4°10'	+45'	92°	2
3	4°59'	+40'	90°	4°58'	+41'	91°	4°58'	+42'	91°	4°57'	+42'	91°	4°56'	+43'	91°	4°55'	+44'	91°	4°54'	+45'	91°	3
4	5°39'	+40'	90°	5°39'	+41'	90°	5°39'	+42'	90°	5°39'	+42'	90°	5°39'	+43'	90°	5°39'	+44'	90°	5°39'	+44'	90°	4
5	6°19'	+40'	89°	6°20'	+41'	89°	6°21'	+41'	89°	6°22'	+42'	89°	6°22'	+43'	89°	6°23'	+44'	90°	6°23'	+44'	90°	5
6	6°59'	+40'	88°	7°01'	+41'	88°	7°02'	+41'	88°	7°04'	+42'	89°	7°05'	+43'	89°	7°07'	+44'	89°	7°08'	+44'	89°	6
7	7°39'	+40'	87°	7°41'	+41'	88°	7°44'	+41'	88°	7°46'	+42'	88°	7°48'	+43'	88°	7°50'	+44'	88°	7°52'	+44'	88°	7
8	8°18'	+40'	87°	8°22'	+40'	87°	8°25'	+41'	87°	8°28'	+42'	87°	8°31'	+43'	87°	8°34'	+44'	87°	8°36'	+44'	88°	8
9	8°58'	+40'	86°	9°02'	+40'	86°	9°06'	+41'	86°	9°10'	+42'	86°	9°14'	+43'	87°	9°17'	+43'	87°	9°21'	+44'	87°	9
10	9°38'	+40'	85°	9°43'	+40'	85°	9°47'	+41'	86°	9°52'	+42'	86°	9°56'	+43'	86°	10°01'	+43'	86°	10°05'	+44'	86°	10
11	10°17'	+39'	84°	10°23'	+40'	85°	10°28'	+41'	85°	10°34'	+42'	85°	10°39'	+42'	85°	10°44'	+43'	85°	10°49'	+44'	86°	11
12	10°57'	+39'	84°	11°03'	+40'	84°	11°09'	+41'	84°	11°16'	+42'	84°	11°22'	+42'	84°	11°27'	+43'	85°	11°33'	+44'	85°	12
13	11°36'	+39'	83°	11°43'	+40'	83°	11°50'	+41'	83°	11°57'	+42'	83°	12°04'	+42'	84°	12°10'	+43'	84°	12°17'	+44'	84°	13
14	12°15'	+39'	82°	12°23'	+40'	82°	12°31'	+41'	83°	12°39'	+41'	83°	12°46'	+42'	83°	12°53'	+43'	83°	13°00'	+44'	83°	14
15	12°54'	+39'	81°	13°03'	+40'	82°	13°12'	+40'	82°	13°20'	+41'	82°	13°28'	+42'	82°	13°36'	+43'	82°	13°44'	+44'	83°	15
16	13°33'	+39'	81°	13°43'	+40'	81°	13°52'	+40'	81°	14°01'	+41'	81°	14°10'	+42'	82°	14°19'	+43'	82°	14°28'	+43'	82°	16
17	14°12'	+39'	80°	14°22'	+39'	80°	14°33'	+40'	80°	14°43'	+41'	81°	14°52'	+42'	81°	15°02'	+43'	81°	15°11'	+43'	81°	17
18	14°50'	+38'	79°	15°02'	+39'	79°	15°13'	+40'	79°	15°24'	+41'	80°	15°34'	+42'	80°	15°44'	+42'	80°	15°54'	+43'	81°	18
19	15°29'	+38'	78°	15°41'	+39'	78°	15°53'	+40'	79°	16°04'	+41'	79°	16°16'	+41'	79°	16°27'	+42'	80°	16°37'	+43'	80°	19
20	16°07'	+38'	77°	16°20'	+39'	78°	16°33'	+40'	78°	16°45'	+40'	78°	16°57'	+41'	79°	17°09'	+42'	79°	17°20'	+43'	79°	20
21	16°45'	+38'	77°	16°59'	+39'	77°	17°12'	+40'	77°	17°25'	+40'	77°	17°38'	+41'	78°	17°51'	+42'	78°	18°03'	+43'	78°	21
22	17°23'	+38'	76°	17°37'	+39'	76°	17°52'	+39'	76°	18°06'	+40'	77°	18°19'	+41'	77°	18°33'	+42'	77°	18°46'	+42'	78°	22
23	18°01'	+37'	75°	18°16'	+38'	75°	18°31'	+39'	76°	18°46'	+40'	76°	19°00'	+41'	76°	19°15'	+42'	77°	19°28'	+42'	77°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

86° 274° LHA — Latitude SAME as Declination — 86° 274° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

87° 273° LHA — Latitude SAME as Declination — 87° 273° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	2°14'	+40'	92°	2°12'	+41'	92°	2°09'	+42'	92°	2°07'	+42'	92°	2°05'	+43'	92°	2°03'	+44'	92°	2°00'	+45'	92°	0
1	2°54'	+40'	91°	2°53'	+41'	91°	2°51'	+42'	91°	2°50'	+42'	91°	2°48'	+43'	91°	2°47'	+44'	92°	2°45'	+45'	92°	1
2	3°34'	+40'	91°	3°33'	+41'	91°	3°33'	+42'	91°	3°32'	+42'	91°	3°31'	+43'	91°	3°31'	+44'	91°	3°30'	+45'	91°	2
3	4°14'	+40'	90°	4°14'	+41'	90°	4°14'	+42'	90°	4°15'	+42'	90°	4°14'	+43'	90°	4°14'	+44'	90°	4°14'	+45'	90°	3
4	4°54'	+40'	89°	4°55'	+41'	89°	4°56'	+42'	89°	4°57'	+42'	89°	4°58'	+43'	89°	4°58'	+44'	89°	4°59'	+44'	90°	4
5	5°34'	+40'	88°	5°36'	+41'	88°	5°38'	+41'	88°	5°39'	+42'	89°	5°41'	+43'	89°	5°42'	+44'	89°	5°43'	+44'	89°	5
6	6°14'	+40'	88°	6°17'	+41'	88°	6°19'	+41'	88°	6°21'	+42'	88°	6°24'	+43'	88°	6°26'	+44'	88°	6°28'	+44'	88°	6
7	6°54'	+40'	87°	6°57'	+41'	87°	7°01'	+41'	87°	7°04'	+42'	87°	7°07'	+43'	87°	7°09'	+44'	87°	7°12'	+44'	88°	7
8	7°34'	+40'	86°	7°38'	+41'	86°	7°42'	+41'	86°	7°46'	+42'	86°	7°49'	+43'	87°	7°53'	+44'	87°	7°56'	+44'	87°	8
9	8°14'	+40'	85°	8°18'	+40'	85°	8°23'	+41'	86°	8°28'	+42'	86°	8°32'	+43'	86°	8°36'	+43'	86°	8°41'	+44'	86°	9
10	8°53'	+40'	85°	8°59'	+40'	85°	9°04'	+41'	85°	9°10'	+42'	85°	9°15'	+43'	85°	9°20'	+43'	85°	9°25'	+44'	85°	10
11	9°33'	+39'	84°	9°39'	+40'	84°	9°46'	+41'	84°	9°52'	+42'	84°	9°58'	+43'	84°	10°03'	+43'	85°	10°09'	+44'	85°	11
12	10°12'	+39'	83°	10°20'	+40'	83°	10°27'	+41'	83°	10°33'	+42'	84°	10°40'	+42'	84°	10°47'	+43'	84°	10°53'	+44'	84°	12
13	10°52'	+39'	82°	11°00'	+40'	82°	11°07'	+41'	83°	11°15'	+42'	83°	11°23'	+42'	83°	11°30'	+43'	83°	11°37'	+44'	83°	13
14	11°31'	+39'	81°	11°40'	+40'	82°	11°48'	+41'	82°	11°57'	+41'	82°	12°05'	+42'	82°	12°13'	+43'	82°	12°21'	+44'	83°	14
15	12°10'	+39'	81°	12°20'	+40'	81°	12°29'	+41'	81°	12°38'	+41'	81°	12°47'	+42'	82°	12°56'	+43'	82°	13°04'	+44'	82°	15
16	12°49'	+39'	80°	12°59'	+40'	80°	13°10'	+40'	80°	13°20'	+41'	81°	13°29'	+42'	81°	13°39'	+43'	81°	13°48'	+43'	81°	16
17	13°28'	+39'	79°	13°39'	+40'	79°	13°50'	+40'	80°	14°01'	+41'	80°	14°11'	+42'	80°	14°21'	+43'	80°	14°31'	+43'	81°	17
18	14°07'	+39'	78°	14°19'	+39'	79°	14°30'	+40'	79°	14°42'	+41'	79°	14°53'	+42'	79°	15°04'	+42'	80°	15°15'	+43'	80°	18
19	14°45'	+38'	78°	14°58'	+39'	78°	15°10'	+40'	78°	15°23'	+41'	78°	15°35'	+42'	79°	15°46'	+42'	79°	15°58'	+43'	79°	19
20	15°23'	+38'	77°	15°37'	+39'	77°	15°50'	+40'	77°	16°04'	+41'	78°	16°16'	+41'	78°	16°29'	+42'	78°	16°41'	+43'	78°	20
21	16°02'	+38'	76°	16°16'	+39'	76°	16°30'	+40'	76°	16°44'	+40'	77°	16°58'	+41'	77°	17°11'	+42'	77°	17°24'	+43'	78°	21
22	16°40'	+38'	75°	16°55'	+39'	75°	17°10'	+39'	76°	17°25'	+40'	76°	17°39'	+41'	76°	17°53'	+42'	77°	18°07'	+43'	77°	22
23	17°18'	+38'	74°	17°34'	+38'	75°	17°49'	+39'	75°	18°05'	+40'	75°	18°20'	+41'	76°	18°35'	+42'	76°	18°49'	+42'	76°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

87° 273° LHA — Latitude SAME as Declination — 87° 273° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

88° 272° LHA — Latitude SAME as Declination — 88° 272° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	1°29'	+40'	91°	1°28'	+41'	91°	1°26'	+42'	91°	1°25'	+42'	91°	1°23'	+43'	91°	1°22'	+44'	91°	1°20'	+45'	91°	0
1	2°09'	+40'	91°	2°09'	+41'	91°	2°08'	+42'	91°	2°07'	+42'	91°	2°07'	+43'	91°	2°06'	+44'	91°	2°05'	+45'	91°	1
2	2°49'	+40'	90°	2°50'	+41'	90°	2°50'	+42'	90°	2°50'	+42'	90°	2°50'	+43'	90°	2°50'	+44'	90°	2°49'	+45'	90°	2
3	3°30'	+40'	89°	3°30'	+41'	89°	3°31'	+42'	89°	3°32'	+42'	89°	3°33'	+43'	89°	3°33'	+44'	89°	3°34'	+45'	89°	3
4	4°10'	+40'	88°	4°11'	+41'	88°	4°13'	+42'	89°	4°14'	+42'	89°	4°16'	+43'	89°	4°17'	+44'	89°	4°19'	+44'	89°	4
5	4°50'	+40'	88°	4°52'	+41'	88°	4°54'	+42'	88°	4°57'	+42'	88°	4°59'	+43'	88°	5°01'	+44'	88°	5°03'	+44'	88°	5
6	5°30'	+40'	87°	5°33'	+41'	87°	5°36'	+41'	87°	5°39'	+42'	87°	5°42'	+43'	87°	5°45'	+44'	87°	5°47'	+44'	87°	6
7	6°10'	+40'	86°	6°14'	+41'	86°	6°17'	+41'	86°	6°21'	+42'	86°	6°25'	+43'	87°	6°28'	+44'	87°	6°32'	+44'	87°	7
8	6°49'	+40'	85°	6°54'	+41'	85°	6°59'	+41'	86°	7°03'	+42'	86°	7°08'	+43'	86°	7°12'	+44'	86°	7°16'	+44'	86°	8
9	7°29'	+40'	85°	7°35'	+40'	85°	7°40'	+41'	85°	7°45'	+42'	85°	7°51'	+43'	85°	7°56'	+43'	85°	8°01'	+44'	85°	9
10	8°09'	+40'	84°	8°15'	+40'	84°	8°21'	+41'	84°	8°28'	+42'	84°	8°33'	+43'	84°	8°39'	+43'	85°	8°45'	+44'	85°	10
11	8°49'	+40'	83°	8°56'	+40'	83°	9°03'	+41'	83°	9°09'	+42'	84°	9°16'	+43'	84°	9°23'	+43'	84°	9°29'	+44'	84°	11
12	9°28'	+39'	82°	9°36'	+40'	82°	9°44'	+41'	83°	9°51'	+42'	83°	9°59'	+43'	83°	10°06'	+43'	83°	10°13'	+44'	83°	12
13	10°07'	+39'	82°	10°16'	+40'	82°	10°25'	+41'	82°	10°33'	+42'	82°	10°41'	+42'	82°	10°49'	+43'	82°	10°57'	+44'	83°	13
14	10°47'	+39'	81°	10°56'	+40'	81°	11°06'	+41'	81°	11°15'	+42'	81°	11°24'	+42'	82°	11°32'	+43'	82°	11°41'	+44'	82°	14
15	11°26'	+39'	80°	11°36'	+40'	80°	11°46'	+41'	80°	11°56'	+41'	81°	12°06'	+42'	81°	12°15'	+43'	81°	12°25'	+44'	81°	15
16	12°05'	+39'	79°	12°16'	+40'	79°	12°27'	+41'	80°	12°38'	+41'	80°	12°48'	+42'	80°	12°58'	+43'	80°	13°08'	+44'	81°	16
17	12°44'	+39'	78°	12°56'	+40'	79°	13°08'	+40'	79°	13°19'	+41'	79°	13°30'	+42'	79°	13°41'	+43'	80°	13°52'	+43'	80°	17
18	13°23'	+39'	78°	13°36'	+39'	78°	13°48'	+40'	78°	14°00'	+41'	78°	14°12'	+42'	79°	14°24'	+43'	79°	14°35'	+43'	79°	18
19	14°02'	+39'	77°	14°15'	+39'	77°	14°28'	+40'	77°	14°41'	+41'	78°	14°54'	+42'	78°	15°06'	+42'	78°	15°19'	+43'	78°	19
20	14°40'	+38'	76°	14°54'	+39'	76°	15°08'	+40'	77°	15°22'	+41'	77°	15°36'	+42'	77°	15°49'	+42'	77°	16°02'	+43'	78°	20
21	15°18'	+38'	75°	15°34'	+39'	76°	15°48'	+40'	76°	16°03'	+41'	76°	16°17'	+41'	76°	16°31'	+42'	77°	16°45'	+43'	77°	21
22	15°57'	+38'	75°	16°13'	+39'	75°	16°28'	+40'	75°	16°43'	+40'	75°	16°58'	+41'	76°	17°13'	+42'	76°	17°28'	+43'	76°	22
23	16°35'	+38'	74°	16°51'	+39'	74°	17°08'	+39'	74°	17°24'	+40'	75°	17°40'	+41'	75°	17°55'	+42'	75°	18°10'	+43'	76°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

88° 272° LHA — Latitude SAME as Declination — 88° 272° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

89° 271° LHA — Latitude SAME as Declination — 89° 271° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	0°45'	+40'	91°	0°44'	+41'	91°	0°43'	+42'	91°	0°42'	+42'	91°	0°42'	+43'	91°	0°41'	+44'	91°	0°40'	+45'	91°	0
1	1°25'	+40'	90°	1°25'	+41'	90°	1°25'	+42'	90°	1°25'	+42'	90°	1°25'	+43'	90°	1°25'	+44'	90°	1°25'	+45'	90°	1
2	2°05'	+40'	89°	2°06'	+41'	89°	2°07'	+42'	89°	2°07'	+42'	89°	2°08'	+43'	89°	2°09'	+44'	89°	2°09'	+45'	89°	2
3	2°45'	+40'	88°	2°47'	+41'	88°	2°48'	+42'	89°	2°50'	+42'	89°	2°51'	+43'	89°	2°53'	+44'	89°	2°54'	+45'	89°	3
4	3°25'	+40'	88°	3°27'	+41'	88°	3°30'	+42'	88°	3°32'	+42'	88°	3°34'	+43'	88°	3°36'	+44'	88°	3°38'	+45'	88°	4
5	4°05'	+40'	87°	4°08'	+41'	87°	4°11'	+42'	87°	4°14'	+42'	87°	4°17'	+43'	87°	4°20'	+44'	87°	4°23'	+44'	87°	5
6	4°45'	+40'	86°	4°49'	+41'	86°	4°53'	+41'	86°	4°57'	+42'	86°	5°00'	+43'	87°	5°04'	+44'	87°	5°07'	+44'	87°	6
7	5°25'	+40'	85°	5°30'	+41'	86°	5°34'	+41'	86°	5°39'	+42'	86°	5°43'	+43'	86°	5°48'	+44'	86°	5°52'	+44'	86°	7
8	6°05'	+40'	85°	6°10'	+41'	85°	6°16'	+41'	85°	6°21'	+42'	85°	6°26'	+43'	85°	6°31'	+44'	85°	6°36'	+44'	85°	8
9	6°45'	+40'	84°	6°51'	+41'	84°	6°57'	+41'	84°	7°03'	+42'	84°	7°09'	+43'	84°	7°15'	+44'	85°	7°21'	+44'	85°	9
10	7°25'	+40'	83°	7°32'	+40'	83°	7°39'	+41'	83°	7°45'	+42'	84°	7°52'	+43'	84°	7°58'	+43'	84°	8°05'	+44'	84°	10
11	8°04'	+40'	82°	8°12'	+40'	83°	8°20'	+41'	83°	8°27'	+42'	83°	8°35'	+43'	83°	8°42'	+43'	83°	8°49'	+44'	83°	11
12	8°44'	+40'	82°	8°53'	+40'	82°	9°01'	+41'	82°	9°09'	+42'	82°	9°17'	+43'	82°	9°25'	+43'	82°	9°33'	+44'	83°	12
13	9°23'	+39'	81°	9°33'	+40'	81°	9°42'	+41'	81°	9°51'	+42'	81°	10°00'	+42'	82°	10°09'	+43'	82°	10°17'	+44'	82°	13
14	10°03'	+39'	80°	10°13'	+40'	80°	10°23'	+41'	81°	10°33'	+42'	81°	10°42'	+42'	81°	10°52'	+43'	81°	11°01'	+44'	81°	14
15	10°42'	+39'	79°	10°53'	+40'	80°	11°04'	+41'	80°	11°14'	+42'	80°	11°25'	+42'	80°	11°35'	+43'	80°	11°45'	+44'	81°	15
16	11°21'	+39'	79°	11°33'	+40'	79°	11°45'	+41'	79°	11°56'	+41'	79°	12°07'	+42'	79°	12°18'	+43'	80°	12°29'	+44'	80°	16
17	12°00'	+39'	78°	12°13'	+40'	78°	12°25'	+41'	78°	12°37'	+41'	78°	12°49'	+42'	79°	13°01'	+43'	79°	13°12'	+44'	79°	17
18	12°39'	+39'	77°	12°53'	+40'	77°	13°06'	+40'	78°	13°19'	+41'	78°	13°31'	+42'	78°	13°44'	+43'	78°	13°56'	+43'	78°	18
19	13°18'	+39'	76°	13°32'	+39'	77°	13°46'	+40'	77°	14°00'	+41'	77°	14°13'	+42'	77°	14°26'	+43'	77°	14°39'	+43'	78°	19
20	13°57'	+39'	75°	14°12'	+39'	76°	14°26'	+40'	76°	14°41'	+41'	76°	14°55'	+42'	76°	15°09'	+42'	77°	15°23'	+43'	77°	20
21	14°35'	+38'	75°	14°51'	+39'	75°	15°07'	+40'	75°	15°22'	+41'	75°	15°37'	+41'	76°	15°51'	+42'	76°	16°06'	+43'	76°	21
22	15°14'	+38'	74°	15°30'	+39'	74°	15°47'	+40'	74°	16°02'	+41'	75°	16°18'	+41'	75°	16°34'	+42'	75°	16°49'	+43'	76°	22
23	15°52'	+38'	73°	16°09'	+39'	73°	16°26'	+40'	74°	16°43'	+40'	74°	16°59'	+41'	74°	17°16'	+42'	75°	17°31'	+43'	75°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

89° 271° LHA — Latitude SAME as Declination — 89° 271° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

90° 270° LHA — Latitude SAME or CONTRARY as Declination — 90° 270° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	0°00'	+40'	90°	0°00'	+41'	90°	0°00'	+42'	90°	0°00'	+42'	90°	0°00'	+43'	90°	0°00'	+44'	90°	0°00'	+45'	90°	0
1	0°40'	+40'	89°	0°41'	+41'	89°	0°42'	+42'	89°	0°42'	+42'	89°	0°43'	+43'	89°	0°44'	+44'	89°	0°45'	+45'	89°	1
2	1°20'	+40'	89°	1°22'	+41'	89°	1°23'	+42'	89°	1°25'	+42'	89°	1°26'	+43'	89°	1°28'	+44'	89°	1°29'	+45'	89°	2
3	2°00'	+40'	88°	2°03'	+41'	88°	2°05'	+42'	88°	2°07'	+42'	88°	2°09'	+43'	88°	2°12'	+44'	88°	2°14'	+45'	88°	3
4	2°41'	+40'	87°	2°44'	+41'	87°	2°47'	+42'	87°	2°50'	+42'	87°	2°53'	+43'	87°	2°55'	+44'	87°	2°58'	+45'	87°	4
5	3°21'	+40'	86°	3°24'	+41'	86°	3°28'	+42'	86°	3°32'	+42'	86°	3°36'	+43'	87°	3°39'	+44'	87°	3°43'	+44'	87°	5
6	4°01'	+40'	86°	4°05'	+41'	86°	4°10'	+42'	86°	4°14'	+42'	86°	4°19'	+43'	86°	4°23'	+44'	86°	4°27'	+44'	86°	6
7	4°41'	+40'	85°	4°46'	+41'	85°	4°51'	+41'	85°	4°57'	+42'	85°	5°02'	+43'	85°	5°07'	+44'	85°	5°12'	+44'	85°	7
8	5°21'	+40'	84°	5°27'	+41'	84°	5°33'	+41'	84°	5°39'	+42'	84°	5°45'	+43'	84°	5°51'	+44'	85°	5°56'	+44'	85°	8
9	6°01'	+40'	83°	6°07'	+41'	83°	6°14'	+41'	84°	6°21'	+42'	84°	6°28'	+43'	84°	6°34'	+44'	84°	6°41'	+44'	84°	9
10	6°40'	+40'	83°	6°48'	+41'	83°	6°56'	+41'	83°	7°03'	+42'	83°	7°11'	+43'	83°	7°18'	+44'	83°	7°25'	+44'	83°	10
11	7°20'	+40'	82°	7°29'	+40'	82°	7°37'	+41'	82°	7°45'	+42'	82°	7°53'	+43'	82°	8°01'	+43'	82°	8°09'	+44'	83°	11
12	8°00'	+40'	81°	8°09'	+40'	81°	8°18'	+41'	81°	8°27'	+42'	81°	8°36'	+43'	82°	8°45'	+43'	82°	8°53'	+44'	82°	12
13	8°39'	+40'	80°	8°49'	+40'	80°	8°59'	+41'	81°	9°09'	+42'	81°	9°19'	+43'	81°	9°28'	+43'	81°	9°37'	+44'	81°	13
14	9°19'	+39'	80°	9°30'	+40'	80°	9°40'	+41'	80°	9°51'	+42'	80°	10°01'	+42'	80°	10°11'	+43'	80°	10°21'	+44'	81°	14
15	9°58'	+39'	79°	10°10'	+40'	79°	10°21'	+41'	79°	10°33'	+42'	79°	10°44'	+42'	79°	10°55'	+43'	80°	11°05'	+44'	80°	15
16	10°38'	+39'	78°	10°50'	+40'	78°	11°02'	+41'	78°	11°14'	+42'	79°	11°26'	+42'	79°	11°38'	+43'	79°	11°49'	+44'	79°	16
17	11°17'	+39'	77°	11°30'	+40'	77°	11°43'	+41'	78°	11°56'	+41'	78°	12°08'	+42'	78°	12°21'	+43'	78°	12°33'	+44'	78°	17
18	11°56'	+39'	76°	12°10'	+40'	77°	12°24'	+41'	77°	12°37'	+41'	77°	12°51'	+42'	77°	13°04'	+43'	78°	13°17'	+44'	78°	18
19	12°35'	+39'	76°	12°50'	+40'	76°	13°04'	+40'	76°	13°19'	+41'	76°	13°33'	+42'	77°	13°46'	+43'	77°	14°00'	+43'	77°	19
20	13°14'	+39'	75°	13°29'	+39'	75°	13°45'	+40'	75°	14°00'	+41'	76°	14°15'	+42'	76°	14°29'	+43'	76°	14°43'	+43'	76°	20
21	13°52'	+39'	74°	14°09'	+39'	74°	14°25'	+40'	75°	14°41'	+41'	75°	14°56'	+42'	75°	15°12'	+42'	75°	15°27'	+43'	76°	21
22	14°31'	+38'	73°	14°48'	+39'	74°	15°05'	+40'	74°	15°22'	+41'	74°	15°38'	+41'	74°	15°54'	+42'	75°	16°10'	+43'	75°	22
23	15°09'	+38'	72°	15°27'	+39'	73°	15°45'	+40'	73°	16°02'	+41'	73°	16°19'	+41'	74°	16°36'	+42'	74°	16°53'	+43'	74°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

90° 270° LHA — Latitude CONTRARY or SAME as Declination — 90° 270° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

89° 271° LHA — Latitude CONTRARY to Declination — 89° 271° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	0°45'	-40'	91°	0°44'	-41'	91°	0°43'	-42'	91°	0°42'	-42'	91°	0°42'	-43'	91°	0°41'	-44'	91°	0°40'	-45'	91°	0
1	0°04'	-40'	91°	0°03'	-41'	91°	0°01'	-42'	91°	0°00'	+42'	89°	0°01'	+43'	89°	0°03'	+44'	89°	0°04'	+45'	89°	1
2	0°36'	+40'	88°	0°38'	+41'	88°	0°40'	+42'	88°	0°42'	+42'	88°	0°45'	+43'	88°	0°47'	+44'	88°	0°49'	+45'	88°	2
3	1°16'	+40'	87°	1°19'	+41'	87°	1°22'	+42'	87°	1°25'	+42'	87°	1°28'	+43'	87°	1°31'	+44'	87°	1°34'	+45'	87°	3
4	1°56'	+40'	86°	2°00'	+41'	86°	2°04'	+42'	86°	2°07'	+42'	86°	2°11'	+43'	87°	2°15'	+44'	87°	2°18'	+45'	87°	4
5	2°36'	+40'	86°	2°41'	+41'	86°	2°45'	+42'	86°	2°50'	+42'	86°	2°54'	+43'	86°	2°58'	+44'	86°	3°03'	+45'	86°	5
6	3°16'	+40'	85°	3°22'	+41'	85°	3°27'	+42'	85°	3°32'	+42'	85°	3°37'	+43'	85°	3°42'	+44'	85°	3°47'	+44'	85°	6
7	3°56'	+40'	84°	4°02'	+41'	84°	4°08'	+42'	84°	4°14'	+42'	84°	4°20'	+43'	84°	4°26'	+44'	84°	4°32'	+44'	85°	7
8	4°36'	+40'	83°	4°43'	+41'	83°	4°50'	+42'	84°	4°57'	+42'	84°	5°03'	+43'	84°	5°10'	+44'	84°	5°16'	+44'	84°	8
9	5°16'	+40'	83°	5°24'	+41'	83°	5°31'	+41'	83°	5°39'	+42'	83°	5°46'	+43'	83°	5°54'	+44'	83°	6°01'	+44'	83°	9
10	5°56'	+40'	82°	6°05'	+41'	82°	6°13'	+41'	82°	6°21'	+42'	82°	6°29'	+43'	82°	6°37'	+44'	82°	6°45'	+44'	83°	10
11	6°36'	+40'	81°	6°45'	+41'	81°	6°54'	+41'	81°	7°03'	+42'	81°	7°12'	+43'	82°	7°21'	+44'	82°	7°29'	+44'	82°	11
12	7°16'	+40'	80°	7°26'	+40'	80°	7°36'	+41'	81°	7°45'	+42'	81°	7°55'	+43'	81°	8°04'	+43'	81°	8°14'	+44'	81°	12
13	7°56'	+40'	80°	8°06'	+40'	80°	8°17'	+41'	80°	8°27'	+42'	80°	8°38'	+43'	80°	8°48'	+43'	80°	8°58'	+44'	80°	13
14	8°35'	+40'	79°	8°47'	+40'	79°	8°58'	+41'	79°	9°09'	+42'	79°	9°20'	+43'	79°	9°31'	+43'	80°	9°42'	+44'	80°	14
15	9°15'	+39'	78°	9°27'	+40'	78°	9°39'	+41'	78°	9°51'	+42'	79°	10°03'	+42'	79°	10°14'	+43'	79°	10°26'	+44'	79°	15
16	9°54'	+39'	77°	10°07'	+40'	78°	10°20'	+41'	78°	10°33'	+42'	78°	10°45'	+42'	78°	10°58'	+43'	78°	11°10'	+44'	78°	16
17	10°33'	+39'	77°	10°47'	+40'	77°	11°01'	+41'	77°	11°14'	+42'	77°	11°28'	+42'	77°	11°41'	+43'	78°	11°54'	+44'	78°	17
18	11°13'	+39'	76°	11°27'	+40'	76°	11°42'	+41'	76°	11°56'	+41'	76°	12°10'	+42'	77°	12°24'	+43'	77°	12°37'	+44'	77°	18
19	11°52'	+39'	75°	12°07'	+40'	75°	12°22'	+41'	75°	12°37'	+41'	76°	12°52'	+42'	76°	13°07'	+43'	76°	13°21'	+44'	76°	19
20	12°31'	+39'	74°	12°47'	+40'	74°	13°03'	+40'	75°	13°19'	+41'	75°	13°34'	+42'	75°	13°49'	+43'	75°	14°05'	+43'	76°	20
21	13°10'	+39'	73°	13°27'	+39'	74°	13°43'	+40'	74°	14°00'	+41'	74°	14°16'	+42'	74°	14°32'	+43'	75°	14°48'	+43'	75°	21
22	13°48'	+39'	73°	14°06'	+39'	73°	14°24'	+40'	73°	14°41'	+41'	73°	14°58'	+42'	74°	15°15'	+42'	74°	15°31'	+43'	74°	22
23	14°27'	+38'	72°	14°45'	+39'	72°	15°04'	+40'	72°	15°22'	+41'	73°	15°40'	+41'	73°	15°57'	+42'	73°	16°14'	+43'	73°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

91° 269° LHA — Latitude SAME as DECLINATION — 91° 269° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

88° 272° LHA — Latitude CONTRARY to Declination — 88° 272° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	1°29'	-40'	91°	1°28'	-41'	91°	1°26'	-42'	91°	1°25'	-42'	91°	1°23'	-43'	91°	1°22'	-44'	91°	1°20'	-45'	91°	0
1	0°49'	-40'	92°	0°47'	-41'	92°	0°45'	-42'	92°	0°42'	-42'	92°	0°40'	-43'	92°	0°38'	-44'	92°	0°36'	-45'	92°	1
2	0°09'	-40'	93°	0°06'	-41'	93°	0°03'	-42'	93°	0°00'	+42'	87°	0°03'	+43'	87°	0°06'	+44'	87°	0°09'	+45'	87°	2
3	0°31'	+40'	86°	0°35'	+41'	86°	0°39'	+42'	86°	0°43'	+42'	86°	0°46'	+43'	86°	0°50'	+44'	86°	0°54'	+45'	87°	3
4	1°12'	+40'	86°	1°16'	+41'	86°	1°20'	+42'	86°	1°25'	+42'	86°	1°29'	+43'	86°	1°34'	+44'	86°	1°38'	+45'	86°	4
5	1°52'	+40'	85°	1°57'	+41'	85°	2°02'	+42'	85°	2°07'	+42'	85°	2°13'	+43'	85°	2°18'	+44'	85°	2°23'	+45'	85°	5
6	2°32'	+40'	84°	2°38'	+41'	84°	2°44'	+42'	84°	2°50'	+42'	84°	2°56'	+43'	84°	3°02'	+44'	84°	3°07'	+45'	84°	6
7	3°12'	+40'	83°	3°19'	+41'	84°	3°25'	+42'	84°	3°32'	+42'	84°	3°39'	+43'	84°	3°45'	+44'	84°	3°52'	+45'	84°	7
8	3°52'	+40'	83°	4°00'	+41'	83°	4°07'	+42'	83°	4°15'	+42'	83°	4°22'	+43'	83°	4°29'	+44'	83°	4°36'	+44'	83°	8
9	4°32'	+40'	82°	4°40'	+41'	82°	4°49'	+42'	82°	4°57'	+42'	82°	5°05'	+43'	82°	5°13'	+44'	82°	5°21'	+44'	82°	9
10	5°12'	+40'	81°	5°21'	+41'	81°	5°30'	+41'	81°	5°39'	+42'	82°	5°48'	+43'	82°	5°57'	+44'	82°	6°05'	+44'	82°	10
11	5°52'	+40'	80°	6°02'	+41'	81°	6°12'	+41'	81°	6°21'	+42'	81°	6°31'	+43'	81°	6°40'	+44'	81°	6°50'	+44'	81°	11
12	6°32'	+40'	80°	6°43'	+41'	80°	6°53'	+41'	80°	7°03'	+42'	80°	7°14'	+43'	80°	7°24'	+44'	80°	7°34'	+44'	80°	12
13	7°12'	+40'	79°	7°23'	+41'	79°	7°34'	+41'	79°	7°46'	+42'	79°	7°57'	+43'	79°	8°07'	+43'	80°	8°18'	+44'	80°	13
14	7°51'	+40'	78°	8°04'	+40'	78°	8°16'	+41'	78°	8°28'	+42'	79°	8°39'	+43'	79°	8°51'	+43'	79°	9°02'	+44'	79°	14
15	8°31'	+40'	77°	8°44'	+40'	78°	8°57'	+41'	78°	9°10'	+42'	78°	9°22'	+43'	78°	9°34'	+43'	78°	9°47'	+44'	78°	15
16	9°11'	+39'	77°	9°24'	+40'	77°	9°38'	+41'	77°	9°51'	+42'	77°	10°05'	+42'	77°	10°18'	+43'	78°	10°31'	+44'	78°	16
17	9°50'	+39'	76°	10°05'	+40'	76°	10°19'	+41'	76°	10°33'	+42'	76°	10°47'	+42'	77°	11°01'	+43'	77°	11°14'	+44'	77°	17
18	10°30'	+39'	75°	10°45'	+40'	75°	11°00'	+41'	76°	11°15'	+42'	76°	11°30'	+42'	76°	11°44'	+43'	76°	11°58'	+44'	76°	18
19	11°09'	+39'	74°	11°25'	+40'	75°	11°41'	+41'	75°	11°56'	+41'	75°	12°12'	+42'	75°	12°27'	+43'	75°	12°42'	+44'	76°	19
20	11°48'	+39'	74°	12°05'	+40'	74°	12°21'	+41'	74°	12°38'	+41'	74°	12°54'	+42'	74°	13°10'	+43'	75°	13°26'	+44'	75°	20
21	12°27'	+39'	73°	12°45'	+40'	73°	13°02'	+40'	73°	13°19'	+41'	73°	13°36'	+42'	74°	13°53'	+43'	74°	14°09'	+43'	74°	21
22	13°06'	+39'	72°	13°24'	+40'	72°	13°42'	+40'	73°	14°00'	+41'	73°	14°18'	+42'	73°	14°35'	+43'	73°	14°53'	+43'	73°	22
23	13°45'	+39'	71°	14°04'	+39'	72°	14°23'	+40'	72°	14°41'	+41'	72°	15°00'	+42'	72°	15°18'	+42'	73°	15°36'	+43'	73°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

92° 268° LHA — Latitude SAME as DECLINATION — 92° 268° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

87° 273° LHA — Latitude CONTRARY to Declination — 87° 273° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	2°14'	-40'	92°	2°12'	-41'	92°	2°09'	-42'	92°	2°07'	-42'	92°	2°05'	-43'	92°	2°03'	-44'	92°	2°00'	-45'	92°	0
1	1°34'	-40'	93°	1°31'	-41'	93°	1°28'	-42'	93°	1°25'	-42'	93°	1°22'	-43'	93°	1°19'	-44'	93°	1°16'	-45'	93°	1
2	0°53'	-40'	93°	0°50'	-41'	94°	0°46'	-42'	94°	0°42'	-42'	94°	0°39'	-43'	94°	0°35'	-44'	94°	0°31'	-45'	94°	2
3	0°13'	-40'	94°	0°09'	-41'	94°	0°04'	-42'	94°	0°00'	+42'	86°	0°05'	+43'	86°	0°09'	+44'	86°	0°13'	+45'	86°	3
4	0°27'	+40'	85°	0°32'	+41'	85°	0°37'	+42'	85°	0°43'	+42'	85°	0°48'	+43'	85°	0°53'	+44'	85°	0°58'	+45'	85°	4
5	1°07'	+40'	84°	1°13'	+41'	84°	1°19'	+42'	84°	1°25'	+42'	84°	1°31'	+43'	84°	1°37'	+44'	84°	1°43'	+45'	84°	5
6	1°47'	+40'	84°	1°54'	+41'	84°	2°01'	+42'	84°	2°08'	+42'	84°	2°14'	+43'	84°	2°21'	+44'	84°	2°27'	+45'	84°	6
7	2°28'	+40'	83°	2°35'	+41'	83°	2°43'	+42'	83°	2°50'	+42'	83°	2°57'	+43'	83°	3°05'	+44'	83°	3°12'	+45'	83°	7
8	3°08'	+40'	82°	3°16'	+41'	82°	3°24'	+42'	82°	3°32'	+42'	82°	3°41'	+43'	82°	3°49'	+44'	82°	3°57'	+45'	82°	8
9	3°48'	+40'	81°	3°57'	+41'	81°	4°06'	+42'	81°	4°15'	+42'	82°	4°24'	+43'	82°	4°32'	+44'	82°	4°41'	+44'	82°	9
10	4°28'	+40'	81°	4°38'	+41'	81°	4°48'	+42'	81°	4°57'	+42'	81°	5°07'	+43'	81°	5°16'	+44'	81°	5°26'	+44'	81°	10
11	5°08'	+40'	80°	5°19'	+41'	80°	5°29'	+42'	80°	5°39'	+42'	80°	5°50'	+43'	80°	6°00'	+44'	80°	6°10'	+44'	80°	11
12	5°48'	+40'	79°	5°59'	+41'	79°	6°11'	+41'	79°	6°22'	+42'	79°	6°33'	+43'	79°	6°44'	+44'	80°	6°54'	+44'	80°	12
13	6°28'	+40'	78°	6°40'	+41'	78°	6°52'	+41'	79°	7°04'	+42'	79°	7°16'	+43'	79°	7°27'	+44'	79°	7°39'	+44'	79°	13
14	7°08'	+40'	78°	7°21'	+41'	78°	7°33'	+41'	78°	7°46'	+42'	78°	7°59'	+43'	78°	8°11'	+44'	78°	8°23'	+44'	78°	14
15	7°48'	+40'	77°	8°01'	+40'	77°	8°15'	+41'	77°	8°28'	+42'	77°	8°41'	+43'	77°	8°54'	+43'	78°	9°07'	+44'	78°	15
16	8°27'	+40'	76°	8°42'	+40'	76°	8°56'	+41'	76°	9°10'	+42'	76°	9°24'	+43'	77°	9°38'	+43'	77°	9°51'	+44'	77°	16
17	9°07'	+40'	75°	9°22'	+40'	75°	9°37'	+41'	76°	9°52'	+42'	76°	10°07'	+43'	76°	10°21'	+43'	76°	10°35'	+44'	76°	17
18	9°47'	+39'	75°	10°02'	+40'	75°	10°18'	+41'	75°	10°34'	+42'	75°	10°49'	+42'	75°	11°04'	+43'	75°	11°19'	+44'	76°	18
19	10°26'	+39'	74°	10°43'	+40'	74°	10°59'	+41'	74°	11°15'	+42'	74°	11°32'	+42'	75°	11°48'	+43'	75°	12°03'	+44'	75°	19
20	11°05'	+39'	73°	11°23'	+40'	73°	11°40'	+41'	73°	11°57'	+41'	74°	12°14'	+42'	74°	12°31'	+43'	74°	12°47'	+44'	74°	20
21	11°44'	+39'	72°	12°03'	+40'	72°	12°21'	+41'	73°	12°39'	+41'	73°	12°56'	+42'	73°	13°13'	+43'	73°	13°31'	+44'	74°	21
22	12°24'	+39'	71°	12°43'	+40'	72°	13°01'	+40'	72°	13°20'	+41'	72°	13°38'	+42'	72°	13°56'	+43'	73°	14°14'	+43'	73°	22
23	13°02'	+39'	71°	13°22'	+40'	71°	13°42'	+40'	71°	14°01'	+41'	71°	14°20'	+42'	72°	14°39'	+43'	72°	14°58'	+43'	72°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

93° 267° LHA — Latitude SAME as DECLINATION — 93° 267° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

86° 274° LHA — Latitude CONTRARY to Declination — 86° 274° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	2°58'	-40'	93°	2°55'	-41'	93°	2°53'	-42'	93°	2°50'	-42'	93°	2°47'	-43'	93°	2°44'	-44'	93°	2°41'	-45'	93°	0
1	2°18'	-40'	93°	2°14'	-41'	93°	2°11'	-42'	93°	2°07'	-43'	94°	2°03'	-43'	94°	2°00'	-44'	94°	1°56'	-45'	94°	1
2	1°38'	-40'	94°	1°33'	-41'	94°	1°29'	-42'	94°	1°25'	-43'	94°	1°20'	-43'	94°	1°16'	-44'	94°	1°11'	-45'	94°	2
3	0°58'	-40'	95°	0°52'	-41'	95°	0°47'	-42'	95°	0°42'	-43'	95°	0°37'	-43'	95°	0°32'	-44'	95°	0°27'	-45'	95°	3
4	0°17'	-40'	96°	0°11'	-41'	96°	0°05'	-42'	96°	0°00'	+43'	84°	0°06'	+43'	84°	0°12'	+44'	84°	0°18'	+45'	84°	4
5	0°23'	+40'	84°	0°30'	+41'	84°	0°36'	+42'	84°	0°43'	+43'	84°	0°50'	+43'	84°	0°56'	+44'	84°	1°03'	+45'	84°	5
6	1°03'	+40'	83°	1°11'	+41'	83°	1°18'	+42'	83°	1°25'	+43'	83°	1°33'	+43'	83°	1°40'	+44'	83°	1°47'	+45'	83°	6
7	1°43'	+40'	82°	1°52'	+41'	82°	2°00'	+42'	82°	2°08'	+42'	82°	2°16'	+43'	82°	2°24'	+44'	82°	2°32'	+45'	82°	7
8	2°24'	+40'	81°	2°33'	+41'	81°	2°42'	+42'	81°	2°50'	+42'	82°	2°59'	+43'	82°	3°08'	+44'	82°	3°17'	+45'	82°	8
9	3°04'	+40'	81°	3°14'	+41'	81°	3°23'	+42'	81°	3°33'	+42'	81°	3°42'	+43'	81°	3°52'	+44'	81°	4°01'	+45'	81°	9
10	3°44'	+40'	80°	3°55'	+41'	80°	4°05'	+42'	80°	4°15'	+42'	80°	4°26'	+43'	80°	4°36'	+44'	80°	4°46'	+45'	80°	10
11	4°24'	+40'	79°	4°35'	+41'	79°	4°47'	+42'	79°	4°58'	+42'	79°	5°09'	+43'	79°	5°20'	+44'	80°	5°30'	+44'	80°	11
12	5°04'	+40'	78°	5°16'	+41'	78°	5°28'	+42'	79°	5°40'	+42'	79°	5°52'	+43'	79°	6°03'	+44'	79°	6°15'	+44'	79°	12
13	5°44'	+40'	78°	5°57'	+41'	78°	6°10'	+41'	78°	6°22'	+42'	78°	6°35'	+43'	78°	6°47'	+44'	78°	6°59'	+44'	78°	13
14	6°24'	+40'	77°	6°38'	+41'	77°	6°51'	+41'	77°	7°05'	+42'	77°	7°18'	+43'	77°	7°31'	+44'	78°	7°44'	+44'	78°	14
15	7°04'	+40'	76°	7°19'	+41'	76°	7°33'	+41'	76°	7°47'	+42'	77°	8°01'	+43'	77°	8°14'	+44'	77°	8°28'	+44'	77°	15
16	7°44'	+40'	75°	7°59'	+41'	76°	8°14'	+41'	76°	8°29'	+42'	76°	8°44'	+43'	76°	8°58'	+43'	76°	9°12'	+44'	76°	16
17	8°24'	+40'	75°	8°40'	+40'	75°	8°55'	+41'	75°	9°11'	+42'	75°	9°26'	+43'	75°	9°41'	+43'	75°	9°56'	+44'	76°	17
18	9°04'	+40'	74°	9°20'	+40'	74°	9°37'	+41'	74°	9°53'	+42'	74°	10°09'	+43'	75°	10°25'	+43'	75°	10°41'	+44'	75°	18
19	9°43'	+39'	73°	10°01'	+40'	73°	10°18'	+41'	73°	10°35'	+42'	74°	10°51'	+42'	74°	11°08'	+43'	74°	11°25'	+44'	74°	19
20	10°23'	+39'	72°	10°41'	+40'	73°	10°59'	+41'	73°	11°16'	+42'	73°	11°34'	+42'	73°	11°51'	+43'	73°	12°08'	+44'	74°	20
21	11°02'	+39'	72°	11°21'	+40'	72°	11°40'	+41'	72°	11°58'	+42'	72°	12°16'	+42'	72°	12°34'	+43'	73°	12°52'	+44'	73°	21
22	11°41'	+39'	71°	12°01'	+40'	71°	12°20'	+41'	71°	12°40'	+41'	71°	12°59'	+42'	72°	13°17'	+43'	72°	13°36'	+44'	72°	22
23	12°20'	+39'	70°	12°41'	+40'	70°	13°01'	+41'	70°	13°21'	+41'	71°	13°41'	+42'	71°	14°00'	+43'	71°	14°19'	+43'	71°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

94° 266° LHA — Latitude SAME as DECLINATION — 94° 266° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

85° 275° LHA — Latitude CONTRARY to Declination — 85° 275° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	3°43'	-40'	93°	3°39'	-41'	93°	3°36'	-42'	93°	3°32'	-43'	94°	3°28'	-43'	94°	3°24'	-44'	94°	3°21'	-45'	94°	0
1	3°03'	-40'	94°	2°58'	-41'	94°	2°54'	-42'	94°	2°49'	-43'	94°	2°45'	-43'	94°	2°40'	-44'	94°	2°36'	-45'	94°	1
2	2°22'	-40'	95°	2°17'	-41'	95°	2°12'	-42'	95°	2°07'	-43'	95°	2°02'	-43'	95°	1°56'	-44'	95°	1°51'	-45'	95°	2
3	1°42'	-40'	96°	1°36'	-41'	96°	1°30'	-42'	96°	1°24'	-43'	96°	1°18'	-43'	96°	1°12'	-44'	96°	1°07'	-45'	96°	3
4	1°02'	-40'	96°	0°55'	-41'	96°	0°48'	-42'	96°	0°42'	-43'	96°	0°35'	-43'	96°	0°28'	-44'	96°	0°22'	-45'	96°	4
5	0°21'	-40'	97°	0°14'	-41'	97°	0°07'	-42'	97°	0°01'	+43'	83°	0°08'	+43'	83°	0°16'	+44'	83°	0°23'	+45'	83°	5
6	0°19'	+40'	82°	0°27'	+41'	82°	0°35'	+42'	82°	0°43'	+43'	82°	0°51'	+43'	82°	1°00'	+44'	82°	1°08'	+45'	82°	6
7	0°59'	+40'	81°	1°08'	+41'	81°	1°17'	+42'	82°	1°26'	+43'	82°	1°35'	+43'	82°	1°44'	+44'	82°	1°52'	+45'	82°	7
8	1°40'	+40'	81°	1°49'	+41'	81°	1°59'	+42'	81°	2°09'	+43'	81°	2°18'	+43'	81°	2°28'	+44'	81°	2°37'	+45'	81°	8
9	2°20'	+40'	80°	2°30'	+41'	80°	2°41'	+42'	80°	2°51'	+43'	80°	3°01'	+43'	80°	3°12'	+44'	80°	3°22'	+45'	80°	9
10	3°00'	+40'	79°	3°11'	+41'	79°	3°23'	+42'	79°	3°34'	+42'	79°	3°45'	+43'	79°	3°56'	+44'	80°	4°06'	+45'	80°	10
11	3°40'	+40'	78°	3°52'	+41'	79°	4°04'	+42'	79°	4°16'	+42'	79°	4°28'	+43'	79°	4°39'	+44'	79°	4°51'	+45'	79°	11
12	4°21'	+40'	78°	4°33'	+41'	78°	4°46'	+42'	78°	4°59'	+42'	78°	5°11'	+43'	78°	5°23'	+44'	78°	5°36'	+45'	78°	12
13	5°01'	+40'	77°	5°14'	+41'	77°	5°28'	+42'	77°	5°41'	+42'	77°	5°54'	+43'	77°	6°07'	+44'	77°	6°20'	+44'	78°	13
14	5°41'	+40'	76°	5°55'	+41'	76°	6°09'	+42'	76°	6°23'	+42'	77°	6°37'	+43'	77°	6°51'	+44'	77°	7°05'	+44'	77°	14
15	6°21'	+40'	76°	6°36'	+41'	76°	6°51'	+41'	76°	7°06'	+42'	76°	7°20'	+43'	76°	7°35'	+44'	76°	7°49'	+44'	76°	15
16	7°01'	+40'	75°	7°17'	+41'	75°	7°32'	+41'	75°	7°48'	+42'	75°	8°03'	+43'	75°	8°18'	+44'	75°	8°33'	+44'	76°	16
17	7°41'	+40'	74°	7°57'	+41'	74°	8°14'	+41'	74°	8°30'	+42'	74°	8°46'	+43'	75°	9°02'	+44'	75°	9°18'	+44'	75°	17
18	8°21'	+40'	73°	8°38'	+41'	73°	8°55'	+41'	74°	9°12'	+42'	74°	9°29'	+43'	74°	9°45'	+43'	74°	10°02'	+44'	74°	18
19	9°01'	+40'	72°	9°19'	+40'	73°	9°36'	+41'	73°	9°54'	+42'	73°	10°12'	+43'	73°	10°29'	+43'	73°	10°46'	+44'	73°	19
20	9°40'	+40'	72°	9°59'	+40'	72°	10°18'	+41'	72°	10°36'	+42'	72°	10°54'	+43'	72°	11°12'	+43'	73°	11°30'	+44'	73°	20
21	10°20'	+39'	71°	10°39'	+40'	71°	10°59'	+41'	71°	11°18'	+42'	72°	11°37'	+42'	72°	11°55'	+43'	72°	12°14'	+44'	72°	21
22	10°59'	+39'	70°	11°20'	+40'	70°	11°40'	+41'	71°	11°59'	+42'	71°	12°19'	+42'	71°	12°39'	+43'	71°	12°58'	+44'	71°	22
23	11°39'	+39'	69°	12°00'	+40'	70°	12°20'	+41'	70°	12°41'	+41'	70°	13°01'	+42'	70°	13°22'	+43'	70°	13°41'	+44'	71°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

95° 265° LHA — Latitude SAME as DECLINATION — 95° 265° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

84° 276° LHA — Latitude CONTRARY to Declination — 84° 276° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	4°27'	-40'	94°	4°23'	-41'	94°	4°19'	-42'	94°	4°14'	-43'	94°	4°10'	-43'	94°	4°05'	-44'	94°	4°01'	-45'	94°	0
1	3°47'	-40'	95°	3°42'	-41'	95°	3°37'	-42'	95°	3°32'	-43'	95°	3°27'	-43'	95°	3°21'	-44'	95°	3°16'	-45'	95°	1
2	3°07'	-40'	96°	3°01'	-41'	96°	2°55'	-42'	96°	2°49'	-43'	96°	2°43'	-43'	96°	2°37'	-44'	96°	2°31'	-45'	96°	2
3	2°26'	-40'	96°	2°20'	-41'	96°	2°13'	-42'	96°	2°07'	-43'	96°	2°00'	-43'	96°	1°53'	-44'	96°	1°46'	-45'	96°	3
4	1°46'	-40'	97°	1°39'	-41'	97°	1°31'	-42'	97°	1°24'	-43'	97°	1°17'	-43'	97°	1°09'	-44'	97°	1°02'	-45'	97°	4
5	1°06'	-40'	98°	0°57'	-41'	98°	0°49'	-42'	98°	0°41'	-43'	98°	0°33'	-43'	98°	0°25'	-44'	98°	0°17'	-45'	98°	5
6	0°25'	-40'	98°	0°16'	-41'	98°	0°07'	-42'	98°	0°01'	+43'	82°	0°10'	+43'	82°	0°19'	+44'	82°	0°28'	+45'	82°	6
7	0°15'	+40'	81°	0°25'	+41'	81°	0°34'	+42'	81°	0°44'	+43'	81°	0°54'	+43'	81°	1°03'	+44'	81°	1°13'	+45'	81°	7
8	0°56'	+40'	80°	1°06'	+41'	80°	1°16'	+42'	80°	1°27'	+43'	80°	1°37'	+43'	80°	1°47'	+44'	80°	1°57'	+45'	80°	8
9	1°36'	+40'	79°	1°47'	+41'	79°	1°58'	+42'	79°	2°09'	+43'	79°	2°20'	+43'	79°	2°31'	+44'	79°	2°42'	+45'	80°	9
10	2°16'	+40'	79°	2°28'	+41'	79°	2°40'	+42'	79°	2°52'	+43'	79°	3°04'	+43'	79°	3°15'	+44'	79°	3°27'	+45'	79°	10
11	2°57'	+40'	78°	3°09'	+41'	78°	3°22'	+42'	78°	3°35'	+43'	78°	3°47'	+43'	78°	3°59'	+44'	78°	4°12'	+45'	78°	11
12	3°37'	+40'	77°	3°51'	+41'	77°	4°04'	+42'	77°	4°17'	+43'	77°	4°30'	+43'	77°	4°43'	+44'	77°	4°56'	+45'	78°	12
13	4°17'	+40'	76°	4°32'	+41'	76°	4°46'	+42'	77°	5°00'	+42'	77°	5°13'	+43'	77°	5°27'	+44'	77°	5°41'	+45'	77°	13
14	4°58'	+40'	76°	5°13'	+41'	76°	5°27'	+42'	76°	5°42'	+42'	76°	5°57'	+43'	76°	6°11'	+44'	76°	6°26'	+45'	76°	14
15	5°38'	+40'	75°	5°54'	+41'	75°	6°09'	+42'	75°	6°25'	+42'	75°	6°40'	+43'	75°	6°55'	+44'	75°	7°10'	+44'	76°	15
16	6°18'	+40'	74°	6°34'	+41'	74°	6°51'	+42'	74°	7°07'	+42'	74°	7°23'	+43'	75°	7°39'	+44'	75°	7°55'	+44'	75°	16
17	6°58'	+40'	73°	7°15'	+41'	73°	7°32'	+41'	74°	7°49'	+42'	74°	8°06'	+43'	74°	8°23'	+44'	74°	8°39'	+44'	74°	17
18	7°38'	+40'	73°	7°56'	+41'	73°	8°14'	+41'	73°	8°31'	+42'	73°	8°49'	+43'	73°	9°06'	+44'	73°	9°23'	+44'	73°	18
19	8°18'	+40'	72°	8°37'	+41'	72°	8°55'	+41'	72°	9°14'	+42'	72°	9°32'	+43'	72°	9°50'	+43'	73°	10°08'	+44'	73°	19
20	8°58'	+40'	71°	9°17'	+41'	71°	9°37'	+41'	71°	9°56'	+42'	72°	10°14'	+43'	72°	10°33'	+43'	72°	10°52'	+44'	72°	20
21	9°38'	+40'	70°	9°58'	+40'	71°	10°18'	+41'	71°	10°38'	+42'	71°	10°57'	+43'	71°	11°17'	+43'	71°	11°36'	+44'	71°	21
22	10°17'	+40'	70°	10°38'	+40'	70°	10°59'	+41'	70°	11°19'	+42'	70°	11°40'	+42'	70°	12°00'	+43'	71°	12°20'	+44'	71°	22
23	10°57'	+39'	69°	11°19'	+40'	69°	11°40'	+41'	69°	12°01'	+42'	69°	12°22'	+42'	70°	12°43'	+43'	70°	13°04'	+44'	70°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

96° 264° LHA — Latitude SAME as DECLINATION — 96° 264° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

83° 277° LHA — Latitude CONTRARY to Declination — 83° 277° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	5°12'	-40'	95°	5°07'	-41'	95°	5°02'	-42'	95°	4°57'	-43'	95°	4°51'	-43'	95°	4°46'	-44'	95°	4°41'	-45'	95°	0
1	4°31'	-40'	95°	4°26'	-41'	96°	4°20'	-42'	96°	4°14'	-43'	96°	4°08'	-43'	96°	4°02'	-44'	96°	3°56'	-45'	96°	1
2	3°51'	-40'	96°	3°45'	-41'	96°	3°38'	-42'	96°	3°31'	-43'	96°	3°25'	-43'	96°	3°18'	-44'	96°	3°11'	-45'	97°	2
3	3°11'	-40'	97°	3°03'	-41'	97°	2°56'	-42'	97°	2°49'	-43'	97°	2°41'	-43'	97°	2°34'	-44'	97°	2°26'	-45'	97°	3
4	2°30'	-40'	98°	2°22'	-41'	98°	2°14'	-42'	98°	2°06'	-43'	98°	1°58'	-43'	98°	1°50'	-44'	98°	1°41'	-45'	98°	4
5	1°50'	-40'	98°	1°41'	-41'	98°	1°32'	-42'	98°	1°23'	-43'	98°	1°14'	-43'	99°	1°06'	-44'	99°	0°57'	-45'	99°	5
6	1°09'	-41'	99°	1°00'	-41'	99°	0°50'	-42'	99°	0°41'	-43'	99°	0°31'	-43'	99°	0°21'	-44'	99°	0°12'	-45'	99°	6
7	0°29'	-41'	100°	0°18'	-41'	100°	0°08'	-42'	100°	0°02'	+43'	80°	0°13'	+43'	80°	0°23'	+44'	80°	0°33'	+45'	80°	7
8	0°12'	+41'	79°	0°23'	+41'	79°	0°34'	+42'	79°	0°45'	+43'	79°	0°56'	+43'	79°	1°07'	+44'	79°	1°18'	+45'	79°	8
9	0°52'	+41'	79°	1°04'	+41'	79°	1°16'	+42'	79°	1°28'	+43'	79°	1°39'	+43'	79°	1°51'	+44'	79°	2°03'	+45'	79°	9
10	1°33'	+40'	78°	1°45'	+41'	78°	1°58'	+42'	78°	2°10'	+43'	78°	2°23'	+43'	78°	2°35'	+44'	78°	2°48'	+45'	78°	10
11	2°13'	+40'	77°	2°27'	+41'	77°	2°40'	+42'	77°	2°53'	+43'	77°	3°06'	+43'	77°	3°19'	+44'	77°	3°32'	+45'	77°	11
12	2°54'	+40'	76°	3°08'	+41'	76°	3°22'	+42'	77°	3°36'	+43'	77°	3°50'	+43'	77°	4°03'	+44'	77°	4°17'	+45'	77°	12
13	3°34'	+40'	76°	3°49'	+41'	76°	4°04'	+42'	76°	4°18'	+43'	76°	4°33'	+43'	76°	4°48'	+44'	76°	5°02'	+45'	76°	13
14	4°15'	+40'	75°	4°30'	+41'	75°	4°46'	+42'	75°	5°01'	+43'	75°	5°16'	+43'	75°	5°32'	+44'	75°	5°47'	+45'	75°	14
15	4°55'	+40'	74°	5°11'	+41'	74°	5°27'	+42'	74°	5°44'	+43'	74°	6°00'	+43'	75°	6°15'	+44'	75°	6°31'	+45'	75°	15
16	5°35'	+40'	73°	5°52'	+41'	74°	6°09'	+42'	74°	6°26'	+42'	74°	6°43'	+43'	74°	6°59'	+44'	74°	7°16'	+45'	74°	16
17	6°16'	+40'	73°	6°33'	+41'	73°	6°51'	+42'	73°	7°09'	+42'	73°	7°26'	+43'	73°	7°43'	+44'	73°	8°00'	+44'	73°	17
18	6°56'	+40'	72°	7°14'	+41'	72°	7°33'	+42'	72°	7°51'	+42'	72°	8°09'	+43'	72°	8°27'	+44'	73°	8°45'	+44'	73°	18
19	7°36'	+40'	71°	7°55'	+41'	71°	8°14'	+42'	71°	8°33'	+42'	72°	8°52'	+43'	72°	9°11'	+44'	72°	9°29'	+44'	72°	19
20	8°16'	+40'	70°	8°36'	+41'	71°	8°56'	+41'	71°	9°15'	+42'	71°	9°35'	+43'	71°	9°54'	+44'	71°	10°14'	+44'	71°	20
21	8°56'	+40'	70°	9°17'	+41'	70°	9°37'	+41'	70°	9°58'	+42'	70°	10°18'	+43'	70°	10°38'	+43'	71°	10°58'	+44'	71°	21
22	9°36'	+40'	69°	9°57'	+41'	69°	10°18'	+41'	69°	10°40'	+42'	69°	11°01'	+43'	70°	11°21'	+43'	70°	11°42'	+44'	70°	22
23	10°15'	+40'	68°	10°38'	+40'	68°	11°00'	+41'	69°	11°22'	+42'	69°	11°43'	+43'	69°	12°05'	+43'	69°	12°26'	+44'	69°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

97° 263° LHA — Latitude SAME as DECLINATION — 97° 263° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

82° 278° LHA — Latitude CONTRARY to Declination — 82° 278° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	5°56'	-40'	95°	5°51'	-41'	95°	5°45'	-42'	96°	5°39'	-43'	96°	5°33'	-43'	96°	5°27'	-44'	96°	5°21'	-45'	96°	0
1	5°16'	-40'	96°	5°09'	-41'	96°	5°03'	-42'	96°	4°56'	-43'	96°	4°49'	-43'	96°	4°43'	-44'	97°	4°36'	-45'	97°	1
2	4°35'	-40'	97°	4°28'	-41'	97°	4°21'	-42'	97°	4°13'	-43'	97°	4°06'	-43'	97°	3°59'	-44'	97°	3°51'	-45'	97°	2
3	3°55'	-41'	98°	3°47'	-41'	98°	3°39'	-42'	98°	3°31'	-43'	98°	3°23'	-43'	98°	3°14'	-44'	98°	3°06'	-45'	98°	3
4	3°14'	-41'	98°	3°06'	-41'	98°	2°57'	-42'	98°	2°48'	-43'	98°	2°39'	-44'	99°	2°30'	-44'	99°	2°21'	-45'	99°	4
5	2°34'	-41'	99°	2°24'	-41'	99°	2°15'	-42'	99°	2°05'	-43'	99°	1°56'	-44'	99°	1°46'	-44'	99°	1°36'	-45'	99°	5
6	1°53'	-41'	100°	1°43'	-41'	100°	1°33'	-42'	100°	1°22'	-43'	100°	1°12'	-44'	100°	1°02'	-44'	100°	0°51'	-45'	100°	6
7	1°13'	-41'	101°	1°02'	-41'	101°	0°51'	-42'	101°	0°40'	-43'	101°	0°29'	-44'	101°	0°17'	-44'	101°	0°06'	-45'	101°	7
8	0°32'	-41'	101°	0°20'	-41'	101°	0°08'	-42'	101°	0°03'	+43'	79°	0°15'	+44'	79°	0°27'	+44'	79°	0°39'	+45'	79°	8
9	0°09'	+41'	78°	0°21'	+41'	78°	0°34'	+42'	78°	0°46'	+43'	78°	0°59'	+44'	78°	1°11'	+44'	78°	1°23'	+45'	78°	9
10	0°49'	+41'	77°	1°03'	+41'	77°	1°16'	+42'	77°	1°29'	+43'	77°	1°42'	+44'	77°	1°55'	+44'	77°	2°08'	+45'	77°	10
11	1°30'	+41'	77°	1°44'	+41'	77°	1°58'	+42'	77°	2°12'	+43'	77°	2°26'	+44'	77°	2°39'	+44'	77°	2°53'	+45'	77°	11
12	2°11'	+41'	76°	2°25'	+41'	76°	2°40'	+42'	76°	2°55'	+43'	76°	3°09'	+43'	76°	3°24'	+44'	76°	3°38'	+45'	76°	12
13	2°51'	+41'	75°	3°07'	+41'	75°	3°22'	+42'	75°	3°37'	+43'	75°	3°53'	+43'	75°	4°08'	+44'	75°	4°23'	+45'	75°	13
14	3°32'	+41'	74°	3°48'	+41'	74°	4°04'	+42'	74°	4°20'	+43'	74°	4°36'	+43'	75°	4°52'	+44'	75°	5°08'	+45'	75°	14
15	4°12'	+40'	74°	4°29'	+41'	74°	4°46'	+42'	74°	5°03'	+43'	74°	5°19'	+43'	74°	5°36'	+44'	74°	5°53'	+45'	74°	15
16	4°53'	+40'	73°	5°10'	+41'	73°	5°28'	+42'	73°	5°45'	+43'	73°	6°03'	+43'	73°	6°20'	+44'	73°	6°37'	+45'	73°	16
17	5°33'	+40'	72°	5°51'	+41'	72°	6°10'	+42'	72°	6°28'	+43'	72°	6°46'	+43'	72°	7°04'	+44'	73°	7°22'	+45'	73°	17
18	6°13'	+40'	71°	6°33'	+41'	71°	6°52'	+42'	72°	7°11'	+42'	72°	7°29'	+43'	72°	7°48'	+44'	72°	8°07'	+45'	72°	18
19	6°54'	+40'	71°	7°14'	+41'	71°	7°33'	+42'	71°	7°53'	+42'	71°	8°13'	+43'	71°	8°32'	+44'	71°	8°51'	+44'	71°	19
20	7°34'	+40'	70°	7°55'	+41'	70°	8°15'	+42'	70°	8°35'	+42'	70°	8°56'	+43'	70°	9°16'	+44'	71°	9°36'	+44'	71°	20
21	8°14'	+40'	69°	8°35'	+41'	69°	8°57'	+42'	69°	9°18'	+42'	70°	9°39'	+43'	70°	9°59'	+44'	70°	10°20'	+44'	70°	21
22	8°54'	+40'	68°	9°16'	+41'	68°	9°38'	+41'	69°	10°00'	+42'	69°	10°22'	+43'	69°	10°43'	+44'	69°	11°04'	+44'	69°	22
23	9°34'	+40'	68°	9°57'	+41'	68°	10°20'	+41'	68°	10°42'	+42'	68°	11°04'	+43'	68°	11°27'	+43'	68°	11°49'	+44'	69°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

98° 262° LHA — Latitude SAME as DECLINATION — 98° 262° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

81° 279° LHA — Latitude CONTRARY to Declination — 81° 279° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	6°41'	-40'	96°	6°34'	-41'	96°	6°28'	-42'	96°	6°21'	-43'	96°	6°14'	-43'	96°	6°07'	-44'	97°	6°01'	-45'	97°	0
1	6°00'	-41'	97°	5°53'	-41'	97°	5°46'	-42'	97°	5°38'	-43'	97°	5°31'	-43'	97°	5°23'	-44'	97°	5°16'	-45'	97°	1
2	5°20'	-41'	98°	5°12'	-41'	98°	5°04'	-42'	98°	4°56'	-43'	98°	4°47'	-44'	98°	4°39'	-44'	98°	4°31'	-45'	98°	2
3	4°39'	-41'	98°	4°30'	-41'	98°	4°22'	-42'	98°	4°13'	-43'	99°	4°04'	-44'	99°	3°55'	-44'	99°	3°46'	-45'	99°	3
4	3°58'	-41'	99°	3°49'	-41'	99°	3°39'	-42'	99°	3°30'	-43'	99°	3°20'	-44'	99°	3°11'	-44'	99°	3°01'	-45'	99°	4
5	3°18'	-41'	100°	3°08'	-41'	100°	2°57'	-42'	100°	2°47'	-43'	100°	2°37'	-44'	100°	2°26'	-44'	100°	2°16'	-45'	100°	5
6	2°37'	-41'	100°	2°26'	-41'	101°	2°15'	-42'	101°	2°04'	-43'	101°	1°53'	-44'	101°	1°42'	-44'	101°	1°31'	-45'	101°	6
7	1°56'	-41'	101°	1°45'	-41'	101°	1°33'	-42'	101°	1°21'	-43'	101°	1°09'	-44'	101°	0°58'	-44'	101°	0°46'	-45'	101°	7
8	1°16'	-41'	102°	1°03'	-41'	102°	0°51'	-42'	102°	0°38'	-43'	102°	0°26'	-44'	102°	0°13'	-44'	102°	0°01'	-45'	102°	8
9	0°35'	-41'	103°	0°22'	-41'	103°	0°09'	-42'	103°	0°05'	+43'	77°	0°18'	+44'	77°	0°31'	+44'	77°	0°44'	+45'	77°	9
10	0°06'	+41'	77°	0°20'	+41'	77°	0°34'	+42'	77°	0°48'	+43'	77°	1°02'	+44'	77°	1°15'	+44'	77°	1°29'	+45'	77°	10
11	0°47'	+41'	76°	1°01'	+41'	76°	1°16'	+42'	76°	1°31'	+43'	76°	1°45'	+44'	76°	2°00'	+44'	76°	2°14'	+45'	76°	11
12	1°27'	+41'	75°	1°43'	+41'	75°	1°58'	+42'	75°	2°13'	+43'	75°	2°29'	+44'	75°	2°44'	+44'	75°	2°59'	+45'	75°	12
13	2°08'	+41'	74°	2°24'	+41'	74°	2°40'	+42'	74°	2°56'	+43'	75°	3°12'	+44'	75°	3°28'	+44'	75°	3°44'	+45'	75°	13
14	2°49'	+41'	74°	3°06'	+41'	74°	3°22'	+42'	74°	3°39'	+43'	74°	3°56'	+44'	74°	4°13'	+44'	74°	4°29'	+45'	74°	14
15	3°29'	+41'	73°	3°47'	+41'	73°	4°05'	+42'	73°	4°22'	+43'	73°	4°39'	+43'	73°	4°57'	+44'	73°	5°14'	+45'	73°	15
16	4°10'	+41'	72°	4°28'	+41'	72°	4°47'	+42'	72°	5°05'	+43'	72°	5°23'	+43'	72°	5°41'	+44'	73°	5°59'	+45'	73°	16
17	4°51'	+41'	71°	5°10'	+41'	72°	5°29'	+42'	72°	5°48'	+43'	72°	6°06'	+43'	72°	6°25'	+44'	72°	6°44'	+45'	72°	17
18	5°31'	+40'	71°	5°51'	+41'	71°	6°11'	+42'	71°	6°30'	+43'	71°	6°50'	+43'	71°	7°09'	+44'	71°	7°28'	+45'	71°	18
19	6°12'	+40'	70°	6°32'	+41'	70°	6°53'	+42'	70°	7°13'	+43'	70°	7°33'	+43'	70°	7°53'	+44'	71°	8°13'	+45'	71°	19
20	6°52'	+40'	69°	7°13'	+41'	69°	7°35'	+42'	69°	7°56'	+43'	70°	8°16'	+43'	70°	8°37'	+44'	70°	8°58'	+45'	70°	20
21	7°33'	+40'	68°	7°55'	+41'	69°	8°16'	+42'	69°	8°38'	+42'	69°	9°00'	+43'	69°	9°21'	+44'	69°	9°42'	+44'	69°	21
22	8°13'	+40'	68°	8°36'	+41'	68°	8°58'	+42'	68°	9°21'	+42'	68°	9°43'	+43'	68°	10°05'	+44'	68°	10°27'	+44'	69°	22
23	8°53'	+40'	67°	9°16'	+41'	67°	9°40'	+42'	67°	10°03'	+42'	67°	10°26'	+43'	68°	10°49'	+44'	68°	11°11'	+44'	68°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

99° 261° LHA — Latitude SAME as DECLINATION — 99° 261° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

80° 280° LHA — Latitude CONTRARY to Declination — 80° 280° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	7°25'	-41'	97°	7°18'	-41'	97°	7°11'	-42'	97°	7°03'	-43'	97°	6°56'	-44'	97°	6°48'	-44'	97°	6°40'	-45'	97°	0
1	6°44'	-41'	97°	6°36'	-41'	98°	6°28'	-42'	98°	6°20'	-43'	98°	6°12'	-44'	98°	6°04'	-44'	98°	5°55'	-45'	98°	1
2	6°04'	-41'	98°	5°55'	-41'	98°	5°46'	-42'	98°	5°38'	-43'	99°	5°29'	-44'	99°	5°20'	-44'	99°	5°10'	-45'	99°	2
3	5°23'	-41'	99°	5°14'	-41'	99°	5°04'	-42'	99°	4°55'	-43'	99°	4°45'	-44'	99°	4°35'	-44'	99°	4°25'	-45'	99°	3
4	4°42'	-41'	100°	4°32'	-42'	100°	4°22'	-42'	100°	4°12'	-43'	100°	4°01'	-44'	100°	3°51'	-44'	100°	3°40'	-45'	100°	4
5	4°02'	-41'	100°	3°51'	-42'	100°	3°40'	-42'	101°	3°29'	-43'	101°	3°18'	-44'	101°	3°07'	-44'	101°	2°55'	-45'	101°	5
6	3°21'	-41'	101°	3°09'	-42'	101°	2°58'	-42'	101°	2°46'	-43'	101°	2°34'	-44'	101°	2°22'	-44'	101°	2°10'	-45'	101°	6
7	2°40'	-41'	102°	2°28'	-42'	102°	2°15'	-42'	102°	2°03'	-43'	102°	1°50'	-44'	102°	1°38'	-44'	102°	1°25'	-45'	102°	7
8	1°59'	-41'	103°	1°46'	-42'	103°	1°33'	-42'	103°	1°20'	-43'	103°	1°06'	-44'	103°	0°53'	-44'	103°	0°40'	-45'	103°	8
9	1°18'	-41'	103°	1°04'	-42'	103°	0°51'	-42'	103°	0°37'	-43'	103°	0°23'	-44'	103°	0°09'	-44'	103°	0°05'	+45'	77°	9
10	0°37'	-41'	104°	0°23'	-42'	104°	0°08'	-42'	104°	0°06'	+43'	76°	0°21'	+44'	76°	0°36'	+44'	76°	0°50'	+45'	76°	10
11	0°03'	+41'	75°	0°19'	+42'	75°	0°34'	+42'	75°	0°49'	+43'	75°	1°05'	+44'	75°	1°20'	+44'	75°	1°35'	+45'	75°	11
12	0°44'	+41'	74°	1°00'	+42'	74°	1°16'	+42'	74°	1°33'	+43'	75°	1°49'	+44'	75°	2°05'	+44'	75°	2°20'	+45'	75°	12
13	1°25'	+41'	74°	1°42'	+42'	74°	1°59'	+42'	74°	2°16'	+43'	74°	2°32'	+44'	74°	2°49'	+44'	74°	3°06'	+45'	74°	13
14	2°06'	+41'	73°	2°24'	+42'	73°	2°41'	+42'	73°	2°59'	+43'	73°	3°16'	+44'	73°	3°33'	+44'	73°	3°51'	+45'	73°	14
15	2°47'	+41'	72°	3°05'	+42'	72°	3°23'	+42'	72°	3°42'	+43'	72°	4°00'	+44'	72°	4°18'	+44'	73°	4°36'	+45'	73°	15
16	3°28'	+41'	72°	3°47'	+42'	72°	4°06'	+42'	72°	4°25'	+43'	72°	4°43'	+44'	72°	5°02'	+44'	72°	5°21'	+45'	72°	16
17	4°09'	+41'	71°	4°28'	+41'	71°	4°48'	+42'	71°	5°07'	+43'	71°	5°27'	+44'	71°	5°46'	+44'	71°	6°06'	+45'	71°	17
18	4°49'	+41'	70°	5°10'	+41'	70°	5°30'	+42'	70°	5°50'	+43'	70°	6°11'	+44'	70°	6°31'	+44'	71°	6°51'	+45'	71°	18
19	5°30'	+41'	69°	5°51'	+41'	69°	6°12'	+42'	69°	6°33'	+43'	70°	6°54'	+43'	70°	7°15'	+44'	70°	7°35'	+45'	70°	19
20	6°11'	+41'	69°	6°32'	+41'	69°	6°54'	+42'	69°	7°16'	+43'	69°	7°37'	+43'	69°	7°59'	+44'	69°	8°20'	+45'	69°	20
21	6°51'	+41'	68°	7°14'	+41'	68°	7°36'	+42'	68°	7°59'	+43'	68°	8°21'	+43'	68°	8°43'	+44'	68°	9°05'	+45'	69°	21
22	7°32'	+40'	67°	7°55'	+41'	67°	8°18'	+42'	67°	8°41'	+43'	67°	9°04'	+43'	68°	9°27'	+44'	68°	9°50'	+45'	68°	22
23	8°12'	+40'	66°	8°36'	+41'	66°	9°00'	+42'	67°	9°24'	+42'	67°	9°47'	+43'	67°	10°11'	+44'	67°	10°34'	+44'	67°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

100° 260° LHA — Latitude SAME as DECLINATION — 100° 260° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

79° 281° LHA — Latitude CONTRARY to Declination — 79° 281° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	8°09'	-41'	97°	8°01'	-41'	98°	7°53'	-42'	98°	7°45'	-43'	98°	7°37'	-44'	98°	7°29'	-44'	98°	7°20'	-45'	98°	0
1	7°29'	-41'	98°	7°20'	-41'	98°	7°11'	-42'	98°	7°02'	-43'	99°	6°53'	-44'	99°	6°44'	-44'	99°	6°35'	-45'	99°	1
2	6°48'	-41'	99°	6°39'	-41'	99°	6°29'	-42'	99°	6°19'	-43'	99°	6°10'	-44'	99°	6°00'	-44'	99°	5°50'	-45'	100°	2
3	6°07'	-41'	100°	5°57'	-42'	100°	5°47'	-42'	100°	5°37'	-43'	100°	5°26'	-44'	100°	5°16'	-44'	100°	5°05'	-45'	100°	3
4	5°26'	-41'	100°	5°15'	-42'	100°	5°05'	-42'	101°	4°53'	-43'	101°	4°42'	-44'	101°	4°31'	-44'	101°	4°20'	-45'	101°	4
5	4°45'	-41'	101°	4°34'	-42'	101°	4°22'	-42'	101°	4°10'	-43'	101°	3°59'	-44'	101°	3°47'	-45'	101°	3°35'	-45'	102°	5
6	4°05'	-41'	102°	3°52'	-42'	102°	3°40'	-42'	102°	3°27'	-43'	102°	3°15'	-44'	102°	3°02'	-45'	102°	2°50'	-45'	102°	6
7	3°24'	-41'	103°	3°11'	-42'	103°	2°57'	-42'	103°	2°44'	-43'	103°	2°31'	-44'	103°	2°18'	-45'	103°	2°04'	-45'	103°	7
8	2°43'	-41'	103°	2°29'	-42'	103°	2°15'	-42'	103°	2°01'	-43'	103°	1°47'	-44'	103°	1°33'	-45'	103°	1°19'	-45'	104°	8
9	2°02'	-41'	104°	1°47'	-42'	104°	1°32'	-42'	104°	1°18'	-43'	104°	1°03'	-44'	104°	0°49'	-45'	104°	0°34'	-45'	104°	9
10	1°21'	-41'	105°	1°05'	-42'	105°	0°50'	-42'	105°	0°35'	-43'	105°	0°19'	-44'	105°	0°04'	-45'	105°	0°11'	+45'	75°	10
11	0°40'	-41'	105°	0°24'	-42'	106°	0°08'	-42'	106°	0°09'	+43'	74°	0°25'	+44'	74°	0°41'	+45'	75°	0°57'	+45'	75°	11
12	0°01'	+41'	74°	0°18'	+42'	74°	0°35'	+42'	74°	0°52'	+43'	74°	1°08'	+44'	74°	1°25'	+45'	74°	1°42'	+45'	74°	12
13	0°42'	+41'	73°	1°00'	+42'	73°	1°17'	+42'	73°	1°35'	+43'	73°	1°52'	+44'	73°	2°10'	+45'	73°	2°27'	+45'	73°	13
14	1°24'	+41'	72°	1°42'	+42'	72°	2°00'	+42'	72°	2°18'	+43'	72°	2°36'	+44'	72°	2°54'	+45'	72°	3°12'	+45'	73°	14
15	2°05'	+41'	72°	2°23'	+42'	72°	2°42'	+42'	72°	3°01'	+43'	72°	3°20'	+44'	72°	3°39'	+44'	72°	3°57'	+45'	72°	15
16	2°46'	+41'	71°	3°05'	+42'	71°	3°25'	+42'	71°	3°44'	+43'	71°	4°04'	+44'	71°	4°23'	+44'	71°	4°43'	+45'	71°	16
17	3°26'	+41'	70°	3°47'	+42'	70°	4°07'	+42'	70°	4°27'	+43'	70°	4°48'	+44'	70°	5°08'	+44'	70°	5°28'	+45'	71°	17
18	4°07'	+41'	69°	4°29'	+42'	69°	4°50'	+42'	70°	5°10'	+43'	70°	5°31'	+44'	70°	5°52'	+44'	70°	6°13'	+45'	70°	18
19	4°48'	+41'	69°	5°10'	+42'	69°	5°32'	+42'	69°	5°53'	+43'	69°	6°15'	+44'	69°	6°36'	+44'	69°	6°58'	+45'	69°	19
20	5°29'	+41'	68°	5°52'	+42'	68°	6°14'	+42'	68°	6°36'	+43'	68°	6°59'	+44'	68°	7°21'	+44'	68°	7°43'	+45'	69°	20
21	6°10'	+41'	67°	6°33'	+41'	67°	6°56'	+42'	67°	7°19'	+43'	68°	7°42'	+44'	68°	8°05'	+44'	68°	8°28'	+45'	68°	21
22	6°51'	+41'	66°	7°15'	+41'	67°	7°38'	+42'	67°	8°02'	+43'	67°	8°26'	+43'	67°	8°49'	+44'	67°	9°12'	+45'	67°	22
23	7°31'	+41'	66°	7°56'	+41'	66°	8°21'	+42'	66°	8°45'	+43'	66°	9°09'	+43'	66°	9°33'	+44'	66°	9°57'	+45'	67°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

101° 259° LHA — Latitude SAME as DECLINATION — 101° 259° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

78° 282° LHA — Latitude CONTRARY to Declination — 78° 282° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	8°53'	-41'	98°	8°45'	-41'	98°	8°36'	-42'	98°	8°27'	-43'	99°	8°18'	-44'	99°	8°09'	-44'	99°	8°00'	-45'	99°	0
1	8°13'	-41'	99°	8°03'	-42'	99°	7°54'	-42'	99°	7°44'	-43'	99°	7°35'	-44'	99°	7°25'	-44'	100°	7°15'	-45'	100°	1
2	7°32'	-41'	100°	7°22'	-42'	100°	7°12'	-42'	100°	7°01'	-43'	100°	6°51'	-44'	100°	6°40'	-44'	100°	6°30'	-45'	100°	2
3	6°51'	-41'	100°	6°40'	-42'	100°	6°29'	-42'	101°	6°18'	-43'	101°	6°07'	-44'	101°	5°56'	-45'	101°	5°44'	-45'	101°	3
4	6°10'	-41'	101°	5°59'	-42'	101°	5°47'	-42'	101°	5°35'	-43'	101°	5°23'	-44'	101°	5°11'	-45'	102°	4°59'	-45'	102°	4
5	5°29'	-41'	102°	5°17'	-42'	102°	5°04'	-42'	102°	4°52'	-43'	102°	4°39'	-44'	102°	4°27'	-45'	102°	4°14'	-45'	102°	5
6	4°48'	-41'	103°	4°35'	-42'	103°	4°22'	-43'	103°	4°09'	-43'	103°	3°55'	-44'	103°	3°42'	-45'	103°	3°29'	-45'	103°	6
7	4°07'	-41'	103°	3°53'	-42'	103°	3°39'	-43'	103°	3°26'	-43'	103°	3°12'	-44'	104°	2°57'	-45'	104°	2°43'	-45'	104°	7
8	3°26'	-41'	104°	3°11'	-42'	104°	2°57'	-43'	104°	2°42'	-43'	104°	2°28'	-44'	104°	2°13'	-45'	104°	1°58'	-45'	104°	8
9	2°45'	-41'	105°	2°30'	-42'	105°	2°14'	-43'	105°	1°59'	-43'	105°	1°44'	-44'	105°	1°28'	-45'	105°	1°13'	-45'	105°	9
10	2°04'	-41'	105°	1°48'	-42'	105°	1°32'	-43'	106°	1°16'	-43'	106°	1°00'	-44'	106°	0°43'	-45'	106°	0°27'	-45'	106°	10
11	1°22'	-41'	106°	1°06'	-42'	106°	0°49'	-43'	106°	0°32'	-43'	106°	0°16'	-44'	106°	0°01'	+45'	74°	0°18'	+45'	74°	11
12	0°41'	-41'	107°	0°24'	-42'	107°	0°06'	-43'	107°	0°11'	+43'	73°	0°28'	+44'	73°	0°46'	+45'	73°	1°03'	+45'	73°	12
13	0°00'	-41'	108°	0°18'	+42'	72°	0°36'	+43'	72°	0°54'	+43'	72°	1°13'	+44'	72°	1°31'	+45'	72°	1°49'	+45'	72°	13
14	0°41'	+41'	72°	1°00'	+42'	72°	1°19'	+43'	72°	1°38'	+43'	72°	1°57'	+44'	72°	2°15'	+45'	72°	2°34'	+45'	72°	14
15	1°22'	+41'	71°	1°42'	+42'	71°	2°01'	+43'	71°	2°21'	+43'	71°	2°41'	+44'	71°	3°00'	+45'	71°	3°19'	+45'	71°	15
16	2°03'	+41'	70°	2°24'	+42'	70°	2°44'	+43'	70°	3°04'	+43'	70°	3°24'	+44'	70°	3°45'	+45'	70°	4°05'	+45'	71°	16
17	2°45'	+41'	69°	3°06'	+42'	70°	3°27'	+43'	70°	3°48'	+43'	70°	4°08'	+44'	70°	4°29'	+45'	70°	4°50'	+45'	70°	17
18	3°26'	+41'	69°	3°48'	+42'	69°	4°09'	+43'	69°	4°31'	+43'	69°	4°52'	+44'	69°	5°14'	+45'	69°	5°35'	+45'	69°	18
19	4°07'	+41'	68°	4°29'	+42'	68°	4°52'	+42'	68°	5°14'	+43'	68°	5°36'	+44'	68°	5°58'	+44'	68°	6°20'	+45'	69°	19
20	4°48'	+41'	67°	5°11'	+42'	67°	5°34'	+42'	67°	5°57'	+43'	68°	6°20'	+44'	68°	6°43'	+44'	68°	7°05'	+45'	68°	20
21	5°29'	+41'	67°	5°53'	+42'	67°	6°17'	+42'	67°	6°40'	+43'	67°	7°04'	+44'	67°	7°27'	+44'	67°	7°51'	+45'	67°	21
22	6°10'	+41'	66°	6°34'	+42'	66°	6°59'	+42'	66°	7°23'	+43'	66°	7°47'	+44'	66°	8°12'	+44'	66°	8°36'	+45'	67°	22
23	6°51'	+41'	65°	7°16'	+42'	65°	7°41'	+42'	65°	8°06'	+43'	65°	8°31'	+44'	66°	8°56'	+44'	66°	9°20'	+45'	66°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

102° 258° LHA — Latitude SAME as DECLINATION — 102° 258° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

77° 283° LHA — Latitude CONTRARY to Declination — 77° 283° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	9°37'	-41'	99°	9°28'	-42'	99°	9°19'	-42'	99°	9°09'	-43'	99°	8°59'	-44'	99°	8°49'	-44'	100°	8°39'	-45'	100°	0
1	8°57'	-41'	100°	8°47'	-42'	100°	8°36'	-42'	100°	8°26'	-43'	100°	8°16'	-44'	100°	8°05'	-45'	100°	7°54'	-45'	100°	1
2	8°16'	-41'	100°	8°05'	-42'	100°	7°54'	-42'	101°	7°43'	-43'	101°	7°32'	-44'	101°	7°21'	-45'	101°	7°09'	-45'	101°	2
3	7°35'	-41'	101°	7°23'	-42'	101°	7°12'	-42'	101°	7°00'	-43'	101°	6°48'	-44'	101°	6°36'	-45'	102°	6°24'	-45'	102°	3
4	6°54'	-41'	102°	6°42'	-42'	102°	6°29'	-43'	102°	6°17'	-43'	102°	6°04'	-44'	102°	5°51'	-45'	102°	5°39'	-45'	102°	4
5	6°13'	-41'	102°	6°00'	-42'	103°	5°47'	-43'	103°	5°33'	-43'	103°	5°20'	-44'	103°	5°07'	-45'	103°	4°53'	-45'	103°	5
6	5°32'	-41'	103°	5°18'	-42'	103°	5°04'	-43'	103°	4°50'	-43'	103°	4°36'	-44'	104°	4°22'	-45'	104°	4°08'	-45'	104°	6
7	4°50'	-41'	104°	4°36'	-42'	104°	4°21'	-43'	104°	4°07'	-43'	104°	3°52'	-44'	104°	3°37'	-45'	104°	3°22'	-45'	104°	7
8	4°09'	-41'	105°	3°54'	-42'	105°	3°39'	-43'	105°	3°23'	-43'	105°	3°08'	-44'	105°	2°52'	-45'	105°	2°37'	-45'	105°	8
9	3°28'	-41'	105°	3°12'	-42'	105°	2°56'	-43'	105°	2°40'	-43'	106°	2°24'	-44'	106°	2°08'	-45'	106°	1°51'	-45'	106°	9
10	2°47'	-41'	106°	2°30'	-42'	106°	2°13'	-43'	106°	1°56'	-43'	106°	1°40'	-44'	106°	1°23'	-45'	106°	1°06'	-45'	106°	10
11	2°05'	-41'	107°	1°48'	-42'	107°	1°30'	-43'	107°	1°13'	-43'	107°	0°55'	-44'	107°	0°38'	-45'	107°	0°20'	-45'	107°	11
12	1°24'	-41'	108°	1°06'	-42'	108°	0°48'	-43'	108°	0°29'	-43'	108°	0°11'	-44'	108°	0°07'	+45'	72°	0°25'	+45'	72°	12
13	0°43'	-41'	108°	0°24'	-42'	108°	0°05'	-43'	108°	0°14'	+43'	72°	0°33'	+44'	72°	0°52'	+45'	72°	1°11'	+45'	72°	13
14	0°01'	-41'	109°	0°18'	+42'	71°	0°38'	+43'	71°	0°57'	+43'	71°	1°17'	+44'	71°	1°37'	+45'	71°	1°56'	+45'	71°	14
15	0°40'	+41'	70°	1°01'	+42'	70°	1°21'	+43'	70°	1°41'	+43'	70°	2°01'	+44'	70°	2°21'	+45'	70°	2°41'	+45'	70°	15
16	1°22'	+41'	70°	1°43'	+42'	70°	2°04'	+43'	70°	2°24'	+43'	70°	2°45'	+44'	70°	3°06'	+45'	70°	3°27'	+45'	70°	16
17	2°03'	+41'	69°	2°25'	+42'	69°	2°46'	+43'	69°	3°08'	+43'	69°	3°29'	+44'	69°	3°51'	+45'	69°	4°12'	+45'	69°	17
18	2°44'	+41'	68°	3°07'	+42'	68°	3°29'	+43'	68°	3°51'	+43'	68°	4°13'	+44'	68°	4°36'	+45'	68°	4°58'	+45'	68°	18
19	3°26'	+41'	67°	3°49'	+42'	67°	4°12'	+43'	67°	4°35'	+43'	68°	4°58'	+44'	68°	5°20'	+45'	68°	5°43'	+45'	68°	19
20	4°07'	+41'	67°	4°31'	+42'	67°	4°54'	+43'	67°	5°18'	+43'	67°	5°42'	+44'	67°	6°05'	+45'	67°	6°28'	+45'	67°	20
21	4°48'	+41'	66°	5°13'	+42'	66°	5°37'	+43'	66°	6°01'	+43'	66°	6°26'	+44'	66°	6°50'	+45'	66°	7°14'	+45'	66°	21
22	5°29'	+41'	65°	5°55'	+42'	65°	6°20'	+43'	65°	6°45'	+43'	65°	7°09'	+44'	66°	7°34'	+44'	66°	7°59'	+45'	66°	22
23	6°11'	+41'	64°	6°36'	+42'	65°	7°02'	+42'	65°	7°28'	+43'	65°	7°53'	+44'	65°	8°19'	+44'	65°	8°44'	+45'	65°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

103° 257° LHA — Latitude SAME as DECLINATION — 103° 257° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

76° 284° LHA — Latitude CONTRARY to Declination — 76° 284° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	10°21'	-41'	99°	10°11'	-42'	100°	10°01'	-42'	100°	9°51'	-43'	100°	9°40'	-44'	100°	9°30'	-45'	100°	9°19'	-45'	100°	0
1	9°41'	-41'	100°	9°30'	-42'	100°	9°19'	-42'	101°	9°08'	-43'	101°	8°57'	-44'	101°	8°45'	-45'	101°	8°34'	-45'	101°	1
2	9°00'	-41'	101°	8°48'	-42'	101°	8°36'	-43'	101°	8°25'	-43'	101°	8°13'	-44'	102°	8°01'	-45'	102°	7°48'	-45'	102°	2
3	8°19'	-41'	102°	8°06'	-42'	102°	7°54'	-43'	102°	7°41'	-43'	102°	7°29'	-44'	102°	7°16'	-45'	102°	7°03'	-45'	102°	3
4	7°37'	-41'	102°	7°24'	-42'	103°	7°11'	-43'	103°	6°58'	-43'	103°	6°45'	-44'	103°	6°31'	-45'	103°	6°18'	-45'	103°	4
5	6°56'	-41'	103°	6°43'	-42'	103°	6°29'	-43'	103°	6°15'	-43'	103°	6°01'	-44'	104°	5°46'	-45'	104°	5°32'	-45'	104°	5
6	6°15'	-41'	104°	6°00'	-42'	104°	5°46'	-43'	104°	5°31'	-43'	104°	5°17'	-44'	104°	5°02'	-45'	104°	4°47'	-46'	104°	6
7	5°34'	-41'	105°	5°18'	-42'	105°	5°03'	-43'	105°	4°48'	-44'	105°	4°32'	-44'	105°	4°17'	-45'	105°	4°01'	-46'	105°	7
8	4°52'	-41'	105°	4°36'	-42'	105°	4°20'	-43'	106°	4°04'	-44'	106°	3°48'	-44'	106°	3°32'	-45'	106°	3°16'	-46'	106°	8
9	4°11'	-41'	106°	3°54'	-42'	106°	3°37'	-43'	106°	3°21'	-44'	106°	3°04'	-44'	106°	2°47'	-45'	106°	2°30'	-46'	106°	9
10	3°29'	-42'	107°	3°12'	-42'	107°	2°55'	-43'	107°	2°37'	-44'	107°	2°20'	-44'	107°	2°02'	-45'	107°	1°44'	-46'	107°	10
11	2°48'	-42'	108°	2°30'	-42'	108°	2°12'	-43'	108°	1°53'	-44'	108°	1°35'	-44'	108°	1°17'	-45'	108°	0°59'	-46'	108°	11
12	2°06'	-42'	108°	1°48'	-42'	108°	1°29'	-43'	108°	1°10'	-44'	108°	0°51'	-44'	108°	0°32'	-45'	108°	0°13'	-46'	108°	12
13	1°25'	-42'	109°	1°05'	-42'	109°	0°46'	-43'	109°	0°26'	-44'	109°	0°07'	-44'	109°	0°13'	+45'	71°	0°32'	+46'	71°	13
14	0°43'	-42'	110°	0°23'	-42'	110°	0°03'	-43'	110°	0°17'	+44'	70°	0°38'	+44'	70°	0°58'	+45'	70°	1°18'	+46'	70°	14
15	0°02'	-42'	110°	0°19'	+42'	70°	0°40'	+43'	70°	1°01'	+44'	70°	1°22'	+44'	70°	1°43'	+45'	70°	2°04'	+46'	70°	15
16	0°40'	+42'	69°	1°02'	+42'	69°	1°23'	+43'	69°	1°45'	+44'	69°	2°06'	+44'	69°	2°28'	+45'	69°	2°49'	+46'	69°	16
17	1°22'	+42'	68°	1°44'	+42'	68°	2°06'	+43'	68°	2°28'	+44'	68°	2°51'	+44'	68°	3°13'	+45'	68°	3°35'	+46'	68°	17
18	2°03'	+42'	67°	2°26'	+42'	67°	2°49'	+43'	68°	3°12'	+44'	68°	3°35'	+44'	68°	3°58'	+45'	68°	4°20'	+46'	68°	18
19	2°45'	+42'	67°	3°08'	+42'	67°	3°32'	+43'	67°	3°56'	+44'	67°	4°19'	+44'	67°	4°43'	+45'	67°	5°06'	+45'	67°	19
20	3°26'	+41'	66°	3°50'	+42'	66°	4°15'	+43'	66°	4°39'	+44'	66°	5°03'	+44'	66°	5°27'	+45'	66°	5°51'	+45'	66°	20
21	4°08'	+41'	65°	4°33'	+42'	65°	4°58'	+43'	65°	5°23'	+43'	65°	5°47'	+44'	66°	6°12'	+45'	66°	6°37'	+45'	66°	21
22	4°49'	+41'	65°	5°15'	+42'	65°	5°40'	+43'	65°	6°06'	+43'	65°	6°32'	+44'	65°	6°57'	+45'	65°	7°22'	+45'	65°	22
23	5°30'	+41'	64°	5°57'	+42'	64°	6°23'	+43'	64°	6°49'	+43'	64°	7°16'	+44'	64°	7°42'	+45'	64°	8°08'	+45'	64°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

104° 256° LHA — Latitude SAME as DECLINATION — 104° 256° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

75° 285° LHA — Latitude CONTRARY to Declination — 75° 285° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	11°05'	-41'	100°	10°55'	-42'	100°	10°44'	-42'	101°	10°33'	-43'	101°	10°21'	-44'	101°	10°10'	-45'	101°	9°58'	-45'	101°	0
1	10°24'	-41'	101°	10°13'	-42'	101°	10°01'	-43'	101°	9°50'	-43'	101°	9°38'	-44'	102°	9°25'	-45'	102°	9°13'	-45'	102°	1
2	9°43'	-41'	102°	9°31'	-42'	102°	9°19'	-43'	102°	9°06'	-43'	102°	8°54'	-44'	102°	8°41'	-45'	102°	8°28'	-45'	103°	2
3	9°02'	-41'	102°	8°49'	-42'	103°	8°36'	-43'	103°	8°23'	-43'	103°	8°09'	-44'	103°	7°56'	-45'	103°	7°42'	-46'	103°	3
4	8°21'	-41'	103°	8°07'	-42'	103°	7°53'	-43'	103°	7°39'	-44'	104°	7°25'	-44'	104°	7°11'	-45'	104°	6°57'	-46'	104°	4
5	7°40'	-41'	104°	7°25'	-42'	104°	7°11'	-43'	104°	6°56'	-44'	104°	6°41'	-44'	104°	6°26'	-45'	104°	6°11'	-46'	105°	5
6	6°58'	-41'	105°	6°43'	-42'	105°	6°28'	-43'	105°	6°12'	-44'	105°	5°57'	-44'	105°	5°41'	-45'	105°	5°26'	-46'	105°	6
7	6°17'	-42'	105°	6°01'	-42'	105°	5°45'	-43'	106°	5°29'	-44'	106°	5°13'	-44'	106°	4°56'	-45'	106°	4°40'	-46'	106°	7
8	5°35'	-42'	106°	5°19'	-42'	106°	5°02'	-43'	106°	4°45'	-44'	106°	4°28'	-44'	106°	4°11'	-45'	106°	3°54'	-46'	107°	8
9	4°54'	-42'	107°	4°36'	-42'	107°	4°19'	-43'	107°	4°01'	-44'	107°	3°44'	-44'	107°	3°26'	-45'	107°	3°08'	-46'	107°	9
10	4°12'	-42'	107°	3°54'	-42'	108°	3°36'	-43'	108°	3°18'	-44'	108°	2°59'	-44'	108°	2°41'	-45'	108°	2°23'	-46'	108°	10
11	3°30'	-42'	108°	3°12'	-42'	108°	2°53'	-43'	108°	2°34'	-44'	108°	2°15'	-44'	108°	1°56'	-45'	108°	1°37'	-46'	108°	11
12	2°49'	-42'	109°	2°29'	-42'	109°	2°10'	-43'	109°	1°50'	-44'	109°	1°30'	-44'	109°	1°11'	-45'	109°	0°51'	-46'	109°	12
13	2°07'	-42'	110°	1°47'	-42'	110°	1°26'	-43'	110°	1°06'	-44'	110°	0°46'	-44'	110°	0°26'	-45'	110°	0°05'	-46'	110°	13
14	1°25'	-42'	110°	1°04'	-42'	110°	0°43'	-43'	110°	0°22'	-44'	110°	0°01'	-44'	110°	0°19'	+45'	70°	0°40'	+46'	70°	14
15	0°43'	-42'	111°	0°22'	-42'	111°	0°00'	-43'	111°	0°21'	+44'	69°	0°43'	+44'	69°	1°05'	+45'	69°	1°26'	+46'	69°	15
16	0°02'	-42'	112°	0°21'	+42'	68°	0°43'	+43'	68°	1°05'	+44'	68°	1°28'	+44'	68°	1°50'	+45'	68°	2°12'	+46'	68°	16
17	0°40'	+42'	67°	1°03'	+42'	67°	1°26'	+43'	68°	1°49'	+44'	68°	2°12'	+44'	68°	2°35'	+45'	68°	2°58'	+46'	68°	17
18	1°22'	+42'	67°	1°46'	+42'	67°	2°09'	+43'	67°	2°33'	+44'	67°	2°56'	+44'	67°	3°20'	+45'	67°	3°43'	+46'	67°	18
19	2°04'	+42'	66°	2°28'	+42'	66°	2°52'	+43'	66°	3°17'	+44'	66°	3°41'	+44'	66°	4°05'	+45'	66°	4°29'	+46'	66°	19
20	2°45'	+42'	65°	3°10'	+42'	65°	3°35'	+43'	65°	4°00'	+44'	65°	4°25'	+44'	66°	4°50'	+45'	66°	5°15'	+46'	66°	20
21	3°27'	+42'	65°	3°53'	+42'	65°	4°19'	+43'	65°	4°44'	+44'	65°	5°10'	+44'	65°	5°35'	+45'	65°	6°00'	+46'	65°	21
22	4°09'	+42'	64°	4°35'	+42'	64°	5°02'	+43'	64°	5°28'	+44'	64°	5°54'	+44'	64°	6°20'	+45'	64°	6°46'	+46'	64°	22
23	4°50'	+42'	63°	5°18'	+42'	63°	5°45'	+43'	63°	6°11'	+44'	63°	6°38'	+44'	64°	7°05'	+45'	64°	7°31'	+45'	64°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

105° 255° LHA — Latitude SAME as DECLINATION — 105° 255° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

74° 286° LHA — Latitude CONTRARY to Declination — 74° 286° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	11°49'	-41'	101°	11°38'	-42'	101°	11°26'	-43'	101°	11°14'	-43'	101°	11°02'	-44'	102°	10°50'	-45'	102°	10°38'	-45'	102°	0
1	11°08'	-41'	102°	10°56'	-42'	102°	10°44'	-43'	102°	10°31'	-43'	102°	10°18'	-44'	102°	10°05'	-45'	103°	9°52'	-45'	103°	1
2	10°27'	-41'	102°	10°14'	-42'	103°	10°01'	-43'	103°	9°48'	-43'	103°	9°34'	-44'	103°	9°21'	-45'	103°	9°07'	-46'	103°	2
3	9°46'	-41'	103°	9°32'	-42'	103°	9°18'	-43'	103°	9°04'	-44'	104°	8°50'	-44'	104°	8°36'	-45'	104°	8°21'	-46'	104°	3
4	9°04'	-41'	104°	8°50'	-42'	104°	8°35'	-43'	104°	8°21'	-44'	104°	8°06'	-44'	104°	7°51'	-45'	105°	7°36'	-46'	105°	4
5	8°23'	-42'	105°	8°08'	-42'	105°	7°52'	-43'	105°	7°37'	-44'	105°	7°21'	-44'	105°	7°06'	-45'	105°	6°50'	-46'	105°	5
6	7°41'	-42'	105°	7°25'	-42'	105°	7°09'	-43'	106°	6°53'	-44'	106°	6°37'	-44'	106°	6°21'	-45'	106°	6°04'	-46'	106°	6
7	7°00'	-42'	106°	6°43'	-42'	106°	6°26'	-43'	106°	6°10'	-44'	106°	5°53'	-44'	106°	5°36'	-45'	107°	5°18'	-46'	107°	7
8	6°18'	-42'	107°	6°01'	-42'	107°	5°43'	-43'	107°	5°26'	-44'	107°	5°08'	-45'	107°	4°50'	-45'	107°	4°33'	-46'	107°	8
9	5°36'	-42'	107°	5°18'	-43'	108°	5°00'	-43'	108°	4°42'	-44'	108°	4°24'	-45'	108°	4°05'	-45'	108°	3°47'	-46'	108°	9
10	4°54'	-42'	108°	4°36'	-43'	108°	4°17'	-43'	108°	3°58'	-44'	108°	3°39'	-45'	108°	3°20'	-45'	109°	3°01'	-46'	109°	10
11	4°13'	-42'	109°	3°53'	-43'	109°	3°34'	-43'	109°	3°14'	-44'	109°	2°54'	-45'	109°	2°35'	-45'	109°	2°15'	-46'	109°	11
12	3°31'	-42'	110°	3°11'	-43'	110°	2°50'	-43'	110°	2°30'	-44'	110°	2°10'	-45'	110°	1°49'	-45'	110°	1°29'	-46'	110°	12
13	2°49'	-42'	110°	2°28'	-43'	110°	2°07'	-43'	110°	1°46'	-44'	110°	1°25'	-45'	110°	1°04'	-45'	110°	0°43'	-46'	110°	13
14	2°07'	-42'	111°	1°45'	-43'	111°	1°24'	-43'	111°	1°02'	-44'	111°	0°40'	-45'	111°	0°19'	-45'	111°	0°03'	+46'	69°	14
15	1°25'	-42'	112°	1°03'	-43'	112°	0°40'	-43'	112°	0°18'	-44'	112°	0°04'	+45'	68°	0°27'	+45'	68°	0°49'	+46'	68°	15
16	0°43'	-42'	112°	0°20'	-43'	112°	0°03'	+43'	68°	0°26'	+44'	68°	0°49'	+45'	68°	1°12'	+45'	68°	1°35'	+46'	68°	16
17	0°01'	-42'	113°	0°23'	+43'	67°	0°46'	+43'	67°	1°10'	+44'	67°	1°34'	+45'	67°	1°57'	+45'	67°	2°21'	+46'	67°	17
18	0°41'	+42'	66°	1°05'	+43'	66°	1°30'	+43'	66°	1°54'	+44'	66°	2°18'	+45'	66°	2°42'	+45'	66°	3°07'	+46'	66°	18
19	1°23'	+42'	65°	1°48'	+43'	65°	2°13'	+43'	65°	2°38'	+44'	65°	3°03'	+45'	66°	3°28'	+45'	66°	3°52'	+46'	66°	19
20	2°05'	+42'	65°	2°31'	+43'	65°	2°56'	+43'	65°	3°22'	+44'	65°	3°47'	+45'	65°	4°13'	+45'	65°	4°38'	+46'	65°	20
21	2°47'	+42'	64°	3°13'	+43'	64°	3°40'	+43'	64°	4°06'	+44'	64°	4°32'	+45'	64°	4°58'	+45'	64°	5°24'	+46'	64°	21
22	3°29'	+42'	63°	3°56'	+43'	63°	4°23'	+43'	63°	4°50'	+44'	63°	5°17'	+44'	64°	5°43'	+45'	64°	6°10'	+46'	64°	22
23	4°11'	+42'	63°	4°38'	+43'	63°	5°06'	+43'	63°	5°34'	+44'	63°	6°01'	+44'	63°	6°28'	+45'	63°	6°56'	+46'	63°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

106° 254° LHA — Latitude SAME as DECLINATION — 106° 254° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

73° 287° LHA — Latitude CONTRARY to Declination — 73° 287° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	12°33'	-41'	102°	12°21'	-42'	102°	12°08'	-43'	102°	11°56'	-43'	102°	11°43'	-44'	102°	11°30'	-45'	103°	11°17'	-46'	103°	0
1	11°52'	-41'	102°	11°39'	-42'	103°	11°26'	-43'	103°	11°12'	-44'	103°	10°59'	-44'	103°	10°45'	-45'	103°	10°31'	-46'	103°	1
2	11°10'	-41'	103°	10°57'	-42'	103°	10°43'	-43'	103°	10°29'	-44'	104°	10°15'	-44'	104°	10°00'	-45'	104°	9°46'	-46'	104°	2
3	10°29'	-42'	104°	10°15'	-42'	104°	10°00'	-43'	104°	9°45'	-44'	104°	9°30'	-44'	104°	9°15'	-45'	105°	9°00'	-46'	105°	3
4	9°48'	-42'	105°	9°32'	-42'	105°	9°17'	-43'	105°	9°02'	-44'	105°	8°46'	-44'	105°	8°30'	-45'	105°	8°14'	-46'	105°	4
5	9°06'	-42'	105°	8°50'	-42'	105°	8°34'	-43'	106°	8°18'	-44'	106°	8°02'	-45'	106°	7°45'	-45'	106°	7°29'	-46'	106°	5
6	8°24'	-42'	106°	8°08'	-42'	106°	7°51'	-43'	106°	7°34'	-44'	106°	7°17'	-45'	107°	7°00'	-45'	107°	6°43'	-46'	107°	6
7	7°42'	-42'	107°	7°25'	-43'	107°	7°08'	-43'	107°	6°50'	-44'	107°	6°32'	-45'	107°	6°15'	-45'	107°	5°57'	-46'	107°	7
8	7°01'	-42'	107°	6°43'	-43'	108°	6°24'	-43'	108°	6°06'	-44'	108°	5°48'	-45'	108°	5°29'	-45'	108°	5°11'	-46'	108°	8
9	6°19'	-42'	108°	6°00'	-43'	108°	5°41'	-43'	108°	5°22'	-44'	108°	5°03'	-45'	109°	4°44'	-45'	109°	4°25'	-46'	109°	9
10	5°37'	-42'	109°	5°17'	-43'	109°	4°58'	-43'	109°	4°38'	-44'	109°	4°18'	-45'	109°	3°59'	-45'	109°	3°39'	-46'	109°	10
11	4°55'	-42'	110°	4°35'	-43'	110°	4°14'	-43'	110°	3°54'	-44'	110°	3°34'	-45'	110°	3°13'	-45'	110°	2°53'	-46'	110°	11
12	4°13'	-42'	110°	3°52'	-43'	110°	3°31'	-43'	110°	3°10'	-44'	110°	2°49'	-45'	111°	2°28'	-45'	111°	2°07'	-46'	111°	12
13	3°30'	-42'	111°	3°09'	-43'	111°	2°47'	-44'	111°	2°26'	-44'	111°	2°04'	-45'	111°	1°42'	-45'	111°	1°21'	-46'	111°	13
14	2°48'	-42'	112°	2°26'	-43'	112°	2°04'	-44'	112°	1°42'	-44'	112°	1°19'	-45'	112°	0°57'	-45'	112°	0°35'	-46'	112°	14
15	2°06'	-42'	112°	1°43'	-43'	112°	1°20'	-44'	112°	0°57'	-44'	113°	0°34'	-45'	113°	0°11'	-45'	113°	0°12'	+46'	67°	15
16	1°24'	-42'	113°	1°00'	-43'	113°	0°37'	-44'	113°	0°13'	-44'	113°	0°10'	+45'	67°	0°34'	+45'	67°	0°58'	+46'	67°	16
17	0°42'	-42'	114°	0°17'	-43'	114°	0°07'	+44'	66°	0°31'	+44'	66°	0°55'	+45'	66°	1°20'	+45'	66°	1°44'	+46'	66°	17
18	0°00'	+42'	65°	0°25'	+43'	65°	0°50'	+44'	65°	1°15'	+44'	65°	1°40'	+45'	65°	2°05'	+45'	66°	2°30'	+46'	66°	18
19	0°43'	+42'	65°	1°08'	+43'	65°	1°34'	+44'	65°	1°59'	+44'	65°	2°25'	+45'	65°	2°50'	+45'	65°	3°16'	+46'	65°	19
20	1°25'	+42'	64°	1°51'	+43'	64°	2°17'	+44'	64°	2°44'	+44'	64°	3°10'	+45'	64°	3°36'	+45'	64°	4°02'	+46'	64°	20
21	2°07'	+42'	63°	2°34'	+43'	63°	3°01'	+43'	63°	3°28'	+44'	63°	3°55'	+45'	63°	4°21'	+45'	64°	4°48'	+46'	64°	21
22	2°49'	+42'	63°	3°17'	+43'	63°	3°44'	+43'	63°	4°12'	+44'	63°	4°39'	+45'	63°	5°07'	+45'	63°	5°34'	+46'	63°	22
23	3°31'	+42'	62°	4°00'	+43'	62°	4°28'	+43'	62°	4°56'	+44'	62°	5°24'	+45'	62°	5°52'	+45'	62°	6°20'	+46'	62°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

107° 253° LHA — Latitude SAME as DECLINATION — 107° 253° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

72° 288° LHA — Latitude CONTRARY to Declination — 72° 288° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	13°17'	-41'	102°	13°04'	-42'	102°	12°51'	-43'	103°	12°37'	-44'	103°	12°24'	-44'	103°	12°10'	-45'	103°	11°56'	-46'	104°	0
1	12°35'	-41'	103°	12°22'	-42'	103°	12°08'	-43'	103°	11°54'	-44'	104°	11°39'	-44'	104°	11°25'	-45'	104°	11°10'	-46'	104°	1
2	11°54'	-42'	104°	11°39'	-42'	104°	11°25'	-43'	104°	11°10'	-44'	104°	10°55'	-44'	105°	10°40'	-45'	105°	10°25'	-46'	105°	2
3	11°12'	-42'	104°	10°57'	-42'	105°	10°42'	-43'	105°	10°26'	-44'	105°	10°11'	-45'	105°	9°55'	-45'	105°	9°39'	-46'	106°	3
4	10°31'	-42'	105°	10°15'	-42'	105°	9°59'	-43'	106°	9°43'	-44'	106°	9°26'	-45'	106°	9°10'	-45'	106°	8°53'	-46'	106°	4
5	9°49'	-42'	106°	9°32'	-43'	106°	9°16'	-43'	106°	8°59'	-44'	106°	8°42'	-45'	107°	8°24'	-45'	107°	8°07'	-46'	107°	5
6	9°07'	-42'	107°	8°50'	-43'	107°	8°32'	-43'	107°	8°15'	-44'	107°	7°57'	-45'	107°	7°39'	-45'	107°	7°21'	-46'	108°	6
7	8°25'	-42'	107°	8°07'	-43'	108°	7°49'	-43'	108°	7°31'	-44'	108°	7°12'	-45'	108°	6°54'	-45'	108°	6°35'	-46'	108°	7
8	7°43'	-42'	108°	7°24'	-43'	108°	7°05'	-43'	108°	6°47'	-44'	108°	6°27'	-45'	109°	6°08'	-45'	109°	5°49'	-46'	109°	8
9	7°01'	-42'	109°	6°42'	-43'	109°	6°22'	-44'	109°	6°02'	-44'	109°	5°43'	-45'	109°	5°23'	-46'	109°	5°03'	-46'	109°	9
10	6°19'	-42'	110°	5°59'	-43'	110°	5°38'	-44'	110°	5°18'	-44'	110°	4°58'	-45'	110°	4°37'	-46'	110°	4°17'	-46'	110°	10
11	5°37'	-42'	110°	5°16'	-43'	110°	4°55'	-44'	110°	4°34'	-44'	111°	4°13'	-45'	111°	3°52'	-46'	111°	3°30'	-46'	111°	11
12	4°54'	-42'	111°	4°33'	-43'	111°	4°11'	-44'	111°	3°50'	-44'	111°	3°28'	-45'	111°	3°06'	-46'	111°	2°44'	-46'	111°	12
13	4°12'	-42'	112°	3°50'	-43'	112°	3°28'	-44'	112°	3°05'	-44'	112°	2°43'	-45'	112°	2°20'	-46'	112°	1°58'	-46'	112°	13
14	3°30'	-42'	112°	3°07'	-43'	112°	2°44'	-44'	113°	2°21'	-44'	113°	1°58'	-45'	113°	1°35'	-46'	113°	1°12'	-46'	113°	14
15	2°47'	-42'	113°	2°24'	-43'	113°	2°00'	-44'	113°	1°36'	-44'	113°	1°13'	-45'	113°	0°49'	-46'	113°	0°25'	-46'	113°	15
16	2°05'	-42'	114°	1°41'	-43'	114°	1°16'	-44'	114°	0°52'	-44'	114°	0°28'	-45'	114°	0°03'	-46'	114°	0°21'	+46'	66°	16
17	1°22'	-42'	115°	0°58'	-43'	115°	0°33'	-44'	115°	0°08'	-44'	115°	0°17'	+45'	65°	0°42'	+46'	65°	1°07'	+46'	65°	17
18	0°40'	-42'	115°	0°14'	-43'	115°	0°11'	+44'	65°	0°37'	+44'	65°	1°02'	+45'	65°	1°28'	+46'	65°	1°53'	+46'	65°	18
19	0°02'	+42'	64°	0°29'	+43'	64°	0°55'	+44'	64°	1°21'	+44'	64°	1°47'	+45'	64°	2°14'	+46'	64°	2°40'	+46'	64°	19
20	0°45'	+42'	63°	1°12'	+43'	63°	1°39'	+44'	63°	2°06'	+44'	63°	2°32'	+45'	63°	2°59'	+46'	63°	3°26'	+46'	64°	20
21	1°27'	+42'	63°	1°55'	+43'	63°	2°22'	+44'	63°	2°50'	+44'	63°	3°17'	+45'	63°	3°45'	+46'	63°	4°12'	+46'	63°	21
22	2°10'	+42'	62°	2°38'	+43'	62°	3°06'	+44'	62°	3°34'	+44'	62°	4°02'	+45'	62°	4°30'	+46'	62°	4°58'	+46'	62°	22
23	2°52'	+42'	61°	3°21'	+43'	61°	3°50'	+44'	61°	4°19'	+44'	61°	4°47'	+45'	61°	5°16'	+46'	62°	5°44'	+46'	62°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

108° 252° LHA — Latitude SAME as DECLINATION — 108° 252° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

71° 289° LHA — Latitude CONTRARY to Declination — 71° 289° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	14°00'	-41'	103°	13°46'	-42'	103°	13°33'	-43'	103°	13°19'	-44'	104°	13°04'	-44'	104°	12°50'	-45'	104°	12°35'	-46'	104°	0
1	13°19'	-42'	104°	13°04'	-42'	104°	12°50'	-43'	104°	12°35'	-44'	104°	12°20'	-44'	105°	12°05'	-45'	105°	11°49'	-46'	105°	1
2	12°37'	-42'	104°	12°22'	-42'	105°	12°07'	-43'	105°	11°51'	-44'	105°	11°35'	-45'	105°	11°20'	-45'	105°	11°03'	-46'	106°	2
3	11°55'	-42'	105°	11°40'	-43'	105°	11°24'	-43'	106°	11°07'	-44'	106°	10°51'	-45'	106°	10°34'	-45'	106°	10°17'	-46'	106°	3
4	11°14'	-42'	106°	10°57'	-43'	106°	10°40'	-43'	106°	10°23'	-44'	106°	10°06'	-45'	107°	9°49'	-45'	107°	9°31'	-46'	107°	4
5	10°32'	-42'	107°	10°14'	-43'	107°	9°57'	-43'	107°	9°39'	-44'	107°	9°21'	-45'	107°	9°04'	-45'	107°	8°45'	-46'	108°	5
6	9°50'	-42'	107°	9°32'	-43'	108°	9°13'	-44'	108°	8°55'	-44'	108°	8°37'	-45'	108°	8°18'	-46'	108°	7°59'	-46'	108°	6
7	9°08'	-42'	108°	8°49'	-43'	108°	8°30'	-44'	108°	8°11'	-44'	109°	7°52'	-45'	109°	7°33'	-46'	109°	7°13'	-46'	109°	7
8	8°25'	-42'	109°	8°06'	-43'	109°	7°46'	-44'	109°	7°27'	-44'	109°	7°07'	-45'	109°	6°47'	-46'	109°	6°27'	-46'	110°	8
9	7°43'	-42'	110°	7°23'	-43'	110°	7°03'	-44'	110°	6°42'	-44'	110°	6°22'	-45'	110°	6°01'	-46'	110°	5°41'	-46'	110°	9
10	7°01'	-42'	110°	6°40'	-43'	110°	6°19'	-44'	110°	5°58'	-44'	111°	5°37'	-45'	111°	5°16'	-46'	111°	4°54'	-46'	111°	10
11	6°18'	-42'	111°	5°57'	-43'	111°	5°35'	-44'	111°	5°13'	-44'	111°	4°52'	-45'	111°	4°30'	-46'	111°	4°08'	-46'	111°	11
12	5°36'	-43'	112°	5°14'	-43'	112°	4°51'	-44'	112°	4°29'	-45'	112°	4°07'	-45'	112°	3°44'	-46'	112°	3°21'	-46'	112°	12
13	4°53'	-43'	112°	4°30'	-43'	112°	4°07'	-44'	113°	3°44'	-45'	113°	3°21'	-45'	113°	2°58'	-46'	113°	2°35'	-46'	113°	13
14	4°11'	-43'	113°	3°47'	-43'	113°	3°24'	-44'	113°	3°00'	-45'	113°	2°36'	-45'	113°	2°12'	-46'	113°	1°49'	-46'	113°	14
15	3°28'	-43'	114°	3°04'	-43'	114°	2°40'	-44'	114°	2°15'	-45'	114°	1°51'	-45'	114°	1°27'	-46'	114°	1°02'	-46'	114°	15
16	2°46'	-43'	115°	2°21'	-43'	115°	1°56'	-44'	115°	1°31'	-45'	115°	1°06'	-45'	115°	0°41'	-46'	115°	0°16'	-46'	115°	16
17	2°03'	-43'	115°	1°37'	-43'	115°	1°12'	-44'	115°	0°46'	-45'	115°	0°20'	-45'	115°	0°05'	+46'	65°	0°31'	+46'	65°	17
18	1°20'	-43'	116°	0°54'	-43'	116°	0°28'	-44'	116°	0°01'	-45'	116°	0°25'	+45'	64°	0°51'	+46'	64°	1°17'	+46'	64°	18
19	0°38'	-43'	117°	0°11'	-43'	117°	0°16'	+44'	63°	0°43'	+45'	63°	1°10'	+45'	63°	1°37'	+46'	63°	2°04'	+46'	63°	19
20	0°05'	+43'	63°	0°33'	+43'	63°	1°00'	+44'	63°	1°28'	+45'	63°	1°55'	+45'	63°	2°23'	+46'	63°	2°50'	+46'	63°	20
21	0°48'	+43'	62°	1°16'	+43'	62°	1°44'	+44'	62°	2°12'	+45'	62°	2°40'	+45'	62°	3°08'	+46'	62°	3°37'	+46'	62°	21
22	1°31'	+43'	61°	1°59'	+43'	61°	2°28'	+44'	61°	2°57'	+45'	61°	3°26'	+45'	61°	3°54'	+46'	61°	4°23'	+46'	62°	22
23	2°13'	+43'	61°	2°43'	+43'	61°	3°12'	+44'	61°	3°41'	+45'	61°	4°11'	+45'	61°	4°40'	+46'	61°	5°09'	+46'	61°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

109° 251° LHA — Latitude SAME as DECLINATION — 109° 251° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

70° 290° LHA — Latitude CONTRARY to Declination — 70° 290° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	14°43'	-42'	104°	14°29'	-42'	104°	14°15'	-43'	104°	14°00'	-44'	104°	13°45'	-44'	105°	13°29'	-45'	105°	13°14'	-46'	105°	0
1	14°02'	-42'	104°	13°47'	-42'	105°	13°31'	-43'	105°	13°16'	-44'	105°	13°00'	-45'	105°	12°44'	-45'	106°	12°28'	-46'	106°	1
2	13°20'	-42'	105°	13°04'	-43'	105°	12°48'	-43'	106°	12°32'	-44'	106°	12°16'	-45'	106°	11°59'	-45'	106°	11°42'	-46'	106°	2
3	12°38'	-42'	106°	12°22'	-43'	106°	12°05'	-43'	106°	11°48'	-44'	107°	11°31'	-45'	107°	11°13'	-45'	107°	10°56'	-46'	107°	3
4	11°56'	-42'	107°	11°39'	-43'	107°	11°22'	-44'	107°	11°04'	-44'	107°	10°46'	-45'	107°	10°28'	-46'	108°	10°10'	-46'	108°	4
5	11°14'	-42'	107°	10°56'	-43'	108°	10°38'	-44'	108°	10°20'	-44'	108°	10°01'	-45'	108°	9°42'	-46'	108°	9°24'	-46'	108°	5
6	10°32'	-42'	108°	10°13'	-43'	108°	9°54'	-44'	108°	9°35'	-44'	109°	9°16'	-45'	109°	8°57'	-46'	109°	8°37'	-46'	109°	6
7	9°50'	-42'	109°	9°30'	-43'	109°	9°11'	-44'	109°	8°51'	-44'	109°	8°31'	-45'	109°	8°11'	-46'	110°	7°51'	-46'	110°	7
8	9°07'	-42'	110°	8°47'	-43'	110°	8°27'	-44'	110°	8°07'	-45'	110°	7°46'	-45'	110°	7°25'	-46'	110°	7°05'	-46'	110°	8
9	8°25'	-43'	110°	8°04'	-43'	110°	7°43'	-44'	111°	7°22'	-45'	111°	7°01'	-45'	111°	6°40'	-46'	111°	6°18'	-46'	111°	9
10	7°42'	-43'	111°	7°21'	-43'	111°	6°59'	-44'	111°	6°38'	-45'	111°	6°16'	-45'	111°	5°54'	-46'	112°	5°32'	-47'	112°	10
11	7°00'	-43'	112°	6°38'	-43'	112°	6°15'	-44'	112°	5°53'	-45'	112°	5°30'	-45'	112°	5°08'	-46'	112°	4°45'	-47'	112°	11
12	6°17'	-43'	112°	5°54'	-43'	112°	5°31'	-44'	113°	5°08'	-45'	113°	4°45'	-45'	113°	4°22'	-46'	113°	3°59'	-47'	113°	12
13	5°34'	-43'	113°	5°11'	-43'	113°	4°47'	-44'	113°	4°24'	-45'	113°	4°00'	-45'	113°	3°36'	-46'	113°	3°12'	-47'	114°	13
14	4°52'	-43'	114°	4°27'	-43'	114°	4°03'	-44'	114°	3°39'	-45'	114°	3°14'	-45'	114°	2°50'	-46'	114°	2°25'	-47'	114°	14
15	4°09'	-43'	114°	3°44'	-44'	115°	3°19'	-44'	115°	2°54'	-45'	115°	2°29'	-45'	115°	2°04'	-46'	115°	1°39'	-47'	115°	15
16	3°26'	-43'	115°	3°00'	-44'	115°	2°35'	-44'	115°	2°09'	-45'	115°	1°44'	-45'	115°	1°18'	-46'	115°	0°52'	-47'	115°	16
17	2°43'	-43'	116°	2°17'	-44'	116°	1°51'	-44'	116°	1°24'	-45'	116°	0°58'	-45'	116°	0°32'	-46'	116°	0°05'	-47'	116°	17
18	2°00'	-43'	117°	1°33'	-44'	117°	1°06'	-44'	117°	0°40'	-45'	117°	0°13'	-45'	117°	0°14'	+46'	63°	0°41'	+47'	63°	18
19	1°17'	-43'	117°	0°50'	-44'	117°	0°22'	-44'	117°	0°05'	+45'	63°	0°33'	+45'	63°	1°00'	+46'	63°	1°28'	+47'	63°	19
20	0°34'	-43'	118°	0°06'	-44'	118°	0°22'	+44'	62°	0°50'	+45'	62°	1°18'	+45'	62°	1°46'	+46'	62°	2°15'	+47'	62°	20
21	0°09'	+43'	61°	0°37'	+44'	61°	1°06'	+44'	61°	1°35'	+45'	61°	2°04'	+45'	61°	2°32'	+46'	61°	3°01'	+47'	61°	21
22	0°52'	+43'	61°	1°21'	+44'	61°	1°50'	+44'	61°	2°20'	+45'	61°	2°49'	+45'	61°	3°18'	+46'	61°	3°48'	+47'	61°	22
23	1°34'	+43'	60°	2°05'	+44'	60°	2°35'	+44'	60°	3°05'	+45'	60°	3°35'	+45'	60°	4°04'	+46'	60°	4°34'	+47'	60°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

110° 250° LHA — Latitude SAME as DECLINATION — 110° 250° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

69° 291° LHA — Latitude CONTRARY to Declination — 69° 291° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	15°27'	-42'	104°	15°12'	-42'	105°	14°56'	-43'	105°	14°41'	-44'	105°	14°25'	-45'	105°	14°09'	-45'	106°	13°52'	-46'	106°	0
1	14°45'	-42'	105°	14°29'	-43'	105°	14°13'	-43'	106°	13°57'	-44'	106°	13°40'	-45'	106°	13°23'	-45'	106°	13°06'	-46'	107°	1
2	14°03'	-42'	106°	13°47'	-43'	106°	13°30'	-43'	106°	13°13'	-44'	107°	12°56'	-45'	107°	12°38'	-46'	107°	12°20'	-46'	107°	2
3	13°21'	-42'	107°	13°04'	-43'	107°	12°46'	-44'	107°	12°29'	-44'	107°	12°11'	-45'	107°	11°53'	-46'	108°	11°34'	-46'	108°	3
4	12°39'	-42'	107°	12°21'	-43'	108°	12°03'	-44'	108°	11°44'	-44'	108°	11°26'	-45'	108°	11°07'	-46'	108°	10°48'	-46'	109°	4
5	11°57'	-42'	108°	11°38'	-43'	108°	11°19'	-44'	108°	11°00'	-44'	109°	10°41'	-45'	109°	10°21'	-46'	109°	10°02'	-46'	109°	5
6	11°14'	-42'	109°	10°55'	-43'	109°	10°35'	-44'	109°	10°16'	-45'	109°	9°56'	-45'	110°	9°35'	-46'	110°	9°15'	-46'	110°	6
7	10°32'	-43'	110°	10°12'	-43'	110°	9°51'	-44'	110°	9°31'	-45'	110°	9°10'	-45'	110°	8°50'	-46'	110°	8°29'	-47'	110°	7
8	9°49'	-43'	110°	9°29'	-43'	110°	9°08'	-44'	111°	8°46'	-45'	111°	8°25'	-45'	111°	8°04'	-46'	111°	7°42'	-47'	111°	8
9	9°07'	-43'	111°	8°45'	-43'	111°	8°24'	-44'	111°	8°02'	-45'	111°	7°40'	-45'	112°	7°18'	-46'	112°	6°56'	-47'	112°	9
10	8°24'	-43'	112°	8°02'	-43'	112°	7°39'	-44'	112°	7°17'	-45'	112°	6°54'	-45'	112°	6°32'	-46'	112°	6°09'	-47'	112°	10
11	7°41'	-43'	112°	7°18'	-44'	112°	6°55'	-44'	113°	6°32'	-45'	113°	6°09'	-46'	113°	5°46'	-46'	113°	5°22'	-47'	113°	11
12	6°58'	-43'	113°	6°35'	-44'	113°	6°11'	-44'	113°	5°47'	-45'	113°	5°23'	-46'	113°	4°59'	-46'	114°	4°35'	-47'	114°	12
13	6°15'	-43'	114°	5°51'	-44'	114°	5°27'	-44'	114°	5°02'	-45'	114°	4°38'	-46'	114°	4°13'	-46'	114°	3°49'	-47'	114°	13
14	5°32'	-43'	114°	5°07'	-44'	115°	4°42'	-44'	115°	4°17'	-45'	115°	3°52'	-46'	115°	3°27'	-46'	115°	3°02'	-47'	115°	14
15	4°49'	-43'	115°	4°24'	-44'	115°	3°58'	-44'	115°	3°32'	-45'	115°	3°07'	-46'	115°	2°41'	-46'	115°	2°15'	-47'	116°	15
16	4°06'	-43'	116°	3°40'	-44'	116°	3°14'	-44'	116°	2°47'	-45'	116°	2°21'	-46'	116°	1°55'	-46'	116°	1°28'	-47'	116°	16
17	3°23'	-43'	117°	2°56'	-44'	117°	2°29'	-44'	117°	2°02'	-45'	117°	1°35'	-46'	117°	1°08'	-46'	117°	0°41'	-47'	117°	17
18	2°40'	-43'	117°	2°12'	-44'	117°	1°45'	-44'	117°	1°17'	-45'	117°	0°50'	-46'	117°	0°22'	-46'	117°	0°05'	+47'	63°	18
19	1°57'	-43'	118°	1°29'	-44'	118°	1°00'	-44'	118°	0°32'	-45'	118°	0°04'	-46'	118°	0°24'	+46'	62°	0°52'	+47'	62°	19
20	1°14'	-43'	119°	0°45'	-44'	119°	0°16'	-44'	119°	0°13'	+45'	61°	0°42'	+46'	61°	1°10'	+46'	61°	1°39'	+47'	61°	20
21	0°30'	-43'	119°	0°01'	-44'	119°	0°28'	+44'	61°	0°58'	+45'	61°	1°27'	+46'	61°	1°57'	+46'	61°	2°26'	+47'	61°	21
22	0°13'	+43'	60°	0°43'	+44'	60°	1°13'	+44'	60°	1°43'	+45'	60°	2°13'	+46'	60°	2°43'	+46'	60°	3°13'	+47'	60°	22
23	0°56'	+43'	59°	1°27'	+44'	59°	1°57'	+44'	59°	2°28'	+45'	59°	2°59'	+46'	59°	3°29'	+46'	59°	4°00'	+47'	59°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

111° 249° LHA — Latitude SAME as DECLINATION — 111° 249° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

68° 292° LHA — **Latitude CONTRARY to Declination** — **68° 292° LHA**

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	16°10'	-42'	105°	15°54'	-43'	105°	15°38'	-43'	106°	15°22'	-44'	106°	15°05'	-45'	106°	14°48'	-45'	106°	14°31'	-46'	107°	0
1	15°28'	-42'	106°	15°11'	-43'	106°	14°55'	-43'	106°	14°38'	-44'	107°	14°20'	-45'	107°	14°03'	-46'	107°	13°45'	-46'	107°	1
2	14°46'	-42'	107°	14°29'	-43'	107°	14°11'	-44'	107°	13°53'	-44'	107°	13°35'	-45'	108°	13°17'	-46'	108°	12°59'	-46'	108°	2
3	14°04'	-42'	107°	13°46'	-43'	108°	13°28'	-44'	108°	13°09'	-44'	108°	12°50'	-45'	108°	12°31'	-46'	108°	12°12'	-46'	109°	3
4	13°21'	-42'	108°	13°03'	-43'	108°	12°44'	-44'	109°	12°25'	-45'	109°	12°05'	-45'	109°	11°46'	-46'	109°	11°26'	-46'	109°	4
5	12°39'	-43'	109°	12°20'	-43'	109°	12°00'	-44'	109°	11°40'	-45'	109°	11°20'	-45'	110°	11°00'	-46'	110°	10°39'	-47'	110°	5
6	11°57'	-43'	110°	11°36'	-43'	110°	11°16'	-44'	110°	10°55'	-45'	110°	10°35'	-45'	110°	10°14'	-46'	110°	9°53'	-47'	111°	6
7	11°14'	-43'	110°	10°53'	-43'	110°	10°32'	-44'	111°	10°11'	-45'	111°	9°49'	-45'	111°	9°28'	-46'	111°	9°06'	-47'	111°	7
8	10°31'	-43'	111°	10°10'	-44'	111°	9°48'	-44'	111°	9°26'	-45'	111°	9°04'	-46'	112°	8°42'	-46'	112°	8°20'	-47'	112°	8
9	9°48'	-43'	112°	9°26'	-44'	112°	9°04'	-44'	112°	8°41'	-45'	112°	8°18'	-46'	112°	7°56'	-46'	112°	7°33'	-47'	113°	9
10	9°05'	-43'	112°	8°42'	-44'	113°	8°19'	-44'	113°	7°56'	-45'	113°	7°33'	-46'	113°	7°09'	-46'	113°	6°46'	-47'	113°	10
11	8°22'	-43'	113°	7°59'	-44'	113°	7°35'	-44'	113°	7°11'	-45'	113°	6°47'	-46'	114°	6°23'	-46'	114°	5°59'	-47'	114°	11
12	7°39'	-43'	114°	7°15'	-44'	114°	6°51'	-44'	114°	6°26'	-45'	114°	6°02'	-46'	114°	5°37'	-46'	114°	5°12'	-47'	114°	12
13	6°56'	-43'	114°	6°31'	-44'	115°	6°06'	-45'	115°	5°41'	-45'	115°	5°16'	-46'	115°	4°51'	-46'	115°	4°25'	-47'	115°	13
14	6°13'	-43'	115°	5°47'	-44'	115°	5°22'	-45'	115°	4°56'	-45'	115°	4°30'	-46'	116°	4°04'	-46'	116°	3°38'	-47'	116°	14
15	5°30'	-43'	116°	5°03'	-44'	116°	4°37'	-45'	116°	4°11'	-45'	116°	3°44'	-46'	116°	3°18'	-46'	116°	2°51'	-47'	116°	15
16	4°46'	-43'	117°	4°19'	-44'	117°	3°52'	-45'	117°	3°25'	-45'	117°	2°58'	-46'	117°	2°31'	-46'	117°	2°04'	-47'	117°	16
17	4°03'	-43'	117°	3°35'	-44'	117°	3°08'	-45'	117°	2°40'	-45'	117°	2°13'	-46'	117°	1°45'	-46'	117°	1°17'	-47'	118°	17
18	3°19'	-43'	118°	2°51'	-44'	118°	2°23'	-45'	118°	1°55'	-45'	118°	1°27'	-46'	118°	0°58'	-46'	118°	0°30'	-47'	118°	18
19	2°36'	-43'	119°	2°07'	-44'	119°	1°38'	-45'	119°	1°10'	-45'	119°	0°41'	-46'	119°	0°12'	-46'	119°	0°17'	+47'	61°	19
20	1°53'	-43'	119°	1°23'	-44'	119°	0°54'	-45'	119°	0°24'	-45'	119°	0°05'	+46'	61°	0°35'	+46'	61°	1°04'	+47'	61°	20
21	1°09'	-43'	120°	0°39'	-44'	120°	0°09'	-45'	120°	0°21'	+45'	60°	0°51'	+46'	60°	1°21'	+46'	60°	1°51'	+47'	60°	21
22	0°26'	-43'	121°	0°05'	+44'	59°	0°36'	+45'	59°	1°06'	+45'	59°	1°37'	+46'	59°	2°08'	+46'	59°	2°38'	+47'	59°	22
23	0°18'	+43'	59°	0°49'	+44'	59°	1°20'	+45'	59°	1°52'	+45'	59°	2°23'	+46'	59°	2°54'	+46'	59°	3°25'	+47'	59°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

112° 248° LHA — **Latitude SAME as DECLINATION** — **112° 248° LHA**

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

67° 293° LHA — **Latitude CONTRARY to Declination** — **67° 293° LHA**

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	16°53'	-42'	106°	16°36'	-43'	106°	16°19'	-44'	106°	16°02'	-44'	107°	15°45'	-45'	107°	15°27'	-46'	107°	15°09'	-46'	108°	0
1	16°11'	-42'	107°	15°53'	-43'	107°	15°36'	-44'	107°	15°18'	-44'	107°	15°00'	-45'	108°	14°42'	-46'	108°	14°23'	-46'	108°	1
2	15°29'	-42'	107°	15°11'	-43'	108°	14°52'	-44'	108°	14°34'	-44'	108°	14°15'	-45'	108°	13°56'	-46'	109°	13°37'	-46'	109°	2
3	14°46'	-42'	108°	14°28'	-43'	108°	14°09'	-44'	109°	13°49'	-45'	109°	13°30'	-45'	109°	13°10'	-46'	109°	12°50'	-47'	109°	3
4	14°04'	-43'	109°	13°44'	-43'	109°	13°25'	-44'	109°	13°05'	-45'	109°	12°45'	-45'	110°	12°24'	-46'	110°	12°04'	-47'	110°	4
5	13°21'	-43'	110°	13°01'	-43'	110°	12°41'	-44'	110°	12°20'	-45'	110°	11°59'	-45'	110°	11°38'	-46'	111°	11°17'	-47'	111°	5
6	12°38'	-43'	110°	12°18'	-44'	110°	11°57'	-44'	111°	11°35'	-45'	111°	11°14'	-46'	111°	10°52'	-46'	111°	10°30'	-47'	111°	6
7	11°56'	-43'	111°	11°34'	-44'	111°	11°12'	-44'	111°	10°50'	-45'	112°	10°28'	-46'	112°	10°06'	-46'	112°	9°44'	-47'	112°	7
8	11°13'	-43'	112°	10°50'	-44'	112°	10°28'	-44'	112°	10°05'	-45'	112°	9°43'	-46'	112°	9°20'	-46'	113°	8°57'	-47'	113°	8
9	10°30'	-43'	112°	10°07'	-44'	113°	9°44'	-44'	113°	9°20'	-45'	113°	8°57'	-46'	113°	8°33'	-46'	113°	8°10'	-47'	113°	9
10	9°46'	-43'	113°	9°23'	-44'	113°	8°59'	-45'	113°	8°35'	-45'	114°	8°11'	-46'	114°	7°47'	-46'	114°	7°23'	-47'	114°	10
11	9°03'	-43'	114°	8°39'	-44'	114°	8°15'	-45'	114°	7°50'	-45'	114°	7°25'	-46'	114°	7°01'	-46'	114°	6°36'	-47'	115°	11
12	8°20'	-43'	114°	7°55'	-44'	115°	7°30'	-45'	115°	7°05'	-45'	115°	6°39'	-46'	115°	6°14'	-47'	115°	5°49'	-47'	115°	12
13	7°37'	-43'	115°	7°11'	-44'	115°	6°45'	-45'	115°	6°19'	-45'	116°	5°54'	-46'	116°	5°28'	-47'	116°	5°01'	-47'	116°	13
14	6°53'	-44'	116°	6°27'	-44'	116°	6°00'	-45'	116°	5°34'	-45'	116°	5°08'	-46'	116°	4°41'	-47'	116°	4°14'	-47'	116°	14
15	6°10'	-44'	117°	5°43'	-44'	117°	5°16'	-45'	117°	4°49'	-45'	117°	4°22'	-46'	117°	3°54'	-47'	117°	3°27'	-47'	117°	15
16	5°26'	-44'	117°	4°58'	-44'	117°	4°31'	-45'	117°	4°03'	-45'	117°	3°35'	-46'	118°	3°08'	-47'	118°	2°40'	-47'	118°	16
17	4°42'	-44'	118°	4°14'	-44'	118°	3°46'	-45'	118°	3°18'	-46'	118°	2°49'	-46'	118°	2°21'	-47'	118°	1°53'	-47'	118°	17
18	3°59'	-44'	119°	3°30'	-44'	119°	3°01'	-45'	119°	2°32'	-46'	119°	2°03'	-46'	119°	1°34'	-47'	119°	1°05'	-47'	119°	18
19	3°15'	-44'	119°	2°46'	-44'	119°	2°16'	-45'	119°	1°47'	-46'	119°	1°17'	-46'	119°	0°48'	-47'	119°	0°18'	-47'	119°	19
20	2°31'	-44'	120°	2°01'	-44'	120°	1°31'	-45'	120°	1°01'	-46'	120°	0°31'	-46'	120°	0°01'	-47'	120°	0°29'	+47'	60°	20
21	1°48'	-44'	121°	1°17'	-44'	121°	0°46'	-45'	121°	0°16'	-46'	121°	0°15'	+46'	59°	0°46'	+47'	59°	1°16'	+47'	59°	21
22	1°04'	-44'	121°	0°33'	-44'	121°	0°01'	-45'	121°	0°30'	+46'	59°	1°01'	+46'	59°	1°32'	+47'	59°	2°04'	+47'	59°	22
23	0°20'	-44'	122°	0°12'	+44'	58°	0°44'	+45'	58°	1°16'	+46'	58°	1°47'	+46'	58°	2°19'	+47'	58°	2°51'	+47'	58°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

113° 247° LHA — **Latitude SAME as DECLINATION** — **113° 247° LHA**

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

66° 294° LHA — Latitude CONTRARY to Declination — 66° 294° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	17°36'	-42'	107°	17°18'	-43'	107°	17°01'	-44'	107°	16°43'	-44'	107°	16°25'	-45'	108°	16°06'	-46'	108°	15°48'	-46'	108°	0
1	16°53'	-42'	107°	16°35'	-43'	108°	16°17'	-44'	108°	15°59'	-45'	108°	15°40'	-45'	108°	15°21'	-46'	109°	15°01'	-47'	109°	1
2	16°11'	-43'	108°	15°52'	-43'	108°	15°33'	-44'	109°	15°14'	-45'	109°	14°54'	-45'	109°	14°35'	-46'	109°	14°15'	-47'	110°	2
3	15°29'	-43'	109°	15°09'	-43'	109°	14°49'	-44'	109°	14°29'	-45'	110°	14°09'	-45'	110°	13°49'	-46'	110°	13°28'	-47'	110°	3
4	14°46'	-43'	110°	14°26'	-43'	110°	14°05'	-44'	110°	13°45'	-45'	110°	13°24'	-46'	110°	13°03'	-46'	111°	12°41'	-47'	111°	4
5	14°03'	-43'	110°	13°42'	-44'	110°	13°21'	-44'	111°	13°00'	-45'	111°	12°38'	-46'	111°	12°16'	-46'	111°	11°55'	-47'	112°	5
6	13°20'	-43'	111°	12°59'	-44'	111°	12°37'	-44'	111°	12°15'	-45'	112°	11°53'	-46'	112°	11°30'	-46'	112°	11°08'	-47'	112°	6
7	12°37'	-43'	112°	12°15'	-44'	112°	11°52'	-45'	112°	11°30'	-45'	112°	11°07'	-46'	112°	10°44'	-46'	113°	10°21'	-47'	113°	7
8	11°54'	-43'	112°	11°31'	-44'	113°	11°08'	-45'	113°	10°45'	-45'	113°	10°21'	-46'	113°	9°57'	-47'	113°	9°34'	-47'	113°	8
9	11°11'	-43'	113°	10°47'	-44'	113°	10°23'	-45'	113°	9°59'	-45'	114°	9°35'	-46'	114°	9°11'	-47'	114°	8°47'	-47'	114°	9
10	10°27'	-43'	114°	10°03'	-44'	114°	9°39'	-45'	114°	9°14'	-45'	114°	8°49'	-46'	114°	8°24'	-47'	115°	7°59'	-47'	115°	10
11	9°44'	-44'	115°	9°19'	-44'	115°	8°54'	-45'	115°	8°29'	-45'	115°	8°03'	-46'	115°	7°38'	-47'	115°	7°12'	-47'	115°	11
12	9°00'	-44'	115°	8°35'	-44'	115°	8°09'	-45'	115°	7°43'	-46'	116°	7°17'	-46'	116°	6°51'	-47'	116°	6°25'	-47'	116°	12
13	8°17'	-44'	116°	7°50'	-44'	116°	7°24'	-45'	116°	6°58'	-46'	116°	6°31'	-46'	116°	6°04'	-47'	116°	5°37'	-47'	117°	13
14	7°33'	-44'	117°	7°06'	-44'	117°	6°39'	-45'	117°	6°12'	-46'	117°	5°45'	-46'	117°	5°17'	-47'	117°	4°50'	-47'	117°	14
15	6°49'	-44'	117°	6°22'	-44'	117°	5°54'	-45'	117°	5°26'	-46'	118°	4°59'	-46'	118°	4°31'	-47'	118°	4°03'	-47'	118°	15
16	6°05'	-44'	118°	5°37'	-44'	118°	5°09'	-45'	118°	4°41'	-46'	118°	4°12'	-46'	118°	3°44'	-47'	118°	3°15'	-47'	118°	16
17	5°22'	-44'	119°	4°53'	-45'	119°	4°24'	-45'	119°	3°55'	-46'	119°	3°26'	-46'	119°	2°57'	-47'	119°	2°28'	-47'	119°	17
18	4°38'	-44'	119°	4°08'	-45'	119°	3°39'	-45'	119°	3°09'	-46'	120°	2°40'	-46'	120°	2°10'	-47'	120°	1°40'	-47'	120°	18
19	3°54'	-44'	120°	3°24'	-45'	120°	2°54'	-45'	120°	2°23'	-46'	120°	1°53'	-46'	120°	1°23'	-47'	120°	0°53'	-47'	120°	19
20	3°10'	-44'	121°	2°39'	-45'	121°	2°08'	-45'	121°	1°38'	-46'	121°	1°07'	-46'	121°	0°36'	-47'	121°	0°05'	-47'	121°	20
21	2°26'	-44'	121°	1°55'	-45'	121°	1°23'	-45'	121°	0°52'	-46'	121°	0°21'	-46'	121°	0°11'	+47'	59°	0°42'	+47'	59°	21
22	1°42'	-44'	122°	1°10'	-45'	122°	0°38'	-45'	122°	0°06'	-46'	122°	0°26'	+46'	58°	0°58'	+47'	58°	1°30'	+47'	58°	22
23	0°58'	-44'	123°	0°25'	-45'	123°	0°07'	+45'	57°	0°40'	+46'	57°	1°12'	+46'	57°	1°45'	+47'	57°	2°17'	+47'	57°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

114° 246° LHA — Latitude SAME as DECLINATION — 114° 246° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

65° 295° LHA — Latitude CONTRARY to Declination — 65° 295° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	18°18'	-42'	107°	18°00'	-43'	108°	17°42'	-44'	108°	17°23'	-45'	108°	17°04'	-45'	109°	16°45'	-46'	109°	16°26'	-47'	109°	0
1	17°36'	-43'	108°	17°17'	-43'	108°	16°58'	-44'	109°	16°39'	-45'	109°	16°19'	-45'	109°	15°59'	-46'	110°	15°39'	-47'	110°	1
2	16°53'	-43'	109°	16°34'	-43'	109°	16°14'	-44'	109°	15°54'	-45'	110°	15°34'	-45'	110°	15°13'	-46'	110°	14°52'	-47'	110°	2
3	16°11'	-43'	110°	15°50'	-44'	110°	15°30'	-44'	110°	15°09'	-45'	110°	14°48'	-46'	111°	14°27'	-46'	111°	14°06'	-47'	111°	3
4	15°28'	-43'	110°	15°07'	-44'	111°	14°46'	-44'	111°	14°24'	-45'	111°	14°03'	-46'	111°	13°41'	-46'	111°	13°19'	-47'	112°	4
5	14°45'	-43'	111°	14°23'	-44'	111°	14°01'	-44'	111°	13°39'	-45'	112°	13°17'	-46'	112°	12°54'	-46'	112°	12°32'	-47'	112°	5
6	14°02'	-43'	112°	13°39'	-44'	112°	13°17'	-45'	112°	12°54'	-45'	112°	12°31'	-46'	113°	12°08'	-47'	113°	11°45'	-47'	113°	6
7	13°18'	-43'	112°	12°55'	-44'	113°	12°32'	-45'	113°	12°09'	-45'	113°	11°45'	-46'	113°	11°22'	-47'	113°	10°58'	-47'	114°	7
8	12°35'	-43'	113°	12°11'	-44'	113°	11°48'	-45'	114°	11°24'	-45'	114°	10°59'	-46'	114°	10°35'	-47'	114°	10°10'	-47'	114°	8
9	11°52'	-44'	114°	11°27'	-44'	114°	11°03'	-45'	114°	10°38'	-46'	114°	10°13'	-46'	115°	9°48'	-47'	115°	9°23'	-47'	115°	9
10	11°08'	-44'	115°	10°43'	-44'	115°	10°18'	-45'	115°	9°53'	-46'	115°	9°27'	-46'	115°	9°01'	-47'	115°	8°36'	-47'	115°	10
11	10°24'	-44'	115°	9°59'	-44'	115°	9°33'	-45'	116°	9°07'	-46'	116°	8°41'	-46'	116°	8°15'	-47'	116°	7°48'	-47'	116°	11
12	9°41'	-44'	116°	9°14'	-44'	116°	8°48'	-45'	116°	8°21'	-46'	116°	7°55'	-46'	116°	7°28'	-47'	117°	7°01'	-48'	117°	12
13	8°57'	-44'	117°	8°30'	-45'	117°	8°03'	-45'	117°	7°36'	-46'	117°	7°08'	-46'	117°	6°41'	-47'	117°	6°13'	-48'	117°	13
14	8°13'	-44'	117°	7°45'	-45'	117°	7°18'	-45'	118°	6°50'	-46'	118°	6°22'	-46'	118°	5°54'	-47'	118°	5°26'	-48'	118°	14
15	7°29'	-44'	118°	7°01'	-45'	118°	6°32'	-45'	118°	6°04'	-46'	118°	5°35'	-46'	118°	5°07'	-47'	118°	4°38'	-48'	119°	15
16	6°45'	-44'	119°	6°16'	-45'	119°	5°47'	-45'	119°	5°18'	-46'	119°	4°49'	-47'	119°	4°20'	-47'	119°	3°50'	-48'	119°	16
17	6°01'	-44'	119°	5°31'	-45'	119°	5°02'	-45'	120°	4°32'	-46'	120°	4°02'	-47'	120°	3°33'	-47'	120°	3°03'	-48'	120°	17
18	5°16'	-44'	120°	4°46'	-45'	120°	4°16'	-45'	120°	3°46'	-46'	120°	3°16'	-47'	120°	2°45'	-47'	120°	2°15'	-48'	120°	18
19	4°32'	-44'	121°	4°02'	-45'	121°	3°31'	-45'	121°	3°00'	-46'	121°	2°29'	-47'	121°	1°58'	-47'	121°	1°27'	-48'	121°	19
20	3°48'	-44'	121°	3°17'	-45'	121°	2°45'	-45'	122°	2°14'	-46'	122°	1°43'	-47'	122°	1°11'	-47'	122°	0°40'	-48'	122°	20
21	3°04'	-44'	122°	2°32'	-45'	122°	2°00'	-45'	122°	1°28'	-46'	122°	0°56'	-47'	122°	0°24'	-47'	122°	0°08'	+48'	58°	21
22	2°19'	-44'	123°	1°47'	-45'	123°	1°14'	-45'	123°	0°42'	-46'	123°	0°09'	-47'	123°	0°23'	+47'	57°	0°56'	+48'	57°	22
23	1°35'	-44'	123°	1°02'	-45'	123°	0°29'	-45'	123°	0°04'	+46'	57°	0°37'	+47'	57°	1°10'	+47'	57°	1°43'	+48'	57°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

115° 245° LHA — Latitude SAME as DECLINATION — 115° 245° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

64° 296° LHA — **Latitude CONTRARY to Declination** — **64° 296° LHA**

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	19°01'	-43'	108°	18°42'	-43'	108°	18°23'	-44'	109°	18°03'	-45'	109°	17°44'	-45'	109°	17°24'	-46'	110°	17°03'	-47'	110°	0
1	18°18'	-43'	109°	17°59'	-43'	109°	17°39'	-44'	109°	17°19'	-45'	110°	16°58'	-46'	110°	16°38'	-46'	110°	16°17'	-47'	111°	1
2	17°35'	-43'	110°	17°15'	-44'	110°	16°55'	-44'	110°	16°34'	-45'	110°	16°13'	-46'	111°	15°52'	-46'	111°	15°30'	-47'	111°	2
3	16°53'	-43'	110°	16°32'	-44'	111°	16°10'	-44'	111°	15°49'	-45'	111°	15°27'	-46'	111°	15°05'	-46'	112°	14°43'	-47'	112°	3
4	16°10'	-43'	111°	15°48'	-44'	111°	15°26'	-45'	112°	15°04'	-45'	112°	14°41'	-46'	112°	14°19'	-47'	112°	13°56'	-47'	113°	4
5	15°26'	-43'	112°	15°04'	-44'	112°	14°41'	-45'	112°	14°19'	-45'	112°	13°56'	-46'	113°	13°32'	-47'	113°	13°09'	-47'	113°	5
6	14°43'	-43'	112°	14°20'	-44'	113°	13°57'	-45'	113°	13°33'	-45'	113°	13°10'	-46'	113°	12°46'	-47'	114°	12°22'	-47'	114°	6
7	14°00'	-44'	113°	13°36'	-44'	113°	13°12'	-45'	114°	12°48'	-46'	114°	12°23'	-46'	114°	11°59'	-47'	114°	11°34'	-47'	114°	7
8	13°16'	-44'	114°	12°52'	-44'	114°	12°27'	-45'	114°	12°02'	-46'	114°	11°37'	-46'	115°	11°12'	-47'	115°	10°47'	-47'	115°	8
9	12°32'	-44'	115°	12°07'	-44'	115°	11°42'	-45'	115°	11°17'	-46'	115°	10°51'	-46'	115°	10°25'	-47'	115°	9°59'	-48'	116°	9
10	11°48'	-44'	115°	11°23'	-45'	115°	10°57'	-45'	116°	10°31'	-46'	116°	10°05'	-46'	116°	9°38'	-47'	116°	9°12'	-48'	116°	10
11	11°05'	-44'	116°	10°38'	-45'	116°	10°12'	-45'	116°	9°45'	-46'	116°	9°18'	-46'	117°	8°51'	-47'	117°	8°24'	-48'	117°	11
12	10°21'	-44'	117°	9°54'	-45'	117°	9°26'	-45'	117°	8°59'	-46'	117°	8°32'	-47'	117°	8°04'	-47'	117°	7°37'	-48'	118°	12
13	9°36'	-44'	117°	9°09'	-45'	117°	8°41'	-45'	118°	8°13'	-46'	118°	7°45'	-47'	118°	7°17'	-47'	118°	6°49'	-48'	118°	13
14	8°52'	-44'	118°	8°24'	-45'	118°	7°56'	-45'	118°	7°27'	-46'	118°	6°59'	-47'	119°	6°30'	-47'	119°	6°01'	-48'	119°	14
15	8°08'	-44'	119°	7°39'	-45'	119°	7°10'	-46'	119°	6°41'	-46'	119°	6°12'	-47'	119°	5°43'	-47'	119°	5°13'	-48'	119°	15
16	7°24'	-44'	119°	6°54'	-45'	120°	6°25'	-46'	120°	5°55'	-46'	120°	5°25'	-47'	120°	4°55'	-47'	120°	4°25'	-48'	120°	16
17	6°39'	-44'	120°	6°09'	-45'	120°	5°39'	-46'	120°	5°09'	-46'	120°	4°38'	-47'	120°	4°08'	-47'	120°	3°38'	-48'	121°	17
18	5°55'	-44'	121°	5°24'	-45'	121°	4°53'	-46'	121°	4°23'	-46'	121°	3°52'	-47'	121°	3°21'	-47'	121°	2°50'	-48'	121°	18
19	5°10'	-45'	121°	4°39'	-45'	122°	4°08'	-46'	122°	3°36'	-46'	122°	3°05'	-47'	122°	2°33'	-47'	122°	2°02'	-48'	122°	19
20	4°26'	-45'	122°	3°54'	-45'	122°	3°22'	-46'	122°	2°50'	-46'	122°	2°18'	-47'	122°	1°46'	-47'	122°	1°14'	-48'	122°	20
21	3°41'	-45'	123°	3°09'	-45'	123°	2°36'	-46'	123°	2°04'	-46'	123°	1°31'	-47'	123°	0°59'	-47'	123°	0°26'	-48'	123°	21
22	2°57'	-45'	123°	2°24'	-45'	123°	1°51'	-46'	124°	1°17'	-46'	124°	0°44'	-47'	124°	0°11'	-47'	124°	0°22'	+48'	56°	22
23	2°12'	-45'	124°	1°38'	-45'	124°	1°05'	-46'	124°	0°31'	-46'	124°	0°03'	+47'	56°	0°36'	+47'	56°	1°10'	+48'	56°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

116° 244° LHA — **Latitude SAME as DECLINATION** — **116° 244° LHA**

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

63° 297° LHA — **Latitude CONTRARY to Declination** — **63° 297° LHA**

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	19°43'	-43'	109°	19°24'	-43'	109°	19°04'	-44'	109°	18°43'	-45'	110°	18°23'	-46'	110°	18°02'	-46'	110°	17°41'	-47'	111°	0
1	19°00'	-43'	110°	18°40'	-44'	110°	18°19'	-44'	110°	17°59'	-45'	111°	17°37'	-46'	111°	17°16'	-46'	111°	16°54'	-47'	111°	1
2	18°17'	-43'	110°	17°56'	-44'	111°	17°35'	-44'	111°	17°14'	-45'	111°	16°52'	-46'	111°	16°30'	-46'	112°	16°07'	-47'	112°	2
3	17°34'	-43'	111°	17°13'	-44'	111°	16°51'	-45'	112°	16°28'	-45'	112°	16°06'	-46'	112°	15°43'	-47'	112°	15°20'	-47'	113°	3
4	16°51'	-43'	112°	16°29'	-44'	112°	16°06'	-45'	112°	15°43'	-45'	113°	15°20'	-46'	113°	14°57'	-47'	113°	14°33'	-47'	113°	4
5	16°08'	-44'	112°	15°45'	-44'	113°	15°21'	-45'	113°	14°58'	-46'	113°	14°34'	-46'	113°	14°10'	-47'	114°	13°46'	-47'	114°	5
6	15°24'	-44'	113°	15°00'	-44'	113°	14°36'	-45'	114°	14°12'	-46'	114°	13°48'	-46'	114°	13°23'	-47'	114°	12°58'	-48'	115°	6
7	14°40'	-44'	114°	14°16'	-44'	114°	13°51'	-45'	114°	13°26'	-46'	115°	13°01'	-46'	115°	12°36'	-47'	115°	12°11'	-48'	115°	7
8	13°57'	-44'	115°	13°32'	-45'	115°	13°06'	-45'	115°	12°41'	-46'	115°	12°15'	-46'	115°	11°49'	-47'	116°	11°23'	-48'	116°	8
9	13°13'	-44'	115°	12°47'	-45'	116°	12°21'	-45'	116°	11°55'	-46'	116°	11°29'	-47'	116°	11°02'	-47'	116°	10°35'	-48'	116°	9
10	12°29'	-44'	116°	12°02'	-45'	116°	11°36'	-45'	116°	11°09'	-46'	117°	10°42'	-47'	117°	10°15'	-47'	117°	9°48'	-48'	117°	10
11	11°45'	-44'	117°	11°17'	-45'	117°	10°50'	-46'	117°	10°23'	-46'	117°	9°55'	-47'	117°	9°28'	-47'	118°	9°00'	-48'	118°	11
12	11°00'	-44'	117°	10°33'	-45'	118°	10°05'	-46'	118°	9°37'	-46'	118°	9°09'	-47'	118°	8°40'	-47'	118°	8°12'	-48'	118°	12
13	10°16'	-44'	118°	9°48'	-45'	118°	9°19'	-46'	118°	8°51'	-46'	119°	8°22'	-47'	119°	7°53'	-47'	119°	7°24'	-48'	119°	13
14	9°32'	-45'	119°	9°03'	-45'	119°	8°34'	-46'	119°	8°04'	-46'	119°	7°35'	-47'	119°	7°06'	-47'	119°	6°36'	-48'	120°	14
15	8°47'	-45'	119°	8°17'	-45'	120°	7°48'	-46'	120°	7°18'	-46'	120°	6°48'	-47'	120°	6°18'	-48'	120°	5°48'	-48'	120°	15
16	8°02'	-45'	120°	7°32'	-45'	120°	7°02'	-46'	120°	6°32'	-46'	120°	6°01'	-47'	121°	5°31'	-48'	121°	5°00'	-48'	121°	16
17	7°18'	-45'	121°	6°47'	-45'	121°	6°16'	-46'	121°	5°45'	-46'	121°	5°14'	-47'	121°	4°43'	-48'	121°	4°12'	-48'	121°	17
18	6°33'	-45'	121°	6°02'	-45'	122°	5°30'	-46'	122°	4°59'	-46'	122°	4°27'	-47'	122°	3°56'	-48'	122°	3°24'	-48'	122°	18
19	5°48'	-45'	122°	5°16'	-45'	122°	4°44'	-46'	122°	4°12'	-47'	122°	3°40'	-47'	122°	3°08'	-48'	122°	2°36'	-48'	123°	19
20	5°04'	-45'	123°	4°31'	-45'	123°	3°58'	-46'	123°	3°26'	-47'	123°	2°53'	-47'	123°	2°20'	-48'	123°	1°48'	-48'	123°	20
21	4°19'	-45'	123°	3°46'	-45'	124°	3°12'	-46'	124°	2°39'	-47'	124°	2°06'	-47'	124°	1°33'	-48'	124°	0°59'	-48'	124°	21
22	3°34'	-45'	124°	3°00'	-45'	124°	2°26'	-46'	124°	1°53'	-47'	124°	1°19'	-47'	124°	0°45'	-48'	124°	0°11'	-48'	124°	22
23	2°49'	-45'	125°	2°15'	-45'	125°	1°40'	-46'	125°	1°06'	-47'	125°	0°32'	-47'	125°	0°03'	+48'	55°	0°37'	+48'	55°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

117° 243° LHA — **Latitude SAME as DECLINATION** — **117° 243° LHA**

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

62° 298° LHA — Latitude CONTRARY to Declination — 62° 298° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	20°25'	-43'	110°	20°05'	-44'	110°	19°44'	-44'	110°	19°23'	-45'	111°	19°02'	-46'	111°	18°40'	-46'	111°	18°19'	-47'	112°	0
1	19°42'	-43'	110°	19°21'	-44'	111°	19°00'	-45'	111°	18°38'	-45'	111°	18°16'	-46'	112°	17°54'	-47'	112°	17°31'	-47'	112°	1
2	18°59'	-43'	111°	18°37'	-44'	111°	18°15'	-45'	112°	17°53'	-45'	112°	17°30'	-46'	112°	17°08'	-47'	113°	16°44'	-47'	113°	2
3	18°16'	-43'	112°	17°53'	-44'	112°	17°31'	-45'	112°	17°08'	-45'	113°	16°44'	-46'	113°	16°21'	-47'	113°	15°57'	-47'	114°	3
4	17°32'	-44'	113°	17°09'	-44'	113°	16°46'	-45'	113°	16°22'	-46'	113°	15°58'	-46'	114°	15°34'	-47'	114°	15°10'	-47'	114°	4
5	16°49'	-44'	113°	16°25'	-44'	114°	16°01'	-45'	114°	15°37'	-46'	114°	15°12'	-46'	114°	14°47'	-47'	115°	14°22'	-48'	115°	5
6	16°05'	-44'	114°	15°41'	-45'	114°	15°16'	-45'	114°	14°51'	-46'	115°	14°26'	-46'	115°	14°00'	-47'	115°	13°35'	-48'	115°	6
7	15°21'	-44'	115°	14°56'	-45'	115°	14°31'	-45'	115°	14°05'	-46'	115°	13°39'	-47'	116°	13°13'	-47'	116°	12°47'	-48'	116°	7
8	14°37'	-44'	115°	14°11'	-45'	116°	13°45'	-45'	116°	13°19'	-46'	116°	12°53'	-47'	116°	12°26'	-47'	116°	11°59'	-48'	117°	8
9	13°53'	-44'	116°	13°26'	-45'	116°	13°00'	-46'	116°	12°33'	-46'	117°	12°06'	-47'	117°	11°39'	-47'	117°	11°11'	-48'	117°	9
10	13°09'	-44'	117°	12°42'	-45'	117°	12°14'	-46'	117°	11°47'	-46'	117°	11°19'	-47'	118°	10°51'	-47'	118°	10°23'	-48'	118°	10
11	12°24'	-44'	117°	11°56'	-45'	118°	11°29'	-46'	118°	11°00'	-46'	118°	10°32'	-47'	118°	10°04'	-48'	118°	9°35'	-48'	118°	11
12	11°40'	-45'	118°	11°11'	-45'	118°	10°43'	-46'	118°	10°14'	-46'	119°	9°45'	-47'	119°	9°16'	-48'	119°	8°47'	-48'	119°	12
13	10°55'	-45'	119°	10°26'	-45'	119°	9°57'	-46'	119°	9°28'	-46'	119°	8°58'	-47'	119°	8°29'	-48'	120°	7°59'	-48'	120°	13
14	10°10'	-45'	119°	9°41'	-45'	120°	9°11'	-46'	120°	8°41'	-47'	120°	8°11'	-47'	120°	7°41'	-48'	120°	7°11'	-48'	120°	14
15	9°26'	-45'	120°	8°55'	-45'	120°	8°25'	-46'	120°	7°55'	-47'	121°	7°24'	-47'	121°	6°53'	-48'	121°	6°23'	-48'	121°	15
16	8°41'	-45'	121°	8°10'	-46'	121°	7°39'	-46'	121°	7°08'	-47'	121°	6°37'	-47'	121°	6°06'	-48'	121°	5°34'	-48'	121°	16
17	7°56'	-45'	122°	7°25'	-46'	122°	6°53'	-46'	122°	6°21'	-47'	122°	5°50'	-47'	122°	5°18'	-48'	122°	4°46'	-48'	122°	17
18	7°11'	-45'	122°	6°39'	-46'	122°	6°07'	-46'	122°	5°35'	-47'	122°	5°02'	-47'	123°	4°30'	-48'	123°	3°58'	-48'	123°	18
19	6°26'	-45'	123°	5°53'	-46'	123°	5°21'	-46'	123°	4°48'	-47'	123°	4°15'	-47'	123°	3°42'	-48'	123°	3°09'	-48'	123°	19
20	5°41'	-45'	124°	5°08'	-46'	124°	4°34'	-46'	124°	4°01'	-47'	124°	3°28'	-47'	124°	2°54'	-48'	124°	2°21'	-48'	124°	20
21	4°56'	-45'	124°	4°22'	-46'	124°	3°48'	-46'	124°	3°14'	-47'	124°	2°41'	-47'	124°	2°07'	-48'	124°	1°33'	-48'	124°	21
22	4°11'	-45'	125°	3°36'	-46'	125°	3°02'	-46'	125°	2°28'	-47'	125°	1°53'	-47'	125°	1°19'	-48'	125°	0°44'	-48'	125°	22
23	3°25'	-45'	125°	2°51'	-46'	126°	2°16'	-46'	126°	1°41'	-47'	126°	1°06'	-47'	126°	0°31'	-48'	126°	0°04'	+48'	54°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

118° 242° LHA — Latitude SAME as DECLINATION — 118° 242° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

61° 299° LHA — Latitude CONTRARY to Declination — 61° 299° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	21°07'	-43'	110°	20°46'	-44'	111°	20°25'	-45'	111°	20°03'	-45'	111°	19°41'	-46'	112°	19°18'	-47'	112°	18°56'	-47'	112°	0
1	20°24'	-43'	111°	20°02'	-44'	111°	19°40'	-45'	112°	19°18'	-45'	112°	18°55'	-46'	112°	18°32'	-47'	113°	18°09'	-47'	113°	1
2	19°41'	-44'	112°	19°18'	-44'	112°	18°55'	-45'	112°	18°32'	-46'	113°	18°09'	-46'	113°	17°45'	-47'	113°	17°21'	-47'	114°	2
3	18°57'	-44'	113°	18°34'	-44'	113°	18°10'	-45'	113°	17°47'	-46'	113°	17°23'	-46'	114°	16°58'	-47'	114°	16°34'	-48'	114°	3
4	18°13'	-44'	113°	17°50'	-45'	114°	17°25'	-45'	114°	17°01'	-46'	114°	16°36'	-46'	114°	16°11'	-47'	115°	15°46'	-48'	115°	4
5	17°30'	-44'	114°	17°05'	-45'	114°	16°40'	-45'	115°	16°15'	-46'	115°	15°50'	-47'	115°	15°24'	-47'	115°	14°58'	-48'	116°	5
6	16°46'	-44'	115°	16°20'	-45'	115°	15°55'	-45'	115°	15°29'	-46'	115°	15°03'	-47'	116°	14°37'	-47'	116°	14°11'	-48'	116°	6
7	16°01'	-44'	115°	15°36'	-45'	116°	15°09'	-46'	116°	14°43'	-46'	116°	14°17'	-47'	116°	13°50'	-47'	117°	13°23'	-48'	117°	7
8	15°17'	-44'	116°	14°51'	-45'	116°	14°24'	-46'	117°	13°57'	-46'	117°	13°30'	-47'	117°	13°02'	-47'	117°	12°35'	-48'	117°	8
9	14°33'	-45'	117°	14°06'	-45'	117°	13°38'	-46'	117°	13°11'	-46'	117°	12°43'	-47'	118°	12°15'	-48'	118°	11°47'	-48'	118°	9
10	13°48'	-45'	118°	13°20'	-45'	118°	12°52'	-46'	118°	12°24'	-46'	118°	11°56'	-47'	118°	11°27'	-48'	118°	10°59'	-48'	119°	10
11	13°04'	-45'	118°	12°35'	-45'	118°	12°07'	-46'	119°	11°38'	-47'	119°	11°09'	-47'	119°	10°40'	-48'	119°	10°10'	-48'	119°	11
12	12°19'	-45'	119°	11°50'	-45'	119°	11°21'	-46'	119°	10°51'	-47'	119°	10°22'	-47'	120°	9°52'	-48'	120°	9°22'	-48'	120°	12
13	11°34'	-45'	120°	11°04'	-46'	120°	10°35'	-46'	120°	10°05'	-47'	120°	9°34'	-47'	120°	9°04'	-48'	120°	8°34'	-48'	120°	13
14	10°49'	-45'	120°	10°19'	-46'	120°	9°48'	-46'	121°	9°18'	-47'	121°	8°47'	-47'	121°	8°16'	-48'	121°	7°45'	-48'	121°	14
15	10°04'	-45'	121°	9°33'	-46'	121°	9°02'	-46'	121°	8°31'	-47'	121°	8°00'	-47'	121°	7°28'	-48'	122°	6°57'	-48'	122°	15
16	9°19'	-45'	122°	8°48'	-46'	122°	8°16'	-46'	122°	7°44'	-47'	122°	7°12'	-47'	122°	6°41'	-48'	122°	6°09'	-49'	122°	16
17	8°34'	-45'	122°	8°02'	-46'	122°	7°30'	-46'	122°	6°57'	-47'	123°	6°25'	-48'	123°	5°53'	-48'	123°	5°20'	-49'	123°	17
18	7°49'	-45'	123°	7°16'	-46'	123°	6°43'	-46'	123°	6°10'	-47'	123°	5°37'	-48'	123°	5°04'	-48'	123°	4°31'	-49'	123°	18
19	7°03'	-45'	124°	6°30'	-46'	124°	5°57'	-46'	124°	5°23'	-47'	124°	4°50'	-48'	124°	4°16'	-48'	124°	3°43'	-49'	124°	19
20	6°18'	-45'	124°	5°44'	-46'	124°	5°10'	-47'	124°	4°36'	-47'	124°	4°02'	-48'	125°	3°28'	-48'	125°	2°54'	-49'	125°	20
21	5°32'	-45'	125°	4°58'	-46'	125°	4°24'	-47'	125°	3°49'	-47'	125°	3°15'	-48'	125°	2°40'	-48'	125°	2°06'	-49'	125°	21
22	4°47'	-45'	126°	4°12'	-46'	126°	3°37'	-47'	126°	3°02'	-47'	126°	2°27'	-48'	126°	1°52'	-48'	126°	1°17'	-49'	126°	22
23	4°02'	-46'	126°	3°26'	-46'	126°	2°51'	-47'	126°	2°15'	-47'	126°	1°39'	-48'	126°	1°04'	-48'	126°	0°28'	-49'	126°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

119° 241° LHA — Latitude SAME as DECLINATION — 119° 241° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

60° 300° LHA — Latitude CONTRARY to Declination — 60° 300° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	21°49'	-43'	111°	21°27'	-44'	111°	21°05'	-45'	112°	20°42'	-45'	112°	20°19'	-46'	113°	19°56'	-47'	113°	19°33'	-47'	113°	0
1	21°05'	-44'	112°	20°43'	-44'	112°	20°20'	-45'	113°	19°57'	-46'	113°	19°33'	-46'	113°	19°10'	-47'	114°	18°45'	-48'	114°	1
2	20°22'	-44'	113°	19°59'	-44'	113°	19°35'	-45'	113°	19°11'	-46'	114°	18°47'	-46'	114°	18°23'	-47'	114°	17°58'	-48'	115°	2
3	19°38'	-44'	113°	19°14'	-45'	114°	18°50'	-45'	114°	18°25'	-46'	114°	18°01'	-47'	115°	17°36'	-47'	115°	17°10'	-48'	115°	3
4	18°54'	-44'	114°	18°30'	-45'	114°	18°05'	-45'	115°	17°40'	-46'	115°	17°14'	-47'	115°	16°48'	-47'	116°	16°22'	-48'	116°	4
5	18°10'	-44'	115°	17°45'	-45'	115°	17°19'	-46'	115°	16°54'	-46'	116°	16°27'	-47'	116°	16°01'	-47'	116°	15°35'	-48'	116°	5
6	17°26'	-44'	115°	17°00'	-45'	116°	16°34'	-46'	116°	16°07'	-46'	116°	15°41'	-47'	117°	15°14'	-47'	117°	14°47'	-48'	117°	6
7	16°42'	-45'	116°	16°15'	-45'	116°	15°48'	-46'	117°	15°21'	-46'	117°	14°54'	-47'	117°	14°26'	-48'	117°	13°59'	-48'	118°	7
8	15°57'	-45'	117°	15°30'	-45'	117°	15°02'	-46'	117°	14°35'	-47'	118°	14°07'	-47'	118°	13°39'	-48'	118°	13°10'	-48'	118°	8
9	15°12'	-45'	118°	14°45'	-45'	118°	14°16'	-46'	118°	13°48'	-47'	118°	13°20'	-47'	118°	12°51'	-48'	119°	12°22'	-48'	119°	9
10	14°28'	-45'	118°	13°59'	-46'	118°	13°30'	-46'	119°	13°02'	-47'	119°	12°32'	-47'	119°	12°03'	-48'	119°	11°34'	-48'	119°	10
11	13°43'	-45'	119°	13°14'	-46'	119°	12°44'	-46'	119°	12°15'	-47'	120°	11°45'	-47'	120°	11°15'	-48'	120°	10°45'	-48'	120°	11
12	12°58'	-45'	120°	12°28'	-46'	120°	11°58'	-46'	120°	11°28'	-47'	120°	10°58'	-47'	120°	10°27'	-48'	121°	9°57'	-49'	121°	12
13	12°13'	-45'	120°	11°42'	-46'	120°	11°12'	-46'	121°	10°41'	-47'	121°	10°10'	-48'	121°	9°39'	-48'	121°	9°08'	-49'	121°	13
14	11°28'	-45'	121°	10°57'	-46'	121°	10°25'	-46'	121°	9°54'	-47'	121°	9°23'	-48'	122°	8°51'	-48'	122°	8°20'	-49'	122°	14
15	10°42'	-45'	122°	10°11'	-46'	122°	9°39'	-47'	122°	9°07'	-47'	122°	8°35'	-48'	122°	8°03'	-48'	122°	7°31'	-49'	122°	15
16	9°57'	-45'	122°	9°25'	-46'	122°	8°52'	-47'	123°	8°20'	-47'	123°	7°48'	-48'	123°	7°15'	-48'	123°	6°42'	-49'	123°	16
17	9°11'	-46'	123°	8°39'	-46'	123°	8°06'	-47'	123°	7°33'	-47'	123°	7°00'	-48'	123°	6°27'	-48'	124°	5°54'	-49'	124°	17
18	8°26'	-46'	124°	7°53'	-46'	124°	7°19'	-47'	124°	6°46'	-47'	124°	6°12'	-48'	124°	5°39'	-48'	124°	5°05'	-49'	124°	18
19	7°40'	-46'	124°	7°06'	-46'	124°	6°32'	-47'	124°	5°58'	-47'	125°	5°24'	-48'	125°	4°50'	-48'	125°	4°16'	-49'	125°	19
20	6°55'	-46'	125°	6°20'	-46'	125°	5°46'	-47'	125°	5°11'	-47'	125°	4°37'	-48'	125°	4°02'	-48'	125°	3°27'	-49'	125°	20
21	6°09'	-46'	126°	5°34'	-46'	126°	4°59'	-47'	126°	4°24'	-47'	126°	3°49'	-48'	126°	3°13'	-48'	126°	2°38'	-49'	126°	21
22	5°23'	-46'	126°	4°48'	-46'	126°	4°12'	-47'	126°	3°36'	-47'	126°	3°01'	-48'	126°	2°25'	-48'	127°	1°49'	-49'	127°	22
23	4°37'	-46'	127°	4°01'	-46'	127°	3°25'	-47'	127°	2°49'	-47'	127°	2°13'	-48'	127°	1°37'	-48'	127°	1°01'	-49'	127°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

60° 300° LHA — Latitude CONTRARY to DECLINATION — 60° 300° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

59° 301° LHA — Latitude CONTRARY to Declination — 59° 301° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	22°30'	-44'	112°	22°08'	-44'	112°	21°45'	-45'	113°	21°21'	-46'	113°	20°58'	-46'	113°	20°34'	-47'	114°	20°10'	-48'	114°	0
1	21°47'	-44'	113°	21°23'	-44'	113°	21°00'	-45'	113°	20°36'	-46'	114°	20°12'	-46'	114°	19°47'	-47'	114°	19°22'	-48'	115°	1
2	21°03'	-44'	113°	20°39'	-45'	114°	20°15'	-45'	114°	19°50'	-46'	114°	19°25'	-47'	115°	19°00'	-47'	115°	18°34'	-48'	115°	2
3	20°19'	-44'	114°	19°54'	-45'	114°	19°29'	-45'	115°	19°04'	-46'	115°	18°38'	-47'	115°	18°13'	-47'	116°	17°46'	-48'	116°	3
4	19°35'	-44'	115°	19°10'	-45'	115°	18°44'	-46'	115°	18°18'	-46'	116°	17°52'	-47'	116°	17°25'	-47'	116°	16°58'	-48'	117°	4
5	18°51'	-44'	116°	18°25'	-45'	116°	17°58'	-46'	116°	17°32'	-46'	116°	17°05'	-47'	117°	16°38'	-48'	117°	16°10'	-48'	117°	5
6	18°06'	-45'	116°	17°39'	-45'	117°	17°12'	-46'	117°	16°45'	-47'	117°	16°18'	-47'	117°	15°50'	-48'	118°	15°22'	-48'	118°	6
7	17°22'	-45'	117°	16°54'	-45'	117°	16°27'	-46'	117°	15°59'	-47'	118°	15°31'	-47'	118°	15°02'	-48'	118°	14°34'	-48'	118°	7
8	16°37'	-45'	118°	16°09'	-46'	118°	15°41'	-46'	118°	15°12'	-47'	118°	14°44'	-47'	119°	14°15'	-48'	119°	13°46'	-48'	119°	8
9	15°52'	-45'	118°	15°23'	-46'	119°	14°54'	-46'	119°	14°25'	-47'	119°	13°56'	-47'	119°	13°27'	-48'	119°	12°57'	-49'	120°	9
10	15°07'	-45'	119°	14°38'	-46'	119°	14°08'	-46'	119°	13°39'	-47'	120°	13°09'	-48'	120°	12°39'	-48'	120°	12°09'	-49'	120°	10
11	14°22'	-45'	120°	13°52'	-46'	120°	13°22'	-46'	120°	12°52'	-47'	120°	12°21'	-48'	121°	11°51'	-48'	121°	11°20'	-49'	121°	11
12	13°36'	-45'	120°	13°06'	-46'	121°	12°35'	-47'	121°	12°05'	-47'	121°	11°34'	-48'	121°	11°02'	-48'	121°	10°31'	-49'	121°	12
13	12°51'	-45'	121°	12°20'	-46'	121°	11°49'	-47'	121°	11°17'	-47'	122°	10°46'	-48'	122°	10°14'	-48'	122°	9°42'	-49'	122°	13
14	12°06'	-46'	122°	11°34'	-46'	122°	11°02'	-47'	122°	10°30'	-47'	122°	9°58'	-48'	122°	9°26'	-48'	123°	8°54'	-49'	123°	14
15	11°20'	-46'	122°	10°48'	-46'	123°	10°15'	-47'	123°	9°43'	-47'	123°	9°10'	-48'	123°	8°38'	-48'	123°	8°05'	-49'	123°	15
16	10°34'	-46'	123°	10°02'	-46'	123°	9°29'	-47'	123°	8°56'	-47'	123°	8°22'	-48'	124°	7°49'	-48'	124°	7°16'	-49'	124°	16
17	9°49'	-46'	124°	9°15'	-46'	124°	8°42'	-47'	124°	8°08'	-47'	124°	7°35'	-48'	124°	7°01'	-49'	124°	6°27'	-49'	124°	17
18	9°03'	-46'	124°	8°29'	-46'	124°	7°55'	-47'	125°	7°21'	-48'	125°	6°47'	-48'	125°	6°12'	-49'	125°	5°38'	-49'	125°	18
19	8°17'	-46'	125°	7°42'	-46'	125°	7°08'	-47'	125°	6°33'	-48'	125°	5°58'	-48'	125°	5°24'	-49'	126°	4°49'	-49'	126°	19
20	7°31'	-46'	126°	6°56'	-47'	126°	6°21'	-47'	126°	5°46'	-48'	126°	5°10'	-48'	126°	4°35'	-49'	126°	4°00'	-49'	126°	20
21	6°45'	-46'	126°	6°09'	-47'	126°	5°34'	-47'	126°	4°58'	-48'	127°	4°22'	-48'	127°	3°46'	-49'	127°	3°11'	-49'	127°	21
22	5°59'	-46'	127°	5°23'	-47'	127°	4°47'	-47'	127°	4°10'	-48'	127°	3°34'	-48'	127°	2°58'	-49'	127°	2°21'	-49'	127°	22
23	5°13'	-46'	128°	4°36'	-47'	128°	3°59'	-47'	128°	3°23'	-48'	128°	2°46'	-48'	128°	2°09'	-49'	128°	1°32'	-49'	128°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

59° 301° LHA — Latitude CONTRARY to DECLINATION — 59° 301° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

58° 302° LHA — Latitude CONTRARY to Declination — 58° 302° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	23°11'	-44'	113°	22°48'	-44'	113°	22°24'	-45'	113°	22°00'	-46'	114°	21°36'	-47'	114°	21°11'	-47'	115°	20°46'	-48'	115°	0
1	22°28'	-44'	113°	22°04'	-45'	114°	21°39'	-45'	114°	21°15'	-46'	115°	20°49'	-47'	115°	20°24'	-47'	115°	19°58'	-48'	116°	1
2	21°44'	-44'	114°	21°19'	-45'	115°	20°54'	-46'	115°	20°29'	-46'	115°	20°03'	-47'	116°	19°37'	-47'	116°	19°10'	-48'	116°	2
3	21°00'	-44'	115°	20°34'	-45'	115°	20°08'	-46'	116°	19°42'	-46'	116°	19°16'	-47'	116°	18°49'	-48'	117°	18°22'	-48'	117°	3
4	20°15'	-45'	116°	19°49'	-45'	116°	19°23'	-46'	116°	18°56'	-46'	117°	18°29'	-47'	117°	18°02'	-48'	117°	17°34'	-48'	117°	4
5	19°31'	-45'	116°	19°04'	-45'	117°	18°37'	-46'	117°	18°10'	-47'	117°	17°42'	-47'	118°	17°14'	-48'	118°	16°46'	-48'	118°	5
6	18°46'	-45'	117°	18°19'	-45'	117°	17°51'	-46'	118°	17°23'	-47'	118°	16°55'	-47'	118°	16°26'	-48'	118°	15°58'	-48'	119°	6
7	18°01'	-45'	118°	17°33'	-46'	118°	17°05'	-46'	118°	16°36'	-47'	119°	16°07'	-47'	119°	15°38'	-48'	119°	15°09'	-49'	119°	7
8	17°16'	-45'	118°	16°47'	-46'	119°	16°18'	-46'	119°	15°49'	-47'	119°	15°20'	-48'	119°	14°50'	-48'	120°	14°21'	-49'	120°	8
9	16°31'	-45'	119°	16°02'	-46'	119°	15°32'	-46'	120°	15°02'	-47'	120°	14°32'	-48'	120°	14°02'	-48'	120°	13°32'	-49'	121°	9
10	15°46'	-45'	120°	15°16'	-46'	120°	14°46'	-47'	120°	14°15'	-47'	120°	13°45'	-48'	121°	13°14'	-48'	121°	12°43'	-49'	121°	10
11	15°00'	-46'	120°	14°30'	-46'	121°	13°59'	-47'	121°	13°28'	-47'	121°	12°57'	-48'	121°	12°26'	-48'	122°	11°54'	-49'	122°	11
12	14°15'	-46'	121°	13°44'	-46'	121°	13°12'	-47'	122°	12°41'	-47'	122°	12°09'	-48'	122°	11°37'	-48'	122°	11°05'	-49'	122°	12
13	13°29'	-46'	122°	12°57'	-46'	122°	12°25'	-47'	122°	11°53'	-47'	122°	11°21'	-48'	123°	10°49'	-49'	123°	10°16'	-49'	123°	13
14	12°43'	-46'	122°	12°11'	-46'	123°	11°39'	-47'	123°	11°06'	-48'	123°	10°33'	-48'	123°	10°00'	-49'	123°	9°27'	-49'	123°	14
15	11°58'	-46'	123°	11°25'	-47'	123°	10°52'	-47'	123°	10°18'	-48'	124°	9°45'	-48'	124°	9°12'	-49'	124°	8°38'	-49'	124°	15
16	11°12'	-46'	124°	10°38'	-47'	124°	10°05'	-47'	124°	9°31'	-48'	124°	8°57'	-48'	124°	8°23'	-49'	125°	7°49'	-49'	125°	16
17	10°26'	-46'	124°	9°52'	-47'	125°	9°17'	-47'	125°	8°43'	-48'	125°	8°09'	-48'	125°	7°34'	-49'	125°	7°00'	-49'	125°	17
18	9°39'	-46'	125°	9°05'	-47'	125°	8°30'	-47'	125°	7°55'	-48'	125°	7°21'	-48'	126°	6°46'	-49'	126°	6°11'	-49'	126°	18
19	8°53'	-46'	126°	8°18'	-47'	126°	7°43'	-47'	126°	7°08'	-48'	126°	6°32'	-48'	126°	5°57'	-49'	126°	5°21'	-49'	126°	19
20	8°07'	-46'	126°	7°31'	-47'	127°	6°56'	-47'	127°	6°20'	-48'	127°	5°44'	-48'	127°	5°08'	-49'	127°	4°32'	-49'	127°	20
21	7°21'	-46'	127°	6°45'	-47'	127°	6°08'	-47'	127°	5°32'	-48'	127°	4°56'	-48'	127°	4°19'	-49'	127°	3°43'	-49'	127°	21
22	6°34'	-46'	128°	5°58'	-47'	128°	5°21'	-47'	128°	4°44'	-48'	128°	4°07'	-48'	128°	3°30'	-49'	128°	2°53'	-49'	128°	22
23	5°48'	-46'	128°	5°11'	-47'	128°	4°33'	-47'	128°	3°56'	-48'	129°	3°19'	-48'	129°	2°41'	-49'	129°	2°04'	-49'	129°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

58° 302° LHA — Latitude CONTRARY to DECLINATION — 58° 302° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

57° 303° LHA — Latitude CONTRARY to Declination — 57° 303° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	23°53'	-44'	113°	23°28'	-45'	114°	23°04'	-45'	114°	22°39'	-46'	115°	22°14'	-47'	115°	21°48'	-47'	115°	21°22'	-48'	116°	0
1	1°14'	-44'	114°	1°12'	-45'	115°	1°11'	-46'	115°	1°09'	-46'	115°	1°07'	-47'	116°	1°05'	-47'	116°	1°04'	-48'	116°	1
2	22°24'	-44'	115°	21°59'	-45'	115°	21°33'	-46'	116°	21°07'	-46'	116°	20°40'	-47'	116°	20°13'	-48'	117°	19°46'	-48'	117°	2
3	21°40'	-45'	116°	21°14'	-45'	116°	20°47'	-46'	116°	20°20'	-47'	117°	19°53'	-47'	117°	19°26'	-48'	117°	18°58'	-48'	118°	3
4	20°55'	-45'	116°	20°28'	-45'	117°	20°01'	-46'	117°	19°34'	-47'	117°	19°06'	-47'	118°	18°38'	-48'	118°	18°10'	-48'	118°	4
5	20°10'	-45'	117°	19°43'	-46'	117°	19°15'	-46'	118°	18°47'	-47'	118°	18°19'	-47'	118°	17°50'	-48'	119°	17°21'	-49'	119°	5
6	19°26'	-45'	118°	18°57'	-46'	118°	18°29'	-46'	118°	18°00'	-47'	119°	17°31'	-48'	119°	17°02'	-48'	119°	16°33'	-49'	120°	6
7	18°40'	-45'	119°	18°12'	-46'	119°	17°43'	-47'	119°	17°13'	-47'	119°	16°44'	-48'	120°	16°14'	-48'	120°	15°44'	-49'	120°	7
8	17°55'	-45'	119°	17°26'	-46'	119°	16°56'	-47'	120°	16°26'	-47'	120°	15°56'	-48'	120°	15°26'	-48'	121°	14°55'	-49'	121°	8
9	17°10'	-46'	120°	16°40'	-46'	120°	16°09'	-47'	120°	15°39'	-47'	121°	15°08'	-48'	121°	14°37'	-48'	121°	14°06'	-49'	121°	9
10	16°24'	-46'	121°	15°54'	-46'	121°	15°23'	-47'	121°	14°52'	-47'	121°	14°20'	-48'	122°	13°49'	-49'	122°	13°17'	-49'	122°	10
11	15°39'	-46'	121°	15°07'	-46'	121°	14°36'	-47'	122°	14°04'	-48'	122°	13°32'	-48'	122°	13°00'	-49'	122°	12°28'	-49'	123°	11
12	14°53'	-46'	122°	14°21'	-46'	122°	13°49'	-47'	122°	13°17'	-48'	123°	12°44'	-48'	123°	12°12'	-49'	123°	11°39'	-49'	123°	12
13	14°07'	-46'	123°	13°34'	-47'	123°	13°02'	-47'	123°	12°29'	-48'	123°	11°56'	-48'	123°	11°23'	-49'	124°	10°50'	-49'	124°	13
14	13°21'	-46'	123°	12°48'	-47'	123°	12°15'	-47'	124°	11°41'	-48'	124°	11°08'	-48'	124°	10°34'	-49'	124°	10°01'	-49'	124°	14
15	12°35'	-46'	124°	12°01'	-47'	124°	11°27'	-47'	124°	10°54'	-48'	124°	10°20'	-48'	125°	9°46'	-49'	125°	9°11'	-49'	125°	15
16	11°48'	-46'	125°	11°14'	-47'	125°	10°40'	-47'	125°	10°06'	-48'	125°	9°31'	-48'	125°	8°57'	-49'	125°	8°22'	-49'	125°	16
17	11°02'	-46'	125°	10°28'	-47'	125°	9°53'	-47'	126°	9°18'	-48'	126°	8°43'	-48'	126°	8°08'	-49'	126°	7°32'	-49'	126°	17
18	10°16'	-46'	126°	9°41'	-47'	126°	9°05'	-48'	126°	8°30'	-48'	126°	7°54'	-49'	126°	7°19'	-49'	126°	6°43'	-50'	127°	18
19	9°29'	-47'	126°	8°54'	-47'	127°	8°18'	-48'	127°	7°42'	-48'	127°	7°06'	-49'	127°	6°30'	-49'	127°	5°53'	-50'	127°	19
20	8°43'	-47'	127°	8°06'	-47'	127°	7°30'	-48'	127°	6°54'	-48'	127°	6°17'	-49'	128°	5°41'	-49'	128°	5°04'	-50'	128°	20
21	7°56'	-47'	128°	7°19'	-47'	128°	6°43'	-48'	128°	6°06'	-48'	128°	5°29'	-49'	128°	4°51'	-49'	128°	4°14'	-50'	128°	21
22	7°10'	-47'	128°	6°32'	-47'	128°	5°55'	-48'	129°	5°17'	-48'	129°	4°40'	-49'	129°	4°02'	-49'	129°	3°25'	-50'	129°	22
23	6°23'	-47'	129°	5°45'	-47'	129°	5°07'	-48'	129°	4°29'	-48'	129°	3°51'	-49'	129°	3°13'	-49'	129°	2°35'	-50'	129°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

57° 303° LHA — Latitude CONTRARY to DECLINATION — 57° 303° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

56° 304° LHA — Latitude CONTRARY to Declination — 56° 304° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	24°33'	-44'	114°	24°08'	-45'	115°	23°43'	-46'	115°	23°17'	-46'	115°	22°51'	-47'	116°	22°25'	-48'	116°	21°58'	-48'	117°	0
1	23°49'	-44'	115°	23°23'	-45'	115°	22°58'	-46'	116°	22°31'	-46'	116°	22°05'	-47'	117°	21°38'	-48'	117°	21°10'	-48'	117°	1
2	23°05'	-45'	116°	22°38'	-45'	116°	22°12'	-46'	117°	21°45'	-47'	117°	21°17'	-47'	117°	20°50'	-48'	118°	20°22'	-48'	118°	2
3	22°20'	-45'	116°	21°53'	-46'	117°	21°26'	-46'	117°	20°58'	-47'	118°	20°30'	-47'	118°	20°02'	-48'	118°	19°34'	-49'	119°	3
4	21°35'	-45'	117°	21°07'	-46'	118°	20°40'	-46'	118°	20°11'	-47'	118°	19°43'	-48'	119°	19°14'	-48'	119°	18°45'	-49'	119°	4
5	20°50'	-45'	118°	20°22'	-46'	118°	19°53'	-46'	119°	19°24'	-47'	119°	18°55'	-48'	119°	18°26'	-48'	119°	17°56'	-49'	120°	5
6	20°05'	-45'	119°	19°36'	-46'	119°	19°07'	-47'	119°	18°37'	-47'	120°	18°08'	-48'	120°	17°38'	-48'	120°	17°07'	-49'	120°	6
7	19°19'	-46'	119°	18°50'	-46'	120°	18°20'	-47'	120°	17°50'	-47'	120°	17°20'	-48'	120°	16°49'	-48'	121°	16°19'	-49'	121°	7
8	18°34'	-46'	120°	18°04'	-46'	120°	17°33'	-47'	121°	17°03'	-47'	121°	16°32'	-48'	121°	16°01'	-49'	121°	15°30'	-49'	122°	8
9	17°48'	-46'	121°	17°18'	-46'	121°	16°47'	-47'	121°	16°15'	-48'	121°	15°44'	-48'	122°	15°12'	-49'	122°	14°40'	-49'	122°	9
10	17°02'	-46'	121°	16°31'	-47'	122°	16°00'	-47'	122°	15°28'	-48'	122°	14°56'	-48'	122°	14°24'	-49'	123°	13°51'	-49'	123°	10
11	16°17'	-46'	122°	15°45'	-47'	122°	15°12'	-47'	123°	14°40'	-48'	123°	14°08'	-48'	123°	13°35'	-49'	123°	13°02'	-49'	123°	11
12	15°30'	-46'	123°	14°58'	-47'	123°	14°25'	-47'	123°	13°52'	-48'	123°	13°19'	-48'	124°	12°46'	-49'	124°	12°13'	-49'	124°	12
13	14°44'	-46'	123°	14°11'	-47'	124°	13°38'	-47'	124°	13°04'	-48'	124°	12°31'	-48'	124°	11°57'	-49'	124°	11°23'	-50'	125°	13
14	13°58'	-46'	124°	13°24'	-47'	124°	12°50'	-48'	124°	12°16'	-48'	125°	11°42'	-49'	125°	11°08'	-49'	125°	10°34'	-50'	125°	14
15	13°12'	-47'	125°	12°37'	-47'	125°	12°03'	-48'	125°	11°28'	-48'	125°	10°54'	-49'	125°	10°19'	-49'	126°	9°44'	-50'	126°	15
16	12°25'	-47'	125°	11°50'	-47'	125°	11°15'	-48'	126°	10°40'	-48'	126°	10°05'	-49'	126°	9°30'	-49'	126°	8°54'	-50'	126°	16
17	11°38'	-47'	126°	11°03'	-47'	126°	10°28'	-48'	126°	9°52'	-48'	126°	9°16'	-49'	127°	8°41'	-49'	127°	8°05'	-50'	127°	17
18	10°52'	-47'	127°	10°16'	-47'	127°	9°40'	-48'	127°	9°04'	-48'	127°	8°28'	-49'	127°	7°51'	-49'	127°	7°15'	-50'	127°	18
19	10°05'	-47'	127°	9°29'	-47'	127°	8°52'	-48'	127°	8°16'	-48'	128°	7°39'	-49'	128°	7°02'	-49'	128°	6°25'	-50'	128°	19
20	9°18'	-47'	128°	8°41'	-47'	128°	8°04'	-48'	128°	7°27'	-48'	128°	6°50'	-49'	128°	6°13'	-49'	128°	5°35'	-50'	128°	20
21	8°31'	-47'	128°	7°54'	-47'	129°	7°16'	-48'	129°	6°39'	-48'	129°	6°01'	-49'	129°	5°23'	-49'	129°	4°46'	-50'	129°	21
22	7°44'	-47'	129°	7°06'	-48'	129°	6°28'	-48'	129°	5°50'	-48'	129°	5°12'	-49'	129°	4°34'	-49'	130°	3°56'	-50'	130°	22
23	6°57'	-47'	130°	6°19'	-48'	130°	5°40'	-48'	130°	5°02'	-49'	130°	4°23'	-49'	130°	3°45'	-49'	130°	3°06'	-50'	130°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

56° 304° LHA — Latitude CONTRARY to DECLINATION — 56° 304° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

55° 305° LHA — Latitude CONTRARY to Declination — 55° 305° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	25°14'	-44'	115°	24°48'	-45'	116°	24°22'	-46'	116°	23°56'	-47'	116°	23°29'	-47'	117°	23°02'	-48'	117°	22°34'	-48'	117°	0
1	24°29'	-45'	116°	24°03'	-45'	116°	23°36'	-46'	117°	23°09'	-47'	117°	22°42'	-47'	117°	22°14'	-48'	118°	21°46'	-49'	118°	1
2	23°45'	-45'	117°	23°18'	-46'	117°	22°50'	-46'	117°	22°22'	-47'	118°	21°54'	-47'	118°	21°26'	-48'	118°	20°57'	-49'	119°	2
3	23°00'	-45'	117°	22°32'	-46'	118°	22°04'	-46'	118°	21°36'	-47'	118°	21°07'	-48'	119°	20°38'	-48'	119°	20°09'	-49'	119°	3
4	22°15'	-45'	118°	21°46'	-46'	118°	21°18'	-47'	119°	20°49'	-47'	119°	20°19'	-48'	119°	19°50'	-48'	120°	19°20'	-49'	120°	4
5	21°29'	-45'	119°	21°00'	-46'	119°	20°31'	-47'	119°	20°01'	-47'	120°	19°32'	-48'	120°	19°01'	-48'	120°	18°31'	-49'	121°	5
6	20°44'	-46'	119°	20°14'	-46'	120°	19°44'	-47'	120°	19°14'	-47'	120°	18°44'	-48'	121°	18°13'	-49'	121°	17°42'	-49'	121°	6
7	19°58'	-46'	120°	19°28'	-46'	120°	18°57'	-47'	121°	18°27'	-48'	121°	17°56'	-48'	121°	17°24'	-49'	122°	16°53'	-49'	122°	7
8	19°12'	-46'	121°	18°42'	-47'	121°	18°10'	-47'	121°	17°39'	-48'	122°	17°07'	-48'	122°	16°36'	-49'	122°	16°04'	-49'	122°	8
9	18°26'	-46'	121°	17°55'	-47'	122°	17°23'	-47'	122°	16°51'	-48'	122°	16°19'	-48'	123°	15°47'	-49'	123°	15°14'	-49'	123°	9
10	17°40'	-46'	122°	17°08'	-47'	122°	16°36'	-47'	123°	16°04'	-48'	123°	15°31'	-48'	123°	14°58'	-49'	123°	14°25'	-50'	124°	10
11	16°54'	-46'	123°	16°22'	-47'	123°	15°49'	-47'	123°	15°16'	-48'	124°	14°42'	-49'	124°	14°09'	-49'	124°	13°35'	-50'	124°	11
12	16°08'	-46'	123°	15°35'	-47'	124°	15°01'	-48'	124°	14°28'	-48'	124°	13°54'	-49'	124°	13°20'	-49'	125°	12°46'	-50'	125°	12
13	15°21'	-47'	124°	14°48'	-47'	124°	14°14'	-48'	125°	13°39'	-48'	125°	13°05'	-49'	125°	12°31'	-49'	125°	11°56'	-50'	125°	13
14	14°35'	-47'	125°	14°00'	-47'	125°	13°26'	-48'	125°	12°51'	-48'	125°	12°16'	-49'	126°	11°41'	-49'	126°	11°06'	-50'	126°	14
15	13°48'	-47'	125°	13°13'	-47'	126°	12°38'	-48'	126°	12°03'	-48'	126°	11°28'	-49'	126°	10°52'	-49'	126°	10°17'	-50'	126°	15
16	13°01'	-47'	126°	12°26'	-47'	126°	11°50'	-48'	126°	11°15'	-48'	127°	10°39'	-49'	127°	10°03'	-49'	127°	9°27'	-50'	127°	16
17	12°14'	-47'	127°	11°38'	-48'	127°	11°02'	-48'	127°	10°26'	-49'	127°	9°50'	-49'	127°	9°13'	-49'	127°	8°37'	-50'	128°	17
18	11°27'	-47'	127°	10°51'	-48'	128°	10°14'	-48'	128°	9°38'	-49'	128°	9°01'	-49'	128°	8°24'	-50'	128°	7°47'	-50'	128°	18
19	10°40'	-47'	128°	10°03'	-48'	128°	9°26'	-48'	128°	8°49'	-49'	128°	8°12'	-49'	129°	7°34'	-50'	129°	6°57'	-50'	129°	19
20	9°53'	-47'	129°	9°16'	-48'	129°	8°38'	-48'	129°	8°00'	-49'	129°	7°23'	-49'	129°	6°45'	-50'	129°	6°07'	-50'	129°	20
21	9°06'	-47'	129°	8°28'	-48'	129°	7°50'	-48'	129°	7°12'	-49'	130°	6°33'	-49'	130°	5°55'	-50'	130°	5°17'	-50'	130°	21
22	8°19'	-47'	130°	7°40'	-48'	130°	7°02'	-48'	130°	6°23'	-49'	130°	5°44'	-49'	130°	5°05'	-50'	130°	4°27'	-50'	130°	22
23	7°31'	-47'	130°	6°52'	-48'	131°	6°13'	-48'	131°	5°34'	-49'	131°	4°55'	-49'	131°	4°16'	-50'	131°	3°36'	-50'	131°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

55° 305° LHA — Latitude CONTRARY to DECLINATION — 55° 305° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

54° 306° LHA — Latitude CONTRARY to Declination — 54° 306° LHA

Dec°	42 Hc°	d'	Z°	43 Hc°	d'	Z°	44 Hc°	d'	Z°	45 Hc°	d'	Z°	46 Hc°	d'	Z°	47 Hc°	d'	Z°	48 Hc°	d'	Z°	Dec°
0	25°54'	-45'	116°	25°28'	-45'	116°	25°01'	-46'	117°	24°34'	-47'	117°	24°06'	-47'	118°	23°38'	-48'	118°	23°10'	-49'	118°	0
1	25°09'	-45'	117°	24°42'	-46'	117°	24°15'	-46'	117°	23°47'	-47'	118°	23°19'	-48'	118°	22°50'	-48'	119°	22°21'	-49'	119°	1
2	24°24'	-45'	117°	23°57'	-46'	118°	23°28'	-46'	118°	23°00'	-47'	119°	22°31'	-48'	119°	22°02'	-48'	119°	21°32'	-49'	120°	2
3	23°39'	-45'	118°	23°11'	-46'	118°	22°42'	-47'	119°	22°13'	-47'	119°	21°43'	-48'	120°	21°14'	-48'	120°	20°43'	-49'	120°	3
4	22°54'	-46'	119°	22°25'	-46'	119°	21°55'	-47'	120°	21°26'	-47'	120°	20°55'	-48'	120°	20°25'	-49'	121°	19°54'	-49'	121°	4
5	22°08'	-46'	120°	21°39'	-46'	120°	21°08'	-47'	120°	20°38'	-48'	121°	20°07'	-48'	121°	19°37'	-49'	121°	19°05'	-49'	121°	5
6	21°23'	-46'	120°	20°52'	-47'	121°	20°21'	-47'	121°	19°51'	-48'	121°	19°19'	-48'	122°	18°48'	-49'	122°	18°16'	-49'	122°	6
7	20°37'	-46'	121°	20°06'	-47'	121°	19°34'	-47'	122°	19°03'	-48'	122°	18°31'	-48'	122°	17°59'	-49'	122°	17°27'	-49'	123°	7
8	19°51'	-46'	122°	19°19'	-47'	122°	18°47'	-47'	122°	18°15'	-48'	122°	17°43'	-49'	123°	17°10'	-49'	123°	16°37'	-50'	123°	8
9	19°04'	-46'	122°	18°32'	-47'	123°	18°00'	-48'	123°	17°27'	-48'	123°	16°54'	-49'	123°	16°21'	-49'	124°	15°48'	-50'	124°	9
10	18°18'	-47'	123°	17°45'	-47'	123°	17°12'	-48'	123°	16°39'	-48'	124°	16°06'	-49'	124°	15°32'	-49'	124°	14°58'	-50'	124°	10
11	17°31'	-47'	124°	16°58'	-47'	124°	16°25'	-48'	124°	15°51'	-48'	124°	15°17'	-49'	125°	14°43'	-49'	125°	14°08'	-50'	125°	11
12	16°45'	-47'	124°	16°11'	-47'	125°	15°37'	-48'	125°	15°03'	-48'	125°	14°28'	-49'	125°	13°53'	-49'	125°	13°19'	-50'	126°	12
13	15°58'	-47'	125°	15°24'	-47'	125°	14°49'	-48'	125°	14°14'	-48'	126°	13°39'	-49'	126°	13°04'	-49'	126°	12°29'	-50'	126°	13
14	15°11'	-47'	126°	14°36'	-48'	126°	14°01'	-48'	126°	13°26'	-49'	126°	12°50'	-49'	126°	12°14'	-50'	127°	11°39'	-50'	127°	14
15	14°24'	-47'	126°	13°49'	-48'	126°	13°13'	-48'	127°	12°37'	-49'	127°	12°01'	-49'	127°	11°25'	-50'	127°	10°49'	-50'	127°	15
16	13°37'	-47'	127°	13°01'	-48'	127°	12°25'	-48'	127°	11°48'	-49'	127°	11°12'	-49'	128°	10°35'	-50'	128°	9°59'	-50'	128°	16
17	12°50'	-47'	127°	12°13'	-48'	128°	11°37'	-48'	128°	11°00'	-49'	128°	10°23'	-49'	128°	9°46'	-50'	128°	9°08'	-50'	128°	17
18	12°03'	-47'	128°	11°26'	-48'	128°	10°48'	-48'	128°	10°11'	-49'	129°	9°33'	-49'	129°	8°56'	-50'	129°	8°18'	-50'	129°	18
19	11°15'	-47'	129°	10°38'	-48'	129°	10°00'	-48'	129°	9°22'	-49'	129°	8°44'	-49'	129°	8°06'	-50'	129°	7°28'	-50'	130°	19
20	10°28'	-48'	129°	9°50'	-48'	130°	9°11'	-48'	130°	8°33'	-49'	130°	7°55'	-49'	130°	7°16'	-50'	130°	6°38'	-50'	130°	20
21	9°40'	-48'	130°	9°02'	-48'	130°	8°23'	-49'	130°	7°44'	-49'	130°	7°05'	-49'	130°	6°26'	-50'	131°	5°47'	-50'	131°	21
22	8°53'	-48'	131°	8°14'	-48'	131°	7°34'	-49'	131°	6°55'	-49'	131°	6°16'	-50'	131°	5°36'	-50'	131°	4°57'	-50'	131°	22
23	8°05'	-48'	131°	7°25'	-48'	131°	6°46'	-49'	131°	6°06'	-49'	132°	5°26'	-50'	132°	4°46'	-50'	132°	4°07'	-50'	132°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

54° 306° LHA — Latitude CONTRARY to DECLINATION — 54° 306° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

53° 307° LHA — Latitude CONTRARY to Declination — 53° 307° LHA

Dec°	42 Hc°	d'	Z°	43 Hc°	d'	Z°	44 Hc°	d'	Z°	45 Hc°	d'	Z°	46 Hc°	d'	Z°	47 Hc°	d'	Z°	48 Hc°	d'	Z°	Dec°
0	26°34'	-45'	117°	26°07'	-46'	117°	25°39'	-46'	118°	25°11'	-47'	118°	24°43'	-48'	118°	24°14'	-48'	119°	23°45'	-49'	119°	0
1	25°49'	-45'	117°	25°21'	-46'	118°	24°53'	-47'	118°	24°24'	-47'	119°	23°55'	-48'	119°	23°26'	-48'	120°	22°56'	-49'	120°	1
2	25°04'	-45'	118°	24°35'	-46'	119°	24°06'	-47'	119°	23°37'	-47'	119°	23°07'	-48'	120°	22°37'	-49'	120°	22°07'	-49'	121°	2
3	24°18'	-46'	119°	23°49'	-46'	119°	23°20'	-47'	120°	22°50'	-47'	120°	22°19'	-48'	120°	21°49'	-49'	121°	21°18'	-49'	121°	3
4	23°33'	-46'	120°	23°03'	-46'	120°	22°33'	-47'	120°	22°02'	-48'	121°	21°31'	-48'	121°	21°00'	-49'	121°	20°29'	-49'	122°	4
5	22°47'	-46'	120°	22°16'	-47'	121°	21°46'	-47'	121°	21°14'	-48'	121°	20°43'	-48'	122°	20°11'	-49'	122°	19°39'	-49'	122°	5
6	22°01'	-46'	121°	21°30'	-47'	121°	20°58'	-47'	122°	20°27'	-48'	122°	19°55'	-49'	122°	19°22'	-49'	123°	18°50'	-50'	123°	6
7	21°15'	-46'	122°	20°43'	-47'	122°	20°11'	-48'	122°	19°39'	-48'	123°	19°06'	-49'	123°	18°33'	-49'	123°	18°00'	-50'	124°	7
8	20°28'	-47'	122°	19°56'	-47'	123°	19°23'	-48'	123°	18°51'	-48'	123°	18°18'	-49'	124°	17°44'	-49'	124°	17°11'	-50'	124°	8
9	19°42'	-47'	123°	19°09'	-47'	123°	18°36'	-48'	124°	18°02'	-48'	124°	17°29'	-49'	124°	16°55'	-49'	124°	16°21'	-50'	125°	9
10	18°55'	-47'	124°	18°22'	-47'	124°	17°48'	-48'	124°	17°14'	-48'	125°	16°40'	-49'	125°	16°06'	-49'	125°	15°31'	-50'	125°	10
11	18°08'	-47'	124°	17°34'	-47'	125°	17°00'	-48'	125°	16°26'	-49'	125°	15°51'	-49'	125°	15°16'	-50'	126°	14°41'	-50'	126°	11
12	17°21'	-47'	125°	16°47'	-48'	125°	16°12'	-48'	126°	15°37'	-49'	126°	15°02'	-49'	126°	14°27'	-50'	126°	13°51'	-50'	126°	12
13	16°34'	-47'	126°	15°59'	-48'	126°	15°24'	-48'	126°	14°48'	-49'	126°	14°13'	-49'	127°	13°37'	-50'	127°	13°01'	-50'	127°	13
14	15°47'	-47'	126°	15°12'	-48'	127°	14°36'	-48'	127°	14°00'	-49'	127°	13°24'	-49'	127°	12°47'	-50'	127°	12°11'	-50'	128°	14
15	15°00'	-47'	127°	14°24'	-48'	127°	13°47'	-48'	127°	13°11'	-49'	128°	12°34'	-49'	128°	11°57'	-50'	128°	11°20'	-50'	128°	15
16	14°13'	-47'	128°	13°36'	-48'	128°	12°59'	-49'	128°	12°22'	-49'	128°	11°45'	-49'	128°	11°07'	-50'	129°	10°30'	-50'	129°	16
17	13°25'	-48'	128°	12°48'	-48'	128°	12°10'	-49'	129°	11°33'	-49'	129°	10°55'	-50'	129°	10°18'	-50'	129°	9°40'	-50'	129°	17
18	12°38'	-48'	129°	12°00'	-48'	129°	11°22'	-49'	129°	10°44'	-49'	129°	10°06'	-50'	130°	9°28'	-50'	130°	8°49'	-50'	130°	18
19	11°50'	-48'	130°	11°12'	-48'	130°	10°33'	-49'	130°	9°55'	-49'	130°	9°16'	-50'	130°	8°38'	-50'	130°	7°59'	-51'	130°	19
20	11°02'	-48'	130°	10°23'	-48'	130°	9°45'	-49'	130°	9°06'	-49'	131°	8°27'	-50'	131°	7°47'	-50'	131°	7°08'	-51'	131°	20
21	10°14'	-48'	131°	9°35'	-48'	131°	8°56'	-49'	131°	8°16'	-49'	131°	7°37'	-50'	131°	6°57'	-50'	131°	6°18'	-51'	131°	21
22	9°26'	-48'	131°	8°47'	-48'	131°	8°07'	-49'	132°	7°27'	-49'	132°	6°47'	-50'	132°	6°07'	-50'	132°	5°27'	-51'	132°	22
23	8°38'	-48'	132°	7°58'	-48'	132°	7°18'	-49'	132°	6°38'	-49'	132°	5°57'	-50'	132°	5°17'	-50'	132°	4°36'	-51'	132°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

53° 307° LHA — Latitude CONTRARY to DECLINATION — 53° 307° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

52° 308° LHA — Latitude CONTRARY to Declination — 52° 308° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	27°14'	-45'	118°	26°46'	-46'	118°	26°17'	-47'	118°	25°48'	-47'	119°	25°19'	-48'	119°	24°50'	-48'	120°	24°20'	-49'	120°	0
1	26°28'	-45'	118°	26°00'	-46'	119°	25°31'	-47'	119°	25°01'	-47'	120°	24°31'	-48'	120°	24°01'	-49'	120°	23°31'	-49'	121°	1
2	25°43'	-46'	119°	25°14'	-46'	119°	24°44'	-47'	120°	24°14'	-48'	120°	23°43'	-48'	121°	23°13'	-49'	121°	22°41'	-49'	121°	2
3	24°57'	-46'	120°	24°27'	-47'	120°	23°57'	-47'	121°	23°26'	-48'	121°	22°55'	-48'	121°	22°24'	-49'	122°	21°52'	-49'	122°	3
4	24°11'	-46'	120°	23°41'	-47'	121°	23°10'	-47'	121°	22°38'	-48'	122°	22°07'	-48'	122°	21°35'	-49'	122°	21°03'	-50'	123°	4
5	23°25'	-46'	121°	22°54'	-47'	122°	22°22'	-47'	122°	21°51'	-48'	122°	21°18'	-49'	123°	20°46'	-49'	123°	20°13'	-50'	123°	5
6	22°39'	-46'	122°	22°07'	-47'	122°	21°35'	-48'	123°	21°02'	-48'	123°	20°30'	-49'	123°	19°57'	-49'	124°	19°23'	-50'	124°	6
7	21°52'	-47'	123°	21°20'	-47'	123°	20°47'	-48'	123°	20°14'	-48'	124°	19°41'	-49'	124°	19°07'	-49'	124°	18°34'	-50'	124°	7
8	21°06'	-47'	123°	20°33'	-47'	124°	19°59'	-48'	124°	19°26'	-48'	124°	18°52'	-49'	124°	18°18'	-50'	125°	17°44'	-50'	125°	8
9	20°19'	-47'	124°	19°45'	-48'	124°	19°12'	-48'	125°	18°37'	-49'	125°	18°03'	-49'	125°	17°29'	-50'	125°	16°54'	-50'	126°	9
10	19°32'	-47'	125°	18°58'	-48'	125°	18°24'	-48'	125°	17°49'	-49'	125°	17°14'	-49'	126°	16°39'	-50'	126°	16°04'	-50'	126°	10
11	18°45'	-47'	125°	18°10'	-48'	125°	17°35'	-48'	126°	17°00'	-49'	126°	16°25'	-49'	126°	15°49'	-50'	126°	15°13'	-50'	127°	11
12	17°58'	-47'	126°	17°23'	-48'	126°	16°47'	-48'	126°	16°11'	-49'	127°	15°35'	-49'	127°	14°59'	-50'	127°	14°23'	-50'	127°	12
13	17°10'	-47'	127°	16°35'	-48'	127°	15°59'	-49'	127°	15°22'	-49'	127°	14°46'	-50'	127°	14°09'	-50'	128°	13°33'	-50'	128°	13
14	16°23'	-48'	127°	15°47'	-48'	127°	15°10'	-49'	128°	14°33'	-49'	128°	13°57'	-50'	128°	13°20'	-50'	128°	12°42'	-51'	128°	14
15	15°35'	-48'	128°	14°59'	-48'	128°	14°22'	-49'	128°	13°44'	-49'	128°	13°07'	-50'	129°	12°29'	-50'	129°	11°52'	-51'	129°	15
16	14°48'	-48'	128°	14°10'	-48'	129°	13°33'	-49'	129°	12°55'	-49'	129°	12°17'	-50'	129°	11°39'	-50'	129°	11°01'	-51'	129°	16
17	14°00'	-48'	129°	13°22'	-48'	129°	12°44'	-49'	129°	12°06'	-49'	130°	11°28'	-50'	130°	10°49'	-50'	130°	10°11'	-51'	130°	17
18	13°12'	-48'	130°	12°34'	-48'	130°	11°55'	-49'	130°	11°17'	-49'	130°	10°38'	-50'	130°	9°59'	-50'	130°	9°20'	-51'	131°	18
19	12°24'	-48'	130°	11°45'	-49'	130°	11°06'	-49'	131°	10°27'	-49'	131°	9°48'	-50'	131°	9°09'	-50'	131°	8°29'	-51'	131°	19
20	11°36'	-48'	131°	10°57'	-49'	131°	10°17'	-49'	131°	9°38'	-50'	131°	8°58'	-50'	131°	8°18'	-50'	132°	7°38'	-51'	132°	20
21	10°48'	-48'	132°	10°08'	-49'	132°	9°28'	-49'	132°	8°48'	-50'	132°	8°08'	-50'	132°	7°28'	-50'	132°	6°48'	-51'	132°	21
22	10°00'	-48'	132°	9°19'	-49'	132°	8°39'	-49'	132°	7°59'	-50'	132°	7°18'	-50'	133°	6°37'	-50'	133°	5°57'	-51'	133°	22
23	9°11'	-48'	133°	8°31'	-49'	133°	7°50'	-49'	133°	7°09'	-50'	133°	6°28'	-50'	133°	5°47'	-51'	133°	5°06'	-51'	133°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

52° 308° LHA — Latitude CONTRARY to DECLINATION — 52° 308° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

51° 309° LHA — Latitude CONTRARY to Declination — 51° 309° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	27°53'	-46'	118°	27°24'	-46'	119°	26°55'	-47'	119°	26°25'	-47'	120°	25°55'	-48'	120°	25°25'	-49'	121°	24°54'	-49'	121°	0
1	27°07'	-46'	119°	26°38'	-46'	120°	26°08'	-47'	120°	25°38'	-48'	120°	25°07'	-48'	121°	24°36'	-49'	121°	24°05'	-49'	122°	1
2	26°22'	-46'	120°	25°52'	-47'	120°	25°21'	-47'	121°	24°50'	-48'	121°	24°19'	-48'	122°	23°47'	-49'	122°	23°16'	-50'	122°	2
3	25°36'	-46'	121°	25°05'	-47'	121°	24°34'	-47'	121°	24°02'	-48'	122°	23°31'	-49'	122°	22°59'	-49'	123°	22°26'	-50'	123°	3
4	24°50'	-46'	121°	24°18'	-47'	122°	23°46'	-48'	122°	23°14'	-48'	122°	22°42'	-49'	123°	22°09'	-49'	123°	21°36'	-50'	124°	4
5	24°03'	-47'	122°	23°31'	-47'	122°	22°59'	-48'	123°	22°26'	-48'	123°	21°53'	-49'	123°	21°20'	-49'	124°	20°47'	-50'	124°	5
6	23°17'	-47'	123°	22°44'	-47'	123°	22°11'	-48'	123°	21°38'	-48'	124°	21°04'	-49'	124°	20°31'	-50'	124°	19°57'	-50'	125°	6
7	22°30'	-47'	123°	21°57'	-47'	124°	21°23'	-48'	124°	20°49'	-49'	124°	20°15'	-49'	125°	19°41'	-50'	125°	19°07'	-50'	125°	7
8	21°43'	-47'	124°	21°09'	-48'	124°	20°35'	-48'	125°	20°01'	-49'	125°	19°26'	-49'	125°	18°52'	-50'	126°	18°16'	-50'	126°	8
9	20°56'	-47'	125°	20°22'	-48'	125°	19°47'	-48'	125°	19°12'	-49'	126°	18°37'	-49'	126°	18°02'	-50'	126°	17°26'	-50'	126°	9
10	20°09'	-47'	125°	19°34'	-48'	126°	18°59'	-48'	126°	18°23'	-49'	126°	17°48'	-49'	127°	17°12'	-50'	127°	16°36'	-50'	127°	10
11	19°21'	-48'	126°	18°46'	-48'	126°	18°10'	-49'	127°	17°34'	-49'	127°	16°58'	-50'	127°	16°22'	-50'	127°	15°45'	-51'	128°	11
12	18°34'	-48'	127°	17°58'	-48'	127°	17°22'	-49'	127°	16°45'	-49'	127°	16°09'	-50'	128°	15°32'	-50'	128°	14°55'	-51'	128°	12
13	17°46'	-48'	127°	17°10'	-48'	128°	16°33'	-49'	128°	15°56'	-49'	128°	15°19'	-50'	128°	14°42'	-50'	128°	14°04'	-51'	129°	13
14	16°58'	-48'	128°	16°21'	-48'	128°	15°44'	-49'	128°	15°07'	-49'	129°	14°29'	-50'	129°	13°51'	-50'	129°	13°14'	-51'	129°	14
15	16°10'	-48'	129°	15°33'	-48'	129°	14°55'	-49'	129°	14°17'	-49'	129°	13°39'	-50'	129°	13°01'	-50'	130°	12°23'	-51'	130°	15
16	15°22'	-48'	129°	14°44'	-49'	129°	14°06'	-49'	130°	13°28'	-50'	130°	12°49'	-50'	130°	12°11'	-50'	130°	11°32'	-51'	130°	16
17	14°34'	-48'	130°	13°56'	-49'	130°	13°17'	-49'	130°	12°38'	-50'	130°	11°59'	-50'	131°	11°20'	-51'	131°	10°41'	-51'	131°	17
18	13°46'	-48'	130°	13°07'	-49'	131°	12°28'	-49'	131°	11°49'	-50'	131°	11°09'	-50'	131°	10°30'	-51'	131°	9°50'	-51'	131°	18
19	12°58'	-48'	131°	12°18'	-49'	131°	11°39'	-49'	131°	10°59'	-50'	132°	10°19'	-50'	132°	9°39'	-51'	132°	8°59'	-51'	132°	19
20	12°10'	-48'	132°	11°30'	-49'	132°	10°49'	-49'	132°	10°09'	-50'	132°	9°29'	-50'	132°	8°49'	-51'	132°	8°08'	-51'	132°	20
21	11°21'	-49'	132°	10°41'	-49'	132°	10°00'	-49'	133°	9°20'	-50'	133°	8°39'	-50'	133°	7°58'	-51'	133°	7°17'	-51'	133°	21
22	10°33'	-49'	133°	9°52'	-49'	133°	9°11'	-49'	133°	8°30'	-50'	133°	7°49'	-50'	133°	7°07'	-51'	133°	6°26'	-51'	134°	22
23	9°44'	-49'	133°	9°03'	-49'	134°	8°21'	-50'	134°	7°40'	-50'	134°	6°58'	-50'	134°	6°17'	-51'	134°	5°35'	-51'	134°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

51° 309° LHA — Latitude CONTRARY to DECLINATION — 51° 309° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

50° 310° LHA — Latitude CONTRARY to Declination — 50° 310° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	28°32'	-46'	119°	28°02'	-46'	120°	27°32'	-47'	120°	27°02'	-48'	121°	26°31'	-48'	121°	26°00'	-49'	122°	25°28'	-49'	122°	0
1	27°46'	-46'	120°	27°16'	-47'	120°	26°45'	-47'	121°	26°14'	-48'	121°	25°43'	-49'	122°	25°11'	-49'	122°	24°39'	-50'	123°	1
2	27°00'	-46'	121°	26°29'	-47'	121°	25°58'	-48'	122°	25°26'	-48'	122°	24°54'	-49'	122°	24°22'	-49'	123°	23°49'	-50'	123°	2
3	26°14'	-46'	121°	25°42'	-47'	122°	25°11'	-48'	122°	24°38'	-48'	123°	24°06'	-49'	123°	23°33'	-49'	123°	23°00'	-50'	124°	3
4	25°27'	-47'	122°	24°55'	-47'	123°	24°23'	-48'	123°	23°50'	-48'	123°	23°17'	-49'	124°	22°43'	-50'	124°	22°10'	-50'	124°	4
5	24°41'	-47'	123°	24°08'	-47'	123°	23°35'	-48'	124°	23°02'	-49'	124°	22°28'	-49'	124°	21°54'	-50'	125°	21°20'	-50'	125°	5
6	23°54'	-47'	124°	23°21'	-48'	124°	22°47'	-48'	124°	22°13'	-49'	125°	21°39'	-49'	125°	21°04'	-50'	125°	20°30'	-50'	126°	6
7	23°07'	-47'	124°	22°33'	-48'	125°	21°59'	-48'	125°	21°24'	-49'	125°	20°50'	-49'	126°	20°15'	-50'	126°	19°39'	-50'	126°	7
8	22°20'	-47'	125°	21°45'	-48'	125°	21°10'	-48'	126°	20°35'	-49'	126°	20°00'	-50'	126°	19°25'	-50'	126°	18°49'	-50'	127°	8
9	21°32'	-48'	126°	20°57'	-48'	126°	20°22'	-49'	126°	19°46'	-49'	126°	19°11'	-50'	127°	18°35'	-50'	127°	17°58'	-51'	127°	9
10	20°45'	-48'	126°	20°09'	-48'	127°	19°33'	-49'	127°	18°57'	-49'	127°	18°21'	-50'	127°	17°44'	-50'	128°	17°08'	-51'	128°	10
11	19°57'	-48'	127°	19°21'	-48'	127°	18°45'	-49'	127°	18°08'	-49'	128°	17°31'	-50'	128°	16°54'	-50'	128°	16°17'	-51'	128°	11
12	19°09'	-48'	128°	18°33'	-48'	128°	17°56'	-49'	128°	17°19'	-49'	128°	16°41'	-50'	129°	16°04'	-50'	129°	15°26'	-51'	129°	12
13	18°21'	-48'	128°	17°44'	-49'	128°	17°07'	-49'	129°	16°29'	-50'	129°	15°51'	-50'	129°	15°14'	-50'	129°	14°35'	-51'	130°	13
14	17°33'	-48'	129°	16°56'	-49'	129°	16°18'	-49'	129°	15°40'	-50'	129°	15°01'	-50'	130°	14°23'	-51'	130°	13°45'	-51'	130°	14
15	16°45'	-48'	129°	16°07'	-49'	130°	15°29'	-49'	130°	14°50'	-50'	130°	14°11'	-50'	130°	13°33'	-51'	130°	12°54'	-51'	131°	15
16	15°57'	-48'	130°	15°18'	-49'	130°	14°39'	-49'	130°	14°00'	-50'	131°	13°21'	-50'	131°	12°42'	-51'	131°	12°02'	-51'	131°	16
17	15°08'	-49'	131°	14°29'	-49'	131°	13°50'	-49'	131°	13°10'	-50'	131°	12°31'	-50'	131°	11°51'	-51'	132°	11°11'	-51'	132°	17
18	14°20'	-49'	131°	13°40'	-49'	131°	13°00'	-50'	132°	12°21'	-50'	132°	11°41'	-50'	132°	11°00'	-51'	132°	10°20'	-51'	132°	18
19	13°31'	-49'	132°	12°51'	-49'	132°	12°11'	-50'	132°	11°31'	-50'	132°	10°50'	-50'	132°	10°10'	-51'	133°	9°29'	-51'	133°	19
20	12°43'	-49'	132°	12°02'	-49'	133°	11°21'	-50'	133°	10°41'	-50'	133°	10°00'	-51'	133°	9°19'	-51'	133°	8°38'	-51'	133°	20
21	11°54'	-49'	133°	11°13'	-49'	133°	10°32'	-50'	133°	9°51'	-50'	133°	9°09'	-51'	134°	8°28'	-51'	134°	7°46'	-51'	134°	21
22	11°05'	-49'	134°	10°24'	-49'	134°	9°42'	-50'	134°	9°00'	-50'	134°	8°19'	-51'	134°	7°37'	-51'	134°	6°55'	-51'	134°	22
23	10°16'	-49'	134°	9°34'	-49'	134°	8°52'	-50'	134°	8°10'	-50'	135°	7°28'	-51'	135°	6°46'	-51'	135°	6°04'	-51'	135°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

50° 310° LHA — Latitude CONTRARY to DECLINATION — 50° 310° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

49° 311° LHA — Latitude CONTRARY to Declination — 49° 311° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	29°11'	-46'	120°	28°40'	-47'	121°	28°10'	-47'	121°	27°38'	-48'	122°	27°07'	-49'	122°	26°35'	-49'	122°	26°02'	-50'	123°	0
1	28°25'	-46'	121°	27°54'	-47'	121°	27°22'	-48'	122°	26°50'	-48'	122°	26°18'	-49'	123°	25°46'	-49'	123°	25°13'	-50'	123°	1
2	27°38'	-47'	122°	27°07'	-47'	122°	26°35'	-48'	123°	26°02'	-48'	123°	25°29'	-49'	123°	24°56'	-49'	124°	24°23'	-50'	124°	2
3	26°52'	-47'	122°	26°19'	-47'	123°	25°47'	-48'	123°	25°14'	-49'	124°	24°40'	-49'	124°	24°07'	-50'	124°	23°33'	-50'	125°	3
4	26°05'	-47'	123°	25°32'	-48'	123°	24°59'	-48'	124°	24°25'	-49'	124°	23°51'	-49'	125°	23°17'	-50'	125°	22°43'	-50'	125°	4
5	25°18'	-47'	124°	24°45'	-48'	124°	24°11'	-48'	124°	23°37'	-49'	125°	23°02'	-49'	125°	22°27'	-50'	126°	21°52'	-50'	126°	5
6	24°31'	-47'	124°	23°57'	-48'	125°	23°22'	-48'	125°	22°48'	-49'	125°	22°13'	-50'	126°	21°38'	-50'	126°	21°02'	-51'	126°	6
7	23°44'	-48'	125°	23°09'	-48'	125°	22°34'	-49'	126°	21°59'	-49'	126°	21°23'	-50'	126°	20°47'	-50'	127°	20°11'	-51'	127°	7
8	22°56'	-48'	126°	22°21'	-48'	126°	21°45'	-49'	126°	21°10'	-49'	127°	20°34'	-50'	127°	19°57'	-50'	127°	19°21'	-51'	128°	8
9	22°08'	-48'	126°	21°33'	-48'	127°	20°57'	-49'	127°	20°20'	-49'	127°	19°44'	-50'	128°	19°07'	-50'	128°	18°30'	-51'	128°	9
10	21°21'	-48'	127°	20°44'	-49'	127°	20°08'	-49'	128°	19°31'	-50'	128°	18°54'	-50'	128°	18°17'	-50'	128°	17°39'	-51'	129°	10
11	20°33'	-48'	128°	19°56'	-49'	128°	19°19'	-49'	128°	18°41'	-50'	129°	18°04'	-50'	129°	17°26'	-51'	129°	16°48'	-51'	129°	11
12	19°44'	-48'	128°	19°07'	-49'	129°	18°30'	-49'	129°	17°52'	-50'	129°	17°14'	-50'	129°	16°36'	-51'	130°	15°57'	-51'	130°	12
13	18°56'	-48'	129°	18°18'	-49'	129°	17°40'	-49'	129°	17°02'	-50'	130°	16°24'	-50'	130°	15°45'	-51'	130°	15°06'	-51'	130°	13
14	18°08'	-48'	130°	17°30'	-49'	130°	16°51'	-49'	130°	16°12'	-50'	130°	15°33'	-50'	131°	14°54'	-51'	131°	14°15'	-51'	131°	14
15	17°19'	-49'	130°	16°41'	-49'	130°	16°02'	-50'	131°	15°22'	-50'	131°	14°43'	-50'	131°	14°03'	-51'	131°	13°24'	-51'	131°	15
16	16°31'	-49'	131°	15°51'	-49'	131°	15°12'	-50'	131°	14°32'	-50'	131°	13°53'	-51'	132°	13°13'	-51'	132°	12°32'	-51'	132°	16
17	15°42'	-49'	131°	15°02'	-49'	132°	14°22'	-50'	132°	13°42'	-50'	132°	13°02'	-51'	132°	12°22'	-51'	132°	11°41'	-51'	133°	17
18	14°53'	-49'	132°	14°13'	-49'	132°	13°33'	-50'	132°	12°52'	-50'	133°	12°11'	-51'	133°	11°31'	-51'	133°	10°50'	-51'	133°	18
19	14°04'	-49'	133°	13°24'	-49'	133°	12°43'	-50'	133°	12°02'	-50'	133°	11°21'	-51'	133°	10°39'	-51'	133°	9°58'	-52'	134°	19
20	13°15'	-49'	133°	12°34'	-50'	133°	11°53'	-50'	134°	11°11'	-50'	134°	10°30'	-51'	134°	9°48'	-51'	134°	9°07'	-52'	134°	20
21	12°26'	-49'	134°	11°45'	-50'	134°	11°03'	-50'	134°	10°21'	-50'	134°	9°39'	-51'	134°	8°57'	-51'	134°	8°15'	-52'	135°	21
22	11°37'	-49'	134°	10°55'	-50'	135°	10°13'	-50'	135°	9°31'	-50'	135°	8°48'	-51'	135°	8°06'	-51'	135°	7°23'	-52'	135°	22
23	10°48'	-49'	135°	10°05'	-50'	135°	9°23'	-50'	135°	8°40'	-51'	135°	7°57'	-51'	135°	7°15'	-51'	136°	6°32'	-52'	136°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

49° 311° LHA — Latitude CONTRARY to DECLINATION — 49° 311° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

48° 312° LHA — Latitude CONTRARY to Declination — 48° 312° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	29°49'	-46'	121°	29°18'	-47'	122°	28°46'	-48'	122°	28°14'	-48'	122°	27°42'	-49'	123°	27°09'	-49'	123°	26°36'	-50'	124°	0
1	29°03'	-47'	122°	28°31'	-47'	122°	27°59'	-48'	123°	27°26'	-48'	123°	26°53'	-49'	124°	26°20'	-50'	124°	25°46'	-50'	124°	1
2	28°16'	-47'	123°	27°44'	-47'	123°	27°11'	-48'	123°	26°38'	-49'	124°	26°04'	-49'	124°	25°30'	-50'	125°	24°56'	-50'	125°	2
3	27°29'	-47'	123°	26°56'	-48'	124°	26°23'	-48'	124°	25°49'	-49'	124°	25°15'	-49'	125°	24°40'	-50'	125°	24°06'	-50'	126°	3
4	26°42'	-47'	124°	26°09'	-48'	124°	25°35'	-48'	125°	25°00'	-49'	125°	24°26'	-49'	125°	23°51'	-50'	126°	23°15'	-51'	126°	4
5	25°55'	-47'	125°	25°21'	-48'	125°	24°46'	-49'	125°	24°11'	-49'	126°	23°36'	-50'	126°	23°01'	-50'	126°	22°25'	-51'	127°	5
6	25°07'	-48'	125°	24°33'	-48'	126°	23°58'	-49'	126°	23°22'	-49'	126°	22°46'	-50'	127°	22°10'	-50'	127°	21°34'	-51'	127°	6
7	24°20'	-48'	126°	23°44'	-48'	126°	23°09'	-49'	127°	22°33'	-49'	127°	21°57'	-50'	127°	21°20'	-50'	128°	20°43'	-51'	128°	7
8	23°32'	-48'	127°	22°56'	-49'	127°	22°20'	-49'	127°	21°43'	-50'	128°	21°07'	-50'	128°	20°30'	-51'	128°	19°52'	-51'	129°	8
9	22°44'	-48'	127°	22°08'	-49'	128°	21°31'	-49'	128°	20°54'	-50'	128°	20°17'	-50'	129°	19°39'	-51'	129°	19°01'	-51'	129°	9
10	21°56'	-48'	128°	21°19'	-49'	128°	20°42'	-49'	129°	20°04'	-50'	129°	19°26'	-50'	129°	18°49'	-51'	129°	18°10'	-51'	130°	10
11	21°08'	-48'	129°	20°30'	-49'	129°	19°52'	-49'	129°	19°14'	-50'	129°	18°36'	-50'	130°	17°58'	-51'	130°	17°19'	-51'	130°	11
12	20°19'	-49'	129°	19°41'	-49'	129°	19°03'	-50'	130°	18°25'	-50'	130°	17°46'	-50'	130°	17°07'	-51'	130°	16°28'	-51'	131°	12
13	19°31'	-49'	130°	18°52'	-49'	130°	18°13'	-50'	130°	17°35'	-50'	131°	16°55'	-51'	131°	16°16'	-51'	131°	15°37'	-51'	131°	13
14	18°42'	-49'	130°	18°03'	-49'	131°	17°24'	-50'	131°	16°44'	-50'	131°	16°05'	-51'	131°	15°25'	-51'	132°	14°45'	-51'	132°	14
15	17°53'	-49'	131°	17°14'	-49'	131°	16°34'	-50'	132°	15°54'	-50'	132°	15°14'	-51'	132°	14°34'	-51'	132°	13°54'	-52'	132°	15
16	17°04'	-49'	132°	16°24'	-49'	132°	15°44'	-50'	132°	15°04'	-50'	132°	14°23'	-51'	132°	13°43'	-51'	133°	13°02'	-52'	133°	16
17	16°15'	-49'	132°	15°35'	-50'	132°	14°54'	-50'	133°	14°14'	-50'	133°	13°33'	-51'	133°	12°52'	-51'	133°	12°10'	-52'	133°	17
18	15°26'	-49'	133°	14°45'	-50'	133°	14°04'	-50'	133°	13°23'	-51'	133°	12°42'	-51'	134°	12°00'	-51'	134°	11°19'	-52'	134°	18
19	14°37'	-49'	133°	13°56'	-50'	134°	13°14'	-50'	134°	12°33'	-51'	134°	11°51'	-51'	134°	11°09'	-51'	134°	10°27'	-52'	134°	19
20	13°48'	-49'	134°	13°06'	-50'	134°	12°24'	-50'	134°	11°42'	-51'	135°	11°00'	-51'	135°	10°18'	-51'	135°	9°35'	-52'	135°	20
21	12°58'	-49'	135°	12°16'	-50'	135°	11°34'	-50'	135°	10°51'	-51'	135°	10°09'	-51'	135°	9°26'	-51'	135°	8°43'	-52'	135°	21
22	12°09'	-50'	135°	11°26'	-50'	135°	10°43'	-50'	135°	10°01'	-51'	136°	9°18'	-51'	136°	8°35'	-52'	136°	7°52'	-52'	136°	22
23	11°19'	-50'	136°	10°36'	-50'	136°	9°53'	-50'	136°	9°10'	-51'	136°	8°26'	-51'	136°	7°43'	-52'	136°	7°00'	-52'	136°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

48° 312° LHA — Latitude CONTRARY to DECLINATION — 48° 312° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

47° 313° LHA — Latitude CONTRARY to Declination — 47° 313° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	30°27'	-47'	122°	29°55'	-47'	122°	29°23'	-48'	123°	28°50'	-49'	123°	28°17'	-49'	124°	27°43'	-50'	124°	27°09'	-50'	125°	0
1	29°40'	-47'	123°	29°08'	-48'	123°	28°35'	-48'	124°	28°01'	-49'	124°	27°28'	-49'	125°	26°53'	-50'	125°	26°19'	-50'	125°	1
2	28°54'	-47'	123°	28°20'	-48'	124°	27°47'	-48'	124°	27°13'	-49'	125°	26°38'	-49'	125°	26°04'	-50'	126°	25°29'	-50'	126°	2
3	28°06'	-47'	124°	27°33'	-48'	125°	26°58'	-49'	125°	26°24'	-49'	125°	25°49'	-50'	126°	25°14'	-50'	126°	24°38'	-51'	127°	3
4	27°19'	-48'	125°	26°45'	-48'	125°	26°10'	-49'	126°	25°35'	-49'	126°	24°59'	-50'	126°	24°24'	-50'	127°	23°47'	-51'	127°	4
5	26°31'	-48'	125°	25°56'	-48'	126°	25°21'	-49'	126°	24°45'	-49'	127°	24°09'	-50'	127°	23°33'	-50'	127°	22°57'	-51'	128°	5
6	25°44'	-48'	126°	25°08'	-48'	127°	24°32'	-49'	127°	23°56'	-50'	127°	23°20'	-50'	128°	22°43'	-51'	128°	22°06'	-51'	128°	6
7	24°56'	-48'	127°	24°20'	-49'	127°	23°43'	-49'	128°	23°07'	-50'	128°	22°30'	-50'	128°	21°52'	-51'	129°	21°15'	-51'	129°	7
8	24°08'	-48'	127°	23°31'	-49'	128°	22°54'	-49'	128°	22°17'	-50'	128°	21°39'	-50'	129°	21°02'	-51'	129°	20°24'	-51'	129°	8
9	23°19'	-48'	128°	22°42'	-49'	128°	22°05'	-49'	129°	21°27'	-50'	129°	20°49'	-50'	129°	20°11'	-51'	130°	19°32'	-51'	130°	9
10	22°31'	-49'	129°	21°53'	-49'	129°	21°15'	-50'	129°	20°37'	-50'	130°	19°59'	-51'	130°	19°20'	-51'	130°	18°41'	-51'	131°	10
11	21°42'	-49'	129°	21°04'	-49'	130°	20°26'	-50'	130°	19°47'	-50'	130°	19°08'	-51'	131°	18°29'	-51'	131°	17°50'	-52'	131°	11
12	20°54'	-49'	130°	20°15'	-49'	130°	19°36'	-50'	131°	18°57'	-50'	131°	18°17'	-51'	131°	17°38'	-51'	131°	16°58'	-52'	132°	12
13	20°05'	-49'	131°	19°26'	-49'	131°	18°46'	-50'	131°	18°07'	-50'	131°	17°27'	-51'	132°	16°47'	-51'	132°	16°07'	-52'	132°	13
14	19°16'	-49'	131°	18°36'	-50'	132°	17°56'	-50'	132°	17°16'	-50'	132°	16°36'	-51'	132°	15°55'	-51'	132°	15°15'	-52'	133°	14
15	18°27'	-49'	132°	17°46'	-50'	132°	17°06'	-50'	132°	16°26'	-51'	133°	15°45'	-51'	133°	15°04'	-51'	133°	14°23'	-52'	133°	15
16	17°37'	-49'	132°	16°57'	-50'	133°	16°16'	-50'	133°	15°35'	-51'	133°	14°54'	-51'	133°	14°13'	-51'	134°	13°31'	-52'	134°	16
17	16°48'	-49'	133°	16°07'	-50'	133°	15°26'	-50'	133°	14°44'	-51'	134°	14°03'	-51'	134°	13°21'	-52'	134°	12°39'	-52'	134°	17
18	15°59'	-50'	134°	15°17'	-50'	134°	14°35'	-50'	134°	13°54'	-51'	134°	13°12'	-51'	134°	12°30'	-52'	135°	11°48'	-52'	135°	18
19	15°09'	-50'	134°	14°27'	-50'	134°	13°45'	-50'	135°	13°03'	-51'	135°	12°21'	-51'	135°	11°38'	-52'	135°	10°56'	-52'	135°	19
20	14°19'	-50'	135°	13°37'	-50'	135°	12°55'	-51'	135°	12°12'	-51'	135°	11°29'	-51'	135°	10°46'	-52'	136°	10°04'	-52'	136°	20
21	13°30'	-50'	135°	12°47'	-50'	136°	12°04'	-51'	136°	11°21'	-51'	136°	10°38'	-51'	136°	9°55'	-52'	136°	9°11'	-52'	136°	21
22	12°40'	-50'	136°	11°57'	-50'	136°	11°13'	-51'	136°	10°30'	-51'	136°	9°47'	-51'	137°	9°03'	-52'	137°	8°19'	-52'	137°	22
23	11°50'	-50'	137°	11°06'	-50'	137°	10°23'	-51'	137°	9°39'	-51'	137°	8°55'	-51'	137°	8°11'	-52'	137°	7°27'	-52'	137°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

47° 313° LHA — Latitude CONTRARY to DECLINATION — 47° 313° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

46° 314° LHA — Latitude CONTRARY to Declination — 46° 314° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	31°05'	-47'	123°	30°32'	-48'	123°	29°59'	-48'	124°	29°25'	-49'	124°	28°51'	-49'	125°	28°17'	-50'	125°	27°42'	-50'	126°	0
1	30°18'	-47'	124°	29°44'	-48'	124°	29°11'	-48'	125°	28°36'	-49'	125°	28°02'	-50'	125°	27°27'	-50'	126°	26°51'	-51'	126°	1
2	29°31'	-47'	124°	28°57'	-48'	125°	28°22'	-49'	125°	27°47'	-49'	126°	27°12'	-50'	126°	26°37'	-50'	126°	26°01'	-51'	127°	2
3	28°43'	-48'	125°	28°08'	-48'	125°	27°34'	-49'	126°	26°58'	-49'	126°	26°22'	-50'	127°	25°46'	-50'	127°	25°10'	-51'	127°	3
4	27°55'	-48'	126°	27°20'	-48'	126°	26°45'	-49'	127°	26°09'	-50'	127°	25°33'	-50'	127°	24°56'	-51'	128°	24°19'	-51'	128°	4
5	27°08'	-48'	126°	26°32'	-49'	127°	25°56'	-49'	127°	25°19'	-50'	128°	24°43'	-50'	128°	24°06'	-51'	128°	23°28'	-51'	129°	5
6	26°19'	-48'	127°	25°43'	-49'	127°	25°07'	-49'	128°	24°30'	-50'	128°	23°52'	-50'	129°	23°15'	-51'	129°	22°37'	-51'	129°	6
7	25°31'	-48'	128°	24°54'	-49'	128°	24°17'	-49'	128°	23°40'	-50'	129°	23°02'	-50'	129°	22°24'	-51'	129°	21°46'	-51'	130°	7
8	24°43'	-49'	128°	24°05'	-49'	129°	23°28'	-50'	129°	22°50'	-50'	129°	22°12'	-51'	130°	21°33'	-51'	130°	20°54'	-51'	130°	8
9	23°54'	-49'	129°	23°16'	-49'	129°	22°38'	-50'	130°	22°00'	-50'	130°	21°21'	-51'	130°	20°42'	-51'	131°	20°03'	-52'	131°	9
10	23°05'	-49'	130°	22°27'	-49'	130°	21°48'	-50'	130°	21°10'	-50'	131°	20°30'	-51'	131°	19°51'	-51'	131°	19°11'	-52'	131°	10
11	22°17'	-49'	130°	21°38'	-50'	131°	20°59'	-50'	131°	20°19'	-50'	131°	19°40'	-51'	131°	19°00'	-51'	132°	18°20'	-52'	132°	11
12	21°28'	-49'	131°	20°48'	-50'	131°	20°09'	-50'	131°	19°29'	-51'	132°	18°49'	-51'	132°	18°08'	-51'	132°	17°28'	-52'	132°	12
13	20°38'	-49'	131°	19°58'	-50'	132°	19°18'	-50'	132°	18°38'	-51'	132°	17°58'	-51'	133°	17°17'	-52'	133°	16°36'	-52'	133°	13
14	19°49'	-49'	132°	19°09'	-50'	132°	18°28'	-50'	133°	17°47'	-51'	133°	17°07'	-51'	133°	16°25'	-52'	133°	15°44'	-52'	134°	14
15	19°00'	-50'	133°	18°19'	-50'	133°	17°38'	-50'	133°	16°57'	-51'	133°	16°15'	-51'	134°	15°34'	-52'	134°	14°52'	-52'	134°	15
16	18°10'	-50'	133°	17°29'	-50'	134°	16°47'	-51'	134°	16°06'	-51'	134°	15°24'	-51'	134°	14°42'	-52'	134°	14°00'	-52'	135°	16
17	17°20'	-50'	134°	16°39'	-50'	134°	15°57'	-51'	134°	15°15'	-51'	135°	14°33'	-51'	135°	13°50'	-52'	135°	13°08'	-52'	135°	17
18	16°31'	-50'	134°	15°49'	-50'	135°	15°06'	-51'	135°	14°24'	-51'	135°	13°41'	-51'	135°	12°59'	-52'	135°	12°16'	-52'	136°	18
19	15°41'	-50'	135°	14°58'	-50'	135°	14°16'	-51'	135°	13°33'	-51'	136°	12°50'	-52'	136°	12°07'	-52'	136°	11°24'	-52'	136°	19
20	14°51'	-50'	136°	14°08'	-50'	136°	13°25'	-51'	136°	12°42'	-51'	136°	11°58'	-52'	136°	11°15'	-52'	136°	10°31'	-52'	137°	20
21	14°01'	-50'	136°	13°17'	-51'	136°	12°34'	-51'	137°	11°50'	-51'	137°	11°07'	-52'	137°	10°23'	-52'	137°	9°39'	-52'	137°	21
22	13°11'	-50'	137°	12°27'	-51'	137°	11°43'	-51'	137°	10°59'	-51'	137°	10°15'	-52'	137°	9°31'	-52'	137°	8°47'	-52'	138°	22
23	12°21'	-50'	137°	11°36'	-51'	137°	10°52'	-51'	138°	10°08'	-51'	138°	9°23'	-52'	138°	8°39'	-52'	138°	7°54'	-52'	138°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

46° 314° LHA — Latitude CONTRARY to DECLINATION — 46° 314° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

45° 315° LHA — Latitude CONTRARY to Declination — 45° 315° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	31°42'	-47'	124°	31°08'	-48'	124°	30°34'	-49'	125°	30°00'	-49'	125°	29°25'	-50'	126°	28°50'	-50'	126°	28°14'	-51'	127°	0
1	30°55'	-48'	125°	30°21'	-48'	125°	29°46'	-49'	125°	29°11'	-49'	126°	28°36'	-50'	126°	28°00'	-50'	127°	27°24'	-51'	127°	1
2	30°07'	-48'	125°	29°32'	-48'	126°	28°57'	-49'	126°	28°22'	-49'	127°	27°46'	-50'	127°	27°09'	-51'	127°	26°33'	-51'	128°	2
3	29°19'	-48'	126°	28°44'	-49'	126°	28°08'	-49'	127°	27°32'	-50'	127°	26°56'	-50'	128°	26°19'	-51'	128°	25°42'	-51'	128°	3
4	28°31'	-48'	127°	27°55'	-49'	127°	27°19'	-49'	127°	26°43'	-50'	128°	26°06'	-50'	128°	25°28'	-51'	129°	24°51'	-51'	129°	4
5	27°43'	-48'	127°	27°07'	-49'	128°	26°30'	-49'	128°	25°53'	-50'	128°	25°15'	-50'	129°	24°37'	-51'	129°	23°59'	-51'	130°	5
6	26°55'	-49'	128°	26°18'	-49'	128°	25°40'	-50'	129°	25°03'	-50'	129°	24°25'	-51'	129°	23°47'	-51'	130°	23°08'	-52'	130°	6
7	26°06'	-49'	129°	25°29'	-49'	129°	24°51'	-50'	129°	24°13'	-50'	130°	23°34'	-51'	130°	22°55'	-51'	130°	22°17'	-52'	131°	7
8	25°18'	-49'	129°	24°39'	-49'	130°	24°01'	-50'	130°	23°22'	-50'	130°	22°43'	-51'	131°	22°04'	-51'	131°	21°25'	-52'	131°	8
9	24°29'	-49'	130°	23°50'	-50'	130°	23°11'	-50'	131°	22°32'	-51'	131°	21°53'	-51'	131°	21°13'	-51'	131°	20°33'	-52'	132°	9
10	23°40'	-49'	131°	23°00'	-50'	131°	22°21'	-50'	131°	21°42'	-51'	131°	21°02'	-51'	132°	20°22'	-52'	132°	19°41'	-52'	132°	10
11	22°50'	-49'	131°	22°11'	-50'	131°	21°31'	-50'	132°	20°51'	-51'	132°	20°11'	-51'	132°	19°30'	-52'	133°	18°49'	-52'	133°	11
12	22°01'	-49'	132°	21°21'	-50'	132°	20°41'	-50'	132°	20°00'	-51'	133°	19°19'	-51'	133°	18°39'	-52'	133°	17°57'	-52'	133°	12
13	21°12'	-50'	132°	20°31'	-50'	133°	19°50'	-51'	133°	19°09'	-51'	133°	18°28'	-51'	133°	17°47'	-52'	134°	17°05'	-52'	134°	13
14	20°22'	-50'	133°	19°41'	-50'	133°	19°00'	-51'	133°	18°18'	-51'	134°	17°37'	-51'	134°	16°55'	-52'	134°	16°13'	-52'	134°	14
15	19°32'	-50'	134°	18°51'	-50'	134°	18°09'	-51'	134°	17°27'	-51'	134°	16°45'	-52'	134°	16°03'	-52'	135°	15°21'	-52'	135°	15
16	18°42'	-50'	134°	18°00'	-50'	134°	17°18'	-51'	135°	16°36'	-51'	135°	15°54'	-52'	135°	15°11'	-52'	135°	14°29'	-52'	135°	16
17	17°52'	-50'	135°	17°10'	-50'	135°	16°28'	-51'	135°	15°45'	-51'	135°	15°02'	-52'	136°	14°19'	-52'	136°	13°36'	-52'	136°	17
18	17°02'	-50'	135°	16°19'	-51'	136°	15°37'	-51'	136°	14°54'	-51'	136°	14°10'	-52'	136°	13°27'	-52'	136°	12°44'	-52'	136°	18
19	16°12'	-50'	136°	15°29'	-51'	136°	14°46'	-51'	136°	14°02'	-51'	136°	13°19'	-52'	137°	12°35'	-52'	137°	11°51'	-53'	137°	19
20	15°22'	-50'	136°	14°38'	-51'	137°	13°55'	-51'	137°	13°11'	-52'	137°	12°27'	-52'	137°	11°43'	-52'	137°	10°59'	-53'	137°	20
21	14°31'	-50'	137°	13°47'	-51'	137°	13°03'	-51'	137°	12°19'	-52'	137°	11°35'	-52'	138°	10°51'	-52'	138°	10°06'	-53'	138°	21
22	13°41'	-51'	138°	12°57'	-51'	138°	12°12'	-51'	138°	11°28'	-52'	138°	10°43'	-52'	138°	9°58'	-52'	138°	9°13'	-53'	138°	22
23	12°51'	-51'	138°	12°06'	-51'	138°	11°21'	-51'	138°	10°36'	-52'	139°	9°51'	-52'	139°	9°06'	-52'	139°	8°21'	-53'	139°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

45° 315° LHA — Latitude CONTRARY to DECLINATION — 45° 315° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

44° 316° LHA — Latitude CONTRARY to Declination — 44° 316° LHA

Dec°	42 Hc°	d'	Z°	43 Hc°	d'	Z°	44 Hc°	d'	Z°	45 Hc°	d'	Z°	46 Hc°	d'	Z°	47 Hc°	d'	Z°	48 Hc°	d'	Z°	Dec°
0	32°19'	-48'	125°	31°45'	-48'	125°	31°10'	-49'	126°	30°34'	-49'	126°	29°59'	-50'	127°	29°23'	-50'	127°	28°46'	-51'	128°	0
1	31°31'	-48'	125°	30°56'	-48'	126°	30°21'	-49'	126°	29°45'	-50'	127°	29°09'	-50'	127°	28°32'	-51'	128°	27°55'	-51'	128°	1
2	30°43'	-48'	126°	30°08'	-49'	127°	29°32'	-49'	127°	28°55'	-50'	128°	28°19'	-50'	128°	27°42'	-51'	128°	27°04'	-51'	129°	2
3	29°55'	-48'	127°	29°19'	-49'	127°	28°43'	-49'	128°	28°06'	-50'	128°	27°29'	-50'	129°	26°51'	-51'	129°	26°13'	-51'	129°	3
4	29°07'	-49'	128°	28°30'	-49'	128°	27°53'	-50'	128°	27°16'	-50'	129°	26°38'	-51'	129°	26°00'	-51'	130°	25°22'	-52'	130°	4
5	28°19'	-49'	128°	27°41'	-49'	129°	27°04'	-50'	129°	26°26'	-50'	129°	25°47'	-51'	130°	25°09'	-51'	130°	24°30'	-52'	130°	5
6	27°30'	-49'	129°	26°52'	-49'	129°	26°14'	-50'	130°	25°35'	-50'	130°	24°57'	-51'	130°	24°18'	-51'	131°	23°39'	-52'	131°	6
7	26°41'	-49'	129°	26°03'	-50'	130°	25°24'	-50'	130°	24°45'	-51'	131°	24°06'	-51'	131°	23°26'	-51'	131°	22°47'	-52'	132°	7
8	25°52'	-49'	130°	25°13'	-50'	131°	24°34'	-50'	131°	23°55'	-51'	131°	23°15'	-51'	132°	22°35'	-52'	132°	21°55'	-52'	132°	8
9	25°03'	-49'	131°	24°23'	-50'	131°	23°44'	-50'	131°	23°04'	-51'	132°	22°24'	-51'	132°	21°43'	-52'	132°	21°03'	-52'	133°	9
10	24°13'	-50'	131°	23°33'	-50'	132°	22°53'	-50'	132°	22°13'	-51'	132°	21°33'	-51'	133°	20°52'	-52'	133°	20°11'	-52'	133°	10
11	23°24'	-50'	132°	22°43'	-50'	132°	22°03'	-51'	133°	21°22'	-51'	133°	20°41'	-51'	133°	20°00'	-52'	133°	19°19'	-52'	134°	11
12	22°34'	-50'	133°	21°53'	-50'	133°	21°12'	-51'	133°	20°31'	-51'	133°	19°50'	-52'	134°	19°08'	-52'	134°	18°26'	-52'	134°	12
13	21°44'	-50'	133°	21°03'	-50'	134°	20°22'	-51'	134°	19°40'	-51'	134°	18°58'	-52'	134°	18°16'	-52'	135°	17°34'	-52'	135°	13
14	20°54'	-50'	134°	20°13'	-51'	134°	19°31'	-51'	134°	18°49'	-51'	135°	18°07'	-52'	135°	17°24'	-52'	135°	16°42'	-52'	135°	14
15	20°04'	-50'	134°	19°22'	-51'	135°	18°40'	-51'	135°	17°57'	-51'	135°	17°15'	-52'	135°	16°32'	-52'	136°	15°49'	-53'	136°	15
16	19°14'	-50'	135°	18°32'	-51'	135°	17°49'	-51'	135°	17°06'	-52'	136°	16°23'	-52'	136°	15°40'	-52'	136°	14°57'	-53'	136°	16
17	18°24'	-50'	136°	17°41'	-51'	136°	16°58'	-51'	136°	16°14'	-52'	136°	15°31'	-52'	136°	14°48'	-52'	137°	14°04'	-53'	137°	17
18	17°33'	-50'	136°	16°50'	-51'	136°	16°07'	-51'	137°	15°23'	-52'	137°	14°39'	-52'	137°	13°55'	-52'	137°	13°11'	-53'	137°	18
19	16°43'	-51'	137°	15°59'	-51'	137°	15°15'	-51'	137°	14°31'	-52'	137°	13°47'	-52'	137°	13°03'	-52'	138°	12°18'	-53'	138°	19
20	15°52'	-51'	137°	15°08'	-51'	137°	14°24'	-51'	138°	13°39'	-52'	138°	12°55'	-52'	138°	12°10'	-53'	138°	11°26'	-53'	138°	20
21	15°02'	-51'	138°	14°17'	-51'	138°	13°32'	-52'	138°	12°48'	-52'	138°	12°03'	-52'	138°	11°18'	-53'	139°	10°33'	-53'	139°	21
22	14°11'	-51'	138°	13°26'	-51'	139°	12°41'	-52'	139°	11°56'	-52'	139°	11°11'	-52'	139°	10°25'	-53'	139°	9°40'	-53'	139°	22
23	13°20'	-51'	139°	12°35'	-51'	139°	11°49'	-52'	139°	11°04'	-52'	139°	10°18'	-52'	139°	9°33'	-53'	140°	8°47'	-53'	140°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

44° 316° LHA — Latitude CONTRARY to DECLINATION — 44° 316° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

43° 317° LHA — Latitude CONTRARY to Declination — 43° 317° LHA

Dec°	42 Hc°	d'	Z°	43 Hc°	d'	Z°	44 Hc°	d'	Z°	45 Hc°	d'	Z°	46 Hc°	d'	Z°	47 Hc°	d'	Z°	48 Hc°	d'	Z°	Dec°
0	32°55'	-48'	126°	32°20'	-49'	126°	31°45'	-49'	127°	31°08'	-50'	127°	30°32'	-50'	128°	29°55'	-51'	128°	29°18'	-51'	129°	0
1	32°07'	-48'	126°	31°32'	-49'	127°	30°55'	-49'	127°	30°19'	-50'	128°	29°42'	-50'	128°	29°04'	-51'	129°	28°27'	-51'	129°	1
2	31°19'	-48'	127°	30°43'	-49'	128°	30°06'	-50'	128°	29°29'	-50'	128°	28°51'	-51'	129°	28°14'	-51'	129°	27°35'	-52'	130°	2
3	30°31'	-49'	128°	29°54'	-49'	128°	29°17'	-50'	129°	28°39'	-50'	129°	28°01'	-51'	130°	27°23'	-51'	130°	26°44'	-52'	130°	3
4	29°42'	-49'	128°	29°05'	-49'	129°	28°27'	-50'	129°	27°49'	-50'	130°	27°10'	-51'	130°	26°31'	-51'	131°	25°52'	-52'	131°	4
5	28°53'	-49'	129°	28°15'	-50'	130°	27°37'	-50'	130°	26°58'	-51'	130°	26°19'	-51'	131°	25°40'	-51'	131°	25°00'	-52'	131°	5
6	28°04'	-49'	130°	27°26'	-50'	130°	26°47'	-50'	131°	26°08'	-51'	131°	25°28'	-51'	131°	24°49'	-52'	132°	24°09'	-52'	132°	6
7	27°15'	-49'	130°	26°36'	-50'	131°	25°57'	-50'	131°	25°17'	-51'	132°	24°37'	-51'	132°	23°57'	-52'	132°	23°17'	-52'	133°	7
8	26°26'	-50'	131°	25°46'	-50'	131°	25°06'	-51'	132°	24°26'	-51'	132°	23°46'	-51'	132°	23°05'	-52'	133°	22°24'	-52'	133°	8
9	25°36'	-50'	132°	24°56'	-50'	132°	24°16'	-51'	132°	23°35'	-51'	133°	22°54'	-52'	133°	22°13'	-52'	133°	21°32'	-52'	134°	9
10	24°46'	-50'	132°	24°06'	-50'	133°	23°25'	-51'	133°	22°44'	-51'	133°	22°03'	-52'	134°	21°22'	-52'	134°	20°40'	-52'	134°	10
11	23°57'	-50'	133°	23°16'	-50'	133°	22°34'	-51'	134°	21°53'	-51'	134°	21°11'	-52'	134°	20°29'	-52'	134°	19°47'	-53'	135°	11
12	23°07'	-50'	134°	22°25'	-51'	134°	21°44'	-51'	134°	21°02'	-51'	134°	20°20'	-52'	135°	19°37'	-52'	135°	18°55'	-53'	135°	12
13	22°16'	-50'	134°	21°35'	-51'	134°	20°53'	-51'	135°	20°10'	-52'	135°	19°28'	-52'	135°	18°45'	-52'	135°	18°02'	-53'	136°	13
14	21°26'	-50'	135°	20°44'	-51'	135°	20°01'	-51'	135°	19°19'	-52'	135°	18°36'	-52'	136°	17°53'	-52'	136°	17°10'	-53'	136°	14
15	20°36'	-51'	135°	19°53'	-51'	136°	19°10'	-51'	136°	18°27'	-52'	136°	17°44'	-52'	136°	17°00'	-52'	136°	16°17'	-53'	137°	15
16	19°45'	-51'	136°	19°02'	-51'	136°	18°19'	-51'	136°	17°35'	-52'	137°	16°52'	-52'	137°	16°08'	-53'	137°	15°24'	-53'	137°	16
17	18°55'	-51'	136°	18°11'	-51'	137°	17°27'	-52'	137°	16°44'	-52'	137°	16°00'	-52'	137°	15°15'	-53'	137°	14°31'	-53'	138°	17
18	18°04'	-51'	137°	17°20'	-51'	137°	16°36'	-52'	137°	15°52'	-52'	138°	15°07'	-52'	138°	14°23'	-53'	138°	13°38'	-53'	138°	18
19	17°13'	-51'	138°	16°29'	-51'	138°	15°44'	-52'	138°	15°00'	-52'	138°	14°15'	-52'	138°	13°30'	-53'	138°	12°45'	-53'	139°	19
20	16°22'	-51'	138°	15°38'	-51'	138°	14°53'	-52'	138°	14°08'	-52'	139°	13°23'	-52'	139°	12°37'	-53'	139°	11°52'	-53'	139°	20
21	15°31'	-51'	139°	14°46'	-51'	139°	14°01'	-52'	139°	13°16'	-52'	139°	12°30'	-52'	139°	11°45'	-53'	139°	10°59'	-53'	140°	21
22	14°40'	-51'	139°	13°55'	-52'	139°	13°09'	-52'	140°	12°24'	-52'	140°	11°38'	-53'	140°	10°52'	-53'	140°	10°06'	-53'	140°	22
23	13°49'	-51'	140°	13°03'	-52'	140°	12°17'	-52'	140°	11°31'	-52'	140°	10°45'	-53'	140°	9°59'	-53'	140°	9°13'	-53'	141°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

43° 317° LHA — Latitude CONTRARY to DECLINATION — 43° 317° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

42° 318° LHA — Latitude CONTRARY to Declination — 42° 318° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	33°31'	-48'	127°	32°55'	-49'	127°	32°19'	-49'	128°	31°42'	-50'	128°	31°05'	-50'	129°	30°27'	-51'	129°	29°49'	-51'	130°	0
1	32°43'	-49'	127°	32°06'	-49'	128°	31°29'	-50'	128°	30°52'	-50'	129°	30°14'	-51'	129°	29°36'	-51'	130°	28°58'	-52'	130°	1
2	31°55'	-49'	128°	31°17'	-49'	129°	30°40'	-50'	129°	30°02'	-50'	129°	29°24'	-51'	130°	28°45'	-51'	130°	28°06'	-52'	131°	2
3	31°06'	-49'	129°	30°28'	-49'	129°	29°50'	-50'	130°	29°12'	-51'	130°	28°33'	-51'	130°	27°54'	-51'	131°	27°14'	-52'	131°	3
4	30°17'	-49'	129°	29°39'	-50'	130°	29°00'	-50'	130°	28°21'	-51'	131°	27°42'	-51'	131°	27°02'	-52'	131°	26°22'	-52'	132°	4
5	29°28'	-49'	130°	28°49'	-50'	130°	28°10'	-50'	131°	27°30'	-51'	131°	26°51'	-51'	132°	26°11'	-52'	132°	25°30'	-52'	132°	5
6	28°38'	-50'	131°	27°59'	-50'	131°	27°19'	-51'	131°	26°40'	-51'	132°	25°59'	-51'	132°	25°19'	-52'	133°	24°38'	-52'	133°	6
7	27°49'	-50'	131°	27°09'	-50'	132°	26°29'	-51'	132°	25°49'	-51'	132°	25°08'	-52'	133°	24°27'	-52'	133°	23°46'	-52'	133°	7
8	26°59'	-50'	132°	26°19'	-50'	132°	25°38'	-51'	133°	24°57'	-51'	133°	24°16'	-52'	133°	23°35'	-52'	134°	22°54'	-52'	134°	8
9	26°09'	-50'	133°	25°29'	-50'	133°	24°48'	-51'	133°	24°06'	-51'	134°	23°25'	-52'	134°	22°43'	-52'	134°	22°01'	-53'	135°	9
10	25°19'	-50'	133°	24°38'	-51'	134°	23°57'	-51'	134°	23°15'	-51'	134°	22°33'	-52'	134°	21°51'	-52'	135°	21°08'	-53'	135°	10
11	24°29'	-50'	134°	23°47'	-51'	134°	23°06'	-51'	134°	22°23'	-52'	135°	21°41'	-52'	135°	20°59'	-52'	135°	20°16'	-53'	136°	11
12	23°39'	-50'	134°	22°57'	-51'	135°	22°14'	-51'	135°	21°32'	-52'	135°	20°49'	-52'	136°	20°06'	-52'	136°	19°23'	-53'	136°	12
13	22°48'	-51'	135°	22°06'	-51'	135°	21°23'	-51'	136°	20°40'	-52'	136°	19°57'	-52'	136°	19°14'	-53'	136°	18°30'	-53'	137°	13
14	21°58'	-51'	136°	21°15'	-51'	136°	20°32'	-52'	136°	19°48'	-52'	136°	19°05'	-52'	137°	18°21'	-53'	137°	17°37'	-53'	137°	14
15	21°07'	-51'	136°	20°24'	-51'	136°	19°40'	-52'	137°	18°56'	-52'	137°	18°12'	-52'	137°	17°28'	-53'	137°	16°44'	-53'	138°	15
16	20°16'	-51'	137°	19°32'	-51'	137°	18°48'	-52'	137°	18°04'	-52'	137°	17°20'	-52'	138°	16°36'	-53'	138°	15°51'	-53'	138°	16
17	19°25'	-51'	137°	18°41'	-51'	138°	17°57'	-52'	138°	17°12'	-52'	138°	16°28'	-53'	138°	15°43'	-53'	138°	14°58'	-53'	139°	17
18	18°34'	-51'	138°	17°50'	-52'	138°	17°05'	-52'	138°	16°20'	-52'	138°	15°35'	-53'	139°	14°50'	-53'	139°	14°05'	-53'	139°	18
19	17°43'	-51'	138°	16°58'	-52'	139°	16°13'	-52'	139°	15°28'	-52'	139°	14°43'	-53'	139°	13°57'	-53'	139°	13°12'	-53'	139°	19
20	16°52'	-51'	139°	16°07'	-52'	139°	15°21'	-52'	139°	14°36'	-52'	139°	13°50'	-53'	140°	13°04'	-53'	140°	12°18'	-53'	140°	20
21	16°01'	-51'	139°	15°15'	-52'	140°	14°29'	-52'	140°	13°43'	-52'	140°	12°57'	-53'	140°	12°11'	-53'	140°	11°25'	-53'	140°	21
22	15°09'	-51'	140°	14°23'	-52'	140°	13°37'	-52'	140°	12°51'	-52'	140°	12°04'	-53'	141°	11°18'	-53'	141°	10°32'	-53'	141°	22
23	14°18'	-52'	141°	13°31'	-52'	141°	12°45'	-52'	141°	11°58'	-53'	141°	11°12'	-53'	141°	10°25'	-53'	141°	9°38'	-53'	141°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

42° 318° LHA — Latitude CONTRARY to DECLINATION — 42° 318° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

41° 319° LHA — Latitude CONTRARY to Declination — 41° 319° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	34°07'	-49'	128°	33°30'	-49'	128°	32°53'	-50'	129°	32°15'	-50'	129°	31°37'	-51'	130°	30°59'	-51'	130°	30°20'	-52'	131°	0
1	33°18'	-49'	128°	32°41'	-49'	129°	32°03'	-50'	129°	31°25'	-50'	130°	30°46'	-51'	130°	30°07'	-51'	131°	29°28'	-52'	131°	1
2	32°29'	-49'	129°	31°52'	-50'	129°	31°13'	-50'	130°	30°34'	-51'	130°	29°55'	-51'	131°	29°16'	-52'	131°	28°36'	-52'	132°	2
3	31°40'	-49'	130°	31°02'	-50'	130°	30°23'	-50'	131°	29°44'	-51'	131°	29°04'	-51'	131°	28°24'	-52'	132°	27°44'	-52'	132°	3
4	30°51'	-49'	130°	30°12'	-50'	131°	29°33'	-50'	131°	28°53'	-51'	132°	28°13'	-51'	132°	27°33'	-52'	132°	26°52'	-52'	133°	4
5	30°02'	-50'	131°	29°22'	-50'	131°	28°42'	-51'	132°	28°02'	-51'	132°	27°22'	-52'	133°	26°41'	-52'	133°	26°00'	-52'	133°	5
6	29°12'	-50'	132°	28°32'	-50'	132°	27°52'	-51'	132°	27°11'	-51'	133°	26°30'	-52'	133°	25°49'	-52'	134°	25°07'	-53'	134°	6
7	28°22'	-50'	132°	27°42'	-51'	133°	27°01'	-51'	133°	26°20'	-51'	133°	25°38'	-52'	134°	24°57'	-52'	134°	24°15'	-53'	134°	7
8	27°32'	-50'	133°	26°51'	-51'	133°	26°10'	-51'	134°	25°28'	-52'	134°	24°46'	-52'	134°	24°04'	-52'	135°	23°22'	-53'	135°	8
9	26°42'	-50'	134°	26°00'	-51'	134°	25°19'	-51'	134°	24°37'	-52'	135°	23°55'	-52'	135°	23°12'	-52'	135°	22°29'	-53'	135°	9
10	25°51'	-51'	134°	25°10'	-51'	134°	24°27'	-51'	135°	23°45'	-52'	135°	23°02'	-52'	135°	22°20'	-53'	136°	21°37'	-53'	136°	10
11	25°01'	-51'	135°	24°19'	-51'	135°	23°36'	-51'	135°	22°53'	-52'	136°	22°10'	-52'	136°	21°27'	-53'	136°	20°44'	-53'	136°	11
12	24°10'	-51'	135°	23°28'	-51'	136°	22°45'	-52'	136°	22°01'	-52'	136°	21°18'	-52'	136°	20°34'	-53'	137°	19°51'	-53'	137°	12
13	23°20'	-51'	136°	22°36'	-51'	136°	21°53'	-52'	136°	21°09'	-52'	137°	20°26'	-52'	137°	19°42'	-53'	137°	18°58'	-53'	137°	13
14	22°29'	-51'	136°	21°45'	-51'	137°	21°01'	-52'	137°	20°17'	-52'	137°	19°33'	-53'	138°	18°49'	-53'	138°	18°04'	-53'	138°	14
15	21°38'	-51'	137°	20°54'	-52'	137°	20°09'	-52'	138°	19°25'	-52'	138°	18°41'	-53'	138°	17°56'	-53'	138°	17°11'	-53'	138°	15
16	20°46'	-51'	138°	20°02'	-52'	138°	19°18'	-52'	138°	18°33'	-52'	138°	17°48'	-53'	139°	17°03'	-53'	139°	16°18'	-53'	139°	16
17	19°55'	-51'	138°	19°10'	-52'	138°	18°26'	-52'	139°	17°40'	-52'	139°	16°55'	-53'	139°	16°10'	-53'	139°	15°24'	-53'	139°	17
18	19°04'	-51'	139°	18°19'	-52'	139°	17°33'	-52'	139°	16°48'	-53'	139°	16°02'	-53'	140°	15°17'	-53'	140°	14°31'	-54'	140°	18
19	18°12'	-52'	139°	17°27'	-52'	139°	16°41'	-52'	140°	15°55'	-53'	140°	15°10'	-53'	140°	14°24'	-53'	140°	13°37'	-54'	140°	19
20	17°21'	-52'	140°	16°35'	-52'	140°	15°49'	-52'	140°	15°03'	-53'	140°	14°17'	-53'	140°	13°30'	-53'	141°	12°44'	-54'	141°	20
21	16°29'	-52'	140°	15°43'	-52'	140°	14°57'	-52'	141°	14°10'	-53'	141°	13°24'	-53'	141°	12°37'	-53'	141°	11°50'	-54'	141°	21
22	15°38'	-52'	141°	14°51'	-52'	141°	14°04'	-52'	141°	13°18'	-53'	141°	12°31'	-53'	141°	11°44'	-53'	142°	10°57'	-54'	142°	22
23	14°46'	-52'	141°	13°59'	-52'	142°	13°12'	-53'	142°	12°25'	-53'	142°	11°38'	-53'	142°	10°50'	-53'	142°	10°03'	-54'	142°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

41° 319° LHA — Latitude CONTRARY to DECLINATION — 41° 319° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

40° 320° LHA — Latitude CONTRARY to Declination — 40° 320° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	34°42'	-49'	129°	34°04'	-50'	129°	33°26'	-50'	130°	32°48'	-51'	130°	32°09'	-51'	131°	31°30'	-52'	131°	30°50'	-52'	132°	0
1	33°53'	-49'	129°	33°15'	-50'	130°	32°36'	-50'	130°	31°57'	-51'	131°	31°18'	-51'	131°	30°38'	-52'	132°	29°58'	-52'	132°	1
2	33°04'	-49'	130°	32°25'	-50'	130°	31°46'	-50'	131°	31°07'	-51'	131°	30°27'	-51'	132°	29°47'	-52'	132°	29°06'	-52'	133°	2
3	32°14'	-50'	131°	31°35'	-50'	131°	30°56'	-51'	132°	30°16'	-51'	132°	29°35'	-52'	132°	28°55'	-52'	133°	28°14'	-52'	133°	3
4	31°25'	-50'	131°	30°45'	-50'	132°	30°05'	-51'	132°	29°24'	-51'	133°	28°44'	-52'	133°	28°03'	-52'	133°	27°21'	-53'	134°	4
5	30°35'	-50'	132°	29°55'	-50'	132°	29°14'	-51'	133°	28°33'	-51'	133°	27°52'	-52'	134°	27°11'	-52'	134°	26°29'	-53'	134°	5
6	29°45'	-50'	133°	29°04'	-51'	133°	28°23'	-51'	133°	27°42'	-52'	134°	27°00'	-52'	134°	26°18'	-52'	135°	25°36'	-53'	135°	6
7	28°55'	-50'	133°	28°14'	-51'	134°	27°32'	-51'	134°	26°50'	-52'	134°	26°08'	-52'	135°	25°26'	-53'	135°	24°43'	-53'	135°	7
8	28°04'	-51'	134°	27°23'	-51'	134°	26°41'	-51'	135°	25°59'	-52'	135°	25°16'	-52'	135°	24°33'	-53'	136°	23°50'	-53'	136°	8
9	27°14'	-51'	134°	26°32'	-51'	135°	25°49'	-52'	135°	25°07'	-52'	135°	24°24'	-52'	136°	23°41'	-53'	136°	22°57'	-53'	136°	9
10	26°23'	-51'	135°	25°41'	-51'	135°	24°58'	-52'	136°	24°15'	-52'	136°	23°31'	-52'	136°	22°48'	-53'	137°	22°04'	-53'	137°	10
11	25°32'	-51'	136°	24°49'	-51'	136°	24°06'	-52'	136°	23°23'	-52'	137°	22°39'	-53'	137°	21°55'	-53'	137°	21°11'	-53'	137°	11
12	24°41'	-51'	136°	23°58'	-52'	137°	23°14'	-52'	137°	22°31'	-52'	137°	21°46'	-53'	137°	21°02'	-53'	138°	20°18'	-53'	138°	12
13	23°50'	-51'	137°	23°07'	-52'	137°	22°22'	-52'	137°	21°38'	-52'	138°	20°54'	-53'	138°	20°09'	-53'	138°	19°24'	-53'	138°	13
14	22°59'	-51'	137°	22°15'	-52'	138°	21°30'	-52'	138°	20°46'	-52'	138°	20°01'	-53'	138°	19°16'	-53'	139°	18°31'	-54'	139°	14
15	22°08'	-51'	138°	21°23'	-52'	138°	20°38'	-52'	138°	19°53'	-53'	139°	19°08'	-53'	139°	18°23'	-53'	139°	17°37'	-54'	139°	15
16	21°16'	-52'	138°	20°31'	-52'	139°	19°46'	-52'	139°	19°01'	-53'	139°	18°15'	-53'	139°	17°30'	-53'	140°	16°44'	-54'	140°	16
17	20°25'	-52'	139°	19°39'	-52'	139°	18°54'	-52'	139°	18°08'	-53'	140°	17°22'	-53'	140°	16°36'	-53'	140°	15°50'	-54'	140°	17
18	19°33'	-52'	140°	18°47'	-52'	140°	18°01'	-52'	140°	17°15'	-53'	140°	16°29'	-53'	140°	15°43'	-53'	141°	14°57'	-54'	141°	18
19	18°41'	-52'	140°	17°55'	-52'	140°	17°09'	-53'	141°	16°23'	-53'	141°	15°36'	-53'	141°	14°50'	-54'	141°	14°03'	-54'	141°	19
20	17°49'	-52'	141°	17°03'	-52'	141°	16°16'	-53'	141°	15°30'	-53'	141°	14°43'	-53'	141°	13°56'	-54'	142°	13°09'	-54'	142°	20
21	16°57'	-52'	141°	16°11'	-52'	141°	15°24'	-53'	142°	14°37'	-53'	142°	13°50'	-53'	142°	13°02'	-54'	142°	12°15'	-54'	142°	21
22	16°05'	-52'	142°	15°18'	-52'	142°	14°31'	-53'	142°	13°44'	-53'	142°	12°56'	-53'	142°	12°09'	-54'	142°	11°21'	-54'	143°	22
23	15°13'	-52'	142°	14°26'	-52'	142°	13°38'	-53'	142°	12°51'	-53'	143°	12°03'	-53'	143°	11°15'	-54'	143°	10°27'	-54'	143°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

40° 320° LHA — Latitude CONTRARY to DECLINATION — 40° 320° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

39° 321° LHA — Latitude CONTRARY to Declination — 39° 321° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	35°17'	-49'	130°	34°38'	-50'	130°	33°59'	-50'	131°	33°20'	-51'	131°	32°40'	-51'	132°	32°00'	-52'	132°	31°20'	-52'	133°	0
1	34°27'	-50'	130°	33°48'	-50'	131°	33°09'	-51'	131°	32°29'	-51'	132°	31°49'	-52'	132°	31°09'	-52'	133°	30°28'	-52'	133°	1
2	33°38'	-50'	131°	32°58'	-50'	131°	32°18'	-51'	132°	31°38'	-51'	132°	30°58'	-52'	133°	30°17'	-52'	133°	29°35'	-53'	134°	2
3	32°48'	-50'	132°	32°08'	-50'	132°	31°28'	-51'	133°	30°47'	-51'	133°	30°06'	-52'	133°	29°24'	-52'	134°	28°43'	-53'	134°	3
4	31°58'	-50'	132°	31°18'	-51'	133°	30°37'	-51'	133°	29°55'	-52'	134°	29°14'	-52'	134°	28°32'	-52'	134°	27°50'	-53'	135°	4
5	31°08'	-50'	133°	30°27'	-51'	133°	29°46'	-51'	134°	29°04'	-52'	134°	28°22'	-52'	135°	27°40'	-53'	135°	26°57'	-53'	135°	5
6	30°18'	-51'	134°	29°36'	-51'	134°	28°54'	-51'	134°	28°12'	-52'	135°	27°30'	-52'	135°	26°47'	-53'	135°	26°04'	-53'	136°	6
7	29°27'	-51'	134°	28°45'	-51'	135°	28°03'	-52'	135°	27°20'	-52'	135°	26°38'	-52'	136°	25°54'	-53'	136°	25°11'	-53'	136°	7
8	28°36'	-51'	135°	27°54'	-51'	135°	27°11'	-52'	136°	26°28'	-52'	136°	25°45'	-53'	136°	25°02'	-53'	137°	24°18'	-53'	137°	8
9	27°46'	-51'	135°	27°03'	-51'	136°	26°20'	-52'	136°	25°36'	-52'	136°	24°53'	-53'	137°	24°09'	-53'	137°	23°25'	-53'	137°	9
10	26°55'	-51'	136°	26°11'	-52'	136°	25°28'	-52'	137°	24°44'	-52'	137°	24°00'	-53'	137°	23°16'	-53'	138°	22°31'	-53'	138°	10
11	26°03'	-51'	137°	25°20'	-52'	137°	24°36'	-52'	137°	23°52'	-52'	138°	23°07'	-53'	138°	22°23'	-53'	138°	21°38'	-54'	138°	11
12	25°12'	-51'	137°	24°28'	-52'	137°	23°44'	-52'	138°	22°59'	-53'	138°	22°14'	-53'	138°	21°30'	-53'	139°	20°44'	-54'	139°	12
13	24°21'	-52'	138°	23°36'	-52'	138°	22°51'	-52'	138°	22°07'	-53'	139°	21°21'	-53'	139°	20°36'	-53'	139°	19°51'	-54'	139°	13
14	23°29'	-52'	138°	22°44'	-52'	139°	21°59'	-52'	139°	21°14'	-53'	139°	20°28'	-53'	139°	19°43'	-53'	140°	18°57'	-54'	140°	14
15	22°37'	-52'	139°	21°52'	-52'	139°	21°07'	-53'	139°	20°21'	-53'	140°	19°35'	-53'	140°	18°49'	-54'	140°	18°03'	-54'	140°	15
16	21°46'	-52'	139°	21°00'	-52'	140°	20°14'	-53'	140°	19°28'	-53'	140°	18°42'	-53'	140°	17°56'	-54'	141°	17°10'	-54'	141°	16
17	20°54'	-52'	140°	20°08'	-52'	140°	19°22'	-53'	140°	18°35'	-53'	141°	17°49'	-53'	141°	17°02'	-54'	141°	16°16'	-54'	141°	17
18	20°02'	-52'	140°	19°15'	-52'	141°	18°29'	-53'	141°	17°42'	-53'	141°	16°56'	-53'	141°	16°09'	-54'	141°	15°22'	-54'	142°	18
19	19°10'	-52'	141°	18°23'	-53'	141°	17°36'	-53'	141°	16°49'	-53'	142°	16°02'	-53'	142°	15°15'	-54'	142°	14°28'	-54'	142°	19
20	18°17'	-52'	141°	17°30'	-53'	142°	16°43'	-53'	142°	15°56'	-53'	142°	15°09'	-54'	142°	14°21'	-54'	142°	13°34'	-54'	143°	20
21	17°25'	-52'	142°	16°38'	-53'	142°	15°50'	-53'	142°	15°03'	-53'	143°	14°15'	-54'	143°	13°27'	-54'	143°	12°40'	-54'	143°	21
22	16°33'	-52'	143°	15°45'	-53'	143°	14°57'	-53'	143°	14°10'	-53'	143°	13°22'	-54'	143°	12°34'	-54'	143°	11°45'	-54'	143°	22
23	15°40'	-52'	143°	14°52'	-53'	143°	14°04'	-53'	143°	13°16'	-53'	143°	12°28'	-54'	144°	11°40'	-54'	144°	10°51'	-54'	144°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

39° 321° LHA — Latitude CONTRARY to DECLINATION — 39° 321° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

38° 322° LHA — Latitude CONTRARY to Declination — 38° 322° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	35°51'	-50'	131°	35°12'	-50'	131°	34°32'	-51'	132°	33°52'	-51'	132°	33°11'	-52'	133°	32°30'	-52'	133°	31°49'	-53'	134°	0
1	35°01'	-50'	131°	34°21'	-50'	132°	33°41'	-51'	132°	33°01'	-51'	133°	32°20'	-52'	133°	31°38'	-52'	134°	30°57'	-53'	134°	1
2	34°11'	-50'	132°	33°31'	-51'	132°	32°50'	-51'	133°	32°09'	-52'	133°	31°28'	-52'	134°	30°46'	-52'	134°	30°04'	-53'	135°	2
3	33°21'	-50'	133°	32°40'	-51'	133°	31°59'	-51'	134°	31°18'	-52'	134°	30°36'	-52'	134°	29°54'	-53'	135°	29°11'	-53'	135°	3
4	32°31'	-50'	133°	31°50'	-51'	134°	31°08'	-51'	134°	30°26'	-52'	135°	29°44'	-52'	135°	29°01'	-53'	135°	28°18'	-53'	136°	4
5	31°40'	-51'	134°	30°59'	-51'	134°	30°16'	-52'	135°	29°34'	-52'	135°	28°51'	-52'	136°	28°08'	-53'	136°	27°25'	-53'	136°	5
6	30°50'	-51'	135°	30°07'	-51'	135°	29°25'	-52'	135°	28°42'	-52'	136°	27°59'	-53'	136°	27°16'	-53'	136°	26°32'	-53'	137°	6
7	29°59'	-51'	135°	29°16'	-51'	136°	28°33'	-52'	136°	27°50'	-52'	136°	27°06'	-53'	137°	26°23'	-53'	137°	25°39'	-53'	137°	7
8	29°08'	-51'	136°	28°25'	-52'	136°	27°41'	-52'	136°	26°58'	-52'	137°	26°14'	-53'	137°	25°30'	-53'	138°	24°45'	-54'	138°	8
9	28°17'	-51'	136°	27°33'	-52'	137°	26°49'	-52'	137°	26°05'	-53'	137°	25°21'	-53'	138°	24°36'	-53'	138°	23°52'	-54'	138°	9
10	27°25'	-51'	137°	26°41'	-52'	137°	25°57'	-52'	138°	25°13'	-53'	138°	24°28'	-53'	138°	23°43'	-53'	139°	22°58'	-54'	139°	10
11	26°34'	-52'	137°	25°49'	-52'	138°	25°05'	-52'	138°	24°20'	-53'	138°	23°35'	-53'	139°	22°50'	-53'	139°	22°04'	-54'	139°	11
12	25°42'	-52'	138°	24°57'	-52'	138°	24°12'	-53'	139°	23°27'	-53'	139°	22°42'	-53'	139°	21°56'	-54'	140°	21°11'	-54'	140°	12
13	24°50'	-52'	139°	24°05'	-52'	139°	23°20'	-53'	139°	22°34'	-53'	139°	21°49'	-53'	140°	21°03'	-54'	140°	20°17'	-54'	140°	13
14	23°58'	-52'	139°	23°13'	-52'	139°	22°27'	-53'	140°	21°41'	-53'	140°	20°55'	-53'	140°	20°09'	-54'	140°	19°23'	-54'	141°	14
15	23°06'	-52'	140°	22°21'	-52'	140°	21°35'	-53'	140°	20°48'	-53'	140°	20°02'	-53'	141°	19°15'	-54'	141°	18°29'	-54'	141°	15
16	22°14'	-52'	140°	21°28'	-53'	141°	20°42'	-53'	141°	19°55'	-53'	141°	19°09'	-54'	141°	18°22'	-54'	141°	17°35'	-54'	142°	16
17	21°22'	-52'	141°	20°36'	-53'	141°	19°49'	-53'	141°	19°02'	-53'	141°	18°15'	-54'	142°	17°28'	-54'	142°	16°41'	-54'	142°	17
18	20°30'	-52'	141°	19°43'	-53'	142°	18°56'	-53'	142°	18°09'	-53'	142°	17°21'	-54'	142°	16°34'	-54'	142°	15°46'	-54'	143°	18
19	19°37'	-52'	142°	18°50'	-53'	142°	18°03'	-53'	142°	17°15'	-53'	142°	16°28'	-54'	143°	15°40'	-54'	143°	14°52'	-54'	143°	19
20	18°45'	-53'	142°	17°57'	-53'	143°	17°10'	-53'	143°	16°22'	-53'	143°	15°34'	-54'	143°	14°46'	-54'	143°	13°58'	-54'	143°	20
21	17°52'	-53'	143°	17°05'	-53'	143°	16°17'	-53'	143°	15°28'	-54'	143°	14°40'	-54'	144°	13°52'	-54'	144°	13°03'	-54'	144°	21
22	17°00'	-53'	143°	16°12'	-53'	144°	15°23'	-53'	144°	14°35'	-54'	144°	13°46'	-54'	144°	12°58'	-54'	144°	12°09'	-54'	144°	22
23	16°07'	-53'	144°	15°19'	-53'	144°	14°30'	-53'	144°	13°41'	-54'	144°	12°52'	-54'	144°	12°04'	-54'	145°	11°15'	-54'	145°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

38° 322° LHA — Latitude CONTRARY to DECLINATION — 38° 322° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

37° 323° LHA — Latitude CONTRARY to Declination — 37° 323° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	36°24'	-50'	132°	35°44'	-51'	132°	35°04'	-51'	133°	34°23'	-52'	133°	33°42'	-52'	134°	33°00'	-52'	134°	32°18'	-53'	135°	0
1	35°34'	-50'	132°	34°54'	-51'	133°	34°13'	-51'	133°	33°31'	-52'	134°	32°50'	-52'	134°	32°08'	-53'	135°	31°25'	-53'	135°	1
2	34°44'	-50'	133°	34°03'	-51'	133°	33°22'	-51'	134°	32°40'	-52'	134°	31°58'	-52'	135°	31°15'	-53'	135°	30°32'	-53'	136°	2
3	33°54'	-51'	134°	33°12'	-51'	134°	32°30'	-52'	135°	31°48'	-52'	135°	31°05'	-52'	135°	30°22'	-53'	136°	29°39'	-53'	136°	3
4	33°03'	-51'	134°	32°21'	-51'	135°	31°39'	-52'	135°	30°56'	-52'	136°	30°13'	-53'	136°	29°30'	-53'	136°	28°46'	-53'	137°	4
5	32°12'	-51'	135°	31°30'	-51'	135°	30°47'	-52'	136°	30°04'	-52'	136°	29°20'	-53'	137°	28°37'	-53'	137°	27°53'	-53'	137°	5
6	31°21'	-51'	136°	30°38'	-52'	136°	29°55'	-52'	136°	29°11'	-52'	137°	28°28'	-53'	137°	27°44'	-53'	137°	26°59'	-54'	138°	6
7	30°30'	-51'	136°	29°47'	-52'	137°	29°03'	-52'	137°	28°19'	-53'	137°	27°35'	-53'	138°	26°50'	-53'	138°	26°06'	-54'	138°	7
8	29°39'	-52'	137°	28°55'	-52'	137°	28°11'	-52'	137°	27°26'	-53'	138°	26°42'	-53'	138°	25°57'	-53'	138°	25°12'	-54'	139°	8
9	28°47'	-52'	137°	28°03'	-52'	138°	27°18'	-52'	138°	26°34'	-53'	138°	25°49'	-53'	139°	25°04'	-54'	139°	24°18'	-54'	139°	9
10	27°55'	-52'	138°	27°11'	-52'	138°	26°26'	-53'	139°	25°41'	-53'	139°	24°56'	-53'	139°	24°10'	-54'	139°	23°24'	-54'	140°	10
11	27°04'	-52'	138°	26°19'	-52'	139°	25°33'	-53'	139°	24°48'	-53'	139°	24°02'	-53'	140°	23°16'	-54'	140°	22°30'	-54'	140°	11
12	26°12'	-52'	139°	25°26'	-52'	139°	24°41'	-53'	140°	23°55'	-53'	140°	23°09'	-53'	140°	22°23'	-54'	140°	21°36'	-54'	141°	12
13	25°20'	-52'	140°	24°34'	-53'	140°	23°48'	-53'	140°	23°02'	-53'	140°	22°15'	-54'	141°	21°29'	-54'	141°	20°42'	-54'	141°	13
14	24°27'	-52'	140°	23°41'	-53'	140°	22°55'	-53'	141°	22°08'	-53'	141°	21°22'	-54'	141°	20°35'	-54'	141°	19°48'	-54'	142°	14
15	23°35'	-52'	141°	22°49'	-53'	141°	22°02'	-53'	141°	21°15'	-53'	141°	20°28'	-54'	142°	19°41'	-54'	142°	18°54'	-54'	142°	15
16	22°43'	-53'	141°	21°56'	-53'	141°	21°09'	-53'	142°	20°22'	-54'	142°	19°34'	-54'	142°	18°47'	-54'	142°	17°59'	-54'	143°	16
17	21°50'	-53'	142°	21°03'	-53'	142°	20°16'	-53'	142°	19°28'	-54'	142°	18°41'	-54'	143°	17°53'	-54'	143°	17°05'	-54'	143°	17
18	20°57'	-53'	142°	20°10'	-53'	142°	19°22'	-53'	143°	18°35'	-54'	143°	17°47'	-54'	143°	16°59'	-54'	143°	16°11'	-54'	143°	18
19	20°05'	-53'	143°	19°17'	-53'	143°	18°29'	-53'	143°	17°41'	-54'	143°	16°53'	-54'	144°	16°04'	-54'	144°	15°16'	-55'	144°	19
20	19°12'	-53'	143°	18°24'	-53'	143°	17°36'	-53'	144°	16°47'	-54'	144°	15°59'	-54'	144°	15°10'	-54'	144°	14°22'	-55'	144°	20
21	18°19'	-53'	144°	17°31'	-53'	144°	16°42'	-54'	144°	15°53'	-54'	144°	15°05'	-54'	144°	14°16'	-54'	145°	13°27'	-55'	145°	21
22	17°26'	-53'	144°	16°37'	-53'	144°	15°49'	-54'	145°	15°00'	-54'	145°	14°11'	-54'	145°	13°21'	-54'	145°	12°32'	-55'	145°	22
23	16°33'	-53'	145°	15°44'	-53'	145°	14°55'	-54'	145°	14°06'	-54'	145°	13°16'	-54'	145°	12°27'	-54'	145°	11°38'	-55'	146°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

37° 323° LHA — Latitude CONTRARY to DECLINATION — 37° 323° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

36° 324° LHA — Latitude CONTRARY to Declination — 36° 324° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	36°57'	-50'	133°	36°17'	-51'	133°	35°35'	-51'	134°	34°54'	-52'	134°	34°12'	-52'	135°	33°29'	-53'	135°	32°46'	-53'	136°	0
1	36°07'	-51'	133°	35°26'	-51'	134°	34°44'	-52'	134°	34°02'	-52'	135°	33°19'	-52'	135°	32°37'	-53'	136°	31°53'	-53'	136°	1
2	35°16'	-51'	134°	34°35'	-51'	134°	33°52'	-52'	135°	33°10'	-52'	135°	32°27'	-53'	136°	31°44'	-53'	136°	31°00'	-53'	137°	2
3	34°26'	-51'	135°	33°43'	-51'	135°	33°01'	-52'	136°	32°18'	-52'	136°	31°34'	-53'	136°	30°51'	-53'	137°	30°07'	-54'	137°	3
4	33°35'	-51'	135°	32°52'	-52'	136°	32°09'	-52'	136°	31°25'	-52'	137°	30°42'	-53'	137°	29°58'	-53'	137°	29°13'	-54'	138°	4
5	32°44'	-51'	136°	32°00'	-52'	136°	31°17'	-52'	137°	30°33'	-53'	137°	29°49'	-53'	138°	29°04'	-53'	138°	28°20'	-54'	138°	5
6	31°52'	-52'	137°	31°08'	-52'	137°	30°24'	-52'	137°	29°40'	-53'	138°	28°56'	-53'	138°	28°11'	-53'	138°	27°26'	-54'	139°	6
7	31°01'	-52'	137°	30°17'	-52'	138°	29°32'	-53'	138°	28°47'	-53'	138°	28°03'	-53'	139°	27°17'	-54'	139°	26°32'	-54'	139°	7
8	30°09'	-52'	138°	29°24'	-52'	138°	28°40'	-53'	138°	27°55'	-53'	139°	27°09'	-53'	139°	26°24'	-54'	139°	25°38'	-54'	140°	8
9	29°17'	-52'	138°	28°32'	-52'	139°	27°47'	-53'	139°	27°02'	-53'	139°	26°16'	-53'	140°	25°30'	-54'	140°	24°44'	-54'	140°	9
10	28°25'	-52'	139°	27°40'	-53'	139°	26°54'	-53'	140°	26°08'	-53'	140°	25°22'	-54'	140°	24°36'	-54'	140°	23°50'	-54'	141°	10
11	27°33'	-52'	139°	26°47'	-53'	140°	26°01'	-53'	140°	25°15'	-53'	140°	24°29'	-54'	141°	23°42'	-54'	141°	22°56'	-54'	141°	11
12	26°41'	-52'	140°	25°55'	-53'	140°	25°08'	-53'	141°	24°22'	-53'	141°	23°35'	-54'	141°	22°48'	-54'	141°	22°01'	-54'	142°	12
13	25°48'	-53'	140°	25°02'	-53'	141°	24°15'	-53'	141°	23°28'	-54'	141°	22°41'	-54'	142°	21°54'	-54'	142°	21°07'	-54'	142°	13
14	24°56'	-53'	141°	24°09'	-53'	141°	23°22'	-53'	142°	22°35'	-54'	142°	21°48'	-54'	142°	21°00'	-54'	142°	20°13'	-55'	143°	14
15	24°03'	-53'	142°	23°16'	-53'	142°	22°29'	-53'	142°	21°41'	-54'	142°	20°54'	-54'	143°	20°06'	-54'	143°	19°18'	-55'	143°	15
16	23°10'	-53'	142°	22°23'	-53'	142°	21°35'	-53'	143°	20°48'	-54'	143°	20°00'	-54'	143°	19°12'	-54'	143°	18°24'	-55'	143°	16
17	22°17'	-53'	143°	21°30'	-53'	143°	20°42'	-54'	143°	19°54'	-54'	143°	19°06'	-54'	143°	18°17'	-54'	144°	17°29'	-55'	144°	17
18	21°25'	-53'	143°	20°36'	-53'	143°	19°48'	-54'	144°	19°00'	-54'	144°	18°11'	-54'	144°	17°23'	-54'	144°	16°34'	-55'	144°	18
19	20°31'	-53'	144°	19°43'	-53'	144°	18°55'	-54'	144°	18°06'	-54'	144°	17°17'	-54'	144°	16°28'	-55'	145°	15°40'	-55'	145°	19
20	19°38'	-53'	144°	18°50'	-53'	144°	18°01'	-54'	144°	17°12'	-54'	145°	16°23'	-54'	145°	15°34'	-55'	145°	14°45'	-55'	145°	20
21	18°45'	-53'	145°	17°56'	-54'	145°	17°07'	-54'	145°	16°18'	-54'	145°	15°29'	-54'	145°	14°39'	-55'	145°	13°50'	-55'	146°	21
22	17°52'	-53'	145°	17°03'	-54'	145°	16°13'	-54'	145°	15°24'	-54'	146°	14°34'	-54'	146°	13°45'	-55'	146°	12°55'	-55'	146°	22
23	16°59'	-53'	146°	16°09'	-54'	146°	15°19'	-54'	146°	14°30'	-54'	146°	13°40'	-54'	146°	12°50'	-55'	146°	12°00'	-55'	146°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

36° 324° LHA — Latitude CONTRARY to DECLINATION — 36° 324° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

35° 325° LHA — Latitude CONTRARY to Declination — 35° 325° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	37°30'	-51'	134°	36°48'	-51'	134°	36°06'	-52'	135°	35°24'	-52'	135°	34°41'	-53'	136°	33°58'	-53'	136°	33°14'	-53'	137°	0
1	36°39'	-51'	134°	35°57'	-51'	135°	35°15'	-52'	135°	34°32'	-52'	136°	33°48'	-53'	136°	33°05'	-53'	137°	32°21'	-54'	137°	1
2	35°48'	-51'	135°	35°06'	-52'	136°	34°23'	-52'	136°	33°39'	-52'	136°	32°56'	-53'	137°	32°12'	-53'	137°	31°27'	-54'	138°	2
3	34°57'	-51'	136°	34°14'	-52'	136°	33°31'	-52'	137°	32°47'	-53'	137°	32°03'	-53'	137°	31°18'	-53'	138°	30°34'	-54'	138°	3
4	34°06'	-52'	136°	33°22'	-52'	137°	32°38'	-52'	137°	31°54'	-53'	138°	31°10'	-53'	138°	30°25'	-54'	138°	29°40'	-54'	139°	4
5	33°14'	-52'	137°	32°30'	-52'	137°	31°46'	-53'	138°	31°01'	-53'	138°	30°17'	-53'	139°	29°31'	-54'	139°	28°46'	-54'	139°	5
6	32°23'	-52'	138°	31°38'	-52'	138°	30°53'	-53'	138°	30°09'	-53'	139°	29°23'	-53'	139°	28°38'	-54'	139°	27°52'	-54'	140°	6
7	31°31'	-52'	138°	30°46'	-52'	139°	30°01'	-53'	139°	29°15'	-53'	139°	28°30'	-54'	140°	27°44'	-54'	140°	26°58'	-54'	140°	7
8	30°39'	-52'	139°	29°53'	-53'	139°	29°08'	-53'	139°	28°22'	-53'	140°	27°36'	-54'	140°	26°50'	-54'	140°	26°04'	-54'	141°	8
9	29°46'	-52'	139°	29°01'	-53'	140°	28°15'	-53'	140°	27°29'	-53'	140°	26°43'	-54'	141°	25°56'	-54'	141°	25°09'	-54'	141°	9
10	28°54'	-52'	140°	28°08'	-53'	140°	27°22'	-53'	141°	26°36'	-54'	141°	25°49'	-54'	141°	25°02'	-54'	141°	24°15'	-54'	142°	10
11	28°02'	-53'	140°	27°15'	-53'	141°	26°29'	-53'	141°	25°42'	-54'	141°	24°55'	-54'	142°	24°08'	-54'	142°	23°21'	-55'	142°	11
12	27°09'	-53'	141°	26°22'	-53'	141°	25°35'	-53'	142°	24°48'	-54'	142°	24°01'	-54'	142°	23°14'	-54'	142°	22°26'	-55'	143°	12
13	26°16'	-53'	141°	25°29'	-53'	142°	24°42'	-54'	142°	23°55'	-54'	142°	23°07'	-54'	143°	22°19'	-54'	143°	21°31'	-55'	143°	13
14	25°23'	-53'	142°	24°36'	-53'	142°	23°49'	-54'	143°	23°01'	-54'	143°	22°13'	-54'	143°	21°25'	-54'	143°	20°37'	-55'	144°	14
15	24°30'	-53'	142°	23°43'	-53'	143°	22°55'	-54'	143°	22°07'	-54'	143°	21°19'	-54'	144°	20°30'	-55'	144°	19°42'	-55'	144°	15
16	23°37'	-53'	143°	22°49'	-53'	143°	22°01'	-54'	144°	21°13'	-54'	144°	20°25'	-54'	144°	19°36'	-55'	144°	18°47'	-55'	144°	16
17	22°44'	-53'	144°	21°56'	-54'	144°	21°07'	-54'	144°	20°19'	-54'	144°	19°30'	-54'	144°	18°41'	-55'	145°	17°52'	-55'	145°	17
18	21°51'	-53'	144°	21°02'	-54'	144°	20°14'	-54'	144°	19°25'	-54'	145°	18°36'	-54'	145°	17°47'	-55'	145°	16°57'	-55'	145°	18
19	20°58'	-53'	144°	20°09'	-54'	145°	19°20'	-54'	145°	18°31'	-54'	145°	17°41'	-55'	145°	16°52'	-55'	145°	16°02'	-55'	146°	19
20	20°04'	-54'	145°	19°15'	-54'	145°	18°26'	-54'	145°	17°36'	-54'	146°	16°47'	-55'	146°	15°57'	-55'	146°	15°07'	-55'	146°	20
21	19°11'	-54'	145°	18°21'	-54'	146°	17°32'	-54'	146°	16°42'	-54'	146°	15°52'	-55'	146°	15°02'	-55'	146°	14°12'	-55'	146°	21
22	18°17'	-54'	146°	17°27'	-54'	146°	16°38'	-54'	146°	15°48'	-54'	146°	14°58'	-55'	147°	14°07'	-55'	147°	13°17'	-55'	147°	22
23	17°24'	-54'	146°	16°33'	-54'	147°	15°43'	-54'	147°	14°53'	-54'	147°	14°03'	-55'	147°	13°12'	-55'	147°	12°22'	-55'	147°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

35° 325° LHA — Latitude CONTRARY to DECLINATION — 35° 325° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

34° 326° LHA — Latitude CONTRARY to Declination — 34° 326° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	38°02'	-51'	135°	37°19'	-52'	135°	36°37'	-52'	136°	35°53'	-52'	136°	35°10'	-53'	137°	34°26'	-53'	137°	33°42'	-54'	138°	0
1	37°11'	-51'	135°	36°28'	-52'	136°	35°45'	-52'	136°	35°01'	-53'	137°	34°17'	-53'	137°	33°33'	-53'	138°	32°48'	-54'	138°	1
2	36°20'	-52'	136°	35°36'	-52'	137°	34°52'	-52'	137°	34°08'	-53'	138°	33°24'	-53'	138°	32°39'	-54'	138°	31°54'	-54'	139°	2
3	35°28'	-52'	137°	34°44'	-52'	137°	34°00'	-53'	138°	33°15'	-53'	138°	32°31'	-53'	139°	31°46'	-54'	139°	31°00'	-54'	139°	3
4	34°36'	-52'	137°	33°52'	-52'	138°	33°07'	-53'	138°	32°23'	-53'	139°	31°37'	-53'	139°	30°52'	-54'	139°	30°06'	-54'	140°	4
5	33°44'	-52'	138°	33°00'	-52'	138°	32°15'	-53'	139°	31°29'	-53'	139°	30°44'	-54'	140°	29°58'	-54'	140°	29°12'	-54'	140°	5
6	32°52'	-52'	139°	32°07'	-53'	139°	31°22'	-53'	139°	30°36'	-53'	140°	29°50'	-54'	140°	29°04'	-54'	140°	28°18'	-54'	141°	6
7	32°00'	-52'	139°	31°15'	-53'	140°	30°29'	-53'	140°	29°43'	-53'	140°	28°57'	-54'	141°	28°10'	-54'	141°	27°23'	-54'	141°	7
8	31°08'	-53'	140°	30°22'	-53'	140°	29°36'	-53'	140°	28°49'	-54'	141°	28°03'	-54'	141°	27°16'	-54'	141°	26°29'	-55'	142°	8
9	30°15'	-53'	140°	29°29'	-53'	141°	28°42'	-53'	141°	27°56'	-54'	141°	27°09'	-54'	142°	26°22'	-54'	142°	25°34'	-55'	142°	9
10	29°23'	-53'	141°	28°36'	-53'	141°	27°49'	-53'	141°	27°02'	-54'	142°	26°15'	-54'	142°	25°27'	-54'	142°	24°40'	-55'	143°	10
11	28°30'	-53'	141°	27°43'	-53'	142°	26°56'	-54'	142°	26°08'	-54'	142°	25°21'	-54'	143°	24°33'	-55'	143°	23°45'	-55'	143°	11
12	27°37'	-53'	142°	26°50'	-53'	142°	26°02'	-54'	143°	25°14'	-54'	143°	24°26'	-54'	143°	23°38'	-55'	143°	22°50'	-55'	144°	12
13	26°44'	-53'	142°	25°56'	-53'	143°	25°08'	-54'	143°	24°20'	-54'	143°	23°32'	-54'	144°	22°44'	-55'	144°	21°55'	-55'	144°	13
14	25°51'	-53'	143°	25°03'	-54'	143°	24°15'	-54'	143°	23°26'	-54'	144°	22°38'	-54'	144°	21°49'	-55'	144°	21°00'	-55'	144°	14
15	24°57'	-53'	143°	24°09'	-54'	144°	23°21'	-54'	144°	22°32'	-54'	144°	21°43'	-55'	144°	20°54'	-55'	145°	20°05'	-55'	145°	15
16	24°04'	-53'	144°	23°15'	-54'	144°	22°27'	-54'	144°	21°38'	-54'	145°	20°49'	-55'	145°	20°00'	-55'	145°	19°10'	-55'	145°	16
17	23°10'	-54'	144°	22°22'	-54'	145°	21°33'	-54'	145°	20°43'	-54'	145°	19°54'	-55'	145°	19°05'	-55'	146°	18°15'	-55'	146°	17
18	22°17'	-54'	145°	21°28'	-54'	145°	20°38'	-54'	145°	19°49'	-54'	146°	18°59'	-55'	146°	18°10'	-55'	146°	17°20'	-55'	146°	18
19	21°23'	-54'	145°	20°34'	-54'	146°	19°44'	-54'	146°	18°55'	-55'	146°	18°05'	-55'	146°	17°15'	-55'	146°	16°25'	-55'	147°	19
20	20°30'	-54'	146°	19°40'	-54'	146°	18°50'	-54'	146°	18°00'	-55'	146°	17°10'	-55'	147°	16°20'	-55'	147°	15°30'	-55'	147°	20
21	19°36'	-54'	146°	18°46'	-54'	147°	17°56'	-54'	147°	17°05'	-55'	147°	16°15'	-55'	147°	15°25'	-55'	147°	14°34'	-55'	147°	21
22	18°42'	-54'	147°	17°52'	-54'	147°	17°01'	-54'	147°	16°11'	-55'	147°	15°20'	-55'	147°	14°30'	-55'	148°	13°39'	-55'	148°	22
23	17°48'	-54'	147°	16°57'	-54'	147°	16°07'	-55'	148°	15°16'	-55'	148°	14°25'	-55'	148°	13°34'	-55'	148°	12°43'	-55'	148°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

34° 326° LHA — Latitude CONTRARY to DECLINATION — 34° 326° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

33° 327° LHA — Latitude CONTRARY to Declination — 33° 327° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	38°33'	-51'	136°	37°50'	-52'	136°	37°06'	-52'	137°	36°22'	-53'	137°	35°38'	-53'	138°	34°53'	-54'	138°	34°08'	-54'	139°	0
1	37°42'	-52'	137°	36°58'	-52'	137°	36°14'	-53'	138°	35°30'	-53'	138°	34°45'	-53'	138°	34°00'	-54'	139°	33°14'	-54'	139°	1
2	36°50'	-52'	137°	36°06'	-52'	138°	35°21'	-53'	138°	34°37'	-53'	139°	33°51'	-53'	139°	33°06'	-54'	139°	32°20'	-54'	140°	2
3	35°58'	-52'	138°	35°14'	-52'	138°	34°29'	-53'	139°	33°44'	-53'	139°	32°58'	-54'	140°	32°12'	-54'	140°	31°26'	-54'	140°	3
4	35°06'	-52'	138°	34°21'	-53'	139°	33°36'	-53'	139°	32°50'	-53'	140°	32°04'	-54'	140°	31°18'	-54'	141°	30°32'	-54'	141°	4
5	34°14'	-52'	139°	33°29'	-53'	139°	32°43'	-53'	140°	31°57'	-54'	140°	31°11'	-54'	141°	30°24'	-54'	141°	29°37'	-55'	141°	5
6	33°22'	-53'	140°	32°36'	-53'	140°	31°50'	-53'	140°	31°03'	-54'	141°	30°17'	-54'	141°	29°30'	-54'	142°	28°43'	-55'	142°	6
7	32°29'	-53'	140°	31°43'	-53'	141°	30°56'	-53'	141°	30°10'	-54'	141°	29°23'	-54'	142°	28°36'	-54'	142°	27°48'	-55'	142°	7
8	31°36'	-53'	141°	30°50'	-53'	141°	30°03'	-54'	141°	29°16'	-54'	142°	28°29'	-54'	142°	27°41'	-55'	142°	26°53'	-55'	143°	8
9	30°43'	-53'	141°	29°57'	-53'	142°	29°09'	-54'	142°	28°22'	-54'	142°	27°34'	-54'	143°	26°47'	-55'	143°	25°59'	-55'	143°	9
10	29°50'	-53'	142°	29°03'	-53'	142°	28°16'	-54'	142°	27°28'	-54'	143°	26°40'	-54'	143°	25°52'	-55'	143°	25°04'	-55'	144°	10
11	28°57'	-53'	142°	28°10'	-54'	143°	27°22'	-54'	143°	26°34'	-54'	143°	25°46'	-54'	144°	24°57'	-55'	144°	24°09'	-55'	144°	11
12	28°04'	-53'	143°	27°16'	-54'	143°	26°28'	-54'	143°	25°40'	-54'	144°	24°51'	-55'	144°	24°03'	-55'	144°	23°14'	-55'	145°	12
13	27°11'	-53'	143°	26°22'	-54'	144°	25°34'	-54'	144°	24°45'	-54'	144°	23°57'	-55'	145°	23°08'	-55'	145°	22°19'	-55'	145°	13
14	26°17'	-54'	144°	25°29'	-54'	144°	24°40'	-54'	144°	23°51'	-54'	145°	23°02'	-55'	145°	22°13'	-55'	145°	21°23'	-55'	145°	14
15	25°24'	-54'	144°	24°35'	-54'	145°	23°46'	-54'	145°	22°57'	-55'	145°	22°07'	-55'	145°	21°18'	-55'	146°	20°28'	-55'	146°	15
16	24°30'	-54'	145°	23°41'	-54'	145°	22°51'	-54'	145°	22°02'	-55'	146°	21°12'	-55'	146°	20°23'	-55'	146°	19°33'	-55'	146°	16
17	23°36'	-54'	145°	22°47'	-54'	146°	21°57'	-54'	146°	21°07'	-55'	146°	20°18'	-55'	146°	19°28'	-55'	146°	18°38'	-55'	147°	17
18	22°42'	-54'	146°	21°53'	-54'	146°	21°03'	-54'	146°	20°13'	-55'	146°	19°23'	-55'	147°	18°32'	-55'	147°	17°42'	-55'	147°	18
19	21°48'	-54'	146°	20°58'	-54'	147°	20°08'	-55'	147°	19°18'	-55'	147°	18°28'	-55'	147°	17°37'	-55'	147°	16°47'	-56'	147°	19
20	20°54'	-54'	147°	20°04'	-54'	147°	19°14'	-55'	147°	18°23'	-55'	147°	17°33'	-55'	148°	16°42'	-55'	148°	15°51'	-56'	148°	20
21	20°00'	-54'	147°	19°10'	-54'	147°	18°19'	-55'	148°	17°28'	-55'	148°	16°37'	-55'	148°	15°47'	-55'	148°	14°56'	-56'	148°	21
22	19°06'	-54'	148°	18°15'	-54'	148°	17°24'	-55'	148°	16°33'	-55'	148°	15°42'	-55'	148°	14°51'	-55'	149°	14°00'	-56'	149°	22
23	18°12'	-54'	148°	17°21'	-55'	148°	16°30'	-55'	148°	15°38'	-55'	149°	14°47'	-55'	149°	13°56'	-55'	149°	13°04'	-56'	149°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

33° 327° LHA — Latitude CONTRARY to DECLINATION — 33° 327° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

32° 328° LHA — Latitude CONTRARY to Declination — 32° 328° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	39°04'	-52'	137°	38°20'	-52'	138°	37°36'	-53'	138°	36°51'	-53'	139°	36°06'	-53'	139°	35°20'	-54'	139°	34°34'	-54'	140°	0
1	38°12'	-52'	138°	37°28'	-52'	138°	36°43'	-53'	139°	35°58'	-53'	139°	35°12'	-54'	140°	34°26'	-54'	140°	33°40'	-54'	140°	1
2	37°20'	-52'	138°	36°35'	-53'	139°	35°50'	-53'	139°	35°04'	-53'	140°	34°18'	-54'	140°	33°32'	-54'	141°	32°46'	-54'	141°	2
3	36°28'	-52'	139°	35°43'	-53'	139°	34°57'	-53'	140°	34°11'	-54'	140°	33°25'	-54'	141°	32°38'	-54'	141°	31°51'	-55'	141°	3
4	35°36'	-53'	139°	34°50'	-53'	140°	34°04'	-53'	140°	33°17'	-54'	141°	32°31'	-54'	141°	31°44'	-54'	142°	30°57'	-55'	142°	4
5	34°43'	-53'	140°	33°57'	-53'	140°	33°10'	-53'	141°	32°24'	-54'	141°	31°37'	-54'	142°	30°50'	-54'	142°	30°02'	-55'	142°	5
6	33°50'	-53'	141°	33°04'	-53'	141°	32°17'	-54'	141°	31°30'	-54'	142°	30°43'	-54'	142°	29°55'	-55'	143°	29°07'	-55'	143°	6
7	32°57'	-53'	141°	32°10'	-53'	142°	31°23'	-54'	142°	30°36'	-54'	142°	29°48'	-54'	143°	29°00'	-55'	143°	28°12'	-55'	143°	7
8	32°04'	-53'	142°	31°17'	-54'	142°	30°30'	-54'	142°	29°42'	-54'	143°	28°54'	-54'	143°	28°06'	-55'	143°	27°17'	-55'	144°	8
9	31°11'	-53'	142°	30°23'	-54'	143°	29°36'	-54'	143°	28°48'	-54'	143°	27°59'	-55'	144°	27°11'	-55'	144°	26°22'	-55'	144°	9
10	30°18'	-53'	143°	29°30'	-54'	143°	28°42'	-54'	143°	27°53'	-54'	144°	27°05'	-55'	144°	26°16'	-55'	144°	25°27'	-55'	145°	10
11	29°24'	-54'	143°	28°36'	-54'	144°	27°48'	-54'	144°	26°59'	-54'	144°	26°10'	-55'	145°	25°21'	-55'	145°	24°32'	-55'	145°	11
12	28°31'	-54'	144°	27°42'	-54'	144°	26°53'	-54'	144°	26°04'	-55'	145°	25°15'	-55'	145°	24°26'	-55'	145°	23°37'	-55'	146°	12
13	27°37'	-54'	144°	26°48'	-54'	145°	25°59'	-54'	145°	25°10'	-55'	145°	24°21'	-55'	145°	23°31'	-55'	146°	22°41'	-55'	146°	13
14	26°43'	-54'	145°	25°54'	-54'	145°	25°05'	-54'	145°	24°15'	-55'	146°	23°26'	-55'	146°	22°36'	-55'	146°	21°46'	-55'	146°	14
15	25°49'	-54'	145°	25°00'	-54'	146°	24°10'	-55'	146°	23°21'	-55'	146°	22°31'	-55'	146°	21°41'	-55'	147°	20°50'	-56'	147°	15
16	24°55'	-54'	146°	24°06'	-54'	146°	23°16'	-55'	146°	22°26'	-55'	147°	21°36'	-55'	147°	20°45'	-55'	147°	19°55'	-56'	147°	16
17	24°01'	-54'	146°	23°11'	-54'	147°	22°21'	-55'	147°	21°31'	-55'	147°	20°40'	-55'	147°	19°50'	-55'	147°	18°59'	-56'	148°	17
18	23°07'	-54'	147°	22°17'	-55'	147°	21°26'	-55'	147°	20°36'	-55'	147°	19°45'	-55'	148°	18°55'	-55'	148°	18°04'	-56'	148°	18
19	22°13'	-54'	147°	21°22'	-55'	147°	20°32'	-55'	148°	19°41'	-55'	148°	18°50'	-55'	148°	17°59'	-56'	148°	17°08'	-56'	148°	19
20	21°18'	-54'	148°	20°28'	-55'	148°	19°37'	-55'	148°	18°46'	-55'	148°	17°55'	-55'	148°	17°04'	-56'	149°	16°12'	-56'	149°	20
21	20°24'	-54'	148°	19°33'	-55'	148°	18°42'	-55'	149°	17°51'	-55'	149°	16°59'	-55'	149°	16°08'	-56'	149°	15°16'	-56'	149°	21
22	19°30'	-55'	149°	18°38'	-55'	149°	17°47'	-55'	149°	16°55'	-55'	149°	16°04'	-55'	149°	15°12'	-56'	149°	14°21'	-56'	150°	22
23	18°35'	-55'	149°	17°43'	-55'	149°	16°52'	-55'	149°	16°00'	-55'	150°	15°08'	-55'	150°	14°17'	-56'	150°	13°25'	-56'	150°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

32° 328° LHA — Latitude CONTRARY to DECLINATION — 32° 328° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

31° 329° LHA — Latitude CONTRARY to Declination — 31° 329° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	39°34'	-52'	138°	38°49'	-53'	139°	38°04'	-53'	139°	37°19'	-53'	140°	36°33'	-54'	140°	35°46'	-54'	141°	35°00'	-54'	141°	0
1	38°42'	-52'	139°	37°57'	-53'	139°	37°11'	-53'	140°	36°25'	-54'	140°	35°39'	-54'	141°	34°52'	-54'	141°	34°05'	-55'	142°	1
2	37°50'	-53'	139°	37°04'	-53'	140°	36°18'	-53'	140°	35°32'	-54'	141°	34°45'	-54'	141°	33°58'	-54'	142°	33°11'	-55'	142°	2
3	36°57'	-53'	140°	36°11'	-53'	140°	35°24'	-54'	141°	34°38'	-54'	141°	33°51'	-54'	142°	33°04'	-55'	142°	32°16'	-55'	143°	3
4	36°04'	-53'	141°	35°18'	-53'	141°	34°31'	-54'	141°	33°44'	-54'	142°	32°57'	-54'	142°	32°09'	-55'	143°	31°21'	-55'	143°	4
5	35°11'	-53'	141°	34°24'	-53'	142°	33°37'	-54'	142°	32°50'	-54'	142°	32°02'	-54'	143°	31°14'	-55'	143°	30°26'	-55'	143°	5
6	34°18'	-53'	142°	33°31'	-54'	142°	32°43'	-54'	142°	31°56'	-54'	143°	31°08'	-55'	143°	30°20'	-55'	144°	29°31'	-55'	144°	6
7	33°25'	-53'	142°	32°37'	-54'	143°	31°50'	-54'	143°	31°02'	-54'	143°	30°13'	-55'	144°	29°25'	-55'	144°	28°36'	-55'	144°	7
8	32°32'	-54'	143°	31°44'	-54'	143°	30°56'	-54'	144°	30°07'	-54'	144°	29°19'	-55'	144°	28°30'	-55'	145°	27°41'	-55'	145°	8
9	31°38'	-54'	143°	30°50'	-54'	144°	30°01'	-54'	144°	29°13'	-55'	144°	28°24'	-55'	145°	27°35'	-55'	145°	26°46'	-55'	145°	9
10	30°44'	-54'	144°	29°56'	-54'	144°	29°07'	-54'	145°	28°18'	-55'	145°	27°29'	-55'	145°	26°40'	-55'	145°	25°50'	-55'	146°	10
11	29°51'	-54'	144°	29°02'	-54'	145°	28°13'	-54'	145°	27°23'	-55'	145°	26°34'	-55'	146°	25°44'	-55'	146°	24°55'	-56'	146°	11
12	28°57'	-54'	145°	28°08'	-54'	145°	27°18'	-55'	145°	26°29'	-55'	146°	25°39'	-55'	146°	24°49'	-55'	146°	23°59'	-56'	147°	12
13	28°03'	-54'	145°	27°13'	-54'	146°	26°24'	-55'	146°	25°34'	-55'	146°	24°44'	-55'	146°	23°54'	-55'	147°	23°04'	-56'	147°	13
14	27°09'	-54'	146°	26°19'	-54'	146°	25°29'	-55'	146°	24°39'	-55'	147°	23°49'	-55'	147°	22°58'	-55'	147°	22°08'	-56'	147°	14
15	26°14'	-54'	146°	25°24'	-55'	147°	24°34'	-55'	147°	23°44'	-55'	147°	22°53'	-55'	147°	22°03'	-56'	148°	21°12'	-56'	148°	15
16	25°20'	-54'	147°	24°30'	-55'	147°	23°39'	-55'	147°	22°49'	-55'	148°	21°58'	-55'	148°	21°07'	-56'	148°	20°16'	-56'	148°	16
17	24°26'	-54'	147°	23°35'	-55'	147°	22°44'	-55'	148°	21°54'	-55'	148°	21°03'	-55'	148°	20°12'	-56'	148°	19°21'	-56'	149°	17
18	23°31'	-55'	148°	22°40'	-55'	148°	21°49'	-55'	148°	20°58'	-55'	148°	20°07'	-56'	149°	19°16'	-56'	149°	18°25'	-56'	149°	18
19	22°37'	-55'	148°	21°46'	-55'	148°	20°54'	-55'	149°	20°03'	-55'	149°	19°12'	-56'	149°	18°20'	-56'	149°	17°29'	-56'	149°	19
20	21°42'	-55'	149°	20°51'	-55'	149°	19°59'	-55'	149°	19°08'	-55'	149°	18°16'	-56'	149°	17°25'	-56'	150°	16°33'	-56'	150°	20
21	20°47'	-55'	149°	19°56'	-55'	149°	19°04'	-55'	149°	18°12'	-55'	150°	17°21'	-56'	150°	16°29'	-56'	150°	15°37'	-56'	150°	21
22	19°52'	-55'	149°	19°01'	-55'	150°	18°09'	-55'	150°	17°17'	-55'	150°	16°25'	-56'	150°	15°33'	-56'	150°	14°41'	-56'	150°	22
23	18°58'	-55'	150°	18°06'	-55'	150°	17°14'	-55'	150°	16°21'	-56'	150°	15°29'	-56'	151°	14°37'	-56'	151°	13°45'	-56'	151°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

31° 329° LHA — Latitude CONTRARY to DECLINATION — 31° 329° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

30° 330° LHA — Latitude CONTRARY to Declination — 30° 330° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	40°04'	-53'	139°	39°18'	-53'	140°	38°32'	-53'	140°	37°46'	-54'	141°	36°59'	-54'	141°	36°12'	-54'	142°	35°25'	-55'	142°	0
1	39°11'	-53'	140°	38°25'	-53'	140°	37°39'	-54'	141°	36°52'	-54'	141°	36°05'	-54'	142°	35°18'	-55'	142°	34°30'	-55'	143°	1
2	38°18'	-53'	140°	37°32'	-53'	141°	36°45'	-54'	141°	35°58'	-54'	142°	35°11'	-54'	142°	34°23'	-55'	143°	33°35'	-55'	143°	2
3	37°25'	-53'	141°	36°39'	-53'	142°	35°51'	-54'	142°	35°04'	-54'	142°	34°16'	-55'	143°	33°28'	-55'	143°	32°40'	-55'	144°	3
4	36°32'	-53'	142°	35°45'	-54'	142°	34°58'	-54'	143°	34°10'	-54'	143°	33°22'	-55'	143°	32°34'	-55'	144°	31°45'	-55'	144°	4
5	35°39'	-53'	142°	34°51'	-54'	143°	34°04'	-54'	143°	33°15'	-54'	143°	32°27'	-55'	144°	31°39'	-55'	144°	30°50'	-55'	145°	5
6	34°45'	-54'	143°	33°58'	-54'	143°	33°09'	-54'	144°	32°21'	-55'	144°	31°32'	-55'	144°	30°44'	-55'	145°	29°55'	-55'	145°	6
7	33°52'	-54'	143°	33°04'	-54'	144°	32°15'	-54'	144°	31°27'	-55'	144°	30°38'	-55'	145°	29°48'	-55'	145°	28°59'	-55'	145°	7
8	32°58'	-54'	144°	32°10'	-54'	144°	31°21'	-54'	145°	30°32'	-55'	145°	29°43'	-55'	145°	28°53'	-55'	146°	28°04'	-56'	146°	8
9	32°04'	-54'	144°	31°15'	-54'	145°	30°26'	-55'	145°	29°37'	-55'	145°	28°48'	-55'	146°	27°58'	-55'	146°	27°08'	-56'	146°	9
10	31°10'	-54'	145°	30°21'	-54'	145°	29°32'	-55'	146°	28°42'	-55'	146°	27°52'	-55'	146°	27°03'	-55'	146°	26°12'	-56'	147°	10
11	30°16'	-54'	145°	29°27'	-55'	146°	28°37'	-55'	146°	27°47'	-55'	146°	26°57'	-55'	147°	26°07'	-56'	147°	25°17'	-56'	147°	11
12	29°22'	-54'	146°	28°32'	-55'	146°	27°42'	-55'	146°	26°52'	-55'	147°	26°02'	-55'	147°	25°12'	-56'	147°	24°21'	-56'	148°	12
13	28°28'	-54'	146°	27°38'	-55'	147°	26°47'	-55'	147°	25°57'	-55'	147°	25°07'	-55'	147°	24°16'	-56'	148°	23°25'	-56'	148°	13
14	27°33'	-55'	147°	26°43'	-55'	147°	25°52'	-55'	147°	25°02'	-55'	148°	24°11'	-56'	148°	23°20'	-56'	148°	22°29'	-56'	148°	14
15	26°39'	-55'	147°	25°48'	-55'	148°	24°57'	-55'	148°	24°07'	-55'	148°	23°16'	-56'	148°	22°25'	-56'	149°	21°33'	-56'	149°	15
16	25°44'	-55'	148°	24°53'	-55'	148°	24°02'	-55'	148°	23°11'	-55'	148°	22°20'	-56'	149°	21°29'	-56'	149°	20°37'	-56'	149°	16
17	24°49'	-55'	148°	23°58'	-55'	148°	23°07'	-55'	149°	22°16'	-55'	149°	21°24'	-56'	149°	20°33'	-56'	149°	19°41'	-56'	149°	17
18	23°55'	-55'	149°	23°03'	-55'	149°	22°12'	-55'	149°	21°20'	-56'	149°	20°29'	-56'	149°	19°37'	-56'	150°	18°45'	-56'	150°	18
19	23°00'	-55'	149°	22°08'	-55'	149°	21°17'	-55'	150°	20°25'	-56'	150°	19°33'	-56'	150°	18°41'	-56'	150°	17°49'	-56'	150°	19
20	22°05'	-55'	150°	21°13'	-55'	150°	20°21'	-55'	150°	19°29'	-56'	150°	18°37'	-56'	150°	17°45'	-56'	150°	16°53'	-56'	151°	20
21	21°10'	-55'	150°	20°18'	-55'	150°	19°26'	-55'	150°	18°34'	-56'	151°	17°41'	-56'	151°	16°49'	-56'	151°	15°57'	-56'	151°	21
22	20°15'	-55'	150°	19°23'	-55'	151°	18°30'	-56'	151°	17°38'	-56'	151°	16°45'	-56'	151°	15°53'	-56'	151°	15°00'	-56'	151°	22
23	19°20'	-55'	151°	18°27'	-55'	151°	17°35'	-56'	151°	16°42'	-56'	151°	15°49'	-56'	151°	14°57'	-56'	152°	14°04'	-56'	152°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

30° 330° LHA — Latitude CONTRARY to DECLINATION — 30° 330° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

29° 331° LHA — Latitude CONTRARY to Declination — 29° 331° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	40°32'	-53'	140°	39°46'	-53'	141°	38°59'	-54'	141°	38°12'	-54'	142°	37°25'	-54'	142°	36°37'	-55'	143°	35°49'	-55'	143°	0
1	39°39'	-53'	141°	38°53'	-54'	141°	38°06'	-54'	142°	37°18'	-54'	142°	36°30'	-55'	143°	35°42'	-55'	143°	34°54'	-55'	144°	1
2	38°46'	-53'	142°	37°59'	-54'	142°	37°12'	-54'	143°	36°24'	-54'	143°	35°36'	-55'	143°	34°48'	-55'	144°	33°59'	-55'	144°	2
3	37°53'	-53'	142°	37°05'	-54'	143°	36°18'	-54'	143°	35°30'	-54'	144°	34°41'	-55'	144°	33°53'	-55'	144°	33°04'	-55'	145°	3
4	37°00'	-54'	143°	36°12'	-54'	143°	35°23'	-54'	144°	34°35'	-55'	144°	33°46'	-55'	144°	32°57'	-55'	145°	32°08'	-55'	145°	4
5	36°06'	-54'	143°	35°18'	-54'	144°	34°29'	-54'	144°	33°40'	-55'	145°	32°51'	-55'	145°	32°02'	-55'	145°	31°13'	-56'	146°	5
6	35°12'	-54'	144°	34°24'	-54'	144°	33°35'	-55'	145°	32°46'	-55'	145°	31°56'	-55'	145°	31°07'	-55'	146°	30°17'	-56'	146°	6
7	34°18'	-54'	144°	33°29'	-54'	145°	32°40'	-55'	145°	31°51'	-55'	145°	31°01'	-55'	146°	30°12'	-55'	146°	29°22'	-56'	146°	7
8	33°24'	-54'	145°	32°35'	-54'	145°	31°46'	-55'	146°	30°56'	-55'	146°	30°06'	-55'	146°	29°16'	-56'	147°	28°26'	-56'	147°	8
9	32°30'	-54'	145°	31°40'	-55'	146°	30°51'	-55'	146°	30°01'	-55'	146°	29°11'	-55'	147°	28°21'	-56'	147°	27°30'	-56'	147°	9
10	31°36'	-54'	146°	30°46'	-55'	146°	29°56'	-55'	147°	29°06'	-55'	147°	28°15'	-55'	147°	27°25'	-56'	147°	26°34'	-56'	148°	10
11	30°41'	-55'	146°	29°51'	-55'	147°	29°01'	-55'	147°	28°10'	-55'	147°	27°20'	-56'	148°	26°29'	-56'	148°	25°38'	-56'	148°	11
12	29°47'	-55'	147°	28°56'	-55'	147°	28°06'	-55'	147°	27°15'	-55'	148°	26°24'	-56'	148°	25°33'	-56'	148°	24°42'	-56'	149°	12
13	28°52'	-55'	147°	28°01'	-55'	148°	27°11'	-55'	148°	26°20'	-55'	148°	25°29'	-56'	148°	24°38'	-56'	149°	23°46'	-56'	149°	13
14	27°57'	-55'	148°	27°06'	-55'	148°	26°15'	-55'	148°	25°24'	-56'	149°	24°33'	-56'	149°	23°42'	-56'	149°	22°50'	-56'	149°	14
15	27°02'	-55'	148°	26°11'	-55'	149°	25°20'	-55'	149°	24°29'	-56'	149°	23°37'	-56'	149°	22°46'	-56'	149°	21°54'	-56'	150°	15
16	26°08'	-55'	149°	25°16'	-55'	149°	24°25'	-55'	149°	23°33'	-56'	149°	22°41'	-56'	150°	21°50'	-56'	150°	20°58'	-56'	150°	16
17	25°13'	-55'	149°	24°21'	-55'	149°	23°29'	-56'	150°	22°37'	-56'	150°	21°46'	-56'	150°	20°53'	-56'	150°	20°01'	-56'	150°	17
18	24°18'	-55'	150°	23°26'	-55'	150°	22°34'	-56'	150°	21°42'	-56'	150°	20°50'	-56'	150°	19°57'	-56'	151°	19°05'	-56'	151°	18
19	23°22'	-55'	150°	22°30'	-55'	150°	21°38'	-56'	150°	20°46'	-56'	151°	19°54'	-56'	151°	19°01'	-56'	151°	18°09'	-56'	151°	19
20	22°27'	-55'	150°	21°35'	-55'	151°	20°43'	-56'	151°	19°50'	-56'	151°	18°58'	-56'	151°	18°05'	-56'	151°	17°12'	-56'	152°	20
21	21°32'	-55'	151°	20°39'	-56'	151°	19°47'	-56'	151°	18°54'	-56'	151°	18°01'	-56'	152°	17°09'	-56'	152°	16°16'	-56'	152°	21
22	20°37'	-55'	151°	19°44'	-56'	151°	18°51'	-56'	152°	17°58'	-56'	152°	17°05'	-56'	152°	16°12'	-56'	152°	15°19'	-57'	152°	22
23	19°41'	-55'	152°	18°48'	-56'	152°	17°55'	-56'	152°	17°02'	-56'	152°	16°09'	-56'	152°	15°16'	-56'	152°	14°23'	-57'	153°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

29° 331° LHA — Latitude CONTRARY to DECLINATION — 29° 331° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

28° 332° LHA — Latitude CONTRARY to Declination — 28° 332° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	41°00'	-53'	142°	40°13'	-54'	142°	39°26'	-54'	143°	38°38'	-54'	143°	37°50'	-55'	144°	37°02'	-55'	144°	36°13'	-55'	144°	0
1	40°07'	-53'	142°	39°20'	-54'	143°	38°32'	-54'	143°	37°44'	-55'	144°	36°55'	-55'	144°	36°06'	-55'	144°	35°18'	-55'	145°	1
2	39°14'	-54'	143°	38°26'	-54'	143°	37°38'	-54'	144°	36°49'	-55'	144°	36°00'	-55'	145°	35°11'	-55'	145°	34°22'	-56'	145°	2
3	38°20'	-54'	143°	37°32'	-54'	144°	36°43'	-54'	144°	35°54'	-55'	145°	35°05'	-55'	145°	34°16'	-55'	145°	33°27'	-56'	146°	3
4	37°26'	-54'	144°	36°38'	-54'	144°	35°49'	-55'	145°	35°00'	-55'	145°	34°10'	-55'	146°	33°21'	-55'	146°	32°31'	-56'	146°	4
5	36°32'	-54'	144°	35°43'	-54'	145°	34°54'	-55'	145°	34°05'	-55'	146°	33°15'	-55'	146°	32°25'	-56'	146°	31°35'	-56'	147°	5
6	35°38'	-54'	145°	34°49'	-55'	145°	33°59'	-55'	146°	33°10'	-55'	146°	32°20'	-55'	146°	31°30'	-56'	147°	30°39'	-56'	147°	6
7	34°44'	-54'	145°	33°54'	-55'	146°	33°05'	-55'	146°	32°15'	-55'	147°	31°24'	-55'	147°	30°34'	-56'	147°	29°43'	-56'	148°	7
8	33°49'	-55'	146°	33°00'	-55'	146°	32°10'	-55'	147°	31°19'	-55'	147°	30°29'	-56'	147°	29°38'	-56'	148°	28°48'	-56'	148°	8
9	32°55'	-55'	146°	32°05'	-55'	147°	31°15'	-55'	147°	30°24'	-55'	147°	29°33'	-56'	148°	28°42'	-56'	148°	27°51'	-56'	148°	9
10	32°00'	-55'	147°	31°10'	-55'	147°	30°19'	-55'	148°	29°29'	-56'	148°	28°38'	-56'	148°	27°47'	-56'	148°	26°55'	-56'	149°	10
11	31°06'	-55'	147°	30°15'	-55'	148°	29°24'	-55'	148°	28°33'	-56'	148°	27°42'	-56'	149°	26°51'	-56'	149°	25°59'	-56'	149°	11
12	30°11'	-55'	148°	29°20'	-55'	148°	28°29'	-55'	149°	27°37'	-56'	149°	26°46'	-56'	149°	25°55'	-56'	149°	25°03'	-56'	150°	12
13	29°16'	-55'	148°	28°25'	-55'	149°	27°33'	-56'	149°	26°42'	-56'	149°	25°50'	-56'	149°	24°58'	-56'	150°	24°07'	-56'	150°	13
14	28°21'	-55'	149°	27°29'	-55'	149°	26°38'	-56'	149°	25°46'	-56'	150°	24°54'	-56'	150°	24°02'	-56'	150°	23°10'	-56'	150°	14
15	27°26'	-55'	149°	26°34'	-55'	150°	25°42'	-56'	150°	24°50'	-56'	150°	23°58'	-56'	150°	23°06'	-56'	150°	22°14'	-56'	151°	15
16	26°30'	-55'	150°	25°39'	-56'	150°	24°47'	-56'	150°	23°54'	-56'	150°	23°02'	-56'	151°	22°10'	-56'	151°	21°17'	-57'	151°	16
17	25°35'	-55'	150°	24°43'	-56'	150°	23°51'	-56'	151°	22°58'	-56'	151°	22°06'	-56'	151°	21°13'	-56'	151°	20°21'	-57'	151°	17
18	24°40'	-55'	151°	23°47'	-56'	151°	22°55'	-56'	151°	22°02'	-56'	151°	21°10'	-56'	151°	20°17'	-56'	152°	19°24'	-57'	152°	18
19	23°44'	-56'	151°	22°52'	-56'	151°	21°59'	-56'	151°	21°06'	-56'	152°	20°14'	-56'	152°	19°21'	-56'	152°	18°28'	-57'	152°	19
20	22°49'	-56'	151°	21°56'	-56'	152°	21°03'	-56'	152°	20°10'	-56'	152°	19°17'	-56'	152°	18°24'	-57'	152°	17°31'	-57'	152°	20
21	21°53'	-56'	152°	21°00'	-56'	152°	20°07'	-56'	152°	19°14'	-56'	152°	18°21'	-56'	152°	17°28'	-57'	153°	16°34'	-57'	153°	21
22	20°58'	-56'	152°	20°04'	-56'	152°	19°11'	-56'	153°	18°18'	-56'	153°	17°25'	-56'	153°	16°31'	-57'	153°	15°38'	-57'	153°	22
23	20°02'	-56'	153°	19°09'	-56'	153°	18°15'	-56'	153°	17°22'	-56'	153°	16°28'	-56'	153°	15°35'	-57'	153°	14°41'	-57'	153°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

28° 332° LHA — Latitude CONTRARY to DECLINATION — 28° 332° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

27° 333° LHA — Latitude CONTRARY to Declination — 27° 333° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	41°28'	-54'	143°	40°40'	-54'	143°	39°52'	-54'	144°	39°03'	-55'	144°	38°14'	-55'	145°	37°25'	-55'	145°	36°36'	-56'	146°	0
1	40°34'	-54'	143°	39°46'	-54'	144°	38°57'	-55'	144°	38°08'	-55'	145°	37°19'	-55'	145°	36°30'	-55'	146°	35°40'	-56'	146°	1
2	39°40'	-54'	144°	38°52'	-54'	144°	38°03'	-55'	145°	37°14'	-55'	145°	36°24'	-55'	146°	35°35'	-56'	146°	34°45'	-56'	146°	2
3	38°46'	-54'	144°	37°57'	-54'	145°	37°08'	-55'	145°	36°19'	-55'	146°	35°29'	-55'	146°	34°39'	-56'	147°	33°49'	-56'	147°	3
4	37°52'	-54'	145°	37°03'	-55'	145°	36°13'	-55'	146°	35°24'	-55'	146°	34°34'	-55'	147°	33°43'	-56'	147°	32°53'	-56'	147°	4
5	36°58'	-54'	146°	36°08'	-55'	146°	35°18'	-55'	146°	34°28'	-55'	147°	33°38'	-56'	147°	32°48'	-56'	147°	31°57'	-56'	148°	5
6	36°03'	-55'	146°	35°13'	-55'	146°	34°23'	-55'	147°	33°33'	-55'	147°	32°43'	-56'	148°	31°52'	-56'	148°	31°01'	-56'	148°	6
7	35°09'	-55'	147°	34°19'	-55'	147°	33°28'	-55'	147°	32°38'	-56'	148°	31°47'	-56'	148°	30°56'	-56'	148°	30°05'	-56'	149°	7
8	34°14'	-55'	147°	33°24'	-55'	147°	32°33'	-55'	148°	31°42'	-56'	148°	30°51'	-56'	148°	30°00'	-56'	149°	29°09'	-56'	149°	8
9	33°19'	-55'	148°	32°28'	-55'	148°	31°38'	-55'	148°	30°46'	-56'	149°	29°55'	-56'	149°	29°04'	-56'	149°	28°12'	-56'	149°	9
10	32°24'	-55'	148°	31°33'	-55'	148°	30°42'	-56'	149°	29°51'	-56'	149°	28°59'	-56'	149°	28°08'	-56'	150°	27°16'	-56'	150°	10
11	31°29'	-55'	148°	30°38'	-55'	149°	29°47'	-56'	149°	28°55'	-56'	149°	28°03'	-56'	150°	27°11'	-56'	150°	26°19'	-56'	150°	11
12	30°34'	-55'	149°	29°43'	-55'	149°	28°51'	-56'	150°	27°59'	-56'	150°	27°07'	-56'	150°	26°15'	-56'	150°	25°23'	-57'	151°	12
13	29°39'	-55'	149°	28°47'	-56'	150°	27°55'	-56'	150°	27°03'	-56'	150°	26°11'	-56'	150°	25°19'	-56'	151°	24°26'	-57'	151°	13
14	28°43'	-55'	150°	27°52'	-56'	150°	26°59'	-56'	150°	26°07'	-56'	151°	25°15'	-56'	151°	24°22'	-56'	151°	23°30'	-57'	151°	14
15	27°48'	-56'	150°	26°56'	-56'	151°	26°04'	-56'	151°	25°11'	-56'	151°	24°19'	-56'	151°	23°26'	-57'	151°	22°33'	-57'	152°	15
16	26°53'	-56'	151°	26°00'	-56'	151°	25°08'	-56'	151°	24°15'	-56'	151°	23°22'	-56'	152°	22°29'	-57'	152°	21°37'	-57'	152°	16
17	25°57'	-56'	151°	25°04'	-56'	151°	24°12'	-56'	152°	23°19'	-56'	152°	22°26'	-56'	152°	21°33'	-57'	152°	20°40'	-57'	152°	17
18	25°01'	-56'	152°	24°09'	-56'	152°	23°16'	-56'	152°	22°23'	-56'	152°	21°29'	-56'	152°	20°36'	-57'	153°	19°43'	-57'	153°	18
19	24°06'	-56'	152°	23°13'	-56'	152°	22°19'	-56'	152°	21°26'	-56'	153°	20°33'	-57'	153°	19°40'	-57'	153°	18°46'	-57'	153°	19
20	23°10'	-56'	152°	22°17'	-56'	153°	21°23'	-56'	153°	20°30'	-56'	153°	19°37'	-57'	153°	18°43'	-57'	153°	17°49'	-57'	153°	20
21	22°14'	-56'	153°	21°21'	-56'	153°	20°27'	-56'	153°	19°34'	-56'	153°	18°40'	-57'	153°	17°46'	-57'	154°	16°52'	-57'	154°	21
22	21°18'	-56'	153°	20°25'	-56'	153°	19°31'	-56'	153°	18°37'	-56'	154°	17°43'	-57'	154°	16°49'	-57'	154°	15°56'	-57'	154°	22
23	20°22'	-56'	154°	19°28'	-56'	154°	18°35'	-56'	154°	17°41'	-57'	154°	16°47'	-57'	154°	15°53'	-57'	154°	14°59'	-57'	154°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

27° 333° LHA — Latitude CONTRARY to DECLINATION — 27° 333° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

26° 334° LHA — Latitude CONTRARY to Declination — 26° 334° LHA

Dec°	42 Hc°	d'	Z°	43 Hc°	d'	Z°	44 Hc°	d'	Z°	45 Hc°	d'	Z°	46 Hc°	d'	Z°	47 Hc°	d'	Z°	48 Hc°	d'	Z°	Dec°
0	41°54'	-54'	144°	41°06'	-54'	144°	40°17'	-55'	145°	39°28'	-55'	145°	38°38'	-55'	146°	37°48'	-56'	146°	36°58'	-56'	147°	0
1	41°00'	-54'	144°	40°11'	-55'	145°	39°22'	-55'	145°	38°33'	-55'	146°	37°43'	-55'	146°	36°53'	-56'	147°	36°02'	-56'	147°	1
2	40°06'	-54'	145°	39°17'	-55'	146°	38°27'	-55'	146°	37°37'	-55'	146°	36°47'	-56'	147°	35°57'	-56'	147°	35°06'	-56'	148°	2
3	39°12'	-55'	146°	38°22'	-55'	146°	37°32'	-55'	146°	36°42'	-55'	147°	35°52'	-56'	147°	35°01'	-56'	148°	34°10'	-56'	148°	3
4	38°17'	-55'	146°	37°27'	-55'	147°	36°37'	-55'	147°	35°47'	-56'	147°	34°56'	-56'	148°	34°05'	-56'	148°	33°14'	-56'	148°	4
5	37°23'	-55'	147°	36°32'	-55'	147°	35°42'	-55'	147°	34°51'	-56'	148°	34°00'	-56'	148°	33°09'	-56'	149°	32°18'	-56'	149°	5
6	36°28'	-55'	147°	35°37'	-55'	148°	34°47'	-55'	148°	33°56'	-56'	148°	33°05'	-56'	149°	32°13'	-56'	149°	31°22'	-56'	149°	6
7	35°33'	-55'	148°	34°42'	-55'	148°	33°51'	-56'	148°	33°00'	-56'	149°	32°09'	-56'	149°	31°17'	-56'	149°	30°25'	-56'	150°	7
8	34°38'	-55'	148°	33°47'	-55'	149°	32°56'	-56'	149°	32°04'	-56'	149°	31°13'	-56'	149°	30°21'	-56'	150°	29°29'	-57'	150°	8
9	33°43'	-55'	149°	32°51'	-56'	149°	32°00'	-56'	149°	31°08'	-56'	150°	30°16'	-56'	150°	29°24'	-56'	150°	28°32'	-57'	150°	9
10	32°48'	-55'	149°	31°56'	-56'	149°	31°04'	-56'	150°	30°12'	-56'	150°	29°20'	-56'	150°	28°28'	-56'	151°	27°36'	-57'	151°	10
11	31°52'	-55'	150°	31°00'	-56'	150°	30°08'	-56'	150°	29°16'	-56'	150°	28°24'	-56'	151°	27°32'	-57'	151°	26°39'	-57'	151°	11
12	30°57'	-56'	150°	30°05'	-56'	150°	29°12'	-56'	151°	28°20'	-56'	151°	27°28'	-56'	151°	26°35'	-57'	151°	25°42'	-57'	152°	12
13	30°01'	-56'	150°	29°09'	-56'	151°	28°16'	-56'	151°	27°24'	-56'	151°	26°31'	-56'	151°	25°39'	-57'	152°	24°46'	-57'	152°	13
14	29°06'	-56'	151°	28°13'	-56'	151°	27°20'	-56'	151°	26°28'	-56'	152°	25°35'	-57'	152°	24°42'	-57'	152°	23°49'	-57'	152°	14
15	28°10'	-56'	151°	27°17'	-56'	152°	26°24'	-56'	152°	25°31'	-56'	152°	24°38'	-57'	152°	23°45'	-57'	152°	22°52'	-57'	153°	15
16	27°14'	-56'	152°	26°21'	-56'	152°	25°28'	-56'	152°	24°35'	-56'	152°	23°42'	-57'	153°	22°48'	-57'	153°	21°55'	-57'	153°	16
17	26°18'	-56'	152°	25°25'	-56'	152°	24°32'	-56'	153°	23°39'	-56'	153°	22°45'	-57'	153°	21°52'	-57'	153°	20°58'	-57'	153°	17
18	25°22'	-56'	153°	24°29'	-56'	153°	23°36'	-56'	153°	22°42'	-57'	153°	21°49'	-57'	153°	20°55'	-57'	153°	20°01'	-57'	154°	18
19	24°26'	-56'	153°	23°33'	-56'	153°	22°39'	-56'	153°	21°46'	-57'	153°	20°52'	-57'	154°	19°58'	-57'	154°	19°04'	-57'	154°	19
20	23°30'	-56'	153°	22°37'	-56'	153°	21°43'	-56'	154°	20°49'	-57'	154°	19°55'	-57'	154°	19°01'	-57'	154°	18°07'	-57'	154°	20
21	22°34'	-56'	154°	21°40'	-56'	154°	20°46'	-57'	154°	19°52'	-57'	154°	18°58'	-57'	154°	18°04'	-57'	155°	17°10'	-57'	155°	21
22	21°38'	-56'	154°	20°44'	-56'	154°	19°50'	-57'	154°	18°56'	-57'	155°	18°01'	-57'	155°	17°07'	-57'	155°	16°13'	-57'	155°	22
23	20°42'	-56'	154°	19°48'	-56'	155°	18°53'	-57'	155°	17°59'	-57'	155°	17°05'	-57'	155°	16°10'	-57'	155°	15°16'	-57'	155°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

26° 334° LHA — Latitude CONTRARY to DECLINATION — 26° 334° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

25° 335° LHA — Latitude CONTRARY to Declination — 25° 335° LHA

Dec°	42 Hc°	d'	Z°	43 Hc°	d'	Z°	44 Hc°	d'	Z°	45 Hc°	d'	Z°	46 Hc°	d'	Z°	47 Hc°	d'	Z°	48 Hc°	d'	Z°	Dec°
0	42°20'	-54'	145°	41°31'	-55'	146°	40°41'	-55'	146°	39°51'	-55'	147°	39°01'	-56'	147°	38°11'	-56'	147°	37°20'	-56'	148°	0
1	41°26'	-55'	146°	40°36'	-55'	146°	39°46'	-55'	147°	38°56'	-55'	147°	38°06'	-56'	148°	37°15'	-56'	148°	36°24'	-56'	148°	1
2	40°31'	-55'	146°	39°41'	-55'	147°	38°51'	-55'	147°	38°01'	-56'	148°	37°10'	-56'	148°	36°19'	-56'	148°	35°28'	-56'	149°	2
3	39°37'	-55'	147°	38°46'	-55'	147°	37°56'	-55'	148°	37°05'	-56'	148°	36°14'	-56'	148°	35°23'	-56'	149°	34°31'	-56'	149°	3
4	38°42'	-55'	147°	37°51'	-55'	148°	37°00'	-56'	148°	36°09'	-56'	149°	35°18'	-56'	149°	34°27'	-56'	149°	33°35'	-56'	150°	4
5	37°47'	-55'	148°	36°56'	-55'	148°	36°05'	-56'	149°	35°14'	-56'	149°	34°22'	-56'	149°	33°30'	-56'	150°	32°38'	-57'	150°	5
6	36°52'	-55'	148°	36°01'	-56'	149°	35°09'	-56'	149°	34°18'	-56'	149°	33°26'	-56'	150°	32°34'	-56'	150°	31°42'	-57'	150°	6
7	35°56'	-55'	149°	35°05'	-56'	149°	34°13'	-56'	150°	33°22'	-56'	150°	32°30'	-56'	150°	31°38'	-56'	150°	30°45'	-57'	151°	7
8	35°01'	-55'	149°	34°09'	-56'	150°	33°18'	-56'	150°	32°26'	-56'	150°	31°33'	-56'	151°	30°41'	-57'	151°	29°49'	-57'	151°	8
9	34°06'	-56'	150°	33°14'	-56'	150°	32°22'	-56'	150°	31°29'	-56'	151°	30°37'	-56'	151°	29°44'	-57'	151°	28°52'	-57'	152°	9
10	33°10'	-56'	150°	32°18'	-56'	151°	31°26'	-56'	151°	30°33'	-56'	151°	29°41'	-57'	151°	28°48'	-57'	152°	27°55'	-57'	152°	10
11	32°14'	-56'	151°	31°22'	-56'	151°	30°30'	-56'	151°	29°37'	-56'	151°	28°44'	-57'	152°	27°51'	-57'	152°	26°58'	-57'	152°	11
12	31°19'	-56'	151°	30°26'	-56'	151°	29°33'	-56'	152°	28°40'	-56'	152°	27°47'	-57'	152°	26°54'	-57'	152°	26°01'	-57'	153°	12
13	30°23'	-56'	151°	29°30'	-56'	152°	28°37'	-56'	152°	27°44'	-57'	152°	26°51'	-57'	153°	25°58'	-57'	153°	25°04'	-57'	153°	13
14	29°27'	-56'	152°	28°34'	-56'	152°	27°41'	-56'	152°	26°48'	-57'	153°	25°54'	-57'	153°	25°01'	-57'	153°	24°07'	-57'	153°	14
15	28°31'	-56'	152°	27°38'	-56'	153°	26°44'	-56'	153°	25°51'	-57'	153°	24°57'	-57'	153°	24°04'	-57'	153°	23°10'	-57'	154°	15
16	27°35'	-56'	153°	26°41'	-56'	153°	25°48'	-57'	153°	24°54'	-57'	153°	24°01'	-57'	154°	23°07'	-57'	154°	22°13'	-57'	154°	16
17	26°39'	-56'	153°	25°45'	-56'	153°	24°51'	-57'	154°	23°58'	-57'	154°	23°04'	-57'	154°	22°10'	-57'	154°	21°16'	-57'	154°	17
18	25°42'	-56'	154°	24°49'	-56'	154°	23°55'	-57'	154°	23°01'	-57'	154°	22°07'	-57'	154°	21°13'	-57'	154°	20°19'	-57'	155°	18
19	24°46'	-56'	154°	23°52'	-56'	154°	22°58'	-57'	154°	22°04'	-57'	154°	21°10'	-57'	155°	20°16'	-57'	155°	19°21'	-57'	155°	19
20	23°50'	-56'	154°	22°56'	-57'	154°	22°02'	-57'	155°	21°07'	-57'	155°	20°13'	-57'	155°	19°19'	-57'	155°	18°24'	-57'	155°	20
21	22°53'	-56'	155°	21°59'	-57'	155°	21°05'	-57'	155°	20°10'	-57'	155°	19°16'	-57'	155°	18°21'	-57'	155°	17°27'	-57'	156°	21
22	21°57'	-56'	155°	21°03'	-57'	155°	20°08'	-57'	155°	19°14'	-57'	155°	18°19'	-57'	156°	17°24'	-57'	156°	16°30'	-57'	156°	22
23	21°01'	-57'	155°	20°06'	-57'	156°	19°11'	-57'	156°	18°17'	-57'	156°	17°22'	-57'	156°	16°27'	-57'	156°	15°32'	-57'	156°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

25° 335° LHA — Latitude CONTRARY to DECLINATION — 25° 335° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

24° 336° LHA — Latitude CONTRARY to Declination — 24° 336° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	42°45'	-55'	146°	41°55'	-55'	147°	41°05'	-55'	147°	40°14'	-56'	148°	39°23'	-56'	148°	38°32'	-56'	149°	37°41'	-56'	149°	0
1	41°51'	-55'	147°	41°00'	-55'	147°	40°10'	-55'	148°	39°19'	-56'	148°	38°28'	-56'	149°	37°36'	-56'	149°	36°45'	-56'	150°	1
2	40°56'	-55'	147°	40°05'	-55'	148°	39°14'	-56'	148°	38°23'	-56'	149°	37°32'	-56'	149°	36°40'	-56'	150°	35°48'	-57'	150°	2
3	40°01'	-55'	148°	39°10'	-55'	148°	38°19'	-56'	149°	37°27'	-56'	149°	36°35'	-56'	150°	35°44'	-56'	150°	34°52'	-57'	150°	3
4	39°06'	-55'	148°	38°14'	-56'	149°	37°23'	-56'	149°	36°31'	-56'	150°	35°39'	-56'	150°	34°47'	-57'	150°	33°55'	-57'	151°	4
5	38°10'	-55'	149°	37°19'	-56'	149°	36°27'	-56'	150°	35°35'	-56'	150°	34°43'	-56'	150°	33°51'	-57'	151°	32°58'	-57'	151°	5
6	37°15'	-56'	149°	36°23'	-56'	150°	35°31'	-56'	150°	34°39'	-56'	151°	33°47'	-56'	151°	32°54'	-57'	151°	32°01'	-57'	152°	6
7	36°19'	-56'	150°	35°27'	-56'	150°	34°35'	-56'	151°	33°43'	-56'	151°	32°50'	-57'	151°	31°57'	-57'	152°	31°04'	-57'	152°	7
8	35°24'	-56'	150°	34°31'	-56'	151°	33°39'	-56'	151°	32°46'	-56'	151°	31°53'	-57'	152°	31°01'	-57'	152°	30°08'	-57'	152°	8
9	34°28'	-56'	151°	33°35'	-56'	151°	32°43'	-56'	151°	31°50'	-56'	152°	30°57'	-57'	152°	30°04'	-57'	152°	29°11'	-57'	153°	9
10	33°32'	-56'	151°	32°39'	-56'	152°	31°46'	-56'	152°	30°53'	-57'	152°	30°00'	-57'	152°	29°07'	-57'	153°	28°14'	-57'	153°	10
11	32°36'	-56'	152°	31°43'	-56'	152°	30°50'	-56'	152°	29°57'	-57'	153°	29°03'	-57'	153°	28°10'	-57'	153°	27°16'	-57'	153°	11
12	31°40'	-56'	152°	30°47'	-56'	152°	29°54'	-57'	153°	29°00'	-57'	153°	28°07'	-57'	153°	27°13'	-57'	153°	26°19'	-57'	154°	12
13	30°44'	-56'	153°	29°50'	-56'	153°	28°57'	-57'	153°	28°03'	-57'	153°	27°10'	-57'	154°	26°16'	-57'	154°	25°22'	-57'	154°	13
14	29°48'	-56'	153°	28°54'	-56'	153°	28°00'	-57'	153°	27°07'	-57'	154°	26°13'	-57'	154°	25°19'	-57'	154°	24°25'	-57'	154°	14
15	28°51'	-56'	153°	27°58'	-57'	154°	27°04'	-57'	154°	26°10'	-57'	154°	25°16'	-57'	154°	24°22'	-57'	154°	23°28'	-57'	155°	15
16	27°55'	-56'	154°	27°01'	-57'	154°	26°07'	-57'	154°	25°13'	-57'	154°	24°19'	-57'	155°	23°25'	-57'	155°	22°30'	-57'	155°	16
17	26°58'	-56'	154°	26°04'	-57'	154°	25°10'	-57'	155°	24°16'	-57'	155°	23°22'	-57'	155°	22°27'	-57'	155°	21°33'	-57'	155°	17
18	26°02'	-57'	155°	25°08'	-57'	155°	24°14'	-57'	155°	23°19'	-57'	155°	22°25'	-57'	155°	21°30'	-57'	155°	20°36'	-57'	156°	18
19	25°05'	-57'	155°	24°11'	-57'	155°	23°17'	-57'	155°	22°22'	-57'	155°	21°28'	-57'	156°	20°33'	-57'	156°	19°38'	-57'	156°	19
20	24°09'	-57'	155°	23°14'	-57'	155°	22°20'	-57'	156°	21°25'	-57'	156°	20°30'	-57'	156°	19°36'	-57'	156°	18°41'	-57'	156°	20
21	23°12'	-57'	156°	22°18'	-57'	156°	21°23'	-57'	156°	20°28'	-57'	156°	19°33'	-57'	156°	18°38'	-57'	156°	17°43'	-58'	157°	21
22	22°16'	-57'	156°	21°21'	-57'	156°	20°26'	-57'	156°	19°31'	-57'	156°	18°36'	-57'	157°	17°41'	-57'	157°	16°46'	-58'	157°	22
23	21°19'	-57'	156°	20°24'	-57'	156°	19°29'	-57'	157°	18°34'	-57'	157°	17°39'	-57'	157°	16°43'	-57'	157°	15°48'	-58'	157°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

24° 336° LHA — Latitude CONTRARY to DECLINATION — 24° 336° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

23° 337° LHA — Latitude CONTRARY to Declination — 23° 337° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	43°10'	-55'	148°	42°19'	-55'	148°	41°28'	-56'	149°	40°37'	-56'	149°	39°45'	-56'	149°	38°53'	-56'	150°	38°01'	-57'	150°	0
1	42°15'	-55'	148°	41°24'	-56'	149°	40°32'	-56'	149°	39°41'	-56'	149°	38°49'	-56'	150°	37°57'	-57'	150°	37°05'	-57'	151°	1
2	41°19'	-55'	149°	40°28'	-56'	149°	39°36'	-56'	150°	38°45'	-56'	150°	37°53'	-56'	150°	37°00'	-57'	151°	36°08'	-57'	151°	2
3	40°24'	-56'	149°	39°32'	-56'	150°	38°40'	-56'	150°	37°48'	-56'	150°	36°56'	-56'	151°	36°04'	-57'	151°	35°11'	-57'	151°	3
4	39°28'	-56'	150°	38°37'	-56'	150°	37°44'	-56'	150°	36°52'	-56'	151°	36°00'	-57'	151°	35°07'	-57'	152°	34°14'	-57'	152°	4
5	38°33'	-56'	150°	37°41'	-56'	151°	36°48'	-56'	151°	35°56'	-56'	151°	35°03'	-57'	152°	34°10'	-57'	152°	33°17'	-57'	152°	5
6	37°37'	-56'	151°	36°45'	-56'	151°	35°52'	-56'	151°	34°59'	-57'	152°	34°06'	-57'	152°	33°13'	-57'	152°	32°20'	-57'	153°	6
7	36°41'	-56'	151°	35°49'	-56'	151°	34°56'	-56'	152°	34°03'	-57'	152°	33°10'	-57'	152°	32°16'	-57'	153°	31°23'	-57'	153°	7
8	35°45'	-56'	152°	34°52'	-56'	152°	33°59'	-56'	152°	33°06'	-57'	152°	32°13'	-57'	153°	31°19'	-57'	153°	30°26'	-57'	153°	8
9	34°49'	-56'	152°	33°56'	-56'	152°	33°03'	-57'	153°	32°10'	-57'	153°	31°16'	-57'	153°	30°22'	-57'	153°	29°29'	-57'	154°	9
10	33°53'	-56'	152°	33°00'	-56'	153°	32°06'	-57'	153°	31°13'	-57'	153°	30°19'	-57'	154°	29°25'	-57'	154°	28°31'	-57'	154°	10
11	32°57'	-56'	153°	32°03'	-57'	153°	31°10'	-57'	153°	30°16'	-57'	154°	29°22'	-57'	154°	28°28'	-57'	154°	27°34'	-57'	154°	11
12	32°00'	-56'	153°	31°07'	-57'	153°	30°13'	-57'	154°	29°19'	-57'	154°	28°25'	-57'	154°	27°31'	-57'	154°	26°37'	-57'	155°	12
13	31°04'	-56'	154°	30°10'	-57'	154°	29°16'	-57'	154°	28°22'	-57'	154°	27°28'	-57'	155°	26°34'	-57'	155°	25°39'	-57'	155°	13
14	30°07'	-57'	154°	29°13'	-57'	154°	28°19'	-57'	154°	27°25'	-57'	155°	26°31'	-57'	155°	25°36'	-57'	155°	24°42'	-57'	155°	14
15	29°11'	-57'	154°	28°17'	-57'	155°	27°22'	-57'	155°	26°28'	-57'	155°	25°34'	-57'	155°	24°39'	-57'	155°	23°44'	-58'	156°	15
16	28°14'	-57'	155°	27°20'	-57'	155°	26°26'	-57'	155°	25°31'	-57'	155°	24°36'	-57'	156°	23°42'	-57'	156°	22°47'	-58'	156°	16
17	27°18'	-57'	155°	26°23'	-57'	155°	25°29'	-57'	156°	24°34'	-57'	156°	23°39'	-57'	156°	22°44'	-57'	156°	21°49'	-58'	156°	17
18	26°21'	-57'	156°	25°26'	-57'	156°	24°31'	-57'	156°	23°37'	-57'	156°	22°42'	-57'	156°	21°47'	-57'	156°	20°52'	-58'	157°	18
19	25°24'	-57'	156°	24°29'	-57'	156°	23°34'	-57'	156°	22°39'	-57'	156°	21°44'	-57'	157°	20°49'	-58'	157°	19°54'	-58'	157°	19
20	24°27'	-57'	156°	23°32'	-57'	156°	22°37'	-57'	157°	21°42'	-57'	157°	20°47'	-57'	157°	19°52'	-58'	157°	18°57'	-58'	157°	20
21	23°30'	-57'	157°	22°35'	-57'	157°	21°40'	-57'	157°	20°45'	-57'	157°	19°50'	-57'	157°	18°54'	-58'	157°	17°59'	-58'	157°	21
22	22°33'	-57'	157°	21°38'	-57'	157°	20°43'	-57'	157°	19°48'	-57'	157°	18°52'	-57'	157°	17°57'	-58'	158°	17°01'	-58'	158°	22
23	21°36'	-57'	157°	20°41'	-57'	157°	19°46'	-57'	158°	18°50'	-57'	158°	17°55'	-58'	158°	16°59'	-58'	158°	16°03'	-58'	158°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

23° 337° LHA — Latitude CONTRARY to DECLINATION — 23° 337° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

22° 338° LHA — Latitude CONTRARY to Declination — 22° 338° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	43°33'	-55'	149°	42°42'	-56'	149°	41°50'	-56'	150°	40°58'	-56'	150°	40°06'	-56'	151°	39°13'	-57'	151°	38°21'	-57'	151°	0
1	42°38'	-56'	149°	41°46'	-56'	150°	40°54'	-56'	150°	40°02'	-56'	151°	39°09'	-57'	151°	38°17'	-57'	152°	37°24'	-57'	152°	1
2	41°42'	-56'	150°	40°50'	-56'	150°	39°58'	-56'	151°	39°05'	-56'	151°	38°13'	-57'	152°	37°20'	-57'	152°	36°27'	-57'	152°	2
3	40°46'	-56'	150°	39°54'	-56'	151°	39°02'	-56'	151°	38°09'	-57'	152°	37°16'	-57'	152°	36°23'	-57'	152°	35°30'	-57'	153°	3
4	39°51'	-56'	151°	38°58'	-56'	151°	38°05'	-56'	152°	37°12'	-57'	152°	36°19'	-57'	152°	35°26'	-57'	153°	34°33'	-57'	153°	4
5	38°55'	-56'	151°	38°02'	-56'	152°	37°09'	-57'	152°	36°16'	-57'	152°	35°23'	-57'	153°	34°29'	-57'	153°	33°36'	-57'	153°	5
6	37°58'	-56'	152°	37°06'	-56'	152°	36°12'	-57'	153°	35°19'	-57'	153°	34°26'	-57'	153°	33°32'	-57'	153°	32°38'	-57'	154°	6
7	37°02'	-56'	152°	36°09'	-56'	153°	35°16'	-57'	153°	34°22'	-57'	153°	33°29'	-57'	154°	32°35'	-57'	154°	31°41'	-57'	154°	7
8	36°06'	-56'	153°	35°13'	-57'	153°	34°19'	-57'	153°	33°25'	-57'	154°	32°32'	-57'	154°	31°38'	-57'	154°	30°44'	-57'	154°	8
9	35°10'	-56'	153°	34°16'	-57'	153°	33°22'	-57'	154°	32°28'	-57'	154°	31°35'	-57'	154°	30°40'	-57'	155°	29°46'	-57'	155°	9
10	34°13'	-57'	154°	33°19'	-57'	154°	32°26'	-57'	154°	31°31'	-57'	154°	30°37'	-57'	155°	29°43'	-57'	155°	28°49'	-58'	155°	10
11	33°17'	-57'	154°	32°23'	-57'	154°	31°29'	-57'	154°	30°34'	-57'	155°	29°40'	-57'	155°	28°46'	-57'	155°	27°51'	-58'	155°	11
12	32°20'	-57'	154°	31°26'	-57'	155°	30°32'	-57'	155°	29°37'	-57'	155°	28°43'	-57'	155°	27°48'	-57'	156°	26°54'	-58'	156°	12
13	31°23'	-57'	155°	30°29'	-57'	155°	29°35'	-57'	155°	28°40'	-57'	155°	27°46'	-57'	156°	26°51'	-58'	156°	25°56'	-58'	156°	13
14	30°27'	-57'	155°	29°32'	-57'	155°	28°38'	-57'	156°	27°43'	-57'	156°	26°48'	-57'	156°	25°53'	-58'	156°	24°58'	-58'	156°	14
15	29°30'	-57'	155°	28°35'	-57'	156°	27°40'	-57'	156°	26°46'	-57'	156°	25°51'	-57'	156°	24°56'	-58'	156°	24°01'	-58'	157°	15
16	28°33'	-57'	156°	27°38'	-57'	156°	26°43'	-57'	156°	25°48'	-57'	156°	24°53'	-57'	157°	23°58'	-58'	157°	23°03'	-58'	157°	16
17	27°36'	-57'	156°	26°41'	-57'	156°	25°46'	-57'	157°	24°51'	-57'	157°	23°56'	-58'	157°	23°01'	-58'	157°	22°05'	-58'	157°	17
18	26°39'	-57'	157°	25°44'	-57'	157°	24°49'	-57'	157°	23°54'	-57'	157°	22°58'	-58'	157°	22°03'	-58'	157°	21°07'	-58'	158°	18
19	25°42'	-57'	157°	24°47'	-57'	157°	23°51'	-57'	157°	22°56'	-57'	157°	22°01'	-58'	158°	21°05'	-58'	158°	20°10'	-58'	158°	19
20	24°45'	-57'	157°	23°50'	-57'	157°	22°54'	-57'	158°	21°59'	-58'	158°	21°03'	-58'	158°	20°07'	-58'	158°	19°12'	-58'	158°	20
21	23°48'	-57'	158°	22°52'	-57'	158°	21°57'	-57'	158°	21°01'	-58'	158°	20°05'	-58'	158°	19°10'	-58'	158°	18°14'	-58'	158°	21
22	22°51'	-57'	158°	21°55'	-57'	158°	20°59'	-57'	158°	20°04'	-58'	158°	19°08'	-58'	158°	18°12'	-58'	159°	17°16'	-58'	159°	22
23	21°53'	-57'	158°	20°58'	-57'	158°	20°02'	-57'	158°	19°06'	-58'	159°	18°10'	-58'	159°	17°14'	-58'	159°	16°18'	-58'	159°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

22° 338° LHA — Latitude CONTRARY to DECLINATION — 22° 338° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

21° 339° LHA — Latitude CONTRARY to Declination — 21° 339° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	43°56'	-56'	150°	43°04'	-56'	151°	42°11'	-56'	151°	41°19'	-57'	152°	40°26'	-57'	152°	39°33'	-57'	152°	38°40'	-57'	153°	0
1	43°00'	-56'	151°	42°08'	-56'	151°	41°15'	-56'	152°	40°22'	-57'	152°	39°29'	-57'	152°	38°36'	-57'	153°	37°42'	-57'	153°	1
2	42°04'	-56'	151°	41°11'	-56'	152°	40°19'	-57'	152°	39°25'	-57'	152°	38°32'	-57'	153°	37°39'	-57'	153°	36°45'	-57'	153°	2
3	41°08'	-56'	152°	40°15'	-56'	152°	39°22'	-57'	152°	38°29'	-57'	153°	37°35'	-57'	153°	36°42'	-57'	153°	35°48'	-57'	154°	3
4	40°12'	-56'	152°	39°19'	-57'	152°	38°25'	-57'	153°	37°32'	-57'	153°	36°38'	-57'	154°	35°45'	-57'	154°	34°51'	-57'	154°	4
5	39°16'	-56'	153°	38°22'	-57'	153°	37°29'	-57'	153°	36°35'	-57'	154°	35°41'	-57'	154°	34°47'	-57'	154°	33°53'	-57'	155°	5
6	38°19'	-56'	153°	37°26'	-57'	153°	36°32'	-57'	154°	35°38'	-57'	154°	34°44'	-57'	154°	33°50'	-57'	155°	32°56'	-58'	155°	6
7	37°23'	-57'	153°	36°29'	-57'	154°	35°35'	-57'	154°	34°41'	-57'	154°	33°47'	-57'	155°	32°53'	-57'	155°	31°58'	-58'	155°	7
8	36°26'	-57'	154°	35°32'	-57'	154°	34°38'	-57'	154°	33°44'	-57'	155°	32°50'	-57'	155°	31°55'	-57'	155°	31°01'	-58'	156°	8
9	35°29'	-57'	154°	34°35'	-57'	155°	33°41'	-57'	155°	32°47'	-57'	155°	31°52'	-57'	155°	30°58'	-58'	156°	30°03'	-58'	156°	9
10	34°33'	-57'	155°	33°38'	-57'	155°	32°44'	-57'	155°	31°49'	-57'	155°	30°55'	-57'	156°	30°00'	-58'	156°	29°05'	-58'	156°	10
11	33°36'	-57'	155°	32°41'	-57'	155°	31°47'	-57'	156°	30°52'	-57'	156°	29°57'	-57'	156°	29°03'	-58'	156°	28°08'	-58'	156°	11
12	32°39'	-57'	155°	31°44'	-57'	156°	30°50'	-57'	156°	29°55'	-57'	156°	29°00'	-58'	156°	28°05'	-58'	157°	27°10'	-58'	157°	12
13	31°42'	-57'	156°	30°47'	-57'	156°	29°52'	-57'	156°	28°57'	-57'	156°	28°02'	-58'	157°	27°07'	-58'	157°	26°12'	-58'	157°	13
14	30°45'	-57'	156°	29°50'	-57'	156°	28°55'	-57'	157°	28°00'	-57'	157°	27°05'	-58'	157°	26°10'	-58'	157°	25°14'	-58'	157°	14
15	29°48'	-57'	156°	28°53'	-57'	157°	27°58'	-57'	157°	27°02'	-58'	157°	26°07'	-58'	157°	25°12'	-58'	158°	24°16'	-58'	158°	15
16	28°51'	-57'	157°	27°56'	-57'	157°	27°00'	-57'	157°	26°05'	-58'	157°	25°09'	-58'	158°	24°14'	-58'	158°	23°18'	-58'	158°	16
17	27°54'	-57'	157°	26°58'	-57'	157°	26°03'	-57'	158°	25°07'	-58'	158°	24°12'	-58'	158°	23°16'	-58'	158°	22°20'	-58'	158°	17
18	26°56'	-57'	158°	26°01'	-57'	158°	25°05'	-58'	158°	24°10'	-58'	158°	23°14'	-58'	158°	22°18'	-58'	158°	21°22'	-58'	159°	18
19	25°59'	-57'	158°	25°04'	-57'	158°	24°08'	-58'	158°	23°12'	-58'	158°	22°16'	-58'	159°	21°20'	-58'	159°	20°25'	-58'	159°	19
20	25°02'	-57'	158°	24°06'	-57'	158°	23°10'	-58'	159°	22°14'	-58'	159°	21°18'	-58'	159°	20°23'	-58'	159°	19°26'	-58'	159°	20
21	24°04'	-57'	159°	23°09'	-58'	159°	22°13'	-58'	159°	21°17'	-58'	159°	20°21'	-58'	159°	19°25'	-58'	159°	18°28'	-58'	159°	21
22	23°07'	-57'	159°	22°11'	-58'	159°	21°15'	-58'	159°	20°19'	-58'	159°	19°23'	-58'	159°	18°27'	-58'	159°	17°30'	-58'	160°	22
23	22°10'	-57'	159°	21°13'	-58'	159°	20°17'	-58'	159°	19°21'	-58'	160°	18°25'	-58'	160°	17°29'	-58'	160°	16°32'	-58'	160°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

21° 339° LHA — Latitude CONTRARY to DECLINATION — 21° 339° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

20° 340° LHA — Latitude CONTRARY to Declination — 20° 340° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	44°18'	-56'	151°	43°25'	-56'	152°	42°32'	-57'	152°	41°38'	-57'	153°	40°45'	-57'	153°	39°51'	-57'	154°	38°58'	-57'	154°	0
1	43°21'	-56'	152°	42°28'	-56'	152°	41°35'	-57'	153°	40°42'	-57'	153°	39°48'	-57'	154°	38°54'	-57'	154°	38°00'	-57'	154°	1
2	42°25'	-56'	152°	41°32'	-57'	153°	40°38'	-57'	153°	39°45'	-57'	154°	38°51'	-57'	154°	37°57'	-57'	154°	37°03'	-58'	155°	2
3	41°29'	-56'	153°	40°35'	-57'	153°	39°42'	-57'	154°	38°48'	-57'	154°	37°54'	-57'	154°	37°00'	-57'	155°	36°05'	-58'	155°	3
4	40°32'	-57'	153°	39°39'	-57'	154°	38°45'	-57'	154°	37°51'	-57'	154°	36°56'	-57'	155°	36°02'	-57'	155°	35°08'	-58'	155°	4
5	39°36'	-57'	154°	38°42'	-57'	154°	37°48'	-57'	154°	36°54'	-57'	155°	35°59'	-57'	155°	35°05'	-58'	155°	34°10'	-58'	156°	5
6	38°39'	-57'	154°	37°45'	-57'	155°	36°51'	-57'	155°	35°56'	-57'	155°	35°02'	-57'	155°	34°07'	-58'	156°	33°12'	-58'	156°	6
7	37°42'	-57'	155°	36°48'	-57'	155°	35°54'	-57'	155°	34°59'	-57'	156°	34°04'	-58'	156°	33°10'	-58'	156°	32°15'	-58'	156°	7
8	36°45'	-57'	155°	35°51'	-57'	155°	34°56'	-57'	156°	34°02'	-57'	156°	33°07'	-58'	156°	32°12'	-58'	156°	31°17'	-58'	157°	8
9	35°48'	-57'	155°	34°54'	-57'	156°	33°59'	-57'	156°	33°04'	-57'	156°	32°09'	-58'	156°	31°14'	-58'	157°	30°19'	-58'	157°	9
10	34°51'	-57'	156°	33°57'	-57'	156°	33°02'	-57'	156°	32°07'	-58'	157°	31°12'	-58'	157°	30°16'	-58'	157°	29°21'	-58'	157°	10
11	33°54'	-57'	156°	32°59'	-57'	156°	32°04'	-57'	157°	31°09'	-58'	157°	30°14'	-58'	157°	29°19'	-58'	157°	28°23'	-58'	158°	11
12	32°57'	-57'	157°	32°02'	-57'	157°	31°07'	-57'	157°	30°12'	-58'	157°	29°16'	-58'	157°	28°21'	-58'	158°	27°25'	-58'	158°	12
13	32°00'	-57'	157°	31°05'	-57'	157°	30°09'	-58'	157°	29°14'	-58'	158°	28°19'	-58'	158°	27°23'	-58'	158°	26°27'	-58'	158°	13
14	31°03'	-57'	157°	30°07'	-57'	157°	29°12'	-58'	158°	28°16'	-58'	158°	27°21'	-58'	158°	26°25'	-58'	158°	25°29'	-58'	158°	14
15	30°05'	-57'	158°	29°10'	-58'	158°	28°14'	-58'	158°	27°19'	-58'	158°	26°23'	-58'	158°	25°27'	-58'	159°	24°31'	-58'	159°	15
16	29°08'	-57'	158°	28°12'	-58'	158°	27°17'	-58'	158°	26°21'	-58'	158°	25°25'	-58'	159°	24°29'	-58'	159°	23°33'	-58'	159°	16
17	28°11'	-57'	158°	27°15'	-58'	158°	26°19'	-58'	159°	25°23'	-58'	159°	24°27'	-58'	159°	23°31'	-58'	159°	22°35'	-58'	159°	17
18	27°13'	-58'	159°	26°17'	-58'	159°	25°21'	-58'	159°	24°25'	-58'	159°	23°29'	-58'	159°	22°33'	-58'	159°	21°37'	-58'	160°	18
19	26°16'	-58'	159°	25°20'	-58'	159°	24°24'	-58'	159°	23°27'	-58'	159°	22°31'	-58'	160°	21°35'	-58'	160°	20°39'	-58'	160°	19
20	25°18'	-58'	159°	24°22'	-58'	159°	23°26'	-58'	159°	22°29'	-58'	160°	21°33'	-58'	160°	20°37'	-58'	160°	19°41'	-58'	160°	20
21	24°20'	-58'	159°	23°24'	-58'	160°	22°28'	-58'	160°	21°32'	-58'	160°	20°35'	-58'	160°	19°39'	-58'	160°	18°42'	-58'	160°	21
22	23°23'	-58'	160°	22°26'	-58'	160°	21°30'	-58'	160°	20°34'	-58'	160°	19°37'	-58'	160°	18°41'	-58'	160°	17°44'	-58'	161°	22
23	22°25'	-58'	160°	21°29'	-58'	160°	20°32'	-58'	160°	19°36'	-58'	160°	18°39'	-58'	161°	17°42'	-58'	161°	16°46'	-58'	161°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

20° 340° LHA — Latitude CONTRARY to DECLINATION — 20° 340° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

19° 341° LHA — Latitude CONTRARY to Declination — 19° 341° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	44°38'	-56'	153°	43°45'	-57'	153°	42°51'	-57'	154°	41°57'	-57'	154°	41°03'	-57'	154°	40°09'	-57'	155°	39°15'	-58'	155°	0
1	43°42'	-57'	153°	42°48'	-57'	154°	41°54'	-57'	154°	41°00'	-57'	154°	40°06'	-57'	155°	39°12'	-58'	155°	38°17'	-58'	155°	1
2	42°45'	-57'	154°	41°51'	-57'	154°	40°57'	-57'	154°	40°03'	-57'	155°	39°09'	-57'	155°	38°14'	-58'	156°	37°20'	-58'	156°	2
3	41°49'	-57'	154°	40°55'	-57'	155°	40°00'	-57'	155°	39°06'	-57'	155°	38°11'	-57'	156°	37°17'	-58'	156°	36°22'	-58'	156°	3
4	40°52'	-57'	155°	39°58'	-57'	155°	39°03'	-57'	155°	38°09'	-57'	156°	37°14'	-58'	156°	36°19'	-58'	156°	35°24'	-58'	157°	4
5	39°55'	-57'	155°	39°01'	-57'	155°	38°06'	-57'	156°	37°11'	-57'	156°	36°16'	-58'	156°	35°21'	-58'	157°	34°26'	-58'	157°	5
6	38°58'	-57'	155°	38°03'	-57'	156°	37°09'	-57'	156°	36°14'	-58'	156°	35°19'	-58'	157°	34°24'	-58'	157°	33°28'	-58'	157°	6
7	38°01'	-57'	156°	37°06'	-57'	156°	36°11'	-57'	156°	35°16'	-58'	157°	34°21'	-58'	157°	33°26'	-58'	157°	32°30'	-58'	157°	7
8	37°04'	-57'	156°	36°09'	-57'	156°	35°14'	-58'	157°	34°19'	-58'	157°	33°23'	-58'	157°	32°28'	-58'	158°	31°32'	-58'	158°	8
9	36°07'	-57'	157°	35°11'	-57'	157°	34°16'	-58'	157°	33°21'	-58'	157°	32°26'	-58'	158°	31°30'	-58'	158°	30°34'	-58'	158°	9
10	35°09'	-57'	157°	34°14'	-57'	157°	33°19'	-58'	157°	32°23'	-58'	158°	31°28'	-58'	158°	30°32'	-58'	158°	29°36'	-58'	158°	10
11	34°12'	-57'	157°	33°17'	-58'	158°	32°21'	-58'	158°	31°25'	-58'	158°	30°30'	-58'	158°	29°34'	-58'	158°	28°38'	-58'	159°	11
12	33°15'	-57'	158°	32°19'	-58'	158°	31°23'	-58'	158°	30°28'	-58'	158°	29°32'	-58'	159°	28°36'	-58'	159°	27°40'	-58'	159°	12
13	32°17'	-58'	158°	31°21'	-58'	158°	30°26'	-58'	158°	29°30'	-58'	159°	28°34'	-58'	159°	27°38'	-58'	159°	26°42'	-58'	159°	13
14	31°20'	-58'	158°	30°24'	-58'	159°	29°28'	-58'	159°	28°32'	-58'	159°	27°36'	-58'	159°	26°40'	-58'	159°	25°44'	-58'	159°	14
15	30°22'	-58'	159°	29°26'	-58'	159°	28°30'	-58'	159°	27°34'	-58'	159°	26°38'	-58'	159°	25°42'	-58'	160°	24°45'	-58'	160°	15
16	29°24'	-58'	159°	28°28'	-58'	159°	27°32'	-58'	159°	26°36'	-58'	160°	25°40'	-58'	160°	24°44'	-58'	160°	23°47'	-58'	160°	16
17	28°27'	-58'	159°	27°31'	-58'	159°	26°34'	-58'	160°	25°38'	-58'	160°	24°42'	-58'	160°	23°45'	-58'	160°	22°49'	-58'	160°	17
18	27°29'	-58'	160°	26°33'	-58'	160°	25°36'	-58'	160°	24°40'	-58'	160°	23°44'	-58'	160°	22°47'	-58'	160°	21°51'	-58'	161°	18
19	26°31'	-58'	160°	25°35'	-58'	160°	24°38'	-58'	160°	23°42'	-58'	160°	22°45'	-58'	160°	21°49'	-58'	161°	20°52'	-58'	161°	19
20	25°33'	-58'	160°	24°37'	-58'	160°	23°40'	-58'	160°	22°44'	-58'	161°	21°47'	-58'	161°	20°51'	-58'	161°	19°54'	-58'	161°	20
21	24°36'	-58'	160°	23°39'	-58'	161°	22°42'	-58'	161°	21°46'	-58'	161°	20°49'	-58'	161°	19°52'	-58'	161°	18°56'	-58'	161°	21
22	23°38'	-58'	161°	22°41'	-58'	161°	21°44'	-58'	161°	20°48'	-58'	161°	19°51'	-58'	161°	18°54'	-58'	161°	17°57'	-58'	161°	22
23	22°40'	-58'	161°	21°43'	-58'	161°	20°46'	-58'	161°	19°49'	-58'	161°	18°53'	-58'	162°	17°56'	-58'	162°	16°59'	-58'	162°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

19° 341° LHA — Latitude CONTRARY to DECLINATION — 19° 341° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

18° 342° LHA — Latitude CONTRARY to Declination — 18° 342° LHA

Dec°	42 Hc°	d'	Z°	43 Hc°	d'	Z°	44 Hc°	d'	Z°	45 Hc°	d'	Z°	46 Hc°	d'	Z°	47 Hc°	d'	Z°	48 Hc°	d'	Z°	Dec°
0	44°58'	-57'	154°	44°04'	-57'	155°	43°10'	-57'	155°	42°16'	-57'	155°	41°21'	-58'	156°	40°26'	-58'	156°	39°31'	-58'	156°	0
1	44°02'	-57'	155°	43°07'	-57'	155°	42°13'	-57'	155°	41°18'	-57'	156°	40°23'	-58'	156°	39°29'	-58'	156°	38°34'	-58'	157°	1
2	43°05'	-57'	155°	42°10'	-57'	155°	41°16'	-57'	156°	40°21'	-58'	156°	39°26'	-58'	156°	38°31'	-58'	157°	37°36'	-58'	157°	2
3	42°08'	-57'	155°	41°13'	-57'	156°	40°18'	-57'	156°	39°23'	-58'	156°	38°28'	-58'	157°	37°33'	-58'	157°	36°38'	-58'	157°	3
4	41°11'	-57'	156°	40°16'	-57'	156°	39°21'	-58'	157°	38°26'	-58'	157°	37°30'	-58'	157°	36°35'	-58'	157°	35°40'	-58'	158°	4
5	40°13'	-57'	156°	39°18'	-57'	157°	38°23'	-58'	157°	37°28'	-58'	157°	36°33'	-58'	157°	35°37'	-58'	158°	34°42'	-58'	158°	5
6	39°16'	-57'	157°	38°21'	-57'	157°	37°26'	-58'	157°	36°30'	-58'	158°	35°35'	-58'	158°	34°39'	-58'	158°	33°44'	-58'	158°	6
7	38°19'	-57'	157°	37°23'	-58'	157°	36°28'	-58'	158°	35°33'	-58'	158°	34°37'	-58'	158°	33°41'	-58'	158°	32°45'	-58'	159°	7
8	37°21'	-57'	157°	36°26'	-58'	158°	35°30'	-58'	158°	34°35'	-58'	158°	33°39'	-58'	158°	32°43'	-58'	159°	31°47'	-58'	159°	8
9	36°24'	-58'	158°	35°28'	-58'	158°	34°33'	-58'	158°	33°37'	-58'	159°	32°41'	-58'	159°	31°45'	-58'	159°	30°49'	-58'	159°	9
10	35°26'	-58'	158°	34°31'	-58'	158°	33°35'	-58'	159°	32°39'	-58'	159°	31°43'	-58'	159°	30°47'	-58'	159°	29°51'	-58'	159°	10
11	34°29'	-58'	158°	33°33'	-58'	159°	32°37'	-58'	159°	31°41'	-58'	159°	30°45'	-58'	159°	29°49'	-58'	160°	28°52'	-58'	160°	11
12	33°31'	-58'	159°	32°35'	-58'	159°	31°39'	-58'	159°	30°43'	-58'	159°	29°47'	-58'	160°	28°50'	-58'	160°	27°54'	-58'	160°	12
13	32°33'	-58'	159°	31°37'	-58'	159°	30°41'	-58'	160°	29°45'	-58'	160°	28°49'	-58'	160°	27°52'	-58'	160°	26°56'	-58'	160°	13
14	31°36'	-58'	159°	30°39'	-58'	160°	29°43'	-58'	160°	28°47'	-58'	160°	27°50'	-58'	160°	26°54'	-58'	160°	25°57'	-58'	161°	14
15	30°38'	-58'	160°	29°42'	-58'	160°	28°45'	-58'	160°	27°49'	-58'	160°	26°52'	-58'	160°	25°56'	-58'	161°	24°59'	-58'	161°	15
16	29°40'	-58'	160°	28°44'	-58'	160°	27°47'	-58'	160°	26°51'	-58'	161°	25°54'	-58'	161°	24°57'	-58'	161°	24°01'	-58'	161°	16
17	28°42'	-58'	160°	27°46'	-58'	160°	26°49'	-58'	161°	25°52'	-58'	161°	24°56'	-58'	161°	23°59'	-58'	161°	23°02'	-58'	161°	17
18	27°44'	-58'	161°	26°48'	-58'	161°	25°51'	-58'	161°	24°54'	-58'	161°	23°57'	-58'	161°	23°01'	-58'	161°	22°04'	-58'	162°	18
19	26°46'	-58'	161°	25°50'	-58'	161°	24°53'	-58'	161°	23°56'	-58'	161°	22°59'	-58'	161°	22°02'	-58'	162°	21°05'	-59'	162°	19
20	25°48'	-58'	161°	24°51'	-58'	161°	23°55'	-58'	161°	22°58'	-58'	162°	22°01'	-58'	162°	21°04'	-58'	162°	20°07'	-59'	162°	20
21	24°50'	-58'	161°	23°53'	-58'	162°	22°56'	-58'	162°	21°59'	-58'	162°	21°02'	-58'	162°	20°05'	-58'	162°	19°08'	-59'	162°	21
22	23°52'	-58'	162°	22°55'	-58'	162°	21°58'	-58'	162°	21°01'	-58'	162°	20°04'	-58'	162°	19°07'	-58'	162°	18°10'	-59'	162°	22
23	22°54'	-58'	162°	21°57'	-58'	162°	21°00'	-58'	162°	20°03'	-58'	162°	19°05'	-58'	162°	18°08'	-59'	163°	17°11'	-59'	163°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

18° 342° LHA — Latitude CONTRARY to DECLINATION — 18° 342° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

17° 343° LHA — Latitude CONTRARY to Declination — 17° 343° LHA

Dec°	42 Hc°	d'	Z°	43 Hc°	d'	Z°	44 Hc°	d'	Z°	45 Hc°	d'	Z°	46 Hc°	d'	Z°	47 Hc°	d'	Z°	48 Hc°	d'	Z°	Dec°
0	45°17'	-57'	155°	44°23'	-57'	156°	43°28'	-57'	156°	42°33'	-58'	157°	41°38'	-58'	157°	40°42'	-58'	157°	39°47'	-58'	158°	0
1	44°20'	-57'	156°	43°25'	-57'	156°	42°30'	-58'	157°	41°35'	-58'	157°	40°40'	-58'	157°	39°45'	-58'	158°	38°49'	-58'	158°	1
2	43°23'	-57'	156°	42°28'	-57'	157°	41°33'	-58'	157°	40°38'	-58'	157°	39°42'	-58'	158°	38°47'	-58'	158°	37°51'	-58'	158°	2
3	42°26'	-57'	157°	41°31'	-58'	157°	40°35'	-58'	157°	39°40'	-58'	158°	38°44'	-58'	158°	37°49'	-58'	158°	36°53'	-58'	159°	3
4	41°28'	-57'	157°	40°33'	-58'	157°	39°38'	-58'	158°	38°42'	-58'	158°	37°46'	-58'	158°	36°50'	-58'	159°	35°55'	-58'	159°	4
5	40°31'	-58'	157°	39°35'	-58'	158°	38°40'	-58'	158°	37°44'	-58'	158°	36°48'	-58'	159°	35°52'	-58'	159°	34°56'	-58'	159°	5
6	39°33'	-58'	158°	38°38'	-58'	158°	37°42'	-58'	158°	36°46'	-58'	159°	35°50'	-58'	159°	34°54'	-58'	159°	33°58'	-58'	159°	6
7	38°36'	-58'	158°	37°40'	-58'	158°	36°44'	-58'	159°	35°48'	-58'	159°	34°52'	-58'	159°	33°56'	-58'	160°	33°00'	-58'	160°	7
8	37°38'	-58'	159°	36°42'	-58'	159°	35°46'	-58'	159°	34°50'	-58'	159°	33°54'	-58'	160°	32°58'	-58'	160°	32°01'	-58'	160°	8
9	36°40'	-58'	159°	35°44'	-58'	159°	34°48'	-58'	159°	33°52'	-58'	160°	32°56'	-58'	160°	31°59'	-58'	160°	31°03'	-58'	160°	9
10	35°43'	-58'	159°	34°46'	-58'	159°	33°50'	-58'	160°	32°54'	-58'	160°	31°57'	-58'	160°	31°01'	-58'	160°	30°04'	-58'	161°	10
11	34°45'	-58'	160°	33°48'	-58'	160°	32°52'	-58'	160°	31°56'	-58'	160°	30°59'	-58'	160°	30°03'	-58'	161°	29°06'	-58'	161°	11
12	33°47'	-58'	160°	32°50'	-58'	160°	31°54'	-58'	160°	30°58'	-58'	161°	30°01'	-58'	161°	29°04'	-58'	161°	28°08'	-59'	161°	12
13	32°49'	-58'	160°	31°52'	-58'	160°	30°56'	-58'	161°	29°59'	-58'	161°	29°03'	-58'	161°	28°06'	-58'	161°	27°09'	-59'	161°	13
14	31°51'	-58'	160°	30°54'	-58'	161°	29°58'	-58'	161°	29°01'	-58'	161°	28°04'	-58'	161°	27°07'	-58'	161°	26°10'	-59'	162°	14
15	30°53'	-58'	161°	29°56'	-58'	161°	28°59'	-58'	161°	28°03'	-58'	161°	27°06'	-58'	162°	26°09'	-59'	162°	25°12'	-59'	162°	15
16	29°55'	-58'	161°	28°58'	-58'	161°	28°01'	-58'	161°	27°04'	-58'	162°	26°07'	-58'	162°	25°10'	-59'	162°	24°13'	-59'	162°	16
17	28°57'	-58'	161°	28°00'	-58'	162°	27°03'	-58'	162°	26°06'	-58'	162°	25°09'	-58'	162°	24°12'	-59'	162°	23°15'	-59'	162°	17
18	27°59'	-58'	162°	27°02'	-58'	162°	26°05'	-58'	162°	25°08'	-58'	162°	24°10'	-59'	162°	23°13'	-59'	162°	22°16'	-59'	163°	18
19	27°00'	-58'	162°	26°03'	-58'	162°	25°06'	-58'	162°	24°09'	-58'	162°	23°12'	-59'	162°	22°15'	-59'	163°	21°17'	-59'	163°	19
20	26°02'	-58'	162°	25°05'	-58'	162°	24°08'	-58'	162°	23°11'	-58'	163°	22°13'	-59'	163°	21°16'	-59'	163°	20°19'	-59'	163°	20
21	25°04'	-58'	162°	24°07'	-58'	163°	23°10'	-58'	163°	22°12'	-58'	163°	21°15'	-59'	163°	20°17'	-59'	163°	19°20'	-59'	163°	21
22	24°06'	-58'	163°	23°08'	-58'	163°	22°11'	-58'	163°	21°14'	-59'	163°	20°16'	-59'	163°	19°19'	-59'	163°	18°21'	-59'	163°	22
23	23°07'	-58'	163°	22°10'	-58'	163°	21°13'	-58'	163°	20°15'	-59'	163°	19°18'	-59'	163°	18°20'	-59'	164°	17°23'	-59'	164°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

17° 343° LHA — Latitude CONTRARY to DECLINATION — 17° 343° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

16° 344° LHA — Latitude CONTRARY to Declination — 16° 344° LHA

Dec°	42 Hc°	d'	Z°	43 Hc°	d'	Z°	44 Hc°	d'	Z°	45 Hc°	d'	Z°	46 Hc°	d'	Z°	47 Hc°	d'	Z°	48 Hc°	d'	Z°	Dec°
0	45°35'	-57'	157°	44°40'	-58'	157°	43°45'	-58'	158°	42°49'	-58'	158°	41°54'	-58'	158°	40°58'	-58'	159°	40°02'	-58'	159°	0
1	44°38'	-58'	157°	43°43'	-58'	158°	42°47'	-58'	158°	41°51'	-58'	158°	40°56'	-58'	159°	40°00'	-58'	159°	39°04'	-58'	159°	1
2	43°41'	-58'	158°	42°45'	-58'	158°	41°49'	-58'	158°	40°53'	-58'	159°	39°58'	-58'	159°	39°01'	-58'	159°	38°05'	-58'	160°	2
3	42°43'	-58'	158°	41°47'	-58'	158°	40°51'	-58'	159°	39°55'	-58'	159°	38°59'	-58'	159°	38°03'	-58'	160°	37°07'	-58'	160°	3
4	41°45'	-58'	158°	40°49'	-58'	159°	39°53'	-58'	159°	38°57'	-58'	159°	38°01'	-58'	160°	37°05'	-58'	160°	36°09'	-58'	160°	4
5	40°48'	-58'	159°	39°52'	-58'	159°	38°55'	-58'	159°	37°59'	-58'	160°	37°03'	-58'	160°	36°07'	-58'	160°	35°10'	-58'	160°	5
6	39°50'	-58'	159°	38°54'	-58'	159°	37°57'	-58'	160°	37°01'	-58'	160°	36°05'	-58'	160°	35°08'	-58'	160°	34°12'	-59'	161°	6
7	38°52'	-58'	159°	37°56'	-58'	160°	36°59'	-58'	160°	36°03'	-58'	160°	35°06'	-58'	160°	34°10'	-58'	161°	33°13'	-59'	161°	7
8	37°54'	-58'	160°	36°58'	-58'	160°	36°01'	-58'	160°	35°05'	-58'	161°	34°08'	-58'	161°	33°11'	-58'	161°	32°15'	-59'	161°	8
9	36°56'	-58'	160°	36°00'	-58'	160°	35°03'	-58'	161°	34°06'	-58'	161°	33°10'	-58'	161°	32°13'	-59'	161°	31°16'	-59'	161°	9
10	35°58'	-58'	160°	35°01'	-58'	161°	34°05'	-58'	161°	33°08'	-58'	161°	32°11'	-58'	161°	31°14'	-59'	161°	30°17'	-59'	162°	10
11	35°00'	-58'	161°	34°03'	-58'	161°	33°06'	-58'	161°	32°10'	-58'	161°	31°13'	-58'	162°	30°16'	-59'	162°	29°19'	-59'	162°	11
12	34°02'	-58'	161°	33°05'	-58'	161°	32°08'	-58'	161°	31°11'	-58'	162°	30°14'	-59'	162°	29°17'	-59'	162°	28°20'	-59'	162°	12
13	33°04'	-58'	161°	32°07'	-58'	162°	31°10'	-58'	162°	30°13'	-58'	162°	29°16'	-59'	162°	28°19'	-59'	162°	27°21'	-59'	162°	13
14	32°05'	-58'	162°	31°08'	-58'	162°	30°11'	-58'	162°	29°14'	-58'	162°	28°17'	-59'	162°	27°20'	-59'	162°	26°23'	-59'	163°	14
15	31°07'	-58'	162°	30°10'	-58'	162°	29°13'	-58'	162°	28°16'	-59'	162°	27°19'	-59'	163°	26°21'	-59'	163°	25°24'	-59'	163°	15
16	30°09'	-58'	162°	29°12'	-58'	162°	28°15'	-58'	162°	27°17'	-59'	163°	26°20'	-59'	163°	25°23'	-59'	163°	24°25'	-59'	163°	16
17	29°11'	-58'	162°	28°13'	-58'	163°	27°16'	-59'	163°	26°19'	-59'	163°	25°21'	-59'	163°	24°24'	-59'	163°	23°27'	-59'	163°	17
18	28°12'	-58'	163°	27°15'	-58'	163°	26°18'	-59'	163°	25°20'	-59'	163°	24°23'	-59'	163°	23°25'	-59'	163°	22°28'	-59'	164°	18
19	27°14'	-58'	163°	26°17'	-58'	163°	25°19'	-59'	163°	24°22'	-59'	163°	23°24'	-59'	164°	22°27'	-59'	164°	21°29'	-59'	164°	19
20	26°16'	-58'	163°	25°18'	-59'	163°	24°21'	-59'	163°	23°23'	-59'	164°	22°25'	-59'	164°	21°28'	-59'	164°	20°30'	-59'	164°	20
21	25°17'	-58'	163°	24°20'	-59'	164°	23°22'	-59'	164°	22°24'	-59'	164°	21°27'	-59'	164°	20°29'	-59'	164°	19°31'	-59'	164°	21
22	24°19'	-58'	164°	23°21'	-59'	164°	22°23'	-59'	164°	21°26'	-59'	164°	20°28'	-59'	164°	19°30'	-59'	164°	18°32'	-59'	164°	22
23	23°20'	-58'	164°	22°22'	-59'	164°	21°25'	-59'	164°	20°27'	-59'	164°	19°29'	-59'	164°	18°31'	-59'	164°	17°34'	-59'	165°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

16° 344° LHA — Latitude CONTRARY to DECLINATION — 16° 344° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

15° 345° LHA — Latitude CONTRARY to Declination — 15° 345° LHA

Dec°	42 Hc°	d'	Z°	43 Hc°	d'	Z°	44 Hc°	d'	Z°	45 Hc°	d'	Z°	46 Hc°	d'	Z°	47 Hc°	d'	Z°	48 Hc°	d'	Z°	Dec°
0	45°53'	-58'	158°	44°57'	-58'	159°	44°01'	-58'	159°	43°05'	-58'	159°	42°09'	-58'	160°	41°12'	-58'	160°	40°16'	-58'	160°	0
1	44°55'	-58'	159°	43°59'	-58'	159°	43°03'	-58'	159°	42°07'	-58'	160°	41°10'	-58'	160°	40°14'	-58'	160°	39°17'	-58'	160°	1
2	43°57'	-58'	159°	43°01'	-58'	159°	42°05'	-58'	160°	41°08'	-58'	160°	40°12'	-58'	160°	39°16'	-58'	160°	38°19'	-59'	161°	2
3	42°59'	-58'	159°	42°03'	-58'	160°	41°07'	-58'	160°	40°10'	-58'	160°	39°14'	-58'	161°	38°17'	-58'	161°	37°20'	-59'	161°	3
4	42°01'	-58'	160°	41°05'	-58'	160°	40°08'	-58'	160°	39°12'	-58'	161°	38°15'	-58'	161°	37°19'	-59'	161°	36°22'	-59'	161°	4
5	41°03'	-58'	160°	40°07'	-58'	160°	39°10'	-58'	161°	38°14'	-58'	161°	37°17'	-58'	161°	36°20'	-59'	161°	35°23'	-59'	162°	5
6	40°05'	-58'	160°	39°09'	-58'	161°	38°12'	-58'	161°	37°15'	-58'	161°	36°18'	-59'	161°	35°22'	-59'	162°	34°25'	-59'	162°	6
7	39°07'	-58'	161°	38°10'	-58'	161°	37°14'	-58'	161°	36°17'	-58'	161°	35°20'	-59'	162°	34°23'	-59'	162°	33°26'	-59'	162°	7
8	38°09'	-58'	161°	37°12'	-58'	161°	36°15'	-58'	161°	35°18'	-58'	162°	34°21'	-59'	162°	33°24'	-59'	162°	32°27'	-59'	162°	8
9	37°11'	-58'	161°	36°14'	-58'	162°	35°17'	-58'	162°	34°20'	-59'	162°	33°23'	-59'	162°	32°26'	-59'	162°	31°28'	-59'	163°	9
10	36°13'	-58'	162°	35°16'	-58'	162°	34°19'	-58'	162°	33°21'	-59'	162°	32°24'	-59'	162°	31°27'	-59'	163°	30°30'	-59'	163°	10
11	35°14'	-58'	162°	34°17'	-58'	162°	33°20'	-59'	162°	32°23'	-59'	162°	31°26'	-59'	163°	30°28'	-59'	163°	29°31'	-59'	163°	11
12	34°16'	-58'	162°	33°19'	-58'	162°	32°22'	-59'	163°	31°24'	-59'	163°	30°27'	-59'	163°	29°30'	-59'	163°	28°32'	-59'	163°	12
13	33°18'	-58'	162°	32°20'	-58'	163°	31°23'	-59'	163°	30°26'	-59'	163°	29°28'	-59'	163°	28°31'	-59'	163°	27°33'	-59'	163°	13
14	32°19'	-58'	163°	31°22'	-59'	163°	30°24'	-59'	163°	29°27'	-59'	163°	28°30'	-59'	163°	27°32'	-59'	164°	26°34'	-59'	164°	14
15	31°21'	-58'	163°	30°23'	-59'	163°	29°26'	-59'	163°	28°28'	-59'	163°	27°31'	-59'	164°	26°33'	-59'	164°	25°36'	-59'	164°	15
16	30°22'	-59'	163°	29°25'	-59'	163°	28°27'	-59'	164°	27°30'	-59'	164°	26°32'	-59'	164°	25°34'	-59'	164°	24°37'	-59'	164°	16
17	29°24'	-59'	163°	28°26'	-59'	164°	27°29'	-59'	164°	26°31'	-59'	164°	25°33'	-59'	164°	24°35'	-59'	164°	23°38'	-59'	164°	17
18	28°25'	-59'	164°	27°28'	-59'	164°	26°30'	-59'	164°	25°32'	-59'	164°	24°34'	-59'	164°	23°37'	-59'	164°	22°39'	-59'	165°	18
19	27°27'	-59'	164°	26°29'	-59'	164°	25°31'	-59'	164°	24°33'	-59'	164°	23°36'	-59'	165°	22°38'	-59'	165°	21°40'	-59'	165°	19
20	26°28'	-59'	164°	25°30'	-59'	164°	24°32'	-59'	164°	23°35'	-59'	165°	22°37'	-59'	165°	21°39'	-59'	165°	20°41'	-59'	165°	20
21	25°29'	-59'	164°	24°32'	-59'	165°	23°34'	-59'	165°	22°36'	-59'	165°	21°38'	-59'	165°	20°40'	-59'	165°	19°42'	-59'	165°	21
22	24°31'	-59'	165°	23°33'	-59'	165°	22°35'	-59'	165°	21°37'	-59'	165°	20°39'	-59'	165°	19°41'	-59'	165°	18°43'	-59'	165°	22
23	23°32'	-59'	165°	22°34'	-59'	165°	21°36'	-59'	165°	20°38'	-59'	165°	19°40'	-59'	165°	18°42'	-59'	165°	17°44'	-59'	166°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

15° 345° LHA — Latitude CONTRARY to DECLINATION — 15° 345° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

14° 346° LHA — Latitude CONTRARY to Declination — 14° 346° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	46°09'	-58'	160°	45°12'	-58'	160°	44°16'	-58'	160°	43°19'	-58'	161°	42°23'	-58'	161°	41°26'	-59'	161°	40°29'	-59'	161°	0
1	45°11'	-58'	160°	44°14'	-58'	160°	43°18'	-58'	161°	42°21'	-58'	161°	41°24'	-58'	161°	40°27'	-59'	161°	39°30'	-59'	162°	1
2	44°13'	-58'	160°	43°16'	-58'	161°	42°19'	-58'	161°	41°23'	-58'	161°	40°26'	-59'	161°	39°29'	-59'	162°	38°32'	-59'	162°	2
3	43°14'	-58'	161°	42°18'	-58'	161°	41°21'	-58'	161°	40°24'	-58'	162°	39°27'	-59'	162°	38°30'	-59'	162°	37°33'	-59'	162°	3
4	42°16'	-58'	161°	41°19'	-58'	161°	40°23'	-58'	162°	39°26'	-59'	162°	38°29'	-59'	162°	37°32'	-59'	162°	36°34'	-59'	163°	4
5	41°18'	-58'	161°	40°21'	-58'	162°	39°24'	-58'	162°	38°27'	-59'	162°	37°30'	-59'	162°	36°33'	-59'	163°	35°36'	-59'	163°	5
6	40°20'	-58'	162°	39°23'	-58'	162°	38°26'	-59'	162°	37°29'	-59'	162°	36°31'	-59'	163°	35°34'	-59'	163°	34°37'	-59'	163°	6
7	39°21'	-58'	162°	38°24'	-58'	162°	37°27'	-59'	162°	36°30'	-59'	163°	35°33'	-59'	163°	34°35'	-59'	163°	33°38'	-59'	163°	7
8	38°23'	-58'	162°	37°26'	-59'	162°	36°29'	-59'	163°	35°31'	-59'	163°	34°34'	-59'	163°	33°37'	-59'	163°	32°39'	-59'	163°	8
9	37°25'	-58'	162°	36°27'	-59'	163°	35°30'	-59'	163°	34°33'	-59'	163°	33°35'	-59'	163°	32°38'	-59'	164°	31°40'	-59'	164°	9
10	36°26'	-59'	163°	35°29'	-59'	163°	34°31'	-59'	163°	33°34'	-59'	163°	32°36'	-59'	164°	31°39'	-59'	164°	30°41'	-59'	164°	10
11	35°28'	-59'	163°	34°30'	-59'	163°	33°33'	-59'	163°	32°35'	-59'	164°	31°38'	-59'	164°	30°40'	-59'	164°	29°42'	-59'	164°	11
12	34°29'	-59'	163°	33°32'	-59'	164°	32°34'	-59'	164°	31°36'	-59'	164°	30°39'	-59'	164°	29°41'	-59'	164°	28°43'	-59'	164°	12
13	33°31'	-59'	164°	32°33'	-59'	164°	31°35'	-59'	164°	30°38'	-59'	164°	29°40'	-59'	164°	28°42'	-59'	164°	27°44'	-59'	165°	13
14	32°32'	-59'	164°	31°34'	-59'	164°	30°37'	-59'	164°	29°39'	-59'	164°	28°41'	-59'	164°	27°43'	-59'	165°	26°45'	-59'	165°	14
15	31°33'	-59'	164°	30°36'	-59'	164°	29°38'	-59'	164°	28°40'	-59'	165°	27°42'	-59'	165°	26°44'	-59'	165°	25°46'	-59'	165°	15
16	30°35'	-59'	164°	29°37'	-59'	164°	28°39'	-59'	165°	27°41'	-59'	165°	26°43'	-59'	165°	25°45'	-59'	165°	24°47'	-59'	165°	16
17	29°36'	-59'	165°	28°38'	-59'	165°	27°40'	-59'	165°	26°42'	-59'	165°	25°44'	-59'	165°	24°46'	-59'	165°	23°48'	-59'	165°	17
18	28°37'	-59'	165°	27°39'	-59'	165°	26°41'	-59'	165°	25°43'	-59'	165°	24°45'	-59'	165°	23°47'	-59'	165°	22°49'	-59'	166°	18
19	27°38'	-59'	165°	26°41'	-59'	165°	25°42'	-59'	165°	24°44'	-59'	165°	23°46'	-59'	166°	22°48'	-59'	166°	21°50'	-59'	166°	19
20	26°40'	-59'	165°	25°42'	-59'	165°	24°44'	-59'	166°	23°46'	-59'	166°	22°47'	-59'	166°	21°49'	-59'	166°	20°51'	-59'	166°	20
21	25°41'	-59'	165°	24°43'	-59'	166°	23°45'	-59'	166°	22°47'	-59'	166°	21°48'	-59'	166°	20°50'	-59'	166°	19°52'	-59'	166°	21
22	24°42'	-59'	166°	23°44'	-59'	166°	22°46'	-59'	166°	21°48'	-59'	166°	20°49'	-59'	166°	19°51'	-59'	166°	18°53'	-59'	166°	22
23	23°43'	-59'	166°	22°45'	-59'	166°	21°47'	-59'	166°	20°49'	-59'	166°	19°50'	-59'	166°	18°52'	-59'	166°	17°54'	-59'	166°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

14° 346° LHA — Latitude CONTRARY to DECLINATION — 14° 346° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

13° 347° LHA — Latitude CONTRARY to Declination — 13° 347° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	46°24'	-58'	161°	45°27'	-58'	161°	44°30'	-58'	162°	43°33'	-59'	162°	42°36'	-59'	162°	41°39'	-59'	162°	40°41'	-59'	163°	0
1	45°25'	-58'	161°	44°29'	-58'	162°	43°32'	-59'	162°	42°34'	-59'	162°	41°37'	-59'	162°	40°40'	-59'	163°	39°43'	-59'	163°	1
2	44°27'	-58'	162°	43°30'	-58'	162°	42°33'	-59'	162°	41°36'	-59'	163°	40°39'	-59'	163°	39°41'	-59'	163°	38°44'	-59'	163°	2
3	43°29'	-58'	162°	42°32'	-59'	162°	41°34'	-59'	163°	40°37'	-59'	163°	39°40'	-59'	163°	38°42'	-59'	163°	37°45'	-59'	163°	3
4	42°30'	-58'	162°	41°33'	-59'	163°	40°36'	-59'	163°	39°38'	-59'	163°	38°41'	-59'	163°	37°44'	-59'	164°	36°46'	-59'	164°	4
5	41°32'	-59'	163°	40°35'	-59'	163°	39°37'	-59'	163°	38°40'	-59'	163°	37°42'	-59'	164°	36°45'	-59'	164°	35°47'	-59'	164°	5
6	40°33'	-59'	163°	39°36'	-59'	163°	38°39'	-59'	163°	37°41'	-59'	164°	36°43'	-59'	164°	35°46'	-59'	164°	34°48'	-59'	164°	6
7	39°35'	-59'	163°	38°37'	-59'	163°	37°40'	-59'	164°	36°42'	-59'	164°	35°45'	-59'	164°	34°47'	-59'	164°	33°49'	-59'	164°	7
8	38°36'	-59'	163°	37°39'	-59'	164°	36°41'	-59'	164°	35°43'	-59'	164°	34°46'	-59'	164°	33°48'	-59'	164°	32°50'	-59'	165°	8
9	37°38'	-59'	164°	36°40'	-59'	164°	35°42'	-59'	164°	34°45'	-59'	164°	33°47'	-59'	164°	32°49'	-59'	165°	31°51'	-59'	165°	9
10	36°39'	-59'	164°	35°41'	-59'	164°	34°43'	-59'	164°	33°46'	-59'	165°	32°48'	-59'	165°	31°50'	-59'	165°	30°52'	-59'	165°	10
11	35°40'	-59'	164°	34°42'	-59'	164°	33°45'	-59'	165°	32°47'	-59'	165°	31°49'	-59'	165°	30°51'	-59'	165°	29°53'	-59'	165°	11
12	34°41'	-59'	164°	33°44'	-59'	165°	32°46'	-59'	165°	31°48'	-59'	165°	30°50'	-59'	165°	29°52'	-59'	165°	28°54'	-59'	165°	12
13	33°43'	-59'	165°	32°45'	-59'	165°	31°47'	-59'	165°	30°49'	-59'	165°	29°51'	-59'	165°	28°53'	-59'	166°	27°55'	-59'	166°	13
14	32°44'	-59'	165°	31°46'	-59'	165°	30°48'	-59'	165°	29°50'	-59'	165°	28°52'	-59'	166°	27°54'	-59'	166°	26°56'	-59'	166°	14
15	31°45'	-59'	165°	30°47'	-59'	165°	29°49'	-59'	165°	28°51'	-59'	166°	27°53'	-59'	166°	26°55'	-59'	166°	25°56'	-59'	166°	15
16	30°46'	-59'	165°	29°48'	-59'	166°	28°50'	-59'	166°	27°52'	-59'	166°	26°54'	-59'	166°	25°55'	-59'	166°	24°57'	-59'	166°	16
17	29°47'	-59'	166°	28°49'	-59'	166°	27°51'	-59'	166°	26°53'	-59'	166°	25°55'	-59'	166°	24°56'	-59'	166°	23°58'	-59'	166°	17
18	28°49'	-59'	166°	27°50'	-59'	166°	26°52'	-59'	166°	25°54'	-59'	166°	24°56'	-59'	166°	23°57'	-59'	166°	22°59'	-59'	167°	18
19	27°50'	-59'	166°	26°51'	-59'	166°	25°53'	-59'	166°	24°55'	-59'	166°	23°56'	-59'	167°	22°58'	-59'	167°	22°00'	-59'	167°	19
20	26°51'	-59'	166°	25°52'	-59'	166°	24°54'	-59'	167°	23°56'	-59'	167°	22°57'	-59'	167°	21°59'	-59'	167°	21°00'	-59'	167°	20
21	25°52'	-59'	167°	24°53'	-59'	167°	23°55'	-59'	167°	22°57'	-59'	167°	21°58'	-59'	167°	21°00'	-59'	167°	20°01'	-59'	167°	21
22	24°53'	-59'	167°	23°54'	-59'	167°	22°56'	-59'	167°	21°57'	-59'	167°	20°59'	-59'	167°	20°01'	-59'	167°	19°02'	-59'	167°	22
23	23°54'	-59'	167°	22°55'	-59'	167°	21°57'	-59'	167°	20°58'	-59'	167°	20°00'	-59'	167°	19°01'	-59'	167°	18°03'	-59'	167°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

13° 347° LHA — Latitude CONTRARY to DECLINATION — 13° 347° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

12° 348° LHA — Latitude CONTRARY to Declination — 12° 348° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	46°38'	-58'	162°	45°40'	-59'	163°	44°43'	-59'	163°	43°46'	-59'	163°	42°48'	-59'	164°	41°51'	-59'	164°	40°53'	-59'	164°	0
1	45°39'	-59'	163°	44°42'	-59'	163°	43°44'	-59'	163°	42°47'	-59'	164°	41°49'	-59'	164°	40°52'	-59'	164°	39°54'	-59'	164°	1
2	44°41'	-59'	163°	43°43'	-59'	163°	42°46'	-59'	164°	41°48'	-59'	164°	40°50'	-59'	164°	39°53'	-59'	164°	38°55'	-59'	165°	2
3	43°42'	-59'	163°	42°45'	-59'	164°	41°47'	-59'	164°	40°49'	-59'	164°	39°52'	-59'	164°	38°54'	-59'	165°	37°56'	-59'	165°	3
4	42°43'	-59'	164°	41°46'	-59'	164°	40°48'	-59'	164°	39°50'	-59'	164°	38°53'	-59'	165°	37°55'	-59'	165°	36°57'	-59'	165°	4
5	41°45'	-59'	164°	40°47'	-59'	164°	39°49'	-59'	164°	38°51'	-59'	165°	37°54'	-59'	165°	36°56'	-59'	165°	35°58'	-59'	165°	5
6	40°46'	-59'	164°	39°48'	-59'	164°	38°50'	-59'	165°	37°53'	-59'	165°	36°55'	-59'	165°	35°57'	-59'	165°	34°59'	-59'	165°	6
7	39°47'	-59'	164°	38°49'	-59'	165°	37°52'	-59'	165°	36°54'	-59'	165°	35°56'	-59'	165°	34°58'	-59'	165°	33°59'	-59'	166°	7
8	38°48'	-59'	165°	37°51'	-59'	165°	36°53'	-59'	165°	35°55'	-59'	165°	34°57'	-59'	165°	33°58'	-59'	166°	33°00'	-59'	166°	8
9	37°50'	-59'	165°	36°52'	-59'	165°	35°54'	-59'	165°	34°56'	-59'	165°	33°57'	-59'	166°	32°59'	-59'	166°	32°01'	-59'	166°	9
10	36°51'	-59'	165°	35°53'	-59'	165°	34°55'	-59'	166°	33°57'	-59'	166°	32°58'	-59'	166°	32°00'	-59'	166°	31°02'	-59'	166°	10
11	35°52'	-59'	165°	34°54'	-59'	166°	33°56'	-59'	166°	32°57'	-59'	166°	31°59'	-59'	166°	31°01'	-59'	166°	30°03'	-59'	166°	11
12	34°53'	-59'	166°	33°55'	-59'	166°	32°57'	-59'	166°	31°58'	-59'	166°	31°00'	-59'	166°	30°02'	-59'	166°	29°03'	-59'	167°	12
13	33°54'	-59'	166°	32°56'	-59'	166°	31°58'	-59'	166°	30°59'	-59'	166°	30°01'	-59'	166°	29°03'	-59'	167°	28°04'	-59'	167°	13
14	32°55'	-59'	166°	31°57'	-59'	166°	30°59'	-59'	166°	30°00'	-59'	167°	29°02'	-59'	167°	28°03'	-59'	167°	27°05'	-59'	167°	14
15	31°56'	-59'	166°	30°58'	-59'	166°	29°59'	-59'	167°	29°01'	-59'	167°	28°03'	-59'	167°	27°04'	-59'	167°	26°06'	-59'	167°	15
16	30°57'	-59'	167°	29°59'	-59'	167°	29°00'	-59'	167°	28°02'	-59'	167°	27°03'	-59'	167°	26°05'	-59'	167°	25°06'	-59'	167°	16
17	29°58'	-59'	167°	29°00'	-59'	167°	28°01'	-59'	167°	27°03'	-59'	167°	26°04'	-59'	167°	25°06'	-59'	167°	24°07'	-59'	167°	17
18	28°59'	-59'	167°	28°01'	-59'	167°	27°02'	-59'	167°	26°04'	-59'	167°	25°05'	-59'	167°	24°06'	-59'	167°	23°08'	-59'	168°	18
19	28°00'	-59'	167°	27°01'	-59'	167°	26°03'	-59'	167°	25°04'	-59'	167°	24°06'	-59'	168°	23°07'	-59'	168°	22°09'	-59'	168°	19
20	27°01'	-59'	167°	26°02'	-59'	167°	25°04'	-59'	168°	24°05'	-59'	168°	23°07'	-59'	168°	22°08'	-59'	168°	21°09'	-59'	168°	20
21	26°02'	-59'	168°	25°03'	-59'	168°	24°05'	-59'	168°	23°06'	-59'	168°	22°07'	-59'	168°	21°09'	-59'	168°	20°10'	-59'	168°	21
22	25°03'	-59'	168°	24°04'	-59'	168°	23°05'	-59'	168°	22°07'	-59'	168°	21°08'	-59'	168°	20°09'	-59'	168°	19°11'	-59'	168°	22
23	24°04'	-59'	168°	23°05'	-59'	168°	22°06'	-59'	168°	21°07'	-59'	168°	20°09'	-59'	168°	19°10'	-59'	168°	18°11'	-59'	168°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

12° 348° LHA — Latitude CONTRARY to DECLINATION — 12° 348° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

11° 349° LHA — Latitude CONTRARY to Declination — 11° 349° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	46°51'	-59'	164°	45°53'	-59'	164°	44°55'	-59'	164°	43°57'	-59'	165°	43°00'	-59'	165°	42°02'	-59'	165°	41°04'	-59'	165°	0
1	45°52'	-59'	164°	44°54'	-59'	164°	43°56'	-59'	165°	42°58'	-59'	165°	42°00'	-59'	165°	41°02'	-59'	165°	40°04'	-59'	166°	1
2	44°53'	-59'	164°	43°55'	-59'	165°	42°57'	-59'	165°	41°59'	-59'	165°	41°01'	-59'	165°	40°03'	-59'	166°	39°05'	-59'	166°	2
3	43°54'	-59'	165°	42°56'	-59'	165°	41°58'	-59'	165°	41°00'	-59'	165°	40°02'	-59'	166°	39°04'	-59'	166°	38°06'	-59'	166°	3
4	42°55'	-59'	165°	41°58'	-59'	165°	40°59'	-59'	165°	40°01'	-59'	166°	39°03'	-59'	166°	38°05'	-59'	166°	37°07'	-59'	166°	4
5	41°57'	-59'	165°	40°59'	-59'	165°	40°00'	-59'	166°	39°02'	-59'	166°	38°04'	-59'	166°	37°06'	-59'	166°	36°08'	-59'	166°	5
6	40°58'	-59'	165°	40°00'	-59'	166°	39°01'	-59'	166°	38°03'	-59'	166°	37°05'	-59'	166°	36°07'	-59'	166°	35°08'	-59'	167°	6
7	39°59'	-59'	166°	39°01'	-59'	166°	38°02'	-59'	166°	37°04'	-59'	166°	36°06'	-59'	166°	35°07'	-59'	167°	34°09'	-59'	167°	7
8	39°00'	-59'	166°	38°02'	-59'	166°	37°03'	-59'	166°	36°05'	-59'	166°	35°07'	-59'	167°	34°08'	-59'	167°	33°10'	-59'	167°	8
9	38°01'	-59'	166°	37°02'	-59'	166°	36°04'	-59'	167°	35°06'	-59'	167°	34°07'	-59'	167°	33°09'	-59'	167°	32°10'	-59'	167°	9
10	37°02'	-59'	166°	36°03'	-59'	167°	35°05'	-59'	167°	34°07'	-59'	167°	33°08'	-59'	167°	32°10'	-59'	167°	31°11'	-59'	167°	10
11	36°03'	-59'	167°	35°04'	-59'	167°	34°06'	-59'	167°	33°07'	-59'	167°	32°09'	-59'	167°	31°10'	-59'	167°	30°12'	-59'	167°	11
12	35°04'	-59'	167°	34°05'	-59'	167°	33°07'	-59'	167°	32°08'	-59'	167°	31°10'	-59'	167°	30°11'	-59'	168°	29°12'	-59'	168°	12
13	34°04'	-59'	167°	33°06'	-59'	167°	32°07'	-59'	167°	31°09'	-59'	167°	30°10'	-59'	168°	29°12'	-59'	168°	28°13'	-59'	168°	13
14	33°05'	-59'	167°	32°07'	-59'	167°	31°08'	-59'	168°	30°10'	-59'	168°	29°11'	-59'	168°	28°12'	-59'	168°	27°14'	-59'	168°	14
15	32°06'	-59'	167°	31°08'	-59'	168°	30°09'	-59'	168°	29°10'	-59'	168°	28°12'	-59'	168°	27°13'	-59'	168°	26°14'	-59'	168°	15
16	31°07'	-59'	168°	30°08'	-59'	168°	29°10'	-59'	168°	28°11'	-59'	168°	27°12'	-59'	168°	26°14'	-59'	168°	25°15'	-59'	168°	16
17	30°08'	-59'	168°	29°09'	-59'	168°	28°11'	-59'	168°	27°12'	-59'	168°	26°13'	-59'	168°	25°14'	-59'	168°	24°16'	-59'	168°	17
18	29°09'	-59'	168°	28°10'	-59'	168°	27°11'	-59'	168°	26°12'	-59'	168°	25°14'	-59'	168°	24°15'	-59'	169°	23°16'	-59'	169°	18
19	28°09'	-59'	168°	27°11'	-59'	168°	26°12'	-59'	168°	25°13'	-59'	168°	24°14'	-59'	169°	23°16'	-59'	169°	22°17'	-59'	169°	19
20	27°10'	-59'	168°	26°11'	-59'	168°	25°13'	-59'	169°	24°14'	-59'	169°	23°15'	-59'	169°	22°16'	-59'	169°	21°17'	-59'	169°	20
21	26°11'	-59'	169°	25°12'	-59'	169°	24°13'	-59'	169°	23°14'	-59'	169°	22°16'	-59'	169°	21°17'	-59'	169°	20°18'	-59'	169°	21
22	25°12'	-59'	169°	24°13'	-59'	169°	23°14'	-59'	169°	22°15'	-59'	169°	21°16'	-59'	169°	20°17'	-59'	169°	19°18'	-59'	169°	22
23	24°12'	-59'	169°	23°14'	-59'	169°	22°15'	-59'	169°	21°16'	-59'	169°	20°17'	-59'	169°	19°18'	-59'	169°	18°19'	-59'	169°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

11° 349° LHA — Latitude CONTRARY to DECLINATION — 11° 349° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

10° 350° LHA — Latitude CONTRARY to Declination — 10° 350° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	47°03'	-59'	165°	46°04'	-59'	166°	45°06'	-59'	166°	44°08'	-59'	166°	43°10'	-59'	166°	42°12'	-59'	166°	41°13'	-59'	167°	0
1	46°04'	-59'	166°	45°05'	-59'	166°	44°07'	-59'	166°	43°09'	-59'	166°	42°11'	-59'	166°	41°12'	-59'	167°	40°14'	-59'	167°	1
2	45°05'	-59'	166°	44°06'	-59'	166°	43°08'	-59'	166°	42°10'	-59'	166°	41°12'	-59'	167°	40°13'	-59'	167°	39°15'	-59'	167°	2
3	44°06'	-59'	166°	43°07'	-59'	166°	42°09'	-59'	166°	41°11'	-59'	167°	40°12'	-59'	167°	39°14'	-59'	167°	38°15'	-59'	167°	3
4	43°07'	-59'	166°	42°08'	-59'	166°	41°10'	-59'	167°	40°11'	-59'	167°	39°13'	-59'	167°	38°15'	-59'	167°	37°16'	-59'	167°	4
5	42°08'	-59'	167°	41°09'	-59'	167°	40°11'	-59'	167°	39°12'	-59'	167°	38°14'	-59'	167°	37°15'	-59'	167°	36°17'	-59'	168°	5
6	41°08'	-59'	167°	40°10'	-59'	167°	39°12'	-59'	167°	38°13'	-59'	167°	37°14'	-59'	167°	36°16'	-59'	168°	35°17'	-59'	168°	6
7	40°09'	-59'	167°	39°11'	-59'	167°	38°12'	-59'	167°	37°14'	-59'	167°	36°15'	-59'	168°	35°16'	-59'	168°	34°18'	-59'	168°	7
8	39°10'	-59'	167°	38°12'	-59'	167°	37°13'	-59'	168°	36°14'	-59'	168°	35°16'	-59'	168°	34°17'	-59'	168°	33°18'	-59'	168°	8
9	38°11'	-59'	167°	37°12'	-59'	168°	36°14'	-59'	168°	35°15'	-59'	168°	34°16'	-59'	168°	33°18'	-59'	168°	32°19'	-59'	168°	9
10	37°12'	-59'	168°	36°13'	-59'	168°	35°14'	-59'	168°	34°16'	-59'	168°	33°17'	-59'	168°	32°18'	-59'	168°	31°20'	-59'	168°	10
11	36°13'	-59'	168°	35°14'	-59'	168°	34°15'	-59'	168°	33°16'	-59'	168°	32°18'	-59'	168°	31°19'	-59'	168°	30°20'	-59'	169°	11
12	35°13'	-59'	168°	34°15'	-59'	168°	33°16'	-59'	168°	32°17'	-59'	168°	31°18'	-59'	169°	30°19'	-59'	169°	29°21'	-59'	169°	12
13	34°14'	-59'	168°	33°15'	-59'	168°	32°17'	-59'	168°	31°18'	-59'	169°	30°19'	-59'	169°	29°20'	-59'	169°	28°21'	-59'	169°	13
14	33°15'	-59'	168°	32°16'	-59'	169°	31°17'	-59'	169°	30°18'	-59'	169°	29°19'	-59'	169°	28°21'	-59'	169°	27°22'	-59'	169°	14
15	32°15'	-59'	169°	31°17'	-59'	169°	30°18'	-59'	169°	29°19'	-59'	169°	28°20'	-59'	169°	27°21'	-59'	169°	26°22'	-59'	169°	15
16	31°16'	-59'	169°	30°17'	-59'	169°	29°18'	-59'	169°	28°20'	-59'	169°	27°21'	-59'	169°	26°22'	-59'	169°	25°23'	-60'	169°	16
17	30°17'	-59'	169°	29°18'	-59'	169°	28°19'	-59'	169°	27°20'	-59'	169°	26°21'	-59'	169°	25°22'	-59'	169°	24°23'	-60'	169°	17
18	29°18'	-59'	169°	28°19'	-59'	169°	27°20'	-59'	169°	26°21'	-59'	169°	25°22'	-59'	169°	24°23'	-59'	170°	23°24'	-60'	170°	18
19	28°18'	-59'	169°	27°19'	-59'	169°	26°20'	-59'	169°	25°21'	-59'	170°	24°22'	-59'	170°	23°23'	-60'	170°	22°24'	-60'	170°	19
20	27°19'	-59'	169°	26°20'	-59'	170°	25°21'	-59'	170°	24°22'	-59'	170°	23°23'	-59'	170°	22°24'	-60'	170°	21°25'	-60'	170°	20
21	26°19'	-59'	170°	25°20'	-59'	170°	24°21'	-59'	170°	23°22'	-59'	170°	22°23'	-59'	170°	21°24'	-60'	170°	20°25'	-60'	170°	21
22	25°20'	-59'	170°	24°21'	-59'	170°	23°22'	-59'	170°	22°23'	-59'	170°	21°24'	-59'	170°	20°25'	-60'	170°	19°26'	-60'	170°	22
23	24°21'	-59'	170°	23°22'	-59'	170°	22°23'	-59'	170°	21°23'	-59'	170°	20°24'	-60'	170°	19°25'	-60'	170°	18°26'	-60'	170°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

10° 350° LHA — Latitude CONTRARY to DECLINATION — 10° 350° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

9° 351° LHA — Latitude CONTRARY to Declination — 9° 351° LHA

Dec°	42			43			44			45			46			47			48			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	47°13'	-59'	167°	46°15'	-59'	167°	45°16'	-59'	167°	44°18'	-59'	167°	43°19'	-59'	168°	42°21'	-59'	168°	41°22'	-59'	168°	0
1	46°14'	-59'	167°	45°16'	-59'	167°	44°17'	-59'	167°	43°19'	-59'	168°	42°20'	-59'	168°	41°21'	-59'	168°	40°23'	-59'	168°	1
2	45°15'	-59'	167°	44°17'	-59'	167°	43°18'	-59'	168°	42°19'	-59'	168°	41°21'	-59'	168°	40°22'	-59'	168°	39°23'	-59'	168°	2
3	44°16'	-59'	167°	43°17'	-59'	168°	42°19'	-59'	168°	41°20'	-59'	168°	40°21'	-59'	168°	39°23'	-59'	168°	38°24'	-59'	169°	3
4	43°17'	-59'	168°	42°18'	-59'	168°	41°19'	-59'	168°	40°21'	-59'	168°	39°22'	-59'	168°	38°23'	-59'	169°	37°24'	-59'	169°	4
5	42°17'	-59'	168°	41°19'	-59'	168°	40°20'	-59'	168°	39°21'	-59'	168°	38°22'	-59'	169°	37°24'	-59'	169°	36°25'	-59'	169°	5
6	41°18'	-59'	168°	40°19'	-59'	168°	39°21'	-59'	168°	38°22'	-59'	169°	37°23'	-59'	169°	36°24'	-59'	169°	35°25'	-60'	169°	6
7	40°19'	-59'	168°	39°20'	-59'	168°	38°21'	-59'	169°	37°22'	-59'	169°	36°24'	-59'	169°	35°25'	-59'	169°	34°26'	-60'	169°	7
8	39°20'	-59'	168°	38°21'	-59'	169°	37°22'	-59'	169°	36°23'	-59'	169°	35°24'	-59'	169°	34°25'	-60'	169°	33°26'	-60'	169°	8
9	38°20'	-59'	169°	37°21'	-59'	169°	36°23'	-59'	169°	35°24'	-59'	169°	34°25'	-59'	169°	33°26'	-60'	169°	32°27'	-60'	169°	9
10	37°21'	-59'	169°	36°22'	-59'	169°	35°23'	-59'	169°	34°24'	-59'	169°	33°25'	-59'	169°	32°26'	-60'	169°	31°27'	-60'	170°	10
11	36°22'	-59'	169°	35°23'	-59'	169°	34°24'	-59'	169°	33°25'	-59'	169°	32°26'	-60'	170°	31°27'	-60'	170°	30°28'	-60'	170°	11
12	35°22'	-59'	169°	34°23'	-59'	169°	33°24'	-59'	169°	32°25'	-59'	170°	31°26'	-60'	170°	30°27'	-60'	170°	29°28'	-60'	170°	12
13	34°23'	-59'	169°	33°24'	-59'	169°	32°25'	-59'	170°	31°26'	-59'	170°	30°27'	-60'	170°	29°28'	-60'	170°	28°29'	-60'	170°	13
14	33°23'	-59'	170°	32°24'	-59'	170°	31°25'	-59'	170°	30°26'	-60'	170°	29°27'	-60'	170°	28°28'	-60'	170°	27°29'	-60'	170°	14
15	32°24'	-59'	170°	31°25'	-59'	170°	30°26'	-59'	170°	29°27'	-60'	170°	28°28'	-60'	170°	27°28'	-60'	170°	26°29'	-60'	170°	15
16	31°24'	-59'	170°	30°25'	-59'	170°	29°26'	-60'	170°	28°27'	-60'	170°	27°28'	-60'	170°	26°29'	-60'	170°	25°30'	-60'	170°	16
17	30°25'	-59'	170°	29°26'	-59'	170°	28°27'	-60'	170°	27°28'	-60'	170°	26°29'	-60'	170°	25°29'	-60'	170°	24°30'	-60'	171°	17
18	29°26'	-59'	170°	28°26'	-59'	170°	27°27'	-60'	170°	26°28'	-60'	170°	25°29'	-60'	171°	24°30'	-60'	171°	23°31'	-60'	171°	18
19	28°26'	-59'	170°	27°27'	-60'	170°	26°28'	-60'	170°	25°29'	-60'	171°	24°29'	-60'	171°	23°30'	-60'	171°	22°31'	-60'	171°	19
20	27°27'	-59'	170°	26°27'	-60'	171°	25°28'	-60'	171°	24°29'	-60'	171°	23°30'	-60'	171°	22°31'	-60'	171°	21°31'	-60'	171°	20
21	26°27'	-59'	171°	25°28'	-60'	171°	24°29'	-60'	171°	23°29'	-60'	171°	22°30'	-60'	171°	21°31'	-60'	171°	20°32'	-60'	171°	21
22	25°28'	-60'	171°	24°28'	-60'	171°	23°29'	-60'	171°	22°30'	-60'	171°	21°31'	-60'	171°	20°31'	-60'	171°	19°32'	-60'	171°	22
23	24°28'	-60'	171°	23°29'	-60'	171°	22°30'	-60'	171°	21°30'	-60'	171°	20°31'	-60'	171°	19°32'	-60'	171°	18°32'	-60'	171°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

9° 351° LHA — Latitude CONTRARY to DECLINATION — 9° 351° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

8° 352° LHA — Latitude CONTRARY to Declination — 8° 352° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	47°23'	-59'	168°	46°24'	-59'	168°	45°26'	-59'	169°	44°27'	-59'	169°	43°28'	-59'	169°	42°29'	-60'	169°	41°30'	-60'	169°	0
1	46°24'	-59'	168°	45°25'	-59'	169°	44°26'	-59'	169°	43°27'	-59'	169°	42°28'	-59'	169°	41°29'	-60'	169°	40°30'	-60'	169°	1
2	45°24'	-59'	169°	44°26'	-59'	169°	43°27'	-59'	169°	42°28'	-59'	169°	41°29'	-60'	169°	40°30'	-60'	169°	39°31'	-60'	170°	2
3	44°25'	-59'	169°	43°26'	-59'	169°	42°27'	-59'	169°	41°28'	-59'	169°	40°29'	-60'	169°	39°30'	-60'	170°	38°31'	-60'	170°	3
4	43°26'	-59'	169°	42°27'	-59'	169°	41°28'	-59'	169°	40°29'	-60'	169°	39°30'	-60'	170°	38°31'	-60'	170°	37°32'	-60'	170°	4
5	42°26'	-59'	169°	41°27'	-59'	169°	40°28'	-59'	169°	39°29'	-60'	170°	38°30'	-60'	170°	37°31'	-60'	170°	36°32'	-60'	170°	5
6	41°27'	-59'	169°	40°28'	-59'	170°	39°29'	-60'	170°	38°30'	-60'	170°	37°31'	-60'	170°	36°32'	-60'	170°	35°33'	-60'	170°	6
7	40°27'	-59'	170°	39°28'	-59'	170°	38°29'	-60'	170°	37°30'	-60'	170°	36°31'	-60'	170°	35°32'	-60'	170°	34°33'	-60'	170°	7
8	39°28'	-59'	170°	38°29'	-59'	170°	37°30'	-60'	170°	36°31'	-60'	170°	35°32'	-60'	170°	34°32'	-60'	170°	33°33'	-60'	170°	8
9	38°29'	-59'	170°	37°29'	-60'	170°	36°30'	-60'	170°	35°31'	-60'	170°	34°32'	-60'	170°	33°33'	-60'	171°	32°34'	-60'	171°	9
10	37°29'	-59'	170°	36°30'	-60'	170°	35°31'	-60'	170°	34°32'	-60'	170°	33°32'	-60'	171°	32°33'	-60'	171°	31°34'	-60'	171°	10
11	36°30'	-60'	170°	35°30'	-60'	170°	34°31'	-60'	170°	33°32'	-60'	171°	32°33'	-60'	171°	31°34'	-60'	171°	30°34'	-60'	171°	11
12	35°30'	-60'	170°	34°31'	-60'	170°	33°32'	-60'	171°	32°32'	-60'	171°	31°33'	-60'	171°	30°34'	-60'	171°	29°35'	-60'	171°	12
13	34°31'	-60'	171°	33°31'	-60'	171°	32°32'	-60'	171°	31°33'	-60'	171°	30°34'	-60'	171°	29°34'	-60'	171°	28°35'	-60'	171°	13
14	33°31'	-60'	171°	32°32'	-60'	171°	31°33'	-60'	171°	30°33'	-60'	171°	29°34'	-60'	171°	28°35'	-60'	171°	27°35'	-60'	171°	14
15	32°31'	-60'	171°	31°32'	-60'	171°	30°33'	-60'	171°	29°34'	-60'	171°	28°34'	-60'	171°	27°35'	-60'	171°	26°36'	-60'	171°	15
16	31°32'	-60'	171°	30°33'	-60'	171°	29°33'	-60'	171°	28°34'	-60'	171°	27°35'	-60'	171°	26°35'	-60'	171°	25°36'	-60'	171°	16
17	30°32'	-60'	171°	29°33'	-60'	171°	28°34'	-60'	171°	27°34'	-60'	171°	26°35'	-60'	171°	25°36'	-60'	172°	24°36'	-60'	172°	17
18	29°33'	-60'	171°	28°33'	-60'	171°	27°34'	-60'	171°	26°35'	-60'	171°	25°35'	-60'	172°	24°36'	-60'	172°	23°37'	-60'	172°	18
19	28°33'	-60'	171°	27°34'	-60'	171°	26°35'	-60'	172°	25°35'	-60'	172°	24°36'	-60'	172°	23°36'	-60'	172°	22°37'	-60'	172°	19
20	27°34'	-60'	172°	26°34'	-60'	172°	25°35'	-60'	172°	24°36'	-60'	172°	23°36'	-60'	172°	22°37'	-60'	172°	21°37'	-60'	172°	20
21	26°34'	-60'	172°	25°35'	-60'	172°	24°35'	-60'	172°	23°36'	-60'	172°	22°36'	-60'	172°	21°37'	-60'	172°	20°38'	-60'	172°	21
22	25°34'	-60'	172°	24°35'	-60'	172°	23°36'	-60'	172°	22°36'	-60'	172°	21°37'	-60'	172°	20°37'	-60'	172°	19°38'	-60'	172°	22
23	24°35'	-60'	172°	23°35'	-60'	172°	22°36'	-60'	172°	21°37'	-60'	172°	20°37'	-60'	172°	19°38'	-60'	172°	18°38'	-60'	172°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

8° 352° LHA — Latitude CONTRARY to DECLINATION — 8° 352° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

7° 353° LHA — Latitude CONTRARY to Declination — 7° 353° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	47°32'	-59'	170°	46°33'	-60'	170°	45°34'	-60'	170°	44°34'	-60'	170°	43°35'	-60'	170°	42°36'	-60'	170°	41°37'	-60'	171°	0
1	46°32'	-59'	170°	45°33'	-60'	170°	44°34'	-60'	170°	43°35'	-60'	170°	42°36'	-60'	170°	41°37'	-60'	171°	40°37'	-60'	171°	1
2	45°33'	-60'	170°	44°34'	-60'	170°	43°34'	-60'	170°	42°35'	-60'	170°	41°36'	-60'	171°	40°37'	-60'	171°	39°38'	-60'	171°	2
3	44°33'	-60'	170°	43°34'	-60'	170°	42°35'	-60'	170°	41°36'	-60'	171°	40°37'	-60'	171°	39°37'	-60'	171°	38°38'	-60'	171°	3
4	43°34'	-60'	170°	42°35'	-60'	170°	41°35'	-60'	171°	40°36'	-60'	171°	39°37'	-60'	171°	38°38'	-60'	171°	37°38'	-60'	171°	4
5	42°34'	-60'	171°	41°35'	-60'	171°	40°36'	-60'	171°	39°37'	-60'	171°	38°37'	-60'	171°	37°38'	-60'	171°	36°39'	-60'	171°	5
6	41°35'	-60'	171°	40°35'	-60'	171°	39°36'	-60'	171°	38°37'	-60'	171°	37°38'	-60'	171°	36°38'	-60'	171°	35°39'	-60'	171°	6
7	40°35'	-60'	171°	39°36'	-60'	171°	38°37'	-60'	171°	37°37'	-60'	171°	36°38'	-60'	171°	35°39'	-60'	171°	34°39'	-60'	172°	7
8	39°35'	-60'	171°	38°36'	-60'	171°	37°37'	-60'	171°	36°38'	-60'	171°	35°38'	-60'	171°	34°39'	-60'	172°	33°40'	-60'	172°	8
9	38°36'	-60'	171°	37°37'	-60'	171°	36°37'	-60'	171°	35°38'	-60'	171°	34°39'	-60'	172°	33°39'	-60'	172°	32°40'	-60'	172°	9
10	37°36'	-60'	171°	36°37'	-60'	171°	35°38'	-60'	172°	34°38'	-60'	172°	33°39'	-60'	172°	32°40'	-60'	172°	31°40'	-60'	172°	10
11	36°37'	-60'	171°	35°37'	-60'	172°	34°38'	-60'	172°	33°39'	-60'	172°	32°39'	-60'	172°	31°40'	-60'	172°	30°40'	-60'	172°	11
12	35°37'	-60'	172°	34°38'	-60'	172°	33°38'	-60'	172°	32°39'	-60'	172°	31°40'	-60'	172°	30°40'	-60'	172°	29°41'	-60'	172°	12
13	34°37'	-60'	172°	33°38'	-60'	172°	32°39'	-60'	172°	31°39'	-60'	172°	30°40'	-60'	172°	29°40'	-60'	172°	28°41'	-60'	172°	13
14	33°38'	-60'	172°	32°38'	-60'	172°	31°39'	-60'	172°	30°40'	-60'	172°	29°40'	-60'	172°	28°41'	-60'	172°	27°41'	-60'	172°	14
15	32°38'	-60'	172°	31°39'	-60'	172°	30°39'	-60'	172°	29°40'	-60'	172°	28°40'	-60'	172°	27°41'	-60'	172°	26°41'	-60'	172°	15
16	31°38'	-60'	172°	30°39'	-60'	172°	29°40'	-60'	172°	28°40'	-60'	172°	27°41'	-60'	172°	26°41'	-60'	172°	25°42'	-60'	173°	16
17	30°39'	-60'	172°	29°39'	-60'	172°	28°40'	-60'	172°	27°40'	-60'	172°	26°41'	-60'	173°	25°41'	-60'	173°	24°42'	-60'	173°	17
18	29°39'	-60'	172°	28°40'	-60'	172°	27°40'	-60'	172°	26°41'	-60'	173°	25°41'	-60'	173°	24°42'	-60'	173°	23°42'	-60'	173°	18
19	28°39'	-60'	172°	27°40'	-60'	173°	26°40'	-60'	173°	25°41'	-60'	173°	24°41'	-60'	173°	23°42'	-60'	173°	22°42'	-60'	173°	19
20	27°40'	-60'	173°	26°40'	-60'	173°	25°41'	-60'	173°	24°41'	-60'	173°	23°42'	-60'	173°	22°42'	-60'	173°	21°43'	-60'	173°	20
21	26°40'	-60'	173°	25°41'	-60'	173°	24°41'	-60'	173°	23°42'	-60'	173°	22°42'	-60'	173°	21°42'	-60'	173°	20°43'	-60'	173°	21
22	25°40'	-60'	173°	24°41'	-60'	173°	23°41'	-60'	173°	22°42'	-60'	173°	21°42'	-60'	173°	20°43'	-60'	173°	19°43'	-60'	173°	22
23	24°41'	-60'	173°	23°41'	-60'	173°	22°42'	-60'	173°	21°42'	-60'	173°	20°42'	-60'	173°	19°43'	-60'	173°	18°43'	-60'	173°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

7° 353° LHA — Latitude CONTRARY to DECLINATION — 7° 353° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

6° 354° LHA — Latitude CONTRARY to Declination — 6° 354° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	47°39'	-60'	171°	46°40'	-60'	171°	45°41'	-60'	171°	44°41'	-60'	172°	43°42'	-60'	172°	42°42'	-60'	172°	41°43'	-60'	172°	0
1	46°40'	-60'	171°	45°40'	-60'	171°	44°41'	-60'	172°	43°42'	-60'	172°	42°42'	-60'	172°	41°43'	-60'	172°	40°43'	-60'	172°	1
2	45°40'	-60'	171°	44°41'	-60'	172°	43°41'	-60'	172°	42°42'	-60'	172°	41°42'	-60'	172°	40°43'	-60'	172°	39°44'	-60'	172°	2
3	44°40'	-60'	172°	43°41'	-60'	172°	42°42'	-60'	172°	41°42'	-60'	172°	40°43'	-60'	172°	39°43'	-60'	172°	38°44'	-60'	172°	3
4	43°41'	-60'	172°	42°41'	-60'	172°	41°42'	-60'	172°	40°42'	-60'	172°	39°43'	-60'	172°	38°44'	-60'	172°	37°44'	-60'	172°	4
5	42°41'	-60'	172°	41°42'	-60'	172°	40°42'	-60'	172°	39°43'	-60'	172°	38°43'	-60'	172°	37°44'	-60'	172°	36°44'	-60'	173°	5
6	41°41'	-60'	172°	40°42'	-60'	172°	39°42'	-60'	172°	38°43'	-60'	172°	37°44'	-60'	172°	36°44'	-60'	173°	35°45'	-60'	173°	6
7	40°42'	-60'	172°	39°42'	-60'	172°	38°43'	-60'	172°	37°43'	-60'	172°	36°44'	-60'	173°	35°44'	-60'	173°	34°45'	-60'	173°	7
8	39°42'	-60'	172°	38°42'	-60'	172°	37°43'	-60'	172°	36°44'	-60'	173°	35°44'	-60'	173°	34°44'	-60'	173°	33°45'	-60'	173°	8
9	38°42'	-60'	172°	37°43'	-60'	173°	36°43'	-60'	173°	35°44'	-60'	173°	34°44'	-60'	173°	33°45'	-60'	173°	32°45'	-60'	173°	9
10	37°43'	-60'	173°	36°43'	-60'	173°	35°44'	-60'	173°	34°44'	-60'	173°	33°44'	-60'	173°	32°45'	-60'	173°	31°45'	-60'	173°	10
11	36°43'	-60'	173°	35°43'	-60'	173°	34°44'	-60'	173°	33°44'	-60'	173°	32°45'	-60'	173°	31°45'	-60'	173°	30°46'	-60'	173°	11
12	35°43'	-60'	173°	34°44'	-60'	173°	33°44'	-60'	173°	32°44'	-60'	173°	31°45'	-60'	173°	30°45'	-60'	173°	29°46'	-60'	173°	12
13	34°43'	-60'	173°	33°44'	-60'	173°	32°44'	-60'	173°	31°45'	-60'	173°	30°45'	-60'	173°	29°46'	-60'	173°	28°46'	-60'	173°	13
14	33°44'	-60'	173°	32°44'	-60'	173°	31°45'	-60'	173°	30°45'	-60'	173°	29°45'	-60'	173°	28°46'	-60'	173°	27°46'	-60'	173°	14
15	32°44'	-60'	173°	31°44'	-60'	173°	30°45'	-60'	173°	29°45'	-60'	173°	28°46'	-60'	173°	27°46'	-60'	173°	26°46'	-60'	174°	15
16	31°44'	-60'	173°	30°45'	-60'	173°	29°45'	-60'	173°	28°45'	-60'	173°	27°46'	-60'	173°	26°46'	-60'	174°	25°47'	-60'	174°	16
17	30°44'	-60'	173°	29°45'	-60'	173°	28°45'	-60'	173°	27°46'	-60'	174°	26°46'	-60'	174°	25°46'	-60'	174°	24°47'	-60'	174°	17
18	29°45'	-60'	173°	28°45'	-60'	173°	27°45'	-60'	174°	26°46'	-60'	174°	25°46'	-60'	174°	24°47'	-60'	174°	23°47'	-60'	174°	18
19	28°45'	-60'	174°	27°45'	-60'	174°	26°46'	-60'	174°	25°46'	-60'	174°	24°46'	-60'	174°	23°47'	-60'	174°	22°47'	-60'	174°	19
20	27°45'	-60'	174°	26°45'	-60'	174°	25°46'	-60'	174°	24°46'	-60'	174°	23°47'	-60'	174°	22°47'	-60'	174°	21°47'	-60'	174°	20
21	26°45'	-60'	174°	25°46'	-60'	174°	24°46'	-60'	174°	23°46'	-60'	174°	22°47'	-60'	174°	21°47'	-60'	174°	20°47'	-60'	174°	21
22	25°46'	-60'	174°	24°46'	-60'	174°	23°46'	-60'	174°	22°47'	-60'	174°	21°47'	-60'	174°	20°47'	-60'	174°	19°48'	-60'	174°	22
23	24°46'	-60'	174°	23°46'	-60'	174°	22°46'	-60'	174°	21°47'	-60'	174°	20°47'	-60'	174°	19°47'	-60'	174°	18°48'	-60'	174°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

6° 354° LHA — Latitude CONTRARY to DECLINATION — 6° 354° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

5° 355° LHA — Latitude CONTRARY to Declination — 5° 355° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	47°46'	-60'	173°	46°46'	-60'	173°	45°46'	-60'	173°	44°47'	-60'	173°	43°47'	-60'	173°	42°48'	-60'	173°	41°48'	-60'	173°	0
1	46°46'	-60'	173°	45°46'	-60'	173°	44°47'	-60'	173°	43°47'	-60'	173°	42°48'	-60'	173°	41°48'	-60'	173°	40°48'	-60'	173°	1
2	45°46'	-60'	173°	44°47'	-60'	173°	43°47'	-60'	173°	42°47'	-60'	173°	41°48'	-60'	173°	40°48'	-60'	173°	39°49'	-60'	173°	2
3	44°46'	-60'	173°	43°47'	-60'	173°	42°47'	-60'	173°	41°48'	-60'	173°	40°48'	-60'	173°	39°48'	-60'	173°	38°49'	-60'	174°	3
4	43°47'	-60'	173°	42°47'	-60'	173°	41°47'	-60'	173°	40°48'	-60'	173°	39°48'	-60'	174°	38°49'	-60'	174°	37°49'	-60'	174°	4
5	42°47'	-60'	173°	41°47'	-60'	173°	40°48'	-60'	173°	39°48'	-60'	174°	38°48'	-60'	174°	37°49'	-60'	174°	36°49'	-60'	174°	5
6	41°47'	-60'	173°	40°47'	-60'	173°	39°48'	-60'	174°	38°48'	-60'	174°	37°49'	-60'	174°	36°49'	-60'	174°	35°49'	-60'	174°	6
7	40°47'	-60'	173°	39°48'	-60'	174°	38°48'	-60'	174°	37°48'	-60'	174°	36°49'	-60'	174°	35°49'	-60'	174°	34°49'	-60'	174°	7
8	39°47'	-60'	174°	38°48'	-60'	174°	37°48'	-60'	174°	36°49'	-60'	174°	35°49'	-60'	174°	34°49'	-60'	174°	33°50'	-60'	174°	8
9	38°48'	-60'	174°	37°48'	-60'	174°	36°48'	-60'	174°	35°49'	-60'	174°	34°49'	-60'	174°	33°49'	-60'	174°	32°50'	-60'	174°	9
10	37°48'	-60'	174°	36°48'	-60'	174°	35°49'	-60'	174°	34°49'	-60'	174°	33°49'	-60'	174°	32°50'	-60'	174°	31°50'	-60'	174°	10
11	36°48'	-60'	174°	35°48'	-60'	174°	34°49'	-60'	174°	33°49'	-60'	174°	32°49'	-60'	174°	31°50'	-60'	174°	30°50'	-60'	174°	11
12	35°48'	-60'	174°	34°49'	-60'	174°	33°49'	-60'	174°	32°49'	-60'	174°	31°50'	-60'	174°	30°50'	-60'	174°	29°50'	-60'	174°	12
13	34°48'	-60'	174°	33°49'	-60'	174°	32°49'	-60'	174°	31°49'	-60'	174°	30°50'	-60'	174°	29°50'	-60'	174°	28°50'	-60'	174°	13
14	33°49'	-60'	174°	32°49'	-60'	174°	31°49'	-60'	174°	30°50'	-60'	174°	29°50'	-60'	174°	28°50'	-60'	174°	27°50'	-60'	175°	14
15	32°49'	-60'	174°	31°49'	-60'	174°	30°49'	-60'	174°	29°50'	-60'	174°	28°50'	-60'	174°	27°50'	-60'	175°	26°51'	-60'	175°	15
16	31°49'	-60'	174°	30°49'	-60'	174°	29°50'	-60'	174°	28°50'	-60'	175°	27°50'	-60'	175°	26°50'	-60'	175°	25°51'	-60'	175°	16
17	30°49'	-60'	174°	29°49'	-60'	174°	28°50'	-60'	175°	27°50'	-60'	175°	26°50'	-60'	175°	25°51'	-60'	175°	24°51'	-60'	175°	17
18	29°49'	-60'	175°	28°50'	-60'	175°	27°50'	-60'	175°	26°50'	-60'	175°	25°50'	-60'	175°	24°51'	-60'	175°	23°51'	-60'	175°	18
19	28°49'	-60'	175°	27°50'	-60'	175°	26°50'	-60'	175°	25°50'	-60'	175°	24°51'	-60'	175°	23°51'	-60'	175°	22°51'	-60'	175°	19
20	27°50'	-60'	175°	26°50'	-60'	175°	25°50'	-60'	175°	24°50'	-60'	175°	23°51'	-60'	175°	22°51'	-60'	175°	21°51'	-60'	175°	20
21	26°50'	-60'	175°	25°50'	-60'	175°	24°50'	-60'	175°	23°51'	-60'	175°	22°51'	-60'	175°	21°51'	-60'	175°	20°51'	-60'	175°	21
22	25°50'	-60'	175°	24°50'	-60'	175°	23°50'	-60'	175°	22°51'	-60'	175°	21°51'	-60'	175°	20°51'	-60'	175°	19°51'	-60'	175°	22
23	24°50'	-60'	175°	23°50'	-60'	175°	22°51'	-60'	175°	21°51'	-60'	175°	20°51'	-60'	175°	19°51'	-60'	175°	18°51'	-60'	175°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

5° 355° LHA — Latitude CONTRARY to DECLINATION — 5° 355° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

4° 356° LHA — Latitude CONTRARY to Declination — 4° 356° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	47°51'	-60'	174°	46°51'	-60'	174°	45°51'	-60'	174°	44°52'	-60'	174°	43°52'	-60'	174°	42°52'	-60'	175°	41°52'	-60'	175°	0
1	46°51'	-60'	174°	45°51'	-60'	174°	44°51'	-60'	174°	43°52'	-60'	174°	42°52'	-60'	175°	41°52'	-60'	175°	40°53'	-60'	175°	1
2	45°51'	-60'	174°	44°51'	-60'	174°	43°52'	-60'	174°	42°52'	-60'	175°	41°52'	-60'	175°	40°52'	-60'	175°	39°53'	-60'	175°	2
3	44°51'	-60'	174°	43°52'	-60'	174°	42°52'	-60'	175°	41°52'	-60'	175°	40°52'	-60'	175°	39°53'	-60'	175°	38°53'	-60'	175°	3
4	43°51'	-60'	174°	42°52'	-60'	175°	41°52'	-60'	175°	40°52'	-60'	175°	39°52'	-60'	175°	38°53'	-60'	175°	37°53'	-60'	175°	4
5	42°52'	-60'	175°	41°52'	-60'	175°	40°52'	-60'	175°	39°52'	-60'	175°	38°53'	-60'	175°	37°53'	-60'	175°	36°53'	-60'	175°	5
6	41°52'	-60'	175°	40°52'	-60'	175°	39°52'	-60'	175°	38°52'	-60'	175°	37°53'	-60'	175°	36°53'	-60'	175°	35°53'	-60'	175°	6
7	40°52'	-60'	175°	39°52'	-60'	175°	38°52'	-60'	175°	37°53'	-60'	175°	36°53'	-60'	175°	35°53'	-60'	175°	34°53'	-60'	175°	7
8	39°52'	-60'	175°	38°52'	-60'	175°	37°52'	-60'	175°	36°53'	-60'	175°	35°53'	-60'	175°	34°53'	-60'	175°	33°53'	-60'	175°	8
9	38°52'	-60'	175°	37°52'	-60'	175°	36°53'	-60'	175°	35°53'	-60'	175°	34°53'	-60'	175°	33°53'	-60'	175°	32°53'	-60'	175°	9
10	37°52'	-60'	175°	36°52'	-60'	175°	35°53'	-60'	175°	34°53'	-60'	175°	33°53'	-60'	175°	32°53'	-60'	175°	31°53'	-60'	175°	10
11	36°52'	-60'	175°	35°53'	-60'	175°	34°53'	-60'	175°	33°53'	-60'	175°	32°53'	-60'	175°	31°53'	-60'	175°	30°54'	-60'	175°	11
12	35°52'	-60'	175°	34°53'	-60'	175°	33°53'	-60'	175°	32°53'	-60'	175°	31°53'	-60'	175°	30°53'	-60'	175°	29°54'	-60'	175°	12
13	34°53'	-60'	175°	33°53'	-60'	175°	32°53'	-60'	175°	31°53'	-60'	175°	30°53'	-60'	175°	29°54'	-60'	176°	28°54'	-60'	176°	13
14	33°53'	-60'	175°	32°53'	-60'	175°	31°53'	-60'	175°	30°53'	-60'	175°	29°53'	-60'	176°	28°54'	-60'	176°	27°54'	-60'	176°	14
15	32°53'	-60'	175°	31°53'	-60'	175°	30°53'	-60'	175°	29°53'	-60'	176°	28°54'	-60'	176°	27°54'	-60'	176°	26°54'	-60'	176°	15
16	31°53'	-60'	175°	30°53'	-60'	176°	29°53'	-60'	176°	28°53'	-60'	176°	27°54'	-60'	176°	26°54'	-60'	176°	25°54'	-60'	176°	16
17	30°53'	-60'	176°	29°53'	-60'	176°	28°53'	-60'	176°	27°54'	-60'	176°	26°54'	-60'	176°	25°54'	-60'	176°	24°54'	-60'	176°	17
18	29°53'	-60'	176°	28°53'	-60'	176°	27°54'	-60'	176°	26°54'	-60'	176°	25°54'	-60'	176°	24°54'	-60'	176°	23°54'	-60'	176°	18
19	28°53'	-60'	176°	27°53'	-60'	176°	26°54'	-60'	176°	25°54'	-60'	176°	24°54'	-60'	176°	23°54'	-60'	176°	22°54'	-60'	176°	19
20	27°53'	-60'	176°	26°54'	-60'	176°	25°54'	-60'	176°	24°54'	-60'	176°	23°54'	-60'	176°	22°54'	-60'	176°	21°54'	-60'	176°	20
21	26°53'	-60'	176°	25°54'	-60'	176°	24°54'	-60'	176°	23°54'	-60'	176°	22°54'	-60'	176°	21°54'	-60'	176°	20°54'	-60'	176°	21
22	25°54'	-60'	176°	24°54'	-60'	176°	23°54'	-60'	176°	22°54'	-60'	176°	21°54'	-60'	176°	20°54'	-60'	176°	19°54'	-60'	176°	22
23	24°54'	-60'	176°	23°54'	-60'	176°	22°54'	-60'	176°	21°54'	-60'	176°	20°54'	-60'	176°	19°54'	-60'	176°	18°55'	-60'	176°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

4° 356° LHA — Latitude CONTRARY to DECLINATION — 4° 356° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

3° 357° LHA — Latitude CONTRARY to Declination — 3° 357° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	47°55'	-60'	176°	46°55'	-60'	176°	45°55'	-60'	176°	44°55'	-60'	176°	43°55'	-60'	176°	42°56'	-60'	176°	41°56'	-60'	176°	0
1	46°55'	-60'	176°	45°55'	-60'	176°	44°55'	-60'	176°	43°55'	-60'	176°	42°56'	-60'	176°	41°56'	-60'	176°	40°56'	-60'	176°	1
2	45°55'	-60'	176°	44°55'	-60'	176°	43°55'	-60'	176°	42°55'	-60'	176°	41°56'	-60'	176°	40°56'	-60'	176°	39°56'	-60'	176°	2
3	44°55'	-60'	176°	43°55'	-60'	176°	42°55'	-60'	176°	41°56'	-60'	176°	40°56'	-60'	176°	39°56'	-60'	176°	38°56'	-60'	176°	3
4	43°55'	-60'	176°	42°55'	-60'	176°	41°55'	-60'	176°	40°56'	-60'	176°	39°56'	-60'	176°	38°56'	-60'	176°	37°56'	-60'	176°	4
5	42°55'	-60'	176°	41°55'	-60'	176°	40°56'	-60'	176°	39°56'	-60'	176°	38°56'	-60'	176°	37°56'	-60'	176°	36°56'	-60'	176°	5
6	41°55'	-60'	176°	40°55'	-60'	176°	39°56'	-60'	176°	38°56'	-60'	176°	37°56'	-60'	176°	36°56'	-60'	176°	35°56'	-60'	176°	6
7	40°55'	-60'	176°	39°56'	-60'	176°	38°56'	-60'	176°	37°56'	-60'	176°	36°56'	-60'	176°	35°56'	-60'	176°	34°56'	-60'	176°	7
8	39°55'	-60'	176°	38°56'	-60'	176°	37°56'	-60'	176°	36°56'	-60'	176°	35°56'	-60'	176°	34°56'	-60'	176°	33°56'	-60'	176°	8
9	38°56'	-60'	176°	37°56'	-60'	176°	36°56'	-60'	176°	35°56'	-60'	176°	34°56'	-60'	176°	33°56'	-60'	176°	32°56'	-60'	176°	9
10	37°56'	-60'	176°	36°56'	-60'	176°	35°56'	-60'	176°	34°56'	-60'	176°	33°56'	-60'	176°	32°56'	-60'	176°	31°56'	-60'	177°	10
11	36°56'	-60'	176°	35°56'	-60'	176°	34°56'	-60'	176°	33°56'	-60'	176°	32°56'	-60'	176°	31°56'	-60'	177°	30°56'	-60'	177°	11
12	35°56'	-60'	176°	34°56'	-60'	176°	33°56'	-60'	176°	32°56'	-60'	177°	31°56'	-60'	177°	30°56'	-60'	177°	29°56'	-60'	177°	12
13	34°56'	-60'	176°	33°56'	-60'	176°	32°56'	-60'	177°	31°56'	-60'	177°	30°56'	-60'	177°	29°56'	-60'	177°	28°56'	-60'	177°	13
14	33°56'	-60'	176°	32°56'	-60'	177°	31°56'	-60'	177°	30°56'	-60'	177°	29°56'	-60'	177°	28°56'	-60'	177°	27°57'	-60'	177°	14
15	32°56'	-60'	177°	31°56'	-60'	177°	30°56'	-60'	177°	29°56'	-60'	177°	28°56'	-60'	177°	27°56'	-60'	177°	26°57'	-60'	177°	15
16	31°56'	-60'	177°	30°56'	-60'	177°	29°56'	-60'	177°	28°56'	-60'	177°	27°56'	-60'	177°	26°57'	-60'	177°	25°57'	-60'	177°	16
17	30°56'	-60'	177°	29°56'	-60'	177°	28°56'	-60'	177°	27°56'	-60'	177°	26°56'	-60'	177°	25°57'	-60'	177°	24°57'	-60'	177°	17
18	29°56'	-60'	177°	28°56'	-60'	177°	27°56'	-60'	177°	26°56'	-60'	177°	25°57'	-60'	177°	24°57'	-60'	177°	23°57'	-60'	177°	18
19	28°56'	-60'	177°	27°56'	-60'	177°	26°56'	-60'	177°	25°56'	-60'	177°	24°57'	-60'	177°	23°57'	-60'	177°	22°57'	-60'	177°	19
20	27°56'	-60'	177°	26°56'	-60'	177°	25°56'	-60'	177°	24°57'	-60'	177°	23°57'	-60'	177°	22°57'	-60'	177°	21°57'	-60'	177°	20
21	26°56'	-60'	177°	25°56'	-60'	177°	24°57'	-60'	177°	23°57'	-60'	177°	22°57'	-60'	177°	21°57'	-60'	177°	20°57'	-60'	177°	21
22	25°56'	-60'	177°	24°56'	-60'	177°	23°57'	-60'	177°	22°57'	-60'	177°	21°57'	-60'	177°	20°57'	-60'	177°	19°57'	-60'	177°	22
23	24°56'	-60'	177°	23°57'	-60'	177°	22°57'	-60'	177°	21°57'	-60'	177°	20°57'	-60'	177°	19°57'	-60'	177°	18°57'	-60'	177°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

3° 357° LHA — Latitude CONTRARY to DECLINATION — 3° 357° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

2° 358° LHA — Latitude CONTRARY to Declination — 2° 358° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	47°58'	-60'	177°	46°58'	-60'	177°	45°58'	-60'	177°	44°58'	-60'	177°	43°58'	-60'	177°	42°58'	-60'	177°	41°58'	-60'	177°	0
1	46°58'	-60'	177°	45°58'	-60'	177°	44°58'	-60'	177°	43°58'	-60'	177°	42°58'	-60'	177°	41°58'	-60'	177°	40°58'	-60'	177°	1
2	45°58'	-60'	177°	44°58'	-60'	177°	43°58'	-60'	177°	42°58'	-60'	177°	41°58'	-60'	177°	40°58'	-60'	177°	39°58'	-60'	177°	2
3	44°58'	-60'	177°	43°58'	-60'	177°	42°58'	-60'	177°	41°58'	-60'	177°	40°58'	-60'	177°	39°58'	-60'	177°	38°58'	-60'	177°	3
4	43°58'	-60'	177°	42°58'	-60'	177°	41°58'	-60'	177°	40°58'	-60'	177°	39°58'	-60'	177°	38°58'	-60'	177°	37°58'	-60'	177°	4
5	42°58'	-60'	177°	41°58'	-60'	177°	40°58'	-60'	177°	39°58'	-60'	177°	38°58'	-60'	177°	37°58'	-60'	177°	36°58'	-60'	178°	5
6	41°58'	-60'	177°	40°58'	-60'	177°	39°58'	-60'	177°	38°58'	-60'	177°	37°58'	-60'	177°	36°58'	-60'	178°	35°58'	-60'	178°	6
7	40°58'	-60'	177°	39°58'	-60'	177°	38°58'	-60'	177°	37°58'	-60'	177°	36°58'	-60'	178°	35°58'	-60'	178°	34°58'	-60'	178°	7
8	39°58'	-60'	177°	38°58'	-60'	177°	37°58'	-60'	177°	36°58'	-60'	178°	35°58'	-60'	178°	34°58'	-60'	178°	33°58'	-60'	178°	8
9	38°58'	-60'	177°	37°58'	-60'	177°	36°58'	-60'	178°	35°58'	-60'	178°	34°58'	-60'	178°	33°58'	-60'	178°	32°58'	-60'	178°	9
10	37°58'	-60'	178°	36°58'	-60'	178°	35°58'	-60'	178°	34°58'	-60'	178°	33°58'	-60'	178°	32°58'	-60'	178°	31°58'	-60'	178°	10
11	36°58'	-60'	178°	35°58'	-60'	178°	34°58'	-60'	178°	33°58'	-60'	178°	32°58'	-60'	178°	31°58'	-60'	178°	30°58'	-60'	178°	11
12	35°58'	-60'	178°	34°58'	-60'	178°	33°58'	-60'	178°	32°58'	-60'	178°	31°58'	-60'	178°	30°58'	-60'	178°	29°58'	-60'	178°	12
13	34°58'	-60'	178°	33°58'	-60'	178°	32°58'	-60'	178°	31°58'	-60'	178°	30°58'	-60'	178°	29°58'	-60'	178°	28°58'	-60'	178°	13
14	33°58'	-60'	178°	32°58'	-60'	178°	31°58'	-60'	178°	30°58'	-60'	178°	29°58'	-60'	178°	28°58'	-60'	178°	27°58'	-60'	178°	14
15	32°58'	-60'	178°	31°58'	-60'	178°	30°58'	-60'	178°	29°58'	-60'	178°	28°58'	-60'	178°	27°58'	-60'	178°	26°58'	-60'	178°	15
16	31°58'	-60'	178°	30°58'	-60'	178°	29°58'	-60'	178°	28°58'	-60'	178°	27°58'	-60'	178°	26°58'	-60'	178°	25°59'	-60'	178°	16
17	30°58'	-60'	178°	29°58'	-60'	178°	28°58'	-60'	178°	27°58'	-60'	178°	26°58'	-60'	178°	25°58'	-60'	178°	24°59'	-60'	178°	17
18	29°58'	-60'	178°	28°58'	-60'	178°	27°58'	-60'	178°	26°58'	-60'	178°	25°58'	-60'	178°	24°59'	-60'	178°	23°59'	-60'	178°	18
19	28°58'	-60'	178°	27°58'	-60'	178°	26°58'	-60'	178°	25°58'	-60'	178°	24°58'	-60'	178°	23°59'	-60'	178°	22°59'	-60'	178°	19
20	27°58'	-60'	178°	26°58'	-60'	178°	25°58'	-60'	178°	24°58'	-60'	178°	23°59'	-60'	178°	22°59'	-60'	178°	21°59'	-60'	178°	20
21	26°58'	-60'	178°	25°58'	-60'	178°	24°58'	-60'	178°	23°58'	-60'	178°	22°59'	-60'	178°	21°59'	-60'	178°	20°59'	-60'	178°	21
22	25°58'	-60'	178°	24°58'	-60'	178°	23°58'	-60'	178°	22°59'	-60'	178°	21°59'	-60'	178°	20°59'	-60'	178°	19°59'	-60'	178°	22
23	24°58'	-60'	178°	23°58'	-60'	178°	22°58'	-60'	178°	21°59'	-60'	178°	20°59'	-60'	178°	19°59'	-60'	178°	18°59'	-60'	178°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

2° 358° LHA — Latitude CONTRARY to DECLINATION — 2° 358° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

1° 359° LHA — Latitude CONTRARY to Declination — 1° 359° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	47°59'	-60'	179°	46°59'	-60'	179°	45°59'	-60'	179°	44°59'	-60'	179°	43°59'	-60'	179°	43°00'	-60'	179°	42°00'	-60'	179°	0
1	46°59'	-60'	179°	45°59'	-60'	179°	44°59'	-60'	179°	43°59'	-60'	179°	43°00'	-60'	179°	42°00'	-60'	179°	41°00'	-60'	179°	1
2	45°59'	-60'	179°	44°59'	-60'	179°	43°59'	-60'	179°	42°59'	-60'	179°	42°00'	-60'	179°	41°00'	-60'	179°	40°00'	-60'	179°	2
3	44°59'	-60'	179°	43°59'	-60'	179°	42°59'	-60'	179°	42°00'	-60'	179°	41°00'	-60'	179°	40°00'	-60'	179°	39°00'	-60'	179°	3
4	43°59'	-60'	179°	42°59'	-60'	179°	41°59'	-60'	179°	41°00'	-60'	179°	40°00'	-60'	179°	39°00'	-60'	179°	38°00'	-60'	179°	4
5	42°59'	-60'	179°	41°59'	-60'	179°	41°00'	-60'	179°	40°00'	-60'	179°	39°00'	-60'	179°	38°00'	-60'	179°	37°00'	-60'	179°	5
6	41°59'	-60'	179°	40°59'	-60'	179°	40°00'	-60'	179°	39°00'	-60'	179°	38°00'	-60'	179°	37°00'	-60'	179°	36°00'	-60'	179°	6
7	40°59'	-60'	179°	40°00'	-60'	179°	39°00'	-60'	179°	38°00'	-60'	179°	37°00'	-60'	179°	36°00'	-60'	179°	35°00'	-60'	179°	7
8	39°59'	-60'	179°	39°00'	-60'	179°	38°00'	-60'	179°	37°00'	-60'	179°	36°00'	-60'	179°	35°00'	-60'	179°	34°00'	-60'	179°	8
9	39°00'	-60'	179°	38°00'	-60'	179°	37°00'	-60'	179°	36°00'	-60'	179°	35°00'	-60'	179°	34°00'	-60'	179°	33°00'	-60'	179°	9
10	38°00'	-60'	179°	37°00'	-60'	179°	36°00'	-60'	179°	35°00'	-60'	179°	34°00'	-60'	179°	33°00'	-60'	179°	32°00'	-60'	179°	10
11	37°00'	-60'	179°	36°00'	-60'	179°	35°00'	-60'	179°	34°00'	-60'	179°	33°00'	-60'	179°	32°00'	-60'	179°	31°00'	-60'	179°	11
12	36°00'	-60'	179°	35°00'	-60'	179°	34°00'	-60'	179°	33°00'	-60'	179°	32°00'	-60'	179°	31°00'	-60'	179°	30°00'	-60'	179°	12
13	35°00'	-60'	179°	34°00'	-60'	179°	33°00'	-60'	179°	32°00'	-60'	179°	31°00'	-60'	179°	30°00'	-60'	179°	29°00'	-60'	179°	13
14	34°00'	-60'	179°	33°00'	-60'	179°	32°00'	-60'	179°	31°00'	-60'	179°	30°00'	-60'	179°	29°00'	-60'	179°	28°00'	-60'	179°	14
15	33°00'	-60'	179°	32°00'	-60'	179°	31°00'	-60'	179°	30°00'	-60'	179°	29°00'	-60'	179°	28°00'	-60'	179°	27°00'	-60'	179°	15
16	32°00'	-60'	179°	31°00'	-60'	179°	30°00'	-60'	179°	29°00'	-60'	179°	28°00'	-60'	179°	27°00'	-60'	179°	26°00'	-60'	179°	16
17	31°00'	-60'	179°	30°00'	-60'	179°	29°00'	-60'	179°	28°00'	-60'	179°	27°00'	-60'	179°	26°00'	-60'	179°	25°00'	-60'	179°	17
18	30°00'	-60'	179°	29°00'	-60'	179°	28°00'	-60'	179°	27°00'	-60'	179°	26°00'	-60'	179°	25°00'	-60'	179°	24°00'	-60'	179°	18
19	29°00'	-60'	179°	28°00'	-60'	179°	27°00'	-60'	179°	26°00'	-60'	179°	25°00'	-60'	179°	24°00'	-60'	179°	23°00'	-60'	179°	19
20	28°00'	-60'	179°	27°00'	-60'	179°	26°00'	-60'	179°	25°00'	-60'	179°	24°00'	-60'	179°	23°00'	-60'	179°	22°00'	-60'	179°	20
21	27°00'	-60'	179°	26°00'	-60'	179°	25°00'	-60'	179°	24°00'	-60'	179°	23°00'	-60'	179°	22°00'	-60'	179°	21°00'	-60'	179°	21
22	26°00'	-60'	179°	25°00'	-60'	179°	24°00'	-60'	179°	23°00'	-60'	179°	22°00'	-60'	179°	21°00'	-60'	179°	20°00'	-60'	179°	22
23	25°00'	-60'	179°	24°00'	-60'	179°	23°00'	-60'	179°	22°00'	-60'	179°	21°00'	-60'	179°	20°00'	-60'	179°	19°00'	-60'	179°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

1° 359° LHA — Latitude CONTRARY to DECLINATION — 1° 359° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . Zn = Z LHA < 180° . . Zn= 360-Z

0° 360° LHA — Latitude CONTRARY to Declination — 0° 360° LHA

	42			43			44			45			46			47			48			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	48°00'	-60'	180°	47°00'	-60'	180°	46°00'	-60'	180°	45°00'	-60'	180°	44°00'	-60'	180°	43°00'	-60'	180°	42°00'	-60'	180°	0
1	47°00'	-60'	180°	46°00'	-60'	180°	45°00'	-60'	180°	44°00'	-60'	180°	43°00'	-60'	180°	42°00'	-60'	180°	41°00'	-60'	180°	1
2	46°00'	-60'	180°	45°00'	-60'	180°	44°00'	-60'	180°	43°00'	-60'	180°	42°00'	-60'	180°	41°00'	-60'	180°	40°00'	-60'	180°	2
3	45°00'	-60'	180°	44°00'	-60'	180°	43°00'	-60'	180°	42°00'	-60'	180°	41°00'	-60'	180°	40°00'	-60'	180°	39°00'	-60'	180°	3
4	44°00'	-60'	180°	43°00'	-60'	180°	42°00'	-60'	180°	41°00'	-60'	180°	40°00'	-60'	180°	39°00'	-60'	180°	38°00'	-60'	180°	4
5	43°00'	-60'	180°	42°00'	-60'	180°	41°00'	-60'	180°	40°00'	-60'	180°	39°00'	-60'	180°	38°00'	-60'	180°	37°00'	-60'	180°	5
6	42°00'	-60'	180°	41°00'	-60'	180°	40°00'	-60'	180°	39°00'	-60'	180°	38°00'	-60'	180°	37°00'	-60'	180°	36°00'	-60'	180°	6
7	41°00'	-60'	180°	40°00'	-60'	180°	39°00'	-60'	180°	38°00'	-60'	180°	37°00'	-60'	180°	36°00'	-60'	180°	35°00'	-60'	180°	7
8	40°00'	-60'	180°	39°00'	-60'	180°	38°00'	-60'	180°	37°00'	-60'	180°	36°00'	-60'	180°	35°00'	-60'	180°	34°00'	-60'	180°	8
9	39°00'	-60'	180°	38°00'	-60'	180°	37°00'	-60'	180°	36°00'	-60'	180°	35°00'	-60'	180°	34°00'	-60'	180°	33°00'	-60'	180°	9
10	38°00'	-60'	180°	37°00'	-60'	180°	36°00'	-60'	180°	35°00'	-60'	180°	34°00'	-60'	180°	33°00'	-60'	180°	32°00'	-60'	180°	10
11	37°00'	-60'	180°	36°00'	-60'	180°	35°00'	-60'	180°	34°00'	-60'	180°	33°00'	-60'	180°	32°00'	-60'	180°	31°00'	-60'	180°	11
12	36°00'	-60'	180°	35°00'	-60'	180°	34°00'	-60'	180°	33°00'	-60'	180°	32°00'	-60'	180°	31°00'	-60'	180°	30°00'	-60'	180°	12
13	35°00'	-60'	180°	34°00'	-60'	180°	33°00'	-60'	180°	32°00'	-60'	180°	31°00'	-60'	180°	30°00'	-60'	180°	29°00'	-60'	180°	13
14	34°00'	-60'	180°	33°00'	-60'	180°	32°00'	-60'	180°	31°00'	-60'	180°	30°00'	-60'	180°	29°00'	-60'	180°	28°00'	-60'	180°	14
15	33°00'	-60'	180°	32°00'	-60'	180°	31°00'	-60'	180°	30°00'	-60'	180°	29°00'	-60'	180°	28°00'	-60'	180°	27°00'	-60'	180°	15
16	32°00'	-60'	180°	31°00'	-60'	180°	30°00'	-60'	180°	29°00'	-60'	180°	28°00'	-60'	180°	27°00'	-60'	180°	26°00'	-60'	180°	16
17	31°00'	-60'	180°	30°00'	-60'	180°	29°00'	-60'	180°	28°00'	-60'	180°	27°00'	-60'	180°	26°00'	-60'	180°	25°00'	-60'	180°	17
18	30°00'	-60'	180°	29°00'	-60'	180°	28°00'	-60'	180°	27°00'	-60'	180°	26°00'	-60'	180°	25°00'	-60'	180°	24°00'	-60'	180°	18
19	29°00'	-60'	180°	28°00'	-60'	180°	27°00'	-60'	180°	26°00'	-60'	180°	25°00'	-60'	180°	24°00'	-60'	180°	23°00'	-60'	180°	19
20	28°00'	-60'	180°	27°00'	-60'	180°	26°00'	-60'	180°	25°00'	-60'	180°	24°00'	-60'	180°	23°00'	-60'	180°	22°00'	-60'	180°	20
21	27°00'	-60'	180°	26°00'	-60'	180°	25°00'	-60'	180°	24°00'	-60'	180°	23°00'	-60'	180°	22°00'	-60'	180°	21°00'	-60'	180°	21
22	26°00'	-60'	180°	25°00'	-60'	180°	24°00'	-60'	180°	23°00'	-60'	180°	22°00'	-60'	180°	21°00'	-60'	180°	20°00'	-60'	180°	22
23	25°00'	-60'	180°	24°00'	-60'	180°	23°00'	-60'	180°	22°00'	-60'	180°	21°00'	-60'	180°	20°00'	-60'	180°	19°00'	-60'	180°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	42			43			44			45			46			47			48			

0° 360° LHA — Latitude CONTRARY to DECLINATION — 0° 360° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

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