Integer

Sight Reduction Tables

Latitude 28° to 34°

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

	28			29			30			31			32			33			34			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	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°	0
1	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°	1
2	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°	2
3	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°	3
4	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°	4
5	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°	5
6	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°	6
7	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°	7
8	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°	8
9	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°	9
10	72°00'	+60'	180°	71°00'	+60'	180°	70°00'	+60'	180°	69°00'	+60'	180°	68°00'	+60'	180°	67°00'	+60'	180°	66°00'	+60'	180°	10
11	73°00'	+60'	180°	72°00'	+60'	180°	71°00'	+60'	180°	70°00'	+60'	180°	69°00'	+60'	180°	68°00'	+60'	180°	67°00'	+60'	180°	11
12	74°00'	+60'	180°	73°00'	+60'	180°	72°00'	+60'	180°	71°00'	+60'	180°	70°00'	+60'	180°	69°00'	+60'	180°	68°00'	+60'	180°	12
13	75°00'	+60'	180°	74°00'	+60'	180°	73°00'	+60'	180°	72°00'	+60'	180°	71°00'	+60'	180°	70°00'	+60'	180°	69°00'	+60'	180°	13
14	76°00'	+60'	180°	75°00'	+60'	180°	74°00'	+60'	180°	73°00'	+60'	180°	72°00'	+60'	180°	71°00'	+60'	180°	70°00'	+60'	180°	14
15	77°00'	+60'	180°	76°00'	+60'	180°	75°00'	+60'	180°	74°00'	+60'	180°	73°00'	+60'	180°	72°00'	+60'	180°	71°00'	+60'	180°	15
16	78°00'	+60'	180°	77°00'	+60'	180°	76°00'	+60'	180°	75°00'	+60'	180°	74°00'	+60'	180°	73°00'	+60'	180°	72°00'	+60'	180°	16
17	79°00'	+60'	180°	78°00'	+60'	180°	77°00'	+60'	180°	76°00'	+60'	180°	75°00'	+60'	180°	74°00'	+60'	180°	73°00'	+60'	180°	17
18	80°00'	+60'	180°	79°00'	+60'	180°	78°00'	+60'	180°	77°00'	+60'	180°	76°00'	+60'	180°	75°00'	+60'	180°	74°00'	+60'	180°	18
19	81°00'	+60'	180°	80°00'	+60'	180°	79°00'	+60'	180°	78°00'	+60'	180°	77°00'	+60'	180°	76°00'	+60'	180°	75°00'	+60'	180°	19
20	82°00'	+60'	180°	81°00'	+60'	180°	80°00'	+60'	180°	79°00'	+60'	180°	78°00'	+60'	180°	77°00'	+60'	180°	76°00'	+60'	180°	20
21	83°00'	+60'	180°	82°00'	+60'	180°	81°00'	+60'	180°	80°00'	+60'	180°	79°00'	+60'	180°	78°00'	+60'	180°	77°00'	+60'	180°	21
22	84°00'	+60'	180°	83°00'	+60'	180°	82°00'	+60'	180°	81°00'	+60'	180°	80°00'	+60'	180°	79°00'	+60'	180°	78°00'	+60'	180°	22
23	85°00'	+60'	180°	84°00'	+60'	180°	83°00'	+60'	180°	82°00'	+60'	180°	81°00'	+60'	180°	80°00'	+60'	180°	79°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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	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°	0
1	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°	1
2	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°	2
3	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°	3
4	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°	4
5	66°59'	+60'	177°	65°59'	+60'	178°	64°59'	+60'	178°	63°59'	+60'	178°	62°59'	+60'	178°	61°59'	+60'	178°	60°59'	+60'	178°	5
6	67°59'	+60'	177°	66°59'	+60'	177°	65°59'	+60'	178°	64°59'	+60'	178°	63°59'	+60'	178°	62°59'	+60'	178°	61°59'	+60'	178°	6
7	68°59'	+60'	177°	67°59'	+60'	177°	66°59'	+60'	177°	65°59'	+60'	178°	64°59'	+60'	178°	63°59'	+60'	178°	62°59'	+60'	178°	7
8	69°59'	+60'	177°	68°59'	+60'	177°	67°59'	+60'	177°	66°59'	+60'	177°	65°59'	+60'	178°	64°59'	+60'	178°	63°59'	+60'	178°	8
9	70°59'	+60'	177°	69°59'	+60'	177°	68°59'	+60'	177°	67°59'	+60'	177°	66°59'	+60'	177°	65°59'	+60'	178°	64°59'	+60'	178°	9
10	71°59'	+60'	177°	70°59'	+60'	177°	69°59'	+60'	177°	68°59'	+60'	177°	67°59'	+60'	177°	66°59'	+60'	177°	65°59'	+60'	178°	10
11	72°58'	+60'	177°	71°59'	+60'	177°	70°59'	+60'	177°	69°59'	+60'	177°	68°59'	+60'	177°	67°59'	+60'	177°	66°59'	+60'	177°	11
12	73°58'	+60'	176°	72°58'	+60'	177°	71°59'	+60'	177°	70°59'	+60'	177°	69°59'	+60'	177°	68°59'	+60'	177°	67°59'	+60'	177°	12
13	74°58'	+60'	176°	73°58'	+60'	176°	72°58'	+60'	177°	71°59'	+60'	177°	70°59'	+60'	177°	69°59'	+60'	177°	68°59'	+60'	177°	13
14	75°58'	+60'	176°	74°58'	+60'	176°	73°58'	+60'	176°	72°59'	+60'	177°	71°59'	+60'	177°	70°59'	+60'	177°	69°59'	+60'	177°	14
15	76°58'	+60'	176°	75°58'	+60'	176°	74°58'	+60'	176°	73°58'	+60'	177°	72°59'	+60'	177°	71°59'	+60'	177°	70°59'	+60'	177°	15
16	77°58'	+60'	175°	76°58'	+60'	176°	75°58'	+60'	176°	74°58'	+60'	176°	73°58'	+60'	177°	72°59'	+60'	177°	71°59'	+60'	177°	16
17	78°58'	+60'	175°	77°58'	+60'	175°	76°58'	+60'	176°	75°58'	+60'	176°	74°58'	+60'	176°	73°58'	+60'	177°	72°59'	+60'	177°	17
18	79°57'	+60'	175°	78°58'	+60'	175°	77°58'	+60'	175°	76°58'	+60'	176°	75°58'	+60'	176°	74°58'	+60'	176°	73°59'	+60'	177°	18
19	80°57'	+60'	174°	79°58'	+60'	175°	78°58'	+60'	175°	77°58'	+60'	175°	76°58'	+60'	176°	75°58'	+60'	176°	74°58'	+60'	176°	19
20	81°57'	+60'	173°	80°57'	+60'	174°	79°58'	+60'	175°	78°58'	+60'	175°	77°58'	+60'	175°	76°58'	+60'	176°	75°58'	+60'	176°	20
21	82°56'	+59'	172°	81°57'	+60'	173°	80°57'	+60'	174°	79°58'	+60'	175°	78°58'	+60'	175°	77°58'	+60'	176°	76°58'	+60'	176°	21
22	83°56'	+59'	171°	82°57'	+59'	172°	81°57'	+60'	173°	80°57'	+60'	174°	79°58'	+60'	175°	78°58'	+60'	175°	77°58'	+60'	176°	22
23	84°55'	+59'	170°	83°56'	+59'	171°	82°57'	+59'	172°	81°57'	+60'	173°	80°57'	+60'	174°	79°58'	+60'	175°	78°58'	+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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	61°56'	+60'	176°	60°56'	+60'	176°	59°56'	+60'	176°	58°57'	+60'	176°	57°57'	+60'	176°	56°57'	+60'	176°	55°57'	+60'	176°	0
1	62°56'	+60'	176°	61°56'	+60'	176°	60°56'	+60'	176°	59°56'	+60'	176°	58°57'	+60'	176°	57°57'	+60'	176°	56°57'	+60'	176°	1
2	63°56'	+60'	175°	62°56'	+60'	176°	61°56'	+60'	176°	60°56'	+60'	176°	59°56'	+60'	176°	58°57'	+60'	176°	57°57'	+60'	176°	2
3	64°56'	+60'	175°	63°56'	+60'	175°	62°56'	+60'	176°	61°56'	+60'	176°	60°56'	+60'	176°	59°56'	+60'	176°	58°57'	+60'	176°	3
4	65°55'	+60'	175°	64°56'	+60'	175°	63°56'	+60'	175°	62°56'	+60'	176°	61°56'	+60'	176°	60°56'	+60'	176°	59°57'	+60'	176°	4
5	66°55'	+63'	175°	65°56'	+63'	175°	64°56'	+63'	175°	63°56'	+63'	175°	62°56'	+63'	176°	61°56'	+63'	176°	60°56'	+63'	176°	5
6	67°59'	+60'	177°	66°59'	+60'	177°	65°59'	+60'	178°	64°59'	+60'	178°	63°59'	+60'	178°	62°59'	+60'	178°	61°59'	+60'	178°	6
7	68°59'	+60'	177°	67°59'	+60'	177°	66°59'	+60'	177°	65°59'	+60'	178°	64°59'	+60'	178°	63°59'	+60'	178°	62°59'	+60'	178°	7
8	69°59'	+60'	177°	68°59'	+60'	177°	67°59'	+60'	177°	66°59'	+60'	177°	65°59'	+60'	178°	64°59'	+60'	178°	63°59'	+60'	178°	8
9	70°59'	+60'	177°	69°59'	+60'	177°	68°59'	+60'	177°	67°59'	+60'	177°	66°59'	+60'	177°	65°59'	+60'	178°	64°59'	+60'	178°	9
10	71°59'	+60'	177°	70°59'	+60'	177°	69°59'	+60'	177°	68°59'	+60'	177°	67°59'	+60'	177°	66°59'	+60'	177°	65°59'	+60'	178°	10
11	72°58'	+60'	177°	71°59'	+60'	177°	70°59'	+60'	177°	69°59'	+60'	177°	68°59'	+60'	177°	67°59'	+60'	177°	66°59'	+60'	177°	11
12	73°58'	+60'	176°	72°58'	+60'	177°	71°59'	+60'	177°	70°59'	+60'	177°	69°59'	+60'	177°	68°59'	+60'	177°	67°59'	+60'	177°	12
13	74°58'	+60'	176°	73°58'	+60'	176°	72°59'	+60'	177°	71°59'	+60'	177°	70°59'	+60'	177°	69°59'	+60'	177°	68°59'	+60'	177°	13
14	75°58'	+60'	176°	74°58'	+60'	176°	73°58'	+60'	176°	72°59'	+60'	177°	71°59'	+60'	177°	70°59'	+60'	177°	69°59'	+60'	177°	14
15	76°58'	+60'	176°	75°58'	+60'	176°	74°58'	+60'	176°	73°58'	+60'	177°	72°59'	+60'	177°	71°59'	+60'	177°	70°59'	+60'	177°	15
16	77°58'	+60'	175°	76°58'	+60'	176°	75°58'	+60'	176°	74°58'	+60'	176°	73°58'	+60'	177°	72°59'	+60'	177°	71°59'	+60'	177°	16
17	78°58'	+60'	175°	77°58'	+60'	175°	76°58'	+60'	176°	75°58'	+60'	176°	74°58'	+60'	176°	73°58'	+60'	177°	72°59'	+60'	177°	17
18	79°57'	+60'	175°	78°58'	+60'	175°	77°58'	+60'	175°	76°58'	+60'	176°	75°58'	+60'	176°	74°58'	+60'	176°	73°59'	+60'	177°	18
19	80°57'	+60'	174°	79°58'	+60'	175°	78°58'	+60'	175°	77°58'	+60'	175°	76°58'	+60'	176°	75°58'	+60'	176°	74°58'	+60'	176°	19
20	81°57'	+60'	173°	80°57'	+60'	174°	79°58'	+60'	175°	78°58'	+60'	175°	77°58'	+60'	176°	76°58'	+60'	176°	75°58'	+60'	176°	20
21	82°57'	+59'	172°	81°57'	+60'	173°	80°57'	+60'	174°	79°58'	+60'	175°	78°58'	+60'	175°	77°58'	+60'	176°	76°58'	+60'	176°	21
22	83°56'	+59'	171°	82°57'	+59'	172°	81°57'	+60'	173°	80°57'	+60'	174°	79°58'	+60'	175°	78°58'	+60'	175°	77°58'	+60'	176°	22
23	84°55'	+59'	170°	83°56'	+59'	171°	82°57'	+59'	173°	81°57'	+60'	173°	80°57'	+60'	174°	79°58'	+60'	175°	78°58'	+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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	61°51'	+60'	174°	60°52'	+60'	174°	59°52'	+60'	174°	58°52'	+60'	174°	57°52'	+60'	174°	56°53'	+60'	175°	55°53'	+60'	175°	0
1	62°51'	+60'	173°	61°51'	+60'	174°	60°52'	+60'	174°	59°52'	+60'	174°	58°52'	+60'	174°	57°53'	+60'	174°	56°53'	+60'	175°	1
2	63°51'	+60'	173°	62°51'	+60'	173°	61°51'	+60'	174°	60°52'	+60'	174°	59°52'	+60'	174°	58°52'	+60'	174°	57°53'	+60'	174°	2
3	64°50'	+60'	173°	63°51'	+60'	173°	62°51'	+60'	173°	61°51'	+60'	174°	60°52'	+60'	174°	59°52'	+60'	174°	58°52'	+60'	174°	3
4	65°50'	+60'	173°	64°50'	+60'	173°	63°51'	+60'	173°	62°51'	+60'	173°	61°52'	+60'	174°	60°52'	+60'	174°	59°52'	+60'	174°	4
5	66°49'	+60'	172°	65°50'	+60'	173°	64°50'	+60'	173°	63°51'	+60'	173°	62°51'	+60'	173°	61°52'	+60'	174°	60°52'	+60'	174°	5
6	67°49'	+60'	172°	66°50'	+60'	172°	65°50'	+60'	173°	64°51'	+60'	173°	63°51'	+60'	173°	62°51'	+60'	173°	61°52'	+60'	174°	6
7	68°49'	+59'	172°	67°49'	+60'	172°	66°50'	+60'	172°	65°50'	+60'	173°	64°51'	+60'	173°	63°51'	+60'	173°	62°51'	+60'	173°	7
8	69°48'	+59'	171°	68°49'	+59'	172°	67°49'	+60'	172°	66°50'	+60'	172°	65°50'	+60'	173°	64°51'	+60'	173°	63°51'	+60'	173°	8
9	70°47'	+59'	171°	69°48'	+59'	171°	68°49'	+60'	172°	67°49'	+60'	172°	66°50'	+60'	172°	65°50'	+60'	173°	64°51'	+60'	173°	9
10	71°47'	+59'	171°	70°48'	+59'	171°	69°48'	+59'	171°	68°49'	+60'	172°	67°50'	+60'	172°	66°50'	+60'	172°	65°51'	+60'	173°	10
11	72°46'	+59'	170°	71°47'	+59'	171°	70°48'	+59'	171°	69°48'	+59'	171°	68°49'	+60'	172°	67°50'	+60'	172°	66°50'	+60'	172°	11
12	73°45'	+59'	169°	72°46'	+59'	170°	71°47'	+59'	171°	70°48'	+59'	171°	69°49'	+59'	171°	68°49'	+60'	172°	67°50'	+60'	172°	12
13	74°44'	+59'	169°	73°46'	+59'	169°	72°46'	+59'	170°	71°47'	+59'	171°	70°48'	+59'	171°	69°49'	+59'	172°	68°49'	+60'	172°	13
14	75°43'	+59'	168°	74°45'	+59'	169°	73°46'	+59'	170°	72°47'	+59'	170°	71°48'	+59'	171°	70°48'	+59'	171°	69°49'	+60'	172°	14
15	76°42'	+59'	167°	75°44'	+59'	168°	74°45'	+59'	169°	73°46'	+59'	170°	72°47'	+59'	170°	71°48'	+59'	171°	70°48'	+59'	171°	15
16	77°41'	+58'	166°	76°43'	+59'	167°	75°44'	+59'	168°	74°45'	+59'	169°	73°46'	+59'	170°	72°47'	+59'	170°	71°48'	+59'	171°	16
17	78°39'	+58'	165°	77°41'	+58'	166°	76°43'	+59'	167°	75°44'	+59'	168°	74°45'	+59'	169°	73°46'	+59'	170°	72°47'	+59'	170°	17
18	79°38'	+58'	164°	78°40'	+58'	165°	77°42'	+59'	166°	76°43'	+59'	167°	75°44'	+59'	168°	74°46'	+59'	169°	73°47'	+59'	170°	18
19	80°35'	+57'	162°	79°38'	+58'	164°	78°40'	+58'	165°	77°42'	+59'	167°	76°43'	+59'	168°	75°45'	+59'	168°	74°46'	+59'	169°	19
20	81°33'	+57'	160°	80°36'	+57'	162°	79°38'	+58'	164°	78°40'	+58'	165°	77°42'	+59'	167°	76°44'	+59'	168°	75°45'	+59'	168°	20
21	82°29'	+56'	158°	81°33'	+57'	161°	80°36'	+57'	163°	79°39'	+58'	164°	78°41'	+58'	166°	77°42'	+59'	167°	76°44'	+59'	168°	21
22	83°25'	+54'	155°	82°30'	+56'	158°	81°34'	+57'	161°	80°37'	+57'	163°	79°39'	+58'	164°	78°41'	+58'	166°	77°43'	+59'	167°	22
23	84°19'	+52'	151°	83°25'	+54'	155°	82°30'	+56'	158°	81°34'	+57'	161°	80°37'	+57'	163°	79°39'	+58'	164°	78°41'	+58'	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°
	28			29			30			31			32			33			34			

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°	28			29			30			31			32			33			34			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	61°44'	+59'	172°	60°45'	+60'	172°	59°46'	+60'	172°	58°46'	+60'	172°	57°47'	+60'	172°	56°47'	+60'	173°	55°48'	+60'	173°	0
1	62°44'	+59'	171°	61°44'	+59'	172°	60°45'	+60'	172°	59°46'	+60'	172°	58°46'	+60'	172°	57°47'	+60'	172°	56°47'	+60'	173°	1
2	63°43'	+59'	171°	62°44'	+59'	171°	61°45'	+59'	172°	60°45'	+60'	172°	59°46'	+60'	172°	58°46'	+60'	172°	57°47'	+60'	172°	2
3	64°43'	+59'	171°	63°43'	+59'	171°	62°44'	+59'	171°	61°45'	+60'	172°	60°45'	+60'	172°	59°46'	+60'	172°	58°47'	+60'	172°	3
4	65°42'	+59'	170°	64°43'	+59'	171°	63°44'	+59'	171°	62°44'	+59'	171°	61°45'	+60'	172°	60°46'	+60'	172°	59°46'	+60'	172°	4
5	66°41'	+59'	170°	65°42'	+59'	170°	64°43'	+59'	171°	63°44'	+59'	171°	62°44'	+59'	171°	61°45'	+60'	172°	60°46'	+60'	172°	5
6	67°41'	+59'	169°	66°41'	+59'	170°	65°42'	+59'	170°	64°43'	+59'	171°	63°44'	+59'	171°	62°45'	+59'	171°	61°45'	+60'	172°	6
7	68°40'	+59'	169°	67°41'	+59'	169°	66°42'	+59'	170°	65°43'	+59'	170°	64°43'	+59'	171°	63°44'	+59'	171°	62°45'	+60'	171°	7
8	69°39'	+59'	169°	68°40'	+59'	169°	67°41'	+59'	170°	66°42'	+59'	170°	65°43'	+59'	170°	64°44'	+59'	171°	63°44'	+59'	171°	8
9	70°38'	+59'	168°	69°39'	+59'	169°	68°40'	+59'	169°	67°41'	+59'	170°	66°42'	+59'	170°	65°43'	+59'	170°	64°44'	+59'	171°	9
10	71°37'	+59'	167°	70°38'	+59'	168°	69°39'	+59'	169°	68°40'	+59'	169°	67°41'	+59'	170°	66°42'	+59'	170°	65°43'	+59'	170°	10
11	72°35'	+59'	167°	71°37'	+59'	167°	70°38'	+59'	168°	69°40'	+59'	169°	68°41'	+59'	169°	67°42'	+59'	170°	66°43'	+59'	170°	11
12	73°34'	+58'	166°	72°36'	+59'	167°	71°37'	+59'	168°	70°39'	+59'	168°	69°40'	+59'	169°	68°41'	+59'	169°	67°42'	+59'	170°	12
13	74°33'	+58'	165°	73°34'	+58'	166°	72°36'	+59'	167°	71°38'	+59'	168°	70°39'	+59'	168°	69°40'	+59'	169°	68°41'	+59'	169°	13
14	75°31'	+58'	164°	74°33'	+58'	165°	73°35'	+59'	166°	72°36'	+59'	167°	71°38'	+59'	168°	70°39'	+59'	168°	69°40'	+59'	169°	14
15	76°29'	+58'	163°	75°31'	+58'	164°	74°33'	+58'	165°	73°35'	+59'	166°	72°37'	+59'	167°	71°38'	+59'	168°	70°40'	+59'	168°	15
16	77°27'	+57'	162°	76°29'	+58'	163°	75°32'	+58'	164°	74°34'	+58'	165°	73°36'	+59'	166°	72°37'	+59'	167°	71°39'	+59'	168°	16
17	78°24'	+57'	161°	77°27'	+57'	162°	76°30'	+58'	163°	75°32'	+58'	165°	74°34'	+58'	165°	73°36'	+59'	166°	72°38'	+59'	167°	17
18	79°21'	+56'	159°	78°24'	+57'	161°	77°28'	+57'	162°	76°30'	+58'	163°	75°33'	+58'	165°	74°35'	+58'	166°	73°36'	+59'	166°	18
19	80°17'	+55'	157°	79°21'	+56'	159°	78°25'	+57'	161°	77°28'	+57'	162°	76°31'	+58'	164°	75°33'	+58'	165°	74°35'	+58'	166°	19
20	81°12'	+54'	155°	80°18'	+55'	157°	79°22'	+56'	159°	78°26'	+57'	161°	77°29'	+58'	162°	76°31'	+58'	164°	75°33'	+58'	165°	20
21	82°07'	+53'	152°	81°13'	+54'	155°	80°18'	+56'	157°	79°23'	+56'	159°	78°26'	+57'	161°	77°29'	+58'	163°	76°32'	+58'	164°	21
22	82°59'	+51'	148°	82°08'	+53'	152°	81°14'	+54'	155°	80°19'	+56'	157°	79°23'	+57'	159°	78°27'	+57'	161°	77°30'	+58'	163°	22
23	83°50'	+47'	143°	83°00'	+51'	148°	82°08'	+53'	152°	81°15'	+55'	155°	80°20'	+56'	158°	79°24'	+57'	160°	78°27'	+57'	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°
	28			29			30			31			32			33			34			

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°	28			29			30			31			32			33			34			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	61°36'	+59'	169°	60°37'	+59'	170°	59°37'	+59'	170°	58°38'	+59'	170°	57°39'	+59'	171°	56°40'	+59'	171°	55°41'	+59'	171°	0
1	62°35'	+59'	169°	61°36'	+59'	169°	60°37'	+59'	170°	59°38'	+59'	170°	58°39'	+59'	170°	57°39'	+59'	171°	56°40'	+59'	171°	1
2	63°34'	+59'	169°	62°35'	+59'	169°	61°36'	+59'	169°	60°37'	+59'	170°	59°38'	+59'	170°	58°39'	+59'	170°	57°40'	+59'	171°	2
3	64°33'	+59'	168°	63°34'	+59'	169°	62°35'	+59'	169°	61°36'	+59'	169°	60°37'	+59'	170°	59°38'	+59'	170°	58°39'	+59'	170°	3
4	65°32'	+59'	168°	64°33'	+59'	168°	63°34'	+59'	169°	62°36'	+59'	169°	61°37'	+59'	169°	60°38'	+59'	170°	59°38'	+59'	170°	4
5	66°31'	+59'	167°	65°32'	+59'	168°	64°34'	+59'	168°	63°35'	+59'	169°	62°36'	+59'	169°	61°37'	+59'	169°	60°38'	+59'	170°	5
6	67°30'	+59'	167°	66°31'	+59'	167°	65°33'	+59'	168°	64°34'	+59'	168°	63°35'	+59'	169°	62°36'	+59'	169°	61°37'	+59'	169°	6
7	68°28'	+59'	166°	67°30'	+59'	167°	66°31'	+59'	167°	65°33'	+59'	168°	64°34'	+59'	168°	63°35'	+59'	169°	62°36'	+59'	169°	7
8	69°27'	+58'	166°	68°29'	+59'	166°	67°30'	+59'	167°	66°32'	+59'	167°	65°33'	+59'	168°	64°34'	+59'	168°	63°36'	+59'	169°	8
9	70°25'	+58'	165°	69°27'	+58'	166°	68°29'	+59'	166°	67°31'	+59'	167°	66°32'	+59'	168°	65°34'	+59'	168°	64°35'	+59'	168°	9
10	71°24'	+58'	164°	70°26'	+58'	165°	69°28'	+59'	166°	68°30'	+59'	166°	67°31'	+59'	167°	66°33'	+59'	168°	65°34'	+59'	168°	10
11	72°22'	+58'	164°	71°24'	+58'	164°	70°26'	+58'	165°	69°28'	+59'	166°	68°30'	+59'	167°	67°32'	+59'	167°	66°33'	+59'	168°	11
12	73°20'	+58'	163°	72°22'	+58'	164°	71°25'	+58'	164°	70°27'	+58'	165°	69°29'	+59'	166°	68°30'	+59'	167°	67°32'	+59'	167°	12
13	74°17'	+57'	162°	73°20'	+58'	163°	72°23'	+58'	164°	71°25'	+58'	165°	70°27'	+58'	165°	69°29'	+59'	166°	68°31'	+59'	167°	13
14	75°15'	+57'	161°	74°18'	+57'	162°	73°21'	+58'	163°	72°23'	+58'	164°	71°26'	+58'	165°	70°28'	+58'	165°	69°30'	+59'	166°	14
15	76°12'	+57'	159°	75°15'	+57'	161°	74°19'	+57'	162°	73°21'	+58'	163°	72°24'	+58'	164°	71°26'	+58'	165°	70°28'	+59'	165°	15
16	77°08'	+56'	158°	76°13'	+57'	159°	75°16'	+57'	161°	74°19'	+58'	162°	73°22'	+58'	163°	72°25'	+58'	164°	71°27'	+58'	165°	16
17	78°04'	+55'	156°	77°09'	+56'	158°	76°13'	+57'	160°	75°17'	+57'	161°	74°20'	+58'	162°	73°23'	+58'	163°	72°25'	+58'	164°	17
18	79°00'	+54'	154°	78°05'	+55'	156°	77°10'	+56'	158°	76°14'	+57'	160°	75°17'	+57'	161°	74°21'	+58'	162°	73°23'	+58'	163°	18
19	79°54'	+53'	152°	79°01'	+55'	154°	78°06'	+55'	156°	77°11'	+56'	158°	76°15'	+57'	160°	75°18'	+57'	161°	74°21'	+58'	162°	19
20	80°47'	+52'	149°	79°55'	+53'	152°	79°02'	+55'	155°	78°07'	+56'	157°	77°11'	+56'	158°	76°15'	+57'	160°	75°19'	+57'	161°	20
21	81°39'	+50'	146°	80°49'	+52'	149°	79°56'	+54'	152°	79°02'	+55'	155°	78°08'	+56'	157°	77°12'	+56'	158°	76°16'	+57'	160°	21
22	82°29'	+47'	142°	81°40'	+50'	146°	80°50'	+52'	150°	79°57'	+54'	152°	79°03'	+55'	155°	78°09'	+56'	157°	77°13'	+56'	159°	22
23	83°16'	+43'	137°	82°30'	+47'	142°	81°42'	+50'	146°	80°51'	+52'	150°	79°58'	+54'	153°	79°04'	+55'	155°	78°10'	+56'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	61°25'	+59'	167°	60°26'	+59'	168°	59°28'	+59'	168°	58°29'	+59'	168°	57°30'	+59'	169°	56°31'	+59'	169°	55°32'	+59'	169°	0
1	62°24'	+59'	167°	61°25'	+59'	167°	60°27'	+59'	168°	59°28'	+59'	168°	58°29'	+59'	168°	57°30'	+59'	169°	56°32'	+59'	169°	1
2	63°23'	+59'	167°	62°24'	+59'	167°	61°26'	+59'	167°	60°27'	+59'	168°	59°28'	+59'	168°	58°30'	+59'	168°	57°31'	+59'	169°	2
3	64°21'	+59'	166°	63°23'	+59'	167°	62°24'	+59'	167°	61°26'	+59'	167°	60°27'	+59'	168°	59°29'	+59'	168°	58°30'	+59'	168°	3
4	65°20'	+58'	166°	64°22'	+59'	166°	63°23'	+59'	167°	62°25'	+59'	167°	61°26'	+59'	167°	60°28'	+59'	168°	59°29'	+59'	168°	4
5	66°18'	+58'	165°	65°20'	+58'	166°	64°22'	+59'	166°	63°24'	+59'	167°	62°25'	+59'	167°	61°27'	+59'	167°	60°28'	+59'	168°	5
6	67°17'	+58'	164°	66°19'	+58'	165°	65°21'	+59'	166°	64°22'	+59'	166°	63°24'	+59'	167°	62°26'	+59'	167°	61°27'	+59'	167°	6
7	68°15'	+58'	164°	67°17'	+58'	164°	66°19'	+58'	165°	65°21'	+59'	166°	64°23'	+59'	166°	63°25'	+59'	167°	62°26'	+59'	167°	7
8	69°13'	+58'	163°	68°15'	+58'	164°	67°18'	+58'	164°	66°20'	+58'	165°	65°22'	+59'	166°	64°23'	+59'	166°	63°25'	+59'	167°	8
9	70°11'	+58'	162°	69°13'	+58'	163°	68°16'	+58'	164°	67°18'	+58'	164°	66°20'	+58'	165°	65°22'	+59'	166°	64°24'	+59'	166°	9
10	71°08'	+57'	161°	70°11'	+58'	162°	69°14'	+58'	163°	68°16'	+58'	164°	67°19'	+58'	165°	66°21'	+58'	165°	65°23'	+59'	166°	10
11	72°06'	+57'	161°	71°09'	+57'	161°	70°12'	+58'	162°	69°14'	+58'	163°	68°17'	+58'	164°	67°19'	+58'	165°	66°21'	+59'	165°	11
12	73°03'	+57'	159°	72°06'	+57'	161°	71°10'	+57'	162°	70°12'	+58'	162°	69°15'	+58'	163°	68°18'	+58'	164°	67°20'	+58'	165°	12
13	73°59'	+56'	158°	73°03'	+57'	160°	72°07'	+57'	161°	71°10'	+58'	162°	70°13'	+58'	162°	69°16'	+58'	163°	68°18'	+58'	164°	13
14	74°56'	+56'	157°	74°00'	+56'	158°	73°04'	+57'	160°	72°08'	+57'	161°	71°11'	+58'	162°	70°14'	+58'	163°	69°16'	+58'	163°	14
15	75°52'	+55'	156°	74°57'	+56'	157°	74°01'	+56'	158°	73°05'	+57'	160°	72°08'	+57'	161°	71°12'	+58'	162°	70°15'	+58'	163°	15
16	76°47'	+55'	154°	75°52'	+55'	156°	74°57'	+56'	157°	74°02'	+57'	159°	73°06'	+57'	160°	72°09'	+57'	161°	71°12'	+58'	162°	16
17	77°41'	+54'	152°	76°48'	+55'	154°	75°53'	+55'	156°	74°58'	+56'	157°	74°03'	+57'	159°	73°07'	+57'	160°	72°10'	+57'	161°	17
18	78°35'	+52'	150°	77°42'	+54'	152°	76°49'	+55'	154°	75°54'	+55'	156°	74°59'	+56'	157°	74°04'	+57'	159°	73°08'	+57'	160°	18
19	79°27'	+51'	147°	78°36'	+53'	150°	77°44'	+54'	152°	76°50'	+55'	154°	75°55'	+56'	156°	75°00'	+56'	158°	74°05'	+57'	159°	19
20	80°18'	+49'	144°	79°29'	+51'	147°	78°37'	+53'	150°	77°45'	+54'	152°	76°51'	+55'	154°	75°57'	+56'	156°	75°01'	+56'	158°	20
21	81°08'	+47'	141°	80°20'	+49'	144°	79°30'	+51'	148°	78°39'	+53'	150°	77°46'	+54'	153°	76°52'	+55'	155°	75°58'	+56'	156°	21
22	81°54'	+44'	137°	81°09'	+47'	141°	80°21'	+49'	145°	79°32'	+51'	148°	78°40'	+53'	150°	77°47'	+54'	153°	76°53'	+55'	155°	22
23	82°38'	+39'	131°	81°56'	+44'	137°	81°11'	+47'	141°	80°23'	+50'	145°	79°33'	+52'	148°	78°41'	+53'	151°	77°49'	+54'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	61°12'	+58'	165°	60°14'	+59'	166°	59°16'	+59'	166°	58°18'	+59'	167°	57°19'	+59'	167°	56°21'	+59'	167°	55°22'	+59'	168°	0
1	62°11'	+58'	165°	61°13'	+58'	165°	60°15'	+59'	166°	59°17'	+59'	166°	58°18'	+59'	167°	57°20'	+59'	167°	56°21'	+59'	167°	1
2	63°09'	+58'	164°	62°11'	+58'	165°	61°13'	+58'	165°	60°15'	+59'	166°	59°17'	+59'	166°	58°19'	+59'	167°	57°20'	+59'	167°	2
3	64°07'	+58'	164°	63°10'	+58'	164°	62°12'	+58'	165°	61°14'	+59'	165°	60°16'	+59'	166°	59°18'	+59'	166°	58°19'	+59'	167°	3
4	65°05'	+58'	163°	64°08'	+58'	164°	63°10'	+58'	164°	62°12'	+58'	165°	61°14'	+59'	165°	60°16'	+59'	166°	59°18'	+59'	166°	4
5	66°03'	+58'	163°	65°06'	+58'	163°	64°09'	+58'	164°	63°11'	+58'	164°	62°13'	+58'	165°	61°15'	+59'	165°	60°17'	+59'	166°	5
6	67°01'	+58'	162°	66°04'	+58'	163°	65°07'	+58'	163°	64°09'	+58'	164°	63°11'	+58'	164°	62°14'	+58'	165°	61°16'	+59'	165°	6
7	67°59'	+57'	161°	67°02'	+58'	162°	66°05'	+58'	163°	65°07'	+58'	163°	64°10'	+58'	164°	63°12'	+58'	164°	62°14'	+59'	165°	7
8	68°56'	+57'	160°	67°59'	+57'	161°	67°03'	+58'	162°	66°05'	+58'	163°	65°08'	+58'	163°	64°10'	+58'	164°	63°13'	+58'	164°	8
9	69°53'	+57'	160°	68°57'	+57'	160°	68°00'	+57'	161°	67°03'	+58'	162°	66°06'	+58'	163°	65°09'	+58'	163°	64°11'	+58'	164°	9
10	70°50'	+57'	159°	69°54'	+57'	160°	68°58'	+57'	160°	68°01'	+58'	161°	67°04'	+58'	162°	66°07'	+58'	163°	65°09'	+58'	163°	10
11	71°47'	+56'	158°	70°51'	+57'	159°	69°55'	+57'	160°	68°58'	+57'	161°	68°02'	+58'	161°	67°05'	+58'	162°	66°08'	+58'	163°	11
12	72°43'	+56'	156°	71°48'	+56'	158°	70°52'	+57'	159°	69°56'	+57'	160°	68°59'	+57'	161°	68°03'	+58'	161°	67°06'	+58'	162°	12
13	73°38'	+55'	155°	72°44'	+56'	156°	71°48'	+56'	158°	70°53'	+57'	159°	69°57'	+57'	160°	69°00'	+57'	161°	68°03'	+58'	161°	13
14	74°34'	+55'	154°	73°39'	+55'	155°	72°45'	+56'	157°	71°49'	+56'	158°	70°54'	+57'	159°	69°58'	+57'	160°	69°01'	+57'	161°	14
15	75°28'	+54'	152°	74°35'	+55'	154°	73°41'	+55'	155°	72°46'	+56'	157°	71°50'	+56'	158°	70°55'	+57'	159°	69°59'	+57'	160°	15
16	76°22'	+53'	150°	75°29'	+54'	152°	74°36'	+55'	154°	73°42'	+55'	155°	72°47'	+56'	157°	71°52'	+56'	158°	70°56'	+57'	159°	16
17	77°15'	+52'	148°	76°23'	+53'	150°	75°31'	+54'	152°	74°37'	+55'	154°	73°43'	+56'	155°	72°48'	+56'	157°	71°53'	+57'	158°	17
18	78°07'	+50'	146°	77°16'	+52'	148°	76°25'	+53'	150°	75°32'	+54'	152°	74°38'	+55'	154°	73°44'	+56'	156°	72°49'	+56'	157°	18
19	78°57'	+49'	143°	78°08'	+51'	146°	77°18'	+52'	148°	76°26'	+53'	151°	75°33'	+54'	152°	74°40'	+55'	154°	73°45'	+56'	156°	19
20	79°46'	+47'	140°	78°59'	+49'	143°	78°10'	+51'	146°	77°19'	+52'	149°	76°28'	+53'	151°	75°35'	+54'	153°	74°41'	+55'	154°	20
21	80°32'	+44'	136°	79°48'	+47'	140°	79°01'	+49'	143°	78°12'	+51'	146°	77°21'	+52'	149°	76°29'	+54'	151°	75°36'	+54'	153°	21
22	81°16'	+40'	132°	80°35'	+44'	136°	79°50'	+47'	140°	79°02'	+49'	144°	78°13'	+51'	146°	77°23'	+52'	149°	76°31'	+54'	151°	22
23	81°57'	+36'	127°	81°19'	+41'	132°	80°37'	+44'	137°	79°52'	+47'	140°	79°04'	+49'	144°	78°15'	+51'	147°	77°24'	+53'	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°
	28			29			30			31			32			33			34			

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**

	28			29			30			31			32			33			34			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	60°58'	+58'	163°	60°01'	+58'	164°	59°03'	+58'	164°	58°05'	+58'	165°	57°07'	+59'	165°	56°09'	+59'	166°	55°11'	+59'	166°	0
1	61°56'	+58'	163°	60°59'	+58'	163°	60°01'	+58'	164°	59°03'	+58'	164°	58°06'	+58'	165°	57°08'	+59'	165°	56°10'	+59'	166°	1
2	62°54'	+58'	162°	61°57'	+58'	163°	60°59'	+58'	163°	60°02'	+58'	164°	59°04'	+58'	164°	58°06'	+58'	165°	57°08'	+59'	165°	2
3	63°52'	+58'	162°	62°55'	+58'	162°	61°57'	+58'	163°	61°00'	+58'	163°	60°02'	+58'	164°	59°05'	+58'	164°	58°07'	+59'	165°	3
4	64°49'	+57'	161°	63°52'	+58'	162°	62°55'	+58'	162°	61°58'	+58'	163°	61°01'	+58'	163°	60°03'	+58'	164°	59°05'	+58'	164°	4
5	65°47'	+57'	160°	64°50'	+57'	161°	63°53'	+58'	162°	62°56'	+58'	162°	61°59'	+58'	163°	61°01'	+58'	163°	60°04'	+58'	164°	5
6	66°44'	+57'	159°	65°47'	+57'	160°	64°51'	+57'	161°	63°54'	+58'	162°	62°57'	+58'	162°	62°00'	+58'	163°	61°02'	+58'	163°	6
7	67°41'	+57'	159°	66°45'	+57'	160°	65°48'	+57'	160°	64°52'	+57'	161°	63°55'	+58'	162°	62°58'	+58'	162°	62°00'	+58'	163°	7
8	68°37'	+56'	158°	67°41'	+57'	159°	66°45'	+57'	160°	65°49'	+57'	160°	64°52'	+58'	161°	63°56'	+58'	162°	62°58'	+58'	162°	8
9	69°34'	+56'	157°	68°38'	+56'	158°	67°42'	+57'	159°	66°46'	+57'	160°	65°50'	+57'	160°	64°53'	+58'	161°	63°56'	+58'	162°	9
10	70°30'	+56'	156°	69°35'	+56'	157°	68°39'	+56'	158°	67°43'	+57'	159°	66°47'	+57'	160°	65°51'	+57'	160°	64°54'	+58'	161°	10
11	71°25'	+55'	155°	70°31'	+56'	156°	69°36'	+56'	157°	68°40'	+57'	158°	67°44'	+57'	159°	66°48'	+57'	160°	65°52'	+57'	160°	11
12	72°20'	+55'	153°	71°26'	+55'	155°	70°32'	+56'	156°	69°37'	+56'	157°	68°41'	+57'	158°	67°46'	+57'	159°	66°49'	+57'	160°	12
13	73°15'	+54'	152°	72°21'	+55'	153°	71°28'	+55'	155°	70°33'	+56'	156°	69°38'	+56'	157°	68°42'	+57'	158°	67°47'	+57'	159°	13
14	74°09'	+53'	150°	73°16'	+54'	152°	72°23'	+55'	154°	71°29'	+55'	155°	70°34'	+56'	156°	69°39'	+56'	157°	68°44'	+57'	158°	14
15	75°02'	+52'	149°	74°10'	+53'	150°	73°18'	+54'	152°	72°24'	+55'	154°	71°30'	+55'	155°	70°35'	+56'	156°	69°40'	+56'	157°	15
16	75°54'	+51'	147°	75°03'	+52'	149°	74°12'	+53'	151°	73°19'	+54'	152°	72°26'	+55'	154°	71°31'	+56'	155°	70°37'	+56'	156°	16
17	76°45'	+50'	144°	75°56'	+51'	147°	75°05'	+53'	149°	74°13'	+54'	151°	73°21'	+54'	152°	72°27'	+55'	154°	71°33'	+56'	155°	17
18	77°35'	+48'	142°	76°47'	+50'	145°	75°58'	+52'	147°	75°07'	+53'	149°	74°15'	+54'	151°	73°22'	+54'	152°	72°29'	+55'	154°	18
19	78°24'	+46'	139°	77°37'	+49'	142°	76°49'	+50'	145°	75°59'	+52'	147°	75°09'	+53'	149°	74°17'	+54'	151°	73°24'	+55'	153°	19
20	79°10'	+44'	136°	78°26'	+47'	139°	77°39'	+49'	142°	76°51'	+50'	145°	76°01'	+52'	147°	75°10'	+53'	149°	74°18'	+54'	151°	20
21	79°54'	+41'	132°	79°13'	+44'	136°	78°28'	+47'	139°	77°42'	+49'	142°	76°53'	+51'	145°	76°03'	+52'	147°	75°12'	+53'	149°	21
22	80°36'	+38'	128°	79°57'	+41'	132°	79°15'	+45'	136°	78°31'	+47'	140°	77°44'	+49'	143°	76°55'	+51'	145°	76°05'	+52'	148°	22
23	81°13'	+33'	123°	80°38'	+38'	128°	80°00'	+42'	132°	79°18'	+45'	136°	78°33'	+47'	140°	77°46'	+49'	143°	76°57'	+51'	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°
	28			29			30			31			32			33			34			

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**

	28			29			30			31			32			33			34			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	60°42'	+57'	161°	59°45'	+58'	162°	58°48'	+58'	162°	57°51'	+58'	163°	56°53'	+58'	163°	55°56'	+58'	164°	54°58'	+58'	164°	0
1	61°40'	+57'	161°	60°43'	+58'	161°	59°46'	+58'	162°	58°49'	+58'	162°	57°51'	+58'	163°	56°54'	+58'	163°	55°56'	+58'	164°	1
2	62°37'	+57'	160°	61°40'	+57'	161°	60°44'	+58'	161°	59°47'	+58'	162°	58°50'	+58'	162°	57°52'	+58'	163°	56°55'	+58'	163°	2
3	63°34'	+57'	159°	62°38'	+57'	160°	61°41'	+57'	161°	60°44'	+58'	161°	59°47'	+58'	162°	58°50'	+58'	162°	57°53'	+58'	163°	3
4	64°31'	+57'	159°	63°35'	+57'	159°	62°39'	+57'	160°	61°42'	+57'	161°	60°45'	+58'	161°	59°48'	+58'	162°	58°51'	+58'	162°	4
5	65°28'	+56'	158°	64°32'	+57'	159°	63°36'	+57'	159°	62°39'	+57'	160°	61°43'	+58'	161°	60°46'	+58'	161°	59°49'	+58'	162°	5
6	66°24'	+56'	157°	65°29'	+57'	158°	64°33'	+57'	159°	63°37'	+57'	160°	62°40'	+57'	160°	61°44'	+58'	161°	60°47'	+58'	161°	6
7	67°20'	+56'	156°	66°25'	+56'	157°	65°30'	+57'	158°	64°34'	+57'	159°	63°38'	+57'	160°	62°41'	+57'	160°	61°45'	+58'	161°	7
8	68°16'	+55'	155°	67°21'	+56'	156°	66°26'	+56'	157°	65°31'	+57'	158°	64°35'	+57'	159°	63°39'	+57'	160°	62°43'	+57'	160°	8
9	69°12'	+55'	154°	68°17'	+56'	155°	67°23'	+56'	156°	66°27'	+56'	157°	65°32'	+57'	158°	64°36'	+57'	159°	63°40'	+57'	160°	9
10	70°07'	+55'	153°	69°13'	+55'	154°	68°19'	+56'	155°	67°24'	+56'	156°	66°29'	+56'	157°	65°33'	+57'	158°	64°37'	+57'	159°	10
11	71°01'	+54'	152°	70°08'	+55'	153°	69°14'	+55'	154°	68°20'	+56'	155°	67°25'	+56'	156°	66°30'	+57'	157°	65°34'	+57'	158°	11
12	71°55'	+53'	150°	71°03'	+54'	152°	70°09'	+55'	153°	69°16'	+55'	154°	68°21'	+56'	155°	67°26'	+56'	156°	66°31'	+57'	157°	12
13	72°49'	+53'	149°	71°57'	+54'	151°	71°04'	+54'	152°	70°11'	+55'	153°	69°17'	+55'	154°	68°23'	+56'	156°	67°28'	+56'	157°	13
14	73°41'	+52'	147°	72°50'	+53'	149°	71°58'	+54'	151°	71°06'	+54'	152°	70°12'	+55'	153°	69°19'	+56'	155°	68°24'	+56'	156°	14
15	74°33'	+51'	145°	73°43'	+52'	147°	72°52'	+53'	149°	72°00'	+54'	151°	71°07'	+54'	152°	70°14'	+55'	153°	69°20'	+56'	155°	15
16	75°24'	+50'	143°	74°35'	+51'	146°	73°45'	+52'	147°	72°54'	+53'	149°	72°02'	+54'	151°	71°09'	+55'	152°	70°16'	+55'	154°	16
17	76°13'	+48'	141°	75°26'	+50'	144°	74°37'	+51'	146°	73°47'	+52'	148°	72°56'	+53'	149°	72°04'	+54'	151°	71°11'	+55'	152°	17
18	77°02'	+46'	138°	76°16'	+48'	141°	75°28'	+50'	144°	74°39'	+51'	146°	73°49'	+52'	148°	72°58'	+53'	149°	72°06'	+54'	151°	18
19	77°48'	+44'	136°	77°04'	+47'	139°	76°18'	+48'	141°	75°30'	+50'	144°	74°41'	+51'	146°	73°51'	+52'	148°	73°00'	+53'	150°	19
20	78°32'	+42'	132°	77°51'	+45'	136°	77°06'	+47'	139°	76°20'	+49'	142°	75°33'	+50'	144°	74°43'	+52'	146°	73°53'	+53'	148°	20
21	79°14'	+39'	129°	78°35'	+42'	132°	77°53'	+45'	136°	77°09'	+47'	139°	76°23'	+49'	142°	75°35'	+50'	144°	74°46'	+52'	146°	21
22	79°53'	+35'	124°	79°17'	+39'	129°	78°38'	+42'	133°	77°56'	+45'	136°	77°12'	+47'	139°	76°25'	+49'	142°	75°37'	+51'	144°	22
23	80°28'	+31'	120°	79°56'	+35'	125°	79°20'	+39'	129°	78°41'	+43'	133°	77°59'	+45'	136°	77°14'	+47'	139°	76°28'	+49'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	60°24'	+57'	159°	59°28'	+57'	160°	58°32'	+57'	161°	57°35'	+58'	161°	56°38'	+58'	162°	55°41'	+58'	162°	54°44'	+58'	162°	0
1	61°21'	+57'	159°	60°25'	+57'	159°	59°29'	+57'	160°	58°32'	+57'	161°	57°36'	+58'	161°	56°39'	+58'	162°	55°42'	+58'	162°	1
2	62°18'	+57'	158°	61°22'	+57'	159°	60°26'	+57'	159°	59°30'	+57'	160°	58°33'	+57'	161°	57°37'	+58'	161°	56°40'	+58'	162°	2
3	63°14'	+56'	157°	62°19'	+57'	158°	61°23'	+57'	159°	60°27'	+57'	159°	59°31'	+57'	160°	58°34'	+58'	161°	57°38'	+58'	161°	3
4	64°11'	+56'	157°	63°16'	+56'	157°	62°20'	+57'	158°	61°24'	+57'	159°	60°28'	+57'	159°	59°32'	+57'	160°	58°35'	+58'	161°	4
5	65°07'	+56'	156°	64°12'	+56'	157°	63°17'	+56'	157°	62°21'	+57'	158°	61°25'	+57'	159°	60°29'	+57'	159°	59°33'	+57'	160°	5
6	66°03'	+55'	155°	65°08'	+56'	156°	64°13'	+56'	157°	63°18'	+56'	157°	62°22'	+57'	158°	61°27'	+57'	159°	60°30'	+57'	159°	6
7	66°58'	+55'	154°	66°04'	+55'	155°	65°09'	+56'	156°	64°14'	+56'	157°	63°19'	+57'	157°	62°24'	+57'	158°	61°28'	+57'	159°	7
8	67°53'	+55'	153°	66°59'	+55'	154°	66°05'	+56'	155°	65°11'	+56'	156°	64°16'	+56'	157°	63°20'	+57'	157°	62°25'	+57'	158°	8
9	68°47'	+54'	152°	67°54'	+55'	153°	67°01'	+55'	154°	66°07'	+56'	155°	65°12'	+56'	156°	64°17'	+56'	157°	63°22'	+57'	158°	9
10	69°42'	+54'	150°	68°49'	+54'	152°	67°56'	+55'	153°	67°02'	+55'	154°	66°08'	+56'	155°	65°13'	+56'	156°	64°19'	+56'	157°	10
11	70°35'	+53'	149°	69°43'	+54'	151°	68°51'	+54'	152°	67°57'	+55'	153°	67°04'	+55'	154°	66°10'	+56'	155°	65°15'	+56'	156°	11
12	71°28'	+52'	148°	70°37'	+53'	149°	69°45'	+54'	151°	68°52'	+54'	152°	67°59'	+55'	153°	67°05'	+55'	154°	66°11'	+56'	155°	12
13	72°20'	+51'	146°	71°30'	+52'	148°	70°39'	+53'	149°	69°47'	+54'	151°	68°54'	+55'	152°	68°01'	+55'	153°	67°07'	+56'	154°	13
14	73°12'	+50'	144°	72°22'	+51'	146°	71°32'	+52'	148°	70°41'	+53'	149°	69°49'	+54'	151°	68°56'	+55'	152°	68°03'	+55'	153°	14
15	74°02'	+49'	142°	73°14'	+51'	144°	72°24'	+52'	146°	71°34'	+53'	148°	70°43'	+53'	149°	69°51'	+54'	151°	68°58'	+55'	152°	15
16	74°51'	+48'	140°	74°04'	+49'	143°	73°16'	+51'	145°	72°26'	+52'	146°	71°36'	+53'	148°	70°45'	+54'	150°	69°53'	+54'	151°	16
17	75°39'	+46'	138°	74°54'	+48'	140°	74°07'	+50'	143°	73°18'	+51'	145°	72°29'	+52'	147°	71°38'	+53'	148°	70°47'	+54'	150°	17
18	76°25'	+44'	135°	75°42'	+47'	138°	74°56'	+48'	141°	74°09'	+50'	143°	73°21'	+51'	145°	72°31'	+52'	147°	71°40'	+53'	148°	18
19	77°10'	+42'	132°	76°28'	+45'	135°	75°44'	+47'	138°	74°59'	+48'	141°	74°12'	+50'	143°	73°23'	+51'	145°	72°33'	+52'	147°	19
20	77°52'	+40'	129°	77°13'	+42'	132°	76°31'	+45'	136°	75°47'	+47'	138°	75°02'	+49'	141°	74°14'	+50'	143°	73°26'	+51'	145°	20
21	78°32'	+37'	125°	77°55'	+40'	129°	77°16'	+43'	133°	76°34'	+45'	136°	75°50'	+47'	139°	75°04'	+49'	141°	74°17'	+50'	143°	21
22	79°08'	+33'	121°	78°35'	+37'	126°	77°59'	+40'	129°	77°19'	+43'	133°	76°37'	+45'	136°	75°53'	+47'	139°	75°07'	+49'	141°	22
23	79°41'	+29'	117°	79°12'	+33'	121°	78°39'	+37'	126°	78°02'	+40'	130°	77°23'	+43'	133°	76°41'	+46'	136°	75°56'	+48'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	60°05'	+56'	158°	59°09'	+57'	158°	58°13'	+57'	159°	57°17'	+57'	159°	56°21'	+57'	160°	55°25'	+58'	160°	54°28'	+58'	161°	0
1	61°01'	+56'	157°	60°06'	+56'	157°	59°10'	+57'	158°	58°15'	+57'	159°	57°18'	+57'	159°	56°22'	+57'	160°	55°26'	+58'	160°	1
2	61°57'	+56'	156°	61°02'	+56'	157°	60°07'	+57'	157°	59°11'	+57'	158°	58°16'	+57'	159°	57°20'	+57'	159°	56°23'	+57'	160°	2
3	62°53'	+56'	155°	61°59'	+56'	156°	61°04'	+56'	157°	60°08'	+57'	157°	59°13'	+57'	158°	58°17'	+57'	159°	57°21'	+57'	159°	3
4	63°49'	+55'	154°	62°54'	+56'	155°	62°00'	+56'	156°	61°05'	+56'	157°	60°10'	+57'	158°	59°14'	+57'	158°	58°18'	+57'	159°	4
5	64°44'	+55'	154°	63°50'	+55'	154°	62°56'	+56'	155°	62°01'	+56'	156°	61°06'	+56'	157°	60°11'	+57'	158°	59°15'	+57'	158°	5
6	65°39'	+55'	153°	64°46'	+55'	154°	63°52'	+55'	154°	62°57'	+56'	155°	62°03'	+56'	156°	61°08'	+57'	157°	60°12'	+57'	158°	6
7	66°34'	+54'	152°	65°41'	+55'	153°	64°47'	+55'	154°	63°53'	+56'	155°	62°59'	+56'	155°	62°04'	+56'	156°	61°09'	+57'	157°	7
8	67°28'	+54'	150°	66°35'	+54'	152°	65°42'	+55'	153°	64°49'	+55'	154°	63°55'	+56'	155°	63°00'	+56'	155°	62°06'	+56'	156°	8
9	68°21'	+53'	149°	67°29'	+54'	151°	66°37'	+54'	152°	65°44'	+55'	153°	64°50'	+55'	154°	63°56'	+56'	155°	63°02'	+56'	155°	9
10	69°14'	+52'	148°	68°23'	+53'	149°	67°31'	+54'	151°	66°39'	+54'	152°	65°46'	+55'	153°	64°52'	+55'	154°	63°58'	+56'	155°	10
11	70°07'	+52'	147°	69°16'	+53'	148°	68°25'	+53'	149°	67°33'	+54'	151°	66°41'	+55'	152°	65°47'	+55'	153°	64°54'	+56'	154°	11
12	70°59'	+51'	145°	70°09'	+52'	147°	69°18'	+53'	148°	68°27'	+53'	149°	67°35'	+54'	151°	66°43'	+55'	152°	65°49'	+55'	153°	12
13	71°50'	+50'	143°	71°01'	+51'	145°	70°11'	+52'	147°	69°21'	+53'	148°	68°29'	+54'	150°	67°37'	+54'	151°	66°45'	+55'	152°	13
14	72°40'	+49'	142°	71°52'	+50'	143°	71°03'	+51'	145°	70°13'	+52'	147°	69°23'	+53'	148°	68°31'	+54'	150°	67°39'	+54'	151°	14
15	73°29'	+48'	140°	72°42'	+49'	142°	71°54'	+50'	144°	71°06'	+51'	145°	70°16'	+52'	147°	69°25'	+53'	148°	68°34'	+54'	150°	15
16	74°16'	+46'	137°	73°31'	+48'	140°	72°45'	+49'	142°	71°57'	+50'	144°	71°08'	+52'	145°	70°18'	+52'	147°	69°27'	+53'	148°	16
17	75°02'	+45'	135°	74°19'	+46'	138°	73°34'	+48'	140°	72°47'	+49'	142°	72°00'	+51'	144°	71°11'	+52'	146°	70°21'	+53'	147°	17
18	75°47'	+43'	132°	75°06'	+45'	135°	74°22'	+47'	138°	73°37'	+48'	140°	72°50'	+50'	142°	72°02'	+51'	144°	71°13'	+52'	146°	18
19	76°30'	+40'	129°	75°50'	+43'	132°	75°09'	+45'	135°	74°25'	+47'	138°	73°40'	+48'	140°	72°53'	+50'	142°	72°05'	+51'	144°	19
20	77°10'	+38'	126°	76°33'	+41'	130°	75°54'	+43'	133°	75°12'	+45'	135°	74°28'	+47'	138°	73°43'	+49'	140°	72°56'	+50'	142°	20
21	77°48'	+35'	123°	77°14'	+38'	126°	76°37'	+41'	130°	75°57'	+43'	133°	75°15'	+45'	136°	74°32'	+47'	138°	73°46'	+49'	140°	21
22	78°22'	+31'	119°	77°52'	+35'	123°	77°18'	+38'	126°	76°41'	+41'	130°	76°01'	+44'	133°	75°19'	+46'	136°	74°35'	+48'	138°	22
23	78°53'	+27'	114°	78°27'	+31'	119°	77°56'	+35'	123°	77°22'	+38'	127°	76°45'	+41'	130°	76°05'	+44'	133°	75°23'	+46'	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°
	28			29			30			31			32			33			34			

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

Dec°	28			29			30			31			32			33			34			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	59°44'	+56'	156°	58°49'	+56'	156°	57°54'	+56'	157°	56°59'	+57'	158°	56°03'	+57'	158°	55°07'	+57'	159°	54°11'	+57'	159°	0
1	60°40'	+55'	155°	59°45'	+56'	156°	58°50'	+56'	156°	57°55'	+56'	157°	57°00'	+57'	158°	56°04'	+57'	158°	55°08'	+57'	159°	1
2	61°35'	+55'	154°	60°41'	+56'	155°	59°46'	+56'	156°	58°52'	+56'	156°	57°56'	+56'	157°	57°01'	+57'	158°	56°06'	+57'	158°	2
3	62°30'	+55'	153°	61°36'	+55'	154°	60°42'	+56'	155°	59°48'	+56'	156°	58°53'	+56'	156°	57°58'	+57'	157°	57°03'	+57'	158°	3
4	63°25'	+55'	152°	62°32'	+55'	153°	61°38'	+55'	154°	60°44'	+56'	155°	59°49'	+56'	156°	58°54'	+56'	156°	57°59'	+57'	157°	4
5	64°20'	+54'	151°	63°27'	+55'	152°	62°33'	+55'	153°	61°40'	+55'	154°	60°45'	+56'	155°	59°51'	+56'	156°	58°56'	+56'	156°	5
6	65°14'	+54'	150°	64°21'	+54'	151°	63°28'	+55'	152°	62°35'	+55'	153°	61°41'	+56'	154°	60°47'	+56'	155°	59°52'	+56'	156°	6
7	66°07'	+53'	149°	65°16'	+54'	150°	64°23'	+54'	151°	63°30'	+55'	152°	62°37'	+55'	153°	61°43'	+56'	154°	60°49'	+56'	155°	7
8	67°01'	+53'	148°	66°09'	+53'	149°	65°17'	+54'	150°	64°25'	+54'	152°	63°32'	+55'	152°	62°39'	+55'	153°	61°45'	+56'	154°	8
9	67°53'	+52'	147°	67°03'	+53'	148°	66°11'	+53'	149°	65°19'	+54'	151°	64°27'	+55'	152°	63°34'	+55'	153°	62°40'	+55'	153°	9
10	68°45'	+51'	146°	67°56'	+52'	147°	67°05'	+53'	148°	66°13'	+54'	149°	65°22'	+54'	151°	64°29'	+55'	152°	63°36'	+55'	153°	10
11	69°37'	+51'	144°	68°48'	+52'	146°	67°58'	+52'	147°	67°07'	+53'	148°	66°16'	+54'	150°	65°24'	+54'	151°	64°31'	+55'	152°	11
12	70°27'	+50'	143°	69°39'	+51'	144°	68°50'	+52'	146°	68°00'	+52'	147°	67°09'	+53'	148°	66°18'	+54'	150°	65°26'	+54'	151°	12
13	71°17'	+49'	141°	70°30'	+50'	143°	69°42'	+51'	144°	68°53'	+52'	146°	68°03'	+53'	147°	67°12'	+53'	148°	66°20'	+54'	150°	13
14	72°06'	+48'	139°	71°20'	+49'	141°	70°33'	+50'	143°	69°44'	+51'	144°	68°55'	+52'	146°	68°05'	+53'	147°	67°14'	+53'	149°	14
15	72°53'	+46'	137°	72°09'	+48'	139°	71°23'	+49'	141°	70°35'	+50'	143°	69°47'	+51'	144°	68°58'	+52'	146°	68°08'	+53'	147°	15
16	73°39'	+45'	135°	72°56'	+46'	137°	72°12'	+48'	139°	71°26'	+49'	141°	70°38'	+50'	143°	69°50'	+51'	145°	69°01'	+52'	146°	16
17	74°24'	+43'	132°	73°43'	+45'	135°	73°00'	+47'	137°	72°15'	+48'	139°	71°29'	+49'	141°	70°41'	+51'	143°	69°53'	+52'	145°	17
18	75°07'	+41'	130°	74°28'	+43'	132°	73°46'	+45'	135°	73°03'	+47'	137°	72°18'	+48'	139°	71°32'	+50'	141°	70°44'	+51'	143°	18
19	75°48'	+39'	127°	75°11'	+41'	130°	74°31'	+43'	133°	73°50'	+45'	135°	73°06'	+47'	137°	72°21'	+49'	140°	71°35'	+50'	142°	19
20	76°27'	+36'	124°	75°52'	+39'	127°	75°15'	+41'	130°	74°35'	+44'	133°	73°53'	+46'	135°	73°10'	+47'	138°	72°25'	+49'	140°	20
21	77°02'	+33'	120°	76°31'	+36'	124°	75°56'	+39'	127°	75°19'	+42'	130°	74°39'	+44'	133°	73°57'	+46'	135°	73°14'	+47'	138°	21
22	77°35'	+29'	116°	77°07'	+33'	120°	76°35'	+36'	124°	76°00'	+39'	127°	75°23'	+42'	130°	74°43'	+44'	133°	74°01'	+46'	136°	22
23	78°05'	+25'	112°	77°40'	+30'	116°	77°12'	+33'	120°	76°40'	+37'	124°	76°05'	+40'	127°	75°27'	+42'	130°	74°47'	+44'	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°
	28			29			30			31			32			33			34			

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

Dec°	28			29			30			31			32			33			34			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	59°21'	+55'	154°	58°27'	+55'	155°	57°33'	+56'	155°	56°38'	+56'	156°	55°43'	+56'	156°	54°48'	+57'	157°	53°53'	+57'	158°	0
1	60°16'	+55'	153°	59°23'	+55'	154°	58°29'	+56'	155°	57°34'	+56'	155°	56°40'	+56'	156°	55°45'	+56'	156°	54°50'	+57'	157°	1
2	61°11'	+55'	152°	60°18'	+55'	153°	59°24'	+55'	154°	58°30'	+56'	155°	57°36'	+56'	155°	56°41'	+56'	156°	55°46'	+57'	156°	2
3	62°06'	+54'	151°	61°13'	+55'	152°	60°19'	+55'	153°	59°26'	+55'	154°	58°32'	+56'	155°	57°37'	+56'	155°	56°43'	+56'	156°	3
4	63°00'	+54'	150°	62°07'	+54'	151°	61°14'	+55'	152°	60°21'	+55'	153°	59°28'	+55'	154°	58°34'	+56'	155°	57°39'	+56'	155°	4
5	63°53'	+53'	149°	63°02'	+54'	150°	62°09'	+54'	151°	61°16'	+55'	152°	60°23'	+55'	153°	59°29'	+56'	154°	58°35'	+56'	155°	5
6	64°47'	+53'	148°	63°55'	+53'	149°	63°04'	+54'	150°	62°11'	+54'	151°	61°18'	+55'	152°	60°25'	+55'	153°	59°31'	+56'	154°	6
7	65°40'	+52'	147°	64°49'	+53'	148°	63°57'	+54'	149°	63°06'	+54'	150°	62°13'	+55'	151°	61°20'	+55'	152°	60°27'	+55'	153°	7
8	66°32'	+52'	146°	65°42'	+52'	147°	64°51'	+53'	148°	64°00'	+54'	149°	63°08'	+54'	150°	62°15'	+55'	151°	61°22'	+55'	152°	8
9	67°24'	+51'	145°	66°34'	+52'	146°	65°44'	+53'	147°	64°53'	+53'	148°	64°02'	+54'	150°	63°10'	+54'	151°	62°17'	+55'	151°	9
10	68°15'	+50'	143°	67°26'	+51'	145°	66°37'	+52'	146°	65°47'	+53'	147°	64°56'	+53'	148°	64°04'	+54'	150°	63°12'	+54'	151°	10
11	69°05'	+49'	142°	68°17'	+50'	143°	67°29'	+51'	145°	66°39'	+52'	146°	65°49'	+53'	147°	64°58'	+53'	149°	64°07'	+54'	150°	11
12	69°54'	+48'	140°	69°08'	+50'	142°	68°20'	+51'	143°	67°31'	+51'	145°	66°42'	+52'	146°	65°52'	+53'	147°	65°01'	+54'	149°	12
13	70°43'	+47'	138°	69°57'	+49'	140°	69°11'	+50'	142°	68°23'	+51'	143°	67°34'	+52'	145°	66°45'	+52'	146°	65°54'	+53'	148°	13
14	71°30'	+46'	137°	70°46'	+48'	139°	70°00'	+49'	140°	69°14'	+50'	142°	68°26'	+51'	144°	67°37'	+52'	145°	66°47'	+53'	146°	14
15	72°16'	+45'	134°	71°33'	+46'	137°	70°49'	+48'	139°	70°04'	+49'	140°	69°17'	+50'	142°	68°29'	+51'	144°	67°40'	+52'	145°	15
16	73°01'	+43'	132°	72°20'	+45'	135°	71°37'	+47'	137°	70°53'	+48'	139°	70°07'	+49'	141°	69°20'	+50'	142°	68°32'	+51'	144°	16
17	73°44'	+41'	130°	73°05'	+43'	132°	72°23'	+45'	135°	71°40'	+47'	137°	70°56'	+48'	139°	70°10'	+49'	141°	69°23'	+50'	142°	17
18	74°26'	+39'	127°	73°48'	+42'	130°	73°09'	+44'	132°	72°27'	+45'	135°	71°44'	+47'	137°	71°00'	+48'	139°	70°14'	+50'	141°	18
19	75°05'	+37'	124°	74°30'	+40'	127°	73°52'	+42'	130°	73°13'	+44'	133°	72°31'	+46'	135°	71°48'	+47'	137°	71°03'	+49'	139°	19
20	75°42'	+34'	121°	75°09'	+37'	124°	74°34'	+40'	127°	73°57'	+42'	130°	73°17'	+44'	133°	72°35'	+46'	135°	71°52'	+47'	137°	20
21	76°16'	+31'	118°	75°47'	+35'	121°	75°14'	+37'	125°	74°39'	+40'	128°	74°01'	+42'	130°	73°21'	+44'	133°	72°39'	+46'	135°	21
22	76°47'	+28'	114°	76°21'	+32'	118°	75°51'	+35'	121°	75°19'	+38'	125°	74°43'	+40'	128°	74°05'	+43'	130°	73°25'	+45'	133°	22
23	77°15'	+24'	110°	76°53'	+28'	114°	76°26'	+32'	118°	75°56'	+35'	122°	75°24'	+38'	125°	74°48'	+41'	128°	74°10'	+43'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	58°57'	+54'	152°	58°04'	+55'	153°	57°10'	+55'	153°	56°16'	+56'	154°	55°22'	+56'	155°	54°28'	+56'	155°	53°33'	+56'	156°	0
1	59°51'	+54'	151°	58°59'	+55'	152°	58°06'	+55'	153°	57°12'	+55'	153°	56°18'	+56'	154°	55°24'	+56'	155°	54°30'	+56'	155°	1
2	60°46'	+54'	150°	59°53'	+54'	151°	59°00'	+55'	152°	58°07'	+55'	153°	57°14'	+55'	153°	56°20'	+56'	154°	55°26'	+56'	155°	2
3	61°39'	+53'	149°	60°47'	+54'	150°	59°55'	+54'	151°	59°02'	+55'	152°	58°09'	+55'	153°	57°16'	+55'	153°	56°22'	+56'	154°	3
4	62°33'	+53'	148°	61°41'	+53'	149°	60°49'	+54'	150°	59°57'	+54'	151°	59°04'	+55'	152°	58°11'	+55'	153°	57°18'	+56'	153°	4
5	63°26'	+52'	147°	62°35'	+53'	148°	61°43'	+54'	149°	60°52'	+54'	150°	59°59'	+55'	151°	59°06'	+55'	152°	58°13'	+55'	153°	5
6	64°18'	+52'	146°	63°28'	+53'	147°	62°37'	+53'	148°	61°46'	+54'	149°	60°54'	+54'	150°	60°01'	+55'	151°	59°09'	+55'	152°	6
7	65°10'	+51'	145°	64°21'	+52'	146°	63°30'	+53'	147°	62°39'	+53'	148°	61°48'	+54'	149°	60°56'	+54'	150°	60°04'	+55'	151°	7
8	66°01'	+51'	144°	65°13'	+52'	145°	64°23'	+52'	146°	63°33'	+53'	147°	62°42'	+53'	149°	61°50'	+54'	149°	60°58'	+54'	150°	8
9	66°52'	+50'	143°	66°04'	+51'	144°	65°15'	+52'	145°	64°26'	+52'	146°	63°35'	+53'	148°	62°44'	+54'	149°	61°53'	+54'	150°	9
10	67°42'	+49'	141°	66°55'	+50'	143°	66°07'	+51'	144°	65°18'	+52'	145°	64°28'	+53'	146°	63°38'	+53'	148°	62°47'	+54'	149°	10
11	68°31'	+48'	140°	67°45'	+49'	141°	66°58'	+50'	143°	66°10'	+51'	144°	65°21'	+52'	145°	64°31'	+53'	146°	63°41'	+53'	148°	11
12	69°20'	+47'	138°	68°34'	+48'	140°	67°48'	+50'	141°	67°01'	+50'	143°	66°13'	+51'	144°	65°24'	+52'	145°	64°34'	+53'	147°	12
13	70°07'	+46'	136°	69°23'	+47'	138°	68°38'	+49'	140°	67°51'	+50'	141°	67°04'	+51'	143°	66°16'	+52'	144°	65°27'	+52'	145°	13
14	70°53'	+45'	134°	70°10'	+46'	136°	69°26'	+48'	138°	68°41'	+49'	140°	67°55'	+50'	141°	67°07'	+51'	143°	66°19'	+52'	144°	14
15	71°38'	+43'	132°	70°57'	+45'	134°	70°14'	+47'	136°	69°30'	+48'	138°	68°45'	+49'	140°	67°58'	+50'	141°	67°11'	+51'	143°	15
16	72°21'	+42'	130°	71°42'	+44'	132°	71°01'	+45'	134°	70°18'	+47'	136°	69°34'	+48'	138°	68°48'	+49'	140°	68°02'	+50'	142°	16
17	73°03'	+40'	127°	72°25'	+42'	130°	71°46'	+44'	132°	71°05'	+45'	134°	70°22'	+47'	136°	69°38'	+48'	138°	68°52'	+49'	140°	17
18	73°43'	+38'	125°	73°07'	+40'	128°	72°30'	+42'	130°	71°50'	+44'	132°	71°09'	+46'	135°	70°26'	+47'	137°	69°42'	+48'	138°	18
19	74°21'	+35'	122°	73°47'	+38'	125°	73°12'	+40'	128°	72°34'	+42'	130°	71°54'	+44'	133°	71°13'	+46'	135°	70°30'	+47'	137°	19
20	74°56'	+33'	119°	74°25'	+36'	122°	73°52'	+38'	125°	73°17'	+41'	128°	72°39'	+43'	130°	71°59'	+45'	133°	71°17'	+46'	135°	20
21	75°29'	+30'	116°	75°01'	+33'	119°	74°31'	+36'	122°	73°57'	+39'	125°	73°21'	+41'	128°	72°43'	+43'	130°	72°04'	+45'	133°	21
22	75°59'	+27'	112°	75°34'	+30'	116°	75°07'	+33'	119°	74°36'	+36'	122°	74°02'	+39'	125°	73°26'	+41'	128°	72°48'	+43'	131°	22
23	76°25'	+23'	108°	76°04'	+27'	112°	75°40'	+30'	116°	75°12'	+34'	119°	74°41'	+37'	123°	74°08'	+39'	125°	73°32'	+41'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	58°31'	+54'	150°	57°39'	+54'	151°	56°46'	+55'	152°	55°53'	+55'	153°	55°00'	+55'	153°	54°06'	+56'	154°	53°12'	+56'	154°	0
1	59°25'	+53'	149°	58°33'	+54'	150°	57°41'	+54'	151°	56°48'	+55'	152°	55°55'	+55'	152°	55°02'	+55'	153°	54°08'	+56'	154°	1
2	60°19'	+53'	149°	59°27'	+54'	149°	58°35'	+54'	150°	57°43'	+54'	151°	56°50'	+55'	152°	55°57'	+55'	152°	55°04'	+56'	153°	2
3	61°12'	+53'	148°	60°21'	+53'	149°	59°29'	+54'	149°	58°38'	+54'	150°	57°45'	+55'	151°	56°53'	+55'	152°	56°00'	+55'	152°	3
4	62°04'	+52'	147°	61°14'	+53'	148°	60°23'	+53'	149°	59°32'	+54'	149°	58°40'	+54'	150°	57°47'	+55'	151°	56°55'	+55'	152°	4
5	62°56'	+52'	145°	62°07'	+52'	147°	61°16'	+53'	148°	60°25'	+53'	149°	59°34'	+54'	149°	58°42'	+54'	150°	57°50'	+55'	151°	5
6	63°48'	+51'	144°	62°59'	+52'	145°	62°09'	+52'	147°	61°19'	+53'	148°	60°28'	+54'	149°	59°36'	+54'	149°	58°45'	+54'	150°	6
7	64°39'	+50'	143°	63°51'	+51'	144°	63°02'	+52'	146°	62°12'	+53'	147°	61°21'	+53'	148°	60°31'	+54'	149°	59°39'	+54'	149°	7
8	65°29'	+50'	142°	64°42'	+51'	143°	63°53'	+51'	144°	63°04'	+52'	146°	62°15'	+53'	147°	61°24'	+53'	148°	60°33'	+54'	149°	8
9	66°19'	+49'	140°	65°32'	+50'	142°	64°45'	+51'	143°	63°56'	+52'	144°	63°07'	+52'	146°	62°17'	+53'	147°	61°27'	+53'	148°	9
10	67°08'	+48'	139°	66°22'	+49'	141°	65°36'	+50'	142°	64°48'	+51'	143°	63°59'	+52'	144°	63°10'	+52'	146°	62°20'	+53'	147°	10
11	67°56'	+47'	137°	67°11'	+48'	139°	66°26'	+49'	141°	65°39'	+50'	142°	64°51'	+51'	143°	64°03'	+52'	145°	63°13'	+53'	146°	11
12	68°43'	+46'	136°	68°00'	+47'	137°	67°15'	+48'	139°	66°29'	+49'	141°	65°42'	+50'	142°	64°54'	+51'	143°	64°06'	+52'	145°	12
13	69°29'	+45'	134°	68°47'	+46'	136°	68°03'	+48'	138°	67°19'	+49'	139°	66°33'	+50'	141°	65°46'	+51'	142°	64°58'	+51'	143°	13
14	70°14'	+44'	132°	69°33'	+45'	134°	68°51'	+46'	136°	68°07'	+48'	138°	67°22'	+49'	139°	66°36'	+50'	141°	65°49'	+51'	142°	14
15	70°58'	+42'	130°	70°18'	+44'	132°	69°37'	+45'	134°	68°55'	+47'	136°	68°11'	+48'	138°	67°26'	+49'	139°	66°40'	+50'	141°	15
16	71°40'	+40'	128°	71°02'	+42'	130°	70°23'	+44'	132°	69°42'	+46'	134°	68°59'	+47'	136°	68°15'	+48'	138°	67°30'	+49'	139°	16
17	72°20'	+39'	125°	71°44'	+41'	128°	71°07'	+43'	130°	70°27'	+44'	132°	69°46'	+46'	134°	69°03'	+47'	136°	68°19'	+48'	138°	17
18	72°59'	+36'	123°	72°25'	+39'	125°	71°49'	+41'	128°	71°11'	+43'	130°	70°32'	+44'	132°	69°51'	+46'	134°	69°08'	+47'	136°	18
19	73°35'	+34'	120°	73°04'	+37'	123°	72°30'	+39'	126°	71°54'	+41'	128°	71°16'	+43'	130°	70°37'	+45'	133°	69°55'	+46'	135°	19
20	74°09'	+32'	117°	73°41'	+34'	120°	73°09'	+37'	123°	72°35'	+39'	126°	71°59'	+41'	128°	71°21'	+43'	130°	70°41'	+45'	133°	20
21	74°41'	+29'	114°	74°15'	+32'	117°	73°46'	+35'	120°	73°15'	+37'	123°	72°41'	+40'	126°	72°05'	+42'	128°	71°26'	+44'	131°	21
22	75°09'	+26'	110°	74°47'	+29'	114°	74°21'	+32'	117°	73°52'	+35'	120°	73°20'	+38'	123°	72°46'	+40'	126°	72°10'	+42'	128°	22
23	75°35'	+22'	107°	75°16'	+26'	111°	74°53'	+29'	114°	74°27'	+32'	117°	73°58'	+35'	120°	73°26'	+38'	123°	72°52'	+40'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	58°05'	+53'	149°	57°13'	+54'	149°	56°21'	+54'	150°	55°29'	+54'	151°	54°36'	+55'	152°	53°43'	+55'	152°	52°50'	+55'	153°	0
1	58°58'	+53'	148°	58°07'	+53'	149°	57°15'	+54'	149°	56°23'	+54'	150°	55°31'	+55'	151°	54°39'	+55'	152°	53°46'	+55'	152°	1
2	59°50'	+52'	147°	59°00'	+53'	148°	58°09'	+53'	149°	57°18'	+54'	149°	56°26'	+54'	150°	55°33'	+55'	151°	54°41'	+55'	152°	2
3	60°43'	+52'	146°	59°53'	+52'	147°	59°02'	+53'	148°	58°11'	+53'	149°	57°20'	+54'	149°	56°28'	+54'	150°	55°36'	+55'	151°	3
4	61°34'	+51'	145°	60°45'	+52'	146°	59°55'	+53'	147°	59°05'	+53'	148°	58°14'	+54'	149°	57°22'	+54'	149°	56°31'	+54'	150°	4
5	62°26'	+51'	144°	61°37'	+51'	145°	60°48'	+52'	146°	59°58'	+53'	147°	59°07'	+53'	148°	58°17'	+54'	149°	57°25'	+54'	149°	5
6	63°16'	+50'	142°	62°28'	+51'	144°	61°40'	+52'	145°	60°51'	+52'	146°	60°01'	+53'	147°	59°10'	+53'	148°	58°19'	+54'	149°	6
7	64°07'	+49'	141°	63°19'	+50'	142°	62°31'	+51'	144°	61°43'	+52'	145°	60°53'	+52'	146°	60°04'	+53'	147°	59°13'	+54'	148°	7
8	64°56'	+49'	140°	64°10'	+50'	141°	63°23'	+50'	142°	62°35'	+51'	144°	61°46'	+52'	145°	60°57'	+53'	146°	60°07'	+53'	147°	8
9	65°45'	+48'	138°	64°59'	+49'	140°	64°13'	+50'	141°	63°26'	+51'	143°	62°38'	+51'	144°	61°49'	+52'	145°	61°00'	+53'	146°	9
10	66°33'	+47'	137°	65°48'	+48'	139°	65°03'	+49'	140°	64°16'	+50'	141°	63°29'	+51'	143°	62°41'	+52'	144°	61°52'	+52'	145°	10
11	67°20'	+46'	135°	66°36'	+47'	137°	65°52'	+48'	139°	65°06'	+49'	140°	64°20'	+50'	141°	63°33'	+51'	143°	62°45'	+52'	144°	11
12	68°06'	+45'	134°	67°24'	+46'	135°	66°40'	+47'	137°	65°56'	+49'	139°	65°10'	+49'	140°	64°24'	+50'	141°	63°36'	+51'	143°	12
13	68°51'	+44'	132°	68°10'	+45'	134°	67°28'	+46'	136°	66°44'	+48'	137°	66°00'	+49'	139°	65°14'	+50'	140°	64°28'	+51'	141°	13
14	69°34'	+42'	130°	68°55'	+44'	132°	68°14'	+45'	134°	67°32'	+47'	136°	66°48'	+48'	137°	66°04'	+49'	139°	65°18'	+50'	140°	14
15	70°17'	+41'	128°	69°39'	+43'	130°	68°59'	+44'	132°	68°19'	+46'	134°	67°36'	+47'	136°	66°53'	+48'	137°	66°08'	+49'	139°	15
16	70°57'	+39'	126°	70°21'	+41'	128°	69°44'	+43'	130°	69°04'	+44'	132°	68°23'	+46'	134°	67°41'	+47'	136°	66°57'	+48'	137°	16
17	71°36'	+37'	123°	71°02'	+39'	126°	70°26'	+41'	128°	69°48'	+43'	130°	69°09'	+45'	132°	68°28'	+46'	134°	67°45'	+47'	136°	17
18	72°14'	+35'	121°	71°42'	+37'	123°	71°08'	+40'	126°	70°32'	+42'	128°	69°54'	+43'	130°	69°14'	+45'	132°	68°33'	+46'	134°	18
19	72°49'	+33'	118°	72°19'	+35'	121°	71°47'	+38'	123°	71°13'	+40'	126°	70°37'	+42'	128°	69°59'	+44'	130°	69°19'	+45'	132°	19
20	73°22'	+30'	115°	72°55'	+33'	118°	72°25'	+36'	121°	71°53'	+38'	124°	71°19'	+40'	126°	70°42'	+42'	128°	70°04'	+44'	131°	20
21	73°52'	+28'	112°	73°28'	+31'	115°	73°01'	+33'	118°	72°31'	+36'	121°	71°59'	+38'	124°	71°25'	+40'	126°	70°48'	+42'	129°	21
22	74°19'	+25'	109°	73°58'	+28'	112°	73°34'	+31'	115°	73°07'	+34'	118°	72°37'	+36'	121°	72°05'	+39'	124°	71°31'	+41'	126°	22
23	74°44'	+21'	106°	74°26'	+25'	109°	74°05'	+28'	112°	73°41'	+31'	115°	73°14'	+34'	118°	72°44'	+37'	121°	72°11'	+39'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	57°36'	+52'	147°	56°46'	+53'	148°	55°55'	+53'	149°	55°03'	+54'	149°	54°12'	+54'	150°	53°19'	+55'	151°	52°27'	+55'	151°	0
1	58°29'	+52'	146°	57°39'	+53'	147°	56°48'	+53'	148°	55°57'	+53'	149°	55°06'	+54'	149°	54°14'	+54'	150°	53°22'	+55'	151°	1
2	59°21'	+52'	145°	58°31'	+52'	146°	57°41'	+53'	147°	56°51'	+53'	148°	56°00'	+54'	149°	55°08'	+54'	149°	54°17'	+54'	150°	2
3	60°12'	+51'	144°	59°23'	+52'	145°	58°34'	+52'	146°	57°44'	+53'	147°	56°53'	+53'	148°	56°02'	+54'	148°	55°11'	+54'	149°	3
4	61°03'	+50'	143°	60°15'	+51'	144°	59°26'	+52'	145°	58°37'	+52'	146°	57°47'	+53'	147°	56°56'	+53'	148°	56°05'	+54'	148°	4
5	61°54'	+50'	142°	61°06'	+51'	143°	60°18'	+51'	144°	59°29'	+52'	145°	58°40'	+53'	146°	57°50'	+53'	147°	56°59'	+54'	148°	5
6	62°43'	+49'	141°	61°57'	+50'	142°	61°09'	+51'	143°	60°21'	+51'	144°	59°32'	+52'	145°	58°43'	+53'	146°	57°53'	+53'	147°	6
7	63°33'	+49'	139°	62°47'	+49'	141°	62°00'	+50'	142°	61°12'	+51'	143°	60°24'	+52'	144°	59°35'	+52'	145°	58°46'	+53'	146°	7
8	64°21'	+48'	138°	63°36'	+49'	139°	62°50'	+50'	141°	62°03'	+50'	142°	61°16'	+51'	143°	60°28'	+52'	144°	59°39'	+52'	145°	8
9	65°09'	+47'	137°	64°25'	+48'	138°	63°40'	+49'	139°	62°54'	+50'	141°	62°07'	+51'	142°	61°19'	+51'	143°	60°31'	+52'	144°	9
10	65°56'	+46'	135°	65°13'	+47'	137°	64°29'	+48'	138°	63°44'	+49'	139°	62°58'	+50'	141°	62°11'	+51'	142°	61°23'	+51'	143°	10
11	66°42'	+45'	133°	66°00'	+46'	135°	65°17'	+47'	137°	64°33'	+48'	138°	63°48'	+49'	139°	63°02'	+50'	141°	62°15'	+51'	142°	11
12	67°27'	+44'	132°	66°46'	+45'	134°	66°04'	+46'	135°	65°21'	+48'	137°	64°37'	+49'	138°	63°52'	+50'	140°	63°06'	+50'	141°	12
13	68°11'	+43'	130°	67°31'	+44'	132°	66°51'	+45'	134°	66°09'	+47'	135°	65°25'	+48'	137°	64°41'	+49'	138°	63°56'	+50'	140°	13
14	68°53'	+41'	128°	68°15'	+43'	130°	67°36'	+44'	132°	66°55'	+46'	134°	66°13'	+47'	135°	65°30'	+48'	137°	64°46'	+49'	138°	14
15	69°34'	+40'	126°	68°58'	+41'	128°	68°20'	+43'	130°	67°41'	+45'	132°	67°00'	+46'	134°	66°18'	+47'	135°	65°35'	+48'	137°	15
16	70°14'	+38'	124°	69°39'	+40'	126°	69°03'	+42'	128°	68°25'	+43'	130°	67°46'	+45'	132°	67°05'	+46'	134°	66°23'	+47'	135°	16
17	70°52'	+36'	121°	70°19'	+38'	124°	69°45'	+40'	126°	69°09'	+42'	128°	68°31'	+44'	130°	67°51'	+45'	132°	67°10'	+46'	134°	17
18	71°28'	+34'	119°	70°57'	+36'	122°	70°25'	+38'	124°	69°51'	+40'	126°	69°14'	+42'	128°	68°36'	+44'	130°	67°57'	+45'	132°	18
19	72°02'	+32'	116°	71°34'	+34'	119°	71°03'	+37'	122°	70°31'	+39'	124°	69°56'	+41'	126°	69°20'	+42'	128°	68°42'	+44'	130°	19
20	72°33'	+29'	114°	72°08'	+32'	116°	71°40'	+35'	119°	71°10'	+37'	122°	70°37'	+39'	124°	70°02'	+41'	126°	69°26'	+43'	129°	20
21	73°03'	+27'	111°	72°40'	+30'	114°	72°15'	+32'	116°	71°47'	+35'	119°	71°16'	+37'	122°	70°43'	+39'	124°	70°09'	+41'	127°	21
22	73°29'	+24'	108°	73°10'	+27'	111°	72°47'	+30'	114°	72°21'	+33'	117°	71°53'	+35'	119°	71°23'	+37'	122°	70°50'	+40'	124°	22
23	73°53'	+20'	104°	73°36'	+24'	108°	73°17'	+27'	111°	72°54'	+30'	114°	72°28'	+33'	117°	72°00'	+35'	119°	71°30'	+38'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	57°07'	+52'	145°	56°17'	+52'	146°	55°27'	+53'	147°	54°37'	+53'	148°	53°46'	+54'	148°	52°54'	+54'	149°	52°03'	+54'	150°	0
1	57°58'	+51'	144°	57°09'	+52'	145°	56°20'	+52'	146°	55°30'	+53'	147°	54°39'	+53'	148°	53°48'	+54'	148°	52°57'	+54'	149°	1
2	58°50'	+51'	143°	58°01'	+51'	144°	57°12'	+52'	145°	56°23'	+53'	146°	55°33'	+53'	147°	54°42'	+53'	148°	53°51'	+54'	148°	2
3	59°40'	+50'	142°	58°53'	+51'	143°	58°04'	+52'	144°	57°15'	+52'	145°	56°26'	+53'	146°	55°36'	+53'	147°	54°45'	+54'	148°	3
4	60°31'	+50'	141°	59°43'	+50'	142°	58°56'	+51'	143°	58°07'	+52'	144°	57°18'	+52'	145°	56°29'	+53'	146°	55°39'	+53'	147°	4
5	61°20'	+49'	140°	60°34'	+50'	141°	59°47'	+51'	142°	58°59'	+51'	143°	58°10'	+52'	144°	57°21'	+52'	145°	56°32'	+53'	146°	5
6	62°09'	+48'	139°	61°24'	+49'	140°	60°37'	+50'	141°	59°50'	+51'	142°	59°02'	+51'	143°	58°14'	+52'	144°	57°25'	+53'	145°	6
7	62°58'	+48'	138°	62°13'	+49'	139°	61°27'	+49'	140°	60°41'	+50'	141°	59°54'	+51'	142°	59°06'	+52'	143°	58°17'	+52'	144°	7
8	63°45'	+47'	136°	63°01'	+48'	138°	62°17'	+49'	139°	61°31'	+50'	140°	60°45'	+50'	141°	59°57'	+51'	142°	59°10'	+52'	143°	8
9	64°32'	+46'	135°	63°49'	+47'	136°	63°05'	+48'	138°	62°21'	+49'	139°	61°35'	+50'	140°	60°49'	+51'	141°	60°01'	+51'	142°	9
10	65°18'	+45'	133°	64°36'	+46'	135°	63°53'	+47'	136°	63°10'	+48'	138°	62°25'	+49'	139°	61°39'	+50'	140°	60°53'	+51'	141°	10
11	66°03'	+44'	132°	65°22'	+45'	133°	64°41'	+46'	135°	63°58'	+47'	136°	63°14'	+48'	138°	62°29'	+49'	139°	61°43'	+50'	140°	11
12	66°47'	+43'	130°	66°08'	+44'	132°	65°27'	+45'	133°	64°45'	+47'	135°	64°02'	+48'	136°	63°18'	+49'	138°	62°34'	+50'	139°	12
13	67°29'	+41'	128°	66°52'	+43'	130°	66°12'	+44'	132°	65°32'	+46'	133°	64°50'	+47'	135°	64°07'	+48'	136°	63°23'	+49'	138°	13
14	68°11'	+40'	126°	67°35'	+42'	128°	66°57'	+43'	130°	66°17'	+45'	132°	65°37'	+46'	133°	64°55'	+47'	135°	64°12'	+48'	136°	14
15	68°51'	+38'	124°	68°16'	+40'	126°	67°40'	+42'	128°	67°02'	+43'	130°	66°23'	+45'	132°	65°42'	+46'	134°	65°00'	+47'	135°	15
16	69°29'	+37'	122°	68°57'	+39'	124°	68°22'	+41'	126°	67°46'	+42'	128°	67°08'	+44'	130°	66°28'	+45'	132°	65°47'	+46'	134°	16
17	70°06'	+35'	120°	69°35'	+37'	122°	69°02'	+39'	124°	68°28'	+41'	126°	67°51'	+42'	128°	67°13'	+44'	130°	66°34'	+45'	132°	17
18	70°41'	+33'	117°	70°12'	+35'	120°	69°41'	+37'	122°	69°09'	+39'	124°	68°34'	+41'	126°	67°57'	+43'	128°	67°19'	+44'	130°	18
19	71°14'	+31'	115°	70°48'	+33'	117°	70°19'	+35'	120°	69°48'	+38'	122°	69°15'	+40'	124°	68°40'	+41'	127°	68°03'	+43'	129°	19
20	71°45'	+28'	112°	71°21'	+31'	115°	70°54'	+33'	117°	70°26'	+36'	120°	69°55'	+38'	122°	69°21'	+40'	125°	68°47'	+42'	127°	20
21	72°13'	+26'	109°	71°52'	+29'	112°	71°28'	+31'	115°	71°01'	+34'	117°	70°32'	+36'	120°	70°01'	+38'	122°	69°28'	+40'	125°	21
22	72°38'	+23'	106°	72°20'	+26'	109°	71°59'	+29'	112°	71°35'	+32'	115°	71°09'	+34'	118°	70°40'	+36'	120°	70°08'	+39'	123°	22
23	73°01'	+20'	103°	72°46'	+23'	106°	72°28'	+26'	109°	72°07'	+29'	112°	71°43'	+32'	115°	71°16'	+34'	118°	70°47'	+37'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	56°36'	+51'	144°	55°47'	+52'	145°	54°58'	+52'	145°	54°08'	+53'	146°	53°18'	+53'	147°	52°28'	+53'	148°	51°37'	+54'	148°	0
1	57°27'	+50'	143°	56°39'	+51'	144°	55°50'	+52'	145°	55°01'	+52'	145°	54°11'	+53'	146°	53°21'	+53'	147°	52°31'	+54'	148°	1
2	58°17'	+50'	142°	57°30'	+51'	143°	56°42'	+51'	144°	55°53'	+52'	145°	55°04'	+52'	145°	54°15'	+53'	146°	53°25'	+53'	147°	2
3	59°07'	+49'	141°	58°21'	+50'	142°	57°33'	+51'	143°	56°45'	+51'	144°	55°57'	+52'	145°	55°07'	+53'	145°	54°18'	+53'	146°	3
4	59°57'	+49'	140°	59°11'	+50'	141°	58°24'	+50'	142°	57°37'	+51'	143°	56°49'	+52'	144°	56°00'	+52'	144°	55°11'	+53'	145°	4
5	60°46'	+48'	138°	60°00'	+49'	140°	59°14'	+50'	141°	58°28'	+50'	142°	57°40'	+51'	143°	56°52'	+52'	144°	56°04'	+52'	144°	5
6	61°34'	+47'	137°	60°49'	+48'	138°	60°04'	+49'	140°	59°18'	+50'	141°	58°31'	+51'	142°	57°44'	+51'	143°	56°56'	+52'	144°	6
7	62°21'	+47'	136°	61°38'	+48'	137°	60°53'	+49'	138°	60°08'	+49'	140°	59°22'	+50'	141°	58°35'	+51'	142°	57°48'	+52'	143°	7
8	63°08'	+46'	134°	62°25'	+47'	136°	61°42'	+48'	137°	60°57'	+49'	138°	60°12'	+50'	140°	59°26'	+50'	141°	58°39'	+51'	142°	8
9	63°54'	+45'	133°	63°12'	+46'	134°	62°30'	+47'	136°	61°46'	+48'	137°	61°02'	+49'	138°	60°17'	+50'	140°	59°30'	+51'	141°	9
10	64°39'	+44'	132°	63°58'	+45'	133°	63°17'	+46'	135°	62°34'	+47'	136°	61°51'	+48'	137°	61°06'	+49'	138°	60°21'	+50'	140°	10
11	65°23'	+43'	130°	64°44'	+44'	132°	64°03'	+45'	133°	63°22'	+47'	135°	62°39'	+48'	136°	61°55'	+49'	137°	61°11'	+49'	138°	11
12	66°06'	+42'	128°	65°28'	+43'	130°	64°49'	+44'	132°	64°08'	+46'	133°	63°27'	+47'	135°	62°44'	+48'	136°	62°00'	+49'	137°	12
13	66°47'	+40'	126°	66°11'	+42'	128°	65°33'	+43'	130°	64°54'	+45'	132°	64°13'	+46'	133°	63°32'	+47'	135°	62°49'	+48'	136°	13
14	67°28'	+39'	124°	66°53'	+41'	126°	66°16'	+42'	128°	65°39'	+44'	130°	64°59'	+45'	132°	64°19'	+46'	133°	63°37'	+47'	135°	14
15	68°07'	+37'	122°	67°34'	+39'	125°	66°59'	+41'	126°	66°22'	+42'	128°	65°44'	+44'	130°	65°05'	+45'	132°	64°24'	+46'	133°	15
16	68°44'	+36'	120°	68°13'	+38'	123°	67°40'	+40'	125°	67°05'	+41'	127°	66°28'	+43'	128°	65°50'	+44'	130°	65°11'	+45'	132°	16
17	69°20'	+34'	118°	68°50'	+36'	120°	68°19'	+38'	123°	67°46'	+40'	125°	67°11'	+41'	127°	66°34'	+43'	128°	65°56'	+44'	130°	17
18	69°54'	+32'	116°	69°26'	+34'	118°	68°57'	+36'	120°	68°26'	+38'	123°	67°52'	+40'	125°	67°17'	+42'	127°	66°41'	+43'	129°	18
19	70°26'	+30'	113°	70°01'	+32'	116°	69°33'	+34'	118°	69°04'	+37'	121°	68°33'	+39'	123°	67°59'	+40'	125°	67°24'	+42'	127°	19
20	70°55'	+27'	111°	70°33'	+30'	113°	70°08'	+32'	116°	69°41'	+35'	118°	69°11'	+37'	121°	68°40'	+39'	123°	68°06'	+41'	125°	20
21	71°23'	+25'	108°	71°03'	+28'	111°	70°40'	+30'	113°	70°15'	+33'	116°	69°48'	+35'	118°	69°18'	+37'	121°	68°47'	+39'	123°	21
22	71°47'	+22'	105°	71°30'	+25'	108°	71°11'	+28'	111°	70°48'	+31'	113°	70°23'	+33'	116°	69°56'	+35'	118°	69°26'	+38'	121°	22
23	72°10'	+19'	102°	71°56'	+22'	105°	71°39'	+25'	108°	71°19'	+28'	111°	70°56'	+31'	113°	70°31'	+33'	116°	70°04'	+36'	119°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	28			29			30			31			32			33			34			

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

Dec°	28			29			30			31			32			33			34			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	56°04'	+50'	142°	55°16'	+51'	143°	54°28'	+51'	144°	53°39'	+52'	145°	52°50'	+52'	146°	52°00'	+53'	146°	51°10'	+53'	147°	0
1	56°54'	+50'	141°	56°07'	+50'	142°	55°20'	+51'	143°	54°31'	+52'	144°	53°43'	+52'	145°	52°53'	+53'	145°	52°04'	+53'	146°	1
2	57°44'	+49'	140°	56°58'	+50'	141°	56°11'	+51'	142°	55°23'	+51'	143°	54°35'	+52'	144°	53°46'	+52'	145°	52°57'	+53'	145°	2
3	58°33'	+49'	139°	57°48'	+49'	140°	57°01'	+50'	141°	56°14'	+51'	142°	55°26'	+51'	143°	54°38'	+52'	144°	53°50'	+52'	145°	3
4	59°22'	+48'	138°	58°37'	+49'	139°	57°51'	+50'	140°	57°05'	+50'	141°	56°18'	+51'	142°	55°30'	+52'	143°	54°42'	+52'	144°	4
5	60°10'	+47'	137°	59°26'	+48'	138°	58°41'	+49'	139°	57°55'	+50'	140°	57°09'	+50'	141°	56°22'	+51'	142°	55°34'	+52'	143°	5
6	60°57'	+47'	136°	60°14'	+48'	137°	59°30'	+48'	138°	58°45'	+49'	139°	57°59'	+50'	140°	57°13'	+51'	141°	56°26'	+51'	142°	6
7	61°44'	+46'	134°	61°01'	+47'	136°	60°18'	+48'	137°	59°34'	+49'	138°	58°49'	+49'	139°	58°04'	+50'	140°	57°17'	+51'	141°	7
8	62°30'	+45'	133°	61°48'	+46'	134°	61°06'	+47'	136°	60°23'	+48'	137°	59°39'	+49'	138°	58°54'	+50'	139°	58°08'	+50'	140°	8
9	63°15'	+44'	131°	62°34'	+45'	133°	61°53'	+46'	134°	61°11'	+47'	136°	60°27'	+48'	137°	59°43'	+49'	138°	58°58'	+50'	139°	9
10	63°59'	+43'	130°	63°20'	+44'	131°	62°39'	+45'	133°	61°58'	+47'	134°	61°16'	+47'	136°	60°32'	+48'	137°	59°48'	+49'	138°	10
11	64°42'	+42'	128°	64°04'	+43'	130°	63°25'	+45'	131°	62°44'	+46'	133°	62°03'	+47'	134°	61°21'	+48'	136°	60°37'	+49'	137°	11
12	65°24'	+41'	127°	64°47'	+42'	128°	64°09'	+44'	130°	63°30'	+45'	131°	62°50'	+46'	133°	62°09'	+47'	134°	61°26'	+48'	136°	12
13	66°04'	+39'	125°	65°29'	+41'	127°	64°53'	+42'	128°	64°15'	+44'	130°	63°36'	+45'	131°	62°55'	+46'	133°	62°14'	+47'	134°	13
14	66°44'	+38'	123°	66°10'	+40'	125°	65°35'	+41'	127°	64°59'	+43'	128°	64°21'	+44'	130°	63°42'	+45'	132°	63°01'	+46'	133°	14
15	67°22'	+36'	121°	66°50'	+38'	123°	66°16'	+40'	125°	65°41'	+42'	127°	65°05'	+43'	128°	64°27'	+44'	130°	63°48'	+46'	132°	15
16	67°58'	+35'	119°	67°28'	+37'	121°	66°56'	+39'	123°	66°23'	+40'	125°	65°48'	+42'	127°	65°11'	+43'	128°	64°33'	+45'	130°	16
17	68°33'	+33'	117°	68°05'	+35'	119°	67°35'	+37'	121°	67°03'	+39'	123°	66°30'	+41'	125°	65°55'	+42'	127°	65°18'	+44'	128°	17
18	69°06'	+31'	114°	68°40'	+33'	117°	68°12'	+35'	119°	67°42'	+37'	121°	67°10'	+39'	123°	66°37'	+41'	125°	66°01'	+42'	127°	18
19	69°37'	+29'	112°	69°13'	+31'	114°	68°47'	+34'	117°	68°19'	+36'	119°	67°49'	+38'	121°	67°17'	+39'	123°	66°44'	+41'	125°	19
20	70°05'	+27'	109°	69°44'	+29'	112°	69°21'	+32'	114°	68°55'	+34'	117°	68°27'	+36'	119°	67°57'	+38'	121°	67°25'	+40'	123°	20
21	70°32'	+24'	107°	70°13'	+27'	109°	69°52'	+29'	112°	69°29'	+32'	114°	69°03'	+34'	117°	68°35'	+36'	119°	68°05'	+38'	121°	21
22	70°56'	+22'	104°	70°40'	+24'	107°	70°22'	+27'	109°	70°01'	+30'	112°	69°37'	+32'	114°	69°11'	+34'	117°	68°43'	+37'	119°	22
23	71°18'	+19'	101°	71°05'	+22'	104°	70°49'	+25'	107°	70°30'	+27'	109°	70°09'	+30'	112°	69°46'	+33'	114°	69°20'	+35'	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°
	28			29			30			31			32			33			34			

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

Dec°	28			29			30			31			32			33			34			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	55°31'	+50'	141°	54°44'	+50'	142°	53°57'	+51'	142°	53°09'	+51'	143°	52°21'	+52'	144°	51°32'	+52'	145°	50°43'	+53'	146°	0
1	56°21'	+49'	140°	55°34'	+50'	141°	54°48'	+50'	142°	54°00'	+51'	142°	53°13'	+52'	143°	52°24'	+52'	144°	51°36'	+53'	145°	1
2	57°10'	+48'	139°	56°24'	+49'	140°	55°38'	+50'	141°	54°51'	+51'	142°	54°04'	+51'	142°	53°16'	+52'	143°	52°28'	+52'	144°	2
3	57°58'	+48'	138°	57°13'	+49'	139°	56°28'	+49'	140°	55°42'	+50'	141°	54°55'	+51'	141°	54°08'	+51'	142°	53°20'	+52'	143°	3
4	58°46'	+47'	136°	58°02'	+48'	138°	57°17'	+49'	139°	56°32'	+50'	140°	55°46'	+50'	141°	54°59'	+51'	141°	54°12'	+51'	142°	4
5	59°33'	+47'	135°	58°50'	+47'	136°	58°06'	+48'	137°	57°22'	+49'	139°	56°36'	+50'	140°	55°50'	+50'	141°	55°04'	+51'	141°	5
6	60°20'	+46'	134°	59°37'	+47'	135°	58°54'	+48'	136°	58°11'	+48'	137°	57°26'	+49'	139°	56°41'	+50'	140°	55°55'	+51'	141°	6
7	61°05'	+45'	133°	60°24'	+46'	134°	59°42'	+47'	135°	58°59'	+48'	136°	58°15'	+49'	137°	57°31'	+49'	139°	56°45'	+50'	140°	7
8	61°50'	+44'	131°	61°10'	+45'	133°	60°29'	+46'	134°	59°47'	+47'	135°	59°04'	+48'	136°	58°20'	+49'	137°	57°36'	+50'	139°	8
9	62°34'	+43'	130°	61°55'	+44'	131°	61°15'	+45'	133°	60°34'	+46'	134°	59°52'	+47'	135°	59°09'	+48'	136°	58°25'	+49'	137°	9
10	63°17'	+42'	128°	62°40'	+43'	130°	62°01'	+45'	131°	61°21'	+46'	133°	60°39'	+47'	134°	59°57'	+48'	135°	59°14'	+49'	136°	10
11	64°00'	+41'	127°	63°23'	+42'	128°	62°45'	+44'	130°	62°06'	+45'	131°	61°26'	+46'	133°	60°45'	+47'	134°	60°03'	+48'	135°	11
12	64°41'	+40'	125°	64°05'	+41'	127°	63°29'	+43'	128°	62°51'	+44'	130°	62°12'	+45'	131°	61°32'	+46'	133°	60°51'	+47'	134°	12
13	65°20'	+38'	123°	64°47'	+40'	125°	64°12'	+42'	127°	63°35'	+43'	128°	62°57'	+44'	130°	62°18'	+45'	131°	61°38'	+46'	133°	13
14	65°59'	+37'	121°	65°27'	+39'	123°	64°53'	+40'	125°	64°18'	+42'	127°	63°41'	+43'	128°	63°04'	+44'	130°	62°24'	+46'	131°	14
15	66°36'	+35'	119°	66°05'	+37'	121°	65°33'	+39'	123°	65°00'	+41'	125°	64°25'	+42'	127°	63°48'	+43'	128°	63°10'	+45'	130°	15
16	67°11'	+34'	117°	66°43'	+36'	119°	66°12'	+38'	121°	65°40'	+39'	123°	65°07'	+41'	125°	64°31'	+42'	127°	63°55'	+44'	128°	16
17	67°45'	+32'	115°	67°18'	+34'	117°	66°50'	+36'	119°	66°20'	+38'	121°	65°47'	+40'	123°	65°14'	+41'	125°	64°38'	+43'	127°	17
18	68°17'	+30'	113°	67°53'	+32'	115°	67°26'	+34'	117°	66°58'	+36'	119°	66°27'	+38'	121°	65°55'	+40'	123°	65°21'	+42'	125°	18
19	68°47'	+28'	111°	68°25'	+30'	113°	68°01'	+33'	115°	67°34'	+35'	117°	67°05'	+37'	119°	66°35'	+39'	122°	66°03'	+40'	123°	19
20	69°15'	+26'	108°	68°55'	+28'	111°	68°33'	+31'	113°	68°09'	+33'	115°	67°42'	+35'	117°	67°13'	+37'	120°	66°43'	+39'	122°	20
21	69°41'	+23'	105°	69°24'	+26'	108°	69°04'	+29'	111°	68°42'	+31'	113°	68°17'	+33'	115°	67°50'	+35'	117°	67°22'	+37'	120°	21
22	70°05'	+21'	103°	69°50'	+24'	105°	69°33'	+26'	108°	69°13'	+29'	111°	68°50'	+31'	113°	68°26'	+34'	115°	67°59'	+36'	118°	22
23	70°26'	+18'	100°	70°14'	+21'	103°	69°59'	+24'	105°	69°42'	+27'	108°	69°22'	+29'	111°	69°00'	+32'	113°	68°35'	+34'	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°
	28			29			30			31			32			33			34			

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°	28			29			30			31			32			33			34			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	54°57'	+49'	139°	54°11'	+49'	140°	53°25'	+50'	141°	52°38'	+51'	142°	51°50'	+51'	143°	51°02'	+52'	143°	50°14'	+52'	144°	0
1	55°46'	+48'	138°	55°01'	+49'	139°	54°15'	+50'	140°	53°29'	+50'	141°	52°42'	+51'	142°	51°54'	+51'	143°	51°06'	+52'	143°	1
2	56°34'	+48'	137°	55°50'	+48'	138°	55°05'	+49'	139°	54°19'	+50'	140°	53°33'	+50'	141°	52°46'	+51'	142°	51°58'	+52'	143°	2
3	57°22'	+47'	136°	56°38'	+48'	137°	55°54'	+49'	138°	55°09'	+49'	139°	54°23'	+50'	140°	53°37'	+51'	141°	52°50'	+51'	142°	3
4	58°09'	+46'	135°	57°26'	+47'	136°	56°42'	+48'	137°	55°58'	+49'	138°	55°13'	+50'	139°	54°28'	+50'	140°	53°41'	+51'	141°	4
5	58°55'	+46'	134°	58°13'	+47'	135°	57°31'	+48'	136°	56°47'	+48'	137°	56°03'	+49'	138°	55°18'	+50'	139°	54°32'	+50'	140°	5
6	59°41'	+45'	132°	59°00'	+46'	134°	58°18'	+47'	135°	57°35'	+48'	136°	56°52'	+49'	137°	56°08'	+49'	138°	55°23'	+50'	139°	6
7	60°26'	+44'	131°	59°46'	+45'	132°	59°05'	+46'	134°	58°23'	+47'	135°	57°40'	+48'	136°	56°57'	+49'	137°	56°13'	+50'	138°	7
8	61°10'	+43'	130°	60°31'	+44'	131°	59°51'	+45'	132°	59°10'	+46'	134°	58°28'	+47'	135°	57°46'	+48'	136°	57°02'	+49'	137°	8
9	61°53'	+42'	128°	61°15'	+43'	130°	60°37'	+45'	131°	59°57'	+46'	132°	59°16'	+47'	134°	58°34'	+48'	135°	57°51'	+48'	136°	9
10	62°35'	+41'	127°	61°59'	+43'	128°	61°21'	+44'	130°	60°42'	+45'	131°	60°02'	+46'	132°	59°21'	+47'	134°	58°40'	+48'	135°	10
11	63°17'	+40'	125°	62°41'	+41'	127°	62°05'	+43'	128°	61°27'	+44'	130°	60°48'	+45'	131°	60°08'	+46'	132°	59°27'	+47'	134°	11
12	63°57'	+39'	123°	63°23'	+40'	125°	62°48'	+42'	127°	62°11'	+43'	128°	61°33'	+44'	130°	60°55'	+45'	131°	60°15'	+46'	132°	12
13	64°36'	+38'	122°	64°03'	+39'	123°	63°29'	+41'	125°	62°54'	+42'	127°	62°18'	+43'	128°	61°40'	+45'	130°	61°01'	+46'	131°	13
14	65°13'	+36'	120°	64°42'	+38'	122°	64°10'	+39'	123°	63°36'	+41'	125°	63°01'	+42'	127°	62°24'	+44'	128°	61°47'	+45'	130°	14
15	65°49'	+35'	118°	65°20'	+36'	120°	64°50'	+38'	122°	64°17'	+40'	123°	63°43'	+41'	125°	63°08'	+43'	127°	62°31'	+44'	128°	15
16	66°24'	+33'	116°	65°57'	+35'	118°	65°28'	+37'	120°	64°57'	+38'	122°	64°25'	+40'	124°	63°51'	+42'	125°	63°15'	+43'	127°	16
17	66°57'	+31'	114°	66°32'	+33'	116°	66°04'	+35'	118°	65°35'	+37'	120°	65°05'	+39'	122°	64°32'	+40'	124°	63°58'	+42'	125°	17
18	67°28'	+29'	112°	67°05'	+32'	114°	66°40'	+34'	116°	66°12'	+36'	118°	65°43'	+37'	120°	65°13'	+39'	122°	64°40'	+41'	124°	18
19	67°57'	+27'	109°	67°36'	+30'	112°	67°13'	+32'	114°	66°48'	+34'	116°	66°21'	+36'	118°	65°52'	+38'	120°	65°21'	+39'	122°	19
20	68°25'	+25'	107°	68°06'	+28'	109°	67°45'	+30'	112°	67°22'	+32'	114°	66°57'	+34'	116°	66°29'	+36'	118°	66°00'	+38'	120°	20
21	68°50'	+23'	104°	68°34'	+25'	107°	68°15'	+28'	109°	67°54'	+30'	112°	67°31'	+33'	114°	67°06'	+35'	116°	66°38'	+37'	118°	21
22	69°13'	+21'	102°	68°59'	+23'	104°	68°43'	+26'	107°	68°24'	+28'	109°	68°03'	+31'	112°	67°40'	+33'	114°	67°15'	+35'	116°	22
23	69°33'	+18'	99°	69°22'	+21'	102°	69°09'	+24'	104°	68°53'	+26'	107°	68°34'	+29'	109°	68°13'	+31'	112°	67°50'	+33'	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°
	28			29			30			31			32			33			34			

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°	28			29			30			31			32			33			34			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	54°22'	+48'	138°	53°37'	+49'	139°	52°52'	+49'	140°	52°06'	+50'	141°	51°19'	+51'	141°	50°32'	+51'	142°	49°44'	+52'	143°	0
1	55°10'	+48'	137°	54°26'	+48'	138°	53°41'	+49'	139°	52°56'	+50'	140°	52°10'	+50'	140°	51°23'	+51'	141°	50°36'	+51'	142°	1
2	55°58'	+47'	136°	55°14'	+48'	137°	54°30'	+49'	138°	53°45'	+49'	139°	53°00'	+50'	140°	52°14'	+50'	140°	51°28'	+51'	141°	2
3	56°45'	+46'	135°	56°02'	+47'	136°	55°19'	+48'	137°	54°35'	+49'	138°	53°50'	+49'	139°	53°05'	+50'	139°	52°19'	+51'	140°	3
4	57°31'	+46'	133°	56°49'	+47'	135°	56°07'	+47'	136°	55°23'	+48'	137°	54°39'	+49'	138°	53°55'	+50'	139°	53°09'	+50'	139°	4
5	58°17'	+45'	132°	57°36'	+46'	133°	56°54'	+47'	135°	56°12'	+48'	136°	55°28'	+48'	137°	54°44'	+49'	138°	54°00'	+50'	139°	5
6	59°01'	+44'	131°	58°22'	+45'	132°	57°41'	+46'	133°	56°59'	+47'	135°	56°17'	+48'	136°	55°33'	+49'	137°	54°50'	+49'	138°	6
7	59°46'	+43'	130°	59°07'	+44'	131°	58°27'	+45'	132°	57°46'	+46'	133°	57°05'	+47'	134°	56°22'	+48'	136°	55°39'	+49'	137°	7
8	60°29'	+42'	128°	59°51'	+44'	130°	59°12'	+45'	131°	58°33'	+46'	132°	57°52'	+47'	133°	57°10'	+47'	134°	56°28'	+48'	136°	8
9	61°11'	+41'	127°	60°35'	+43'	128°	59°57'	+44'	130°	59°18'	+45'	131°	58°38'	+46'	132°	57°58'	+47'	133°	57°16'	+48'	134°	9
10	61°53'	+40'	125°	61°17'	+42'	127°	60°41'	+43'	128°	60°03'	+44'	130°	59°24'	+45'	131°	58°45'	+46'	132°	58°04'	+47'	133°	10
11	62°33'	+39'	124°	61°59'	+41'	125°	61°24'	+42'	127°	60°47'	+43'	128°	60°09'	+44'	130°	59°31'	+45'	131°	58°51'	+46'	132°	11
12	63°12'	+38'	122°	62°40'	+40'	124°	62°06'	+41'	125°	61°30'	+42'	127°	60°54'	+43'	128°	60°16'	+45'	130°	59°37'	+46'	131°	12
13	63°50'	+37'	120°	63°19'	+38'	122°	62°47'	+40'	124°	62°13'	+41'	125°	61°37'	+43'	127°	61°01'	+44'	128°	60°23'	+45'	130°	13
14	64°27'	+35'	118°	63°57'	+37'	120°	63°26'	+39'	122°	62°54'	+40'	124°	62°20'	+42'	125°	61°45'	+43'	127°	61°08'	+44'	128°	14
15	65°02'	+34'	117°	64°34'	+36'	118°	64°05'	+37'	120°	63°34'	+39'	122°	63°01'	+40'	124°	62°27'	+42'	125°	61°52'	+43'	127°	15
16	65°36'	+32'	115°	65°10'	+34'	117°	64°42'	+36'	118°	64°13'	+38'	120°	63°42'	+39'	122°	63°09'	+41'	124°	62°35'	+42'	125°	16
17	66°08'	+30'	113°	65°44'	+33'	115°	65°18'	+34'	117°	64°50'	+36'	118°	64°21'	+38'	120°	63°50'	+40'	122°	63°17'	+41'	124°	17
18	66°39'	+29'	110°	66°17'	+31'	113°	65°53'	+33'	115°	65°27'	+35'	117°	64°59'	+37'	119°	64°29'	+38'	120°	63°58'	+40'	122°	18
19	67°07'	+27'	108°	66°47'	+29'	110°	66°25'	+31'	113°	66°01'	+33'	115°	65°36'	+35'	117°	65°08'	+37'	119°	64°38'	+39'	120°	19
20	67°34'	+25'	106°	67°16'	+27'	108°	66°57'	+29'	110°	66°35'	+31'	113°	66°11'	+33'	115°	65°45'	+35'	117°	65°17'	+37'	119°	20
21	67°58'	+22'	103°	67°43'	+25'	106°	67°26'	+27'	108°	67°06'	+30'	110°	66°44'	+32'	113°	66°20'	+34'	115°	65°54'	+36'	117°	21
22	68°21'	+20'	101°	68°08'	+23'	103°	67°53'	+25'	106°	67°36'	+28'	108°	67°16'	+30'	110°	66°54'	+32'	113°	66°30'	+34'	115°	22
23	68°41'	+18'	98°	68°31'	+20'	101°	68°18'	+23'	103°	68°03'	+26'	106°	67°46'	+28'	108°	67°26'	+30'	110°	67°04'	+32'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	53°46'	+47'	137°	53°02'	+48'	137°	52°18'	+49'	138°	51°33'	+49'	139°	50°47'	+50'	140°	50°01'	+51'	141°	49°14'	+51'	141°	0
1	54°33'	+47'	135°	53°50'	+48'	136°	53°06'	+48'	137°	52°22'	+49'	138°	51°37'	+50'	139°	50°51'	+50'	140°	50°05'	+51'	141°	1
2	55°20'	+46'	134°	54°38'	+47'	135°	53°55'	+48'	136°	53°11'	+49'	137°	52°27'	+49'	138°	51°42'	+50'	139°	50°56'	+51'	140°	2
3	56°06'	+46'	133°	55°25'	+46'	134°	54°43'	+47'	135°	54°00'	+48'	136°	53°16'	+49'	137°	52°31'	+49'	138°	51°47'	+50'	139°	3
4	56°52'	+45'	132°	56°11'	+46'	133°	55°30'	+47'	134°	54°48'	+48'	135°	54°05'	+48'	136°	53°21'	+49'	137°	52°37'	+50'	138°	4
5	57°37'	+44'	131°	56°57'	+45'	132°	56°17'	+46'	133°	55°35'	+47'	134°	54°53'	+48'	135°	54°10'	+49'	136°	53°26'	+49'	137°	5
6	58°21'	+43'	130°	57°42'	+44'	131°	57°03'	+45'	132°	56°22'	+46'	133°	55°41'	+47'	134°	54°58'	+48'	135°	54°16'	+49'	136°	6
7	59°04'	+42'	128°	58°27'	+44'	130°	57°48'	+45'	131°	57°08'	+46'	132°	56°28'	+47'	133°	55°46'	+47'	134°	55°04'	+48'	135°	7
8	59°47'	+42'	127°	59°10'	+43'	128°	58°33'	+44'	129°	57°54'	+45'	131°	57°14'	+46'	132°	56°34'	+47'	133°	55°53'	+48'	134°	8
9	60°28'	+41'	125°	59°53'	+42'	127°	59°17'	+43'	128°	58°39'	+44'	129°	58°00'	+45'	131°	57°21'	+46'	132°	56°40'	+47'	133°	9
10	61°09'	+40'	124°	60°35'	+41'	125°	60°00'	+42'	127°	59°23'	+43'	128°	58°45'	+44'	129°	58°07'	+45'	131°	57°27'	+46'	132°	10
11	61°49'	+38'	122°	61°16'	+40'	124°	60°42'	+41'	125°	60°06'	+42'	127°	59°30'	+44'	128°	58°52'	+45'	129°	58°14'	+46'	131°	11
12	62°27'	+37'	121°	61°56'	+39'	122°	61°23'	+40'	124°	60°49'	+41'	125°	60°13'	+43'	127°	59°37'	+44'	128°	58°59'	+45'	129°	12
13	63°04'	+36'	119°	62°34'	+38'	121°	62°03'	+39'	122°	61°30'	+40'	124°	60°56'	+42'	125°	60°21'	+43'	127°	59°44'	+44'	128°	13
14	63°40'	+35'	117°	63°12'	+36'	119°	62°42'	+38'	121°	62°11'	+39'	122°	61°38'	+41'	124°	61°04'	+42'	125°	60°29'	+43'	127°	14
15	64°15'	+33'	115°	63°48'	+35'	117°	63°20'	+37'	119°	62°50'	+38'	121°	62°19'	+40'	122°	61°46'	+41'	124°	61°12'	+42'	125°	15
16	64°48'	+31'	113°	64°23'	+33'	115°	63°56'	+35'	117°	63°28'	+37'	119°	62°58'	+38'	121°	62°27'	+40'	122°	61°54'	+41'	124°	16
17	65°19'	+30'	111°	64°56'	+32'	113°	64°31'	+34'	115°	64°05'	+35'	117°	63°37'	+37'	119°	63°07'	+39'	121°	62°36'	+40'	122°	17
18	65°49'	+28'	109°	65°28'	+30'	111°	65°05'	+32'	113°	64°40'	+34'	115°	64°14'	+36'	117°	63°46'	+38'	119°	63°16'	+39'	121°	18
19	66°17'	+26'	107°	65°58'	+28'	109°	65°37'	+30'	111°	65°14'	+32'	113°	64°50'	+34'	115°	64°23'	+36'	117°	63°55'	+38'	119°	19
20	66°43'	+24'	105°	66°26'	+26'	107°	66°08'	+29'	109°	65°47'	+31'	111°	65°24'	+33'	113°	64°59'	+35'	115°	64°33'	+37'	117°	20
21	67°07'	+22'	102°	66°53'	+24'	105°	66°36'	+27'	107°	66°18'	+29'	109°	65°57'	+31'	111°	65°34'	+33'	113°	65°09'	+35'	115°	21
22	67°29'	+20'	100°	67°17'	+22'	102°	67°03'	+25'	105°	66°47'	+27'	107°	66°28'	+29'	109°	66°07'	+31'	111°	65°44'	+33'	113°	22
23	67°49'	+17'	98°	67°39'	+20'	100°	67°28'	+23'	102°	67°14'	+25'	105°	66°57'	+27'	107°	66°39'	+30'	109°	66°18'	+32'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	53°09'	+47'	135°	52°26'	+47'	136°	51°43'	+48'	137°	50°58'	+49'	138°	50°14'	+49'	139°	49°28'	+50'	139°	48°43'	+51'	140°	0
1	53°56'	+46'	134°	53°14'	+47'	135°	52°31'	+48'	136°	51°47'	+48'	137°	51°03'	+49'	138°	50°18'	+50'	139°	49°33'	+50'	139°	1
2	54°42'	+45'	133°	54°01'	+46'	134°	53°18'	+47'	135°	52°36'	+48'	136°	51°52'	+49'	137°	51°08'	+49'	138°	50°24'	+50'	139°	2
3	55°27'	+45'	132°	54°47'	+46'	133°	54°06'	+47'	134°	53°24'	+47'	135°	52°41'	+48'	136°	51°57'	+49'	137°	51°13'	+50'	138°	3
4	56°12'	+44'	131°	55°33'	+45'	132°	54°52'	+46'	133°	54°11'	+47'	134°	53°29'	+48'	135°	52°46'	+48'	136°	52°03'	+49'	137°	4
5	56°56'	+43'	129°	56°18'	+44'	131°	55°38'	+45'	132°	54°58'	+46'	133°	54°17'	+47'	134°	53°35'	+48'	135°	52°52'	+49'	136°	5
6	57°40'	+43'	128°	57°02'	+44'	129°	56°24'	+45'	131°	55°44'	+46'	132°	55°04'	+46'	133°	54°23'	+47'	134°	53°41'	+48'	135°	6
7	58°22'	+42'	127°	57°46'	+43'	128°	57°08'	+44'	129°	56°30'	+45'	131°	55°50'	+46'	132°	55°10'	+47'	133°	54°29'	+48'	134°	7
8	59°04'	+41'	125°	58°29'	+42'	127°	57°52'	+43'	128°	57°15'	+44'	129°	56°36'	+45'	131°	55°57'	+46'	132°	55°16'	+47'	133°	8
9	59°45'	+40'	124°	59°11'	+41'	125°	58°35'	+42'	127°	57°59'	+43'	128°	57°21'	+44'	129°	56°43'	+45'	130°	56°03'	+46'	132°	9
10	60°25'	+39'	123°	59°52'	+40'	124°	59°18'	+41'	125°	58°42'	+43'	127°	58°06'	+44'	128°	57°28'	+45'	129°	56°50'	+46'	130°	10
11	61°03'	+38'	121°	60°32'	+39'	123°	59°59'	+40'	124°	59°25'	+42'	125°	58°49'	+43'	127°	58°13'	+44'	128°	57°36'	+45'	129°	11
12	61°41'	+36'	119°	61°11'	+38'	121°	60°39'	+39'	122°	60°06'	+41'	124°	59°32'	+42'	125°	58°57'	+43'	127°	58°21'	+44'	128°	12
13	62°17'	+35'	118°	61°49'	+37'	119°	61°19'	+38'	121°	60°47'	+40'	122°	60°14'	+41'	124°	59°40'	+42'	125°	59°05'	+43'	127°	13
14	62°53'	+34'	116°	62°26'	+35'	118°	61°57'	+37'	119°	61°27'	+39'	121°	60°55'	+40'	122°	60°22'	+41'	124°	59°48'	+43'	125°	14
15	63°26'	+32'	114°	63°01'	+34'	116°	62°34'	+36'	118°	62°05'	+37'	119°	61°35'	+39'	121°	61°04'	+40'	122°	60°31'	+42'	124°	15
16	63°59'	+31'	112°	63°35'	+33'	114°	63°10'	+34'	116°	62°43'	+36'	118°	62°14'	+38'	119°	61°44'	+39'	121°	61°13'	+41'	122°	16
17	64°29'	+29'	110°	64°08'	+31'	112°	63°44'	+33'	114°	63°19'	+35'	116°	62°52'	+36'	118°	62°23'	+38'	119°	61°53'	+40'	121°	17
18	64°59'	+27'	108°	64°39'	+29'	110°	64°17'	+31'	112°	63°54'	+33'	114°	63°28'	+35'	116°	63°01'	+37'	118°	62°33'	+38'	119°	18
19	65°26'	+26'	106°	65°08'	+28'	108°	64°49'	+30'	110°	64°27'	+32'	112°	64°04'	+34'	114°	63°38'	+35'	116°	63°11'	+37'	118°	19
20	65°51'	+24'	104°	65°36'	+26'	106°	65°18'	+28'	108°	64°59'	+30'	110°	64°37'	+32'	112°	64°14'	+34'	114°	63°48'	+36'	116°	20
21	66°15'	+22'	102°	66°02'	+24'	104°	65°46'	+26'	106°	65°29'	+28'	108°	65°09'	+30'	110°	64°48'	+32'	112°	64°24'	+34'	114°	21
22	66°37'	+19'	99°	66°26'	+22'	102°	66°13'	+24'	104°	65°57'	+27'	106°	65°40'	+29'	108°	65°20'	+31'	110°	64°59'	+33'	112°	22
23	66°56'	+17'	97°	66°48'	+20'	99°	66°37'	+22'	101°	66°24'	+25'	104°	66°09'	+27'	106°	65°51'	+29'	108°	65°31'	+31'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	52°31'	+46'	134°	51°49'	+47'	135°	51°07'	+48'	136°	50°23'	+48'	137°	49°40'	+49'	137°	48°55'	+50'	138°	48°10'	+50'	139°	0
1	53°17'	+45'	133°	52°36'	+46'	134°	51°54'	+47'	135°	51°12'	+48'	136°	50°29'	+48'	136°	49°45'	+49'	137°	49°00'	+50'	138°	1
2	54°03'	+45'	132°	53°22'	+46'	133°	52°41'	+46'	134°	52°00'	+47'	135°	51°17'	+48'	136°	50°34'	+49'	136°	49°50'	+49'	137°	2
3	54°48'	+44'	131°	54°08'	+45'	132°	53°28'	+46'	133°	52°47'	+47'	134°	52°05'	+48'	135°	51°23'	+48'	135°	50°39'	+49'	136°	3
4	55°32'	+43'	129°	54°53'	+44'	131°	54°14'	+45'	132°	53°34'	+46'	133°	52°53'	+47'	134°	52°11'	+48'	135°	51°28'	+48'	135°	4
5	56°15'	+43'	128°	55°38'	+44'	129°	54°59'	+45'	130°	54°20'	+46'	132°	53°40'	+46'	133°	52°59'	+47'	134°	52°17'	+48'	134°	5
6	56°58'	+42'	127°	56°21'	+43'	128°	55°44'	+44'	129°	55°05'	+45'	130°	54°26'	+46'	131°	53°46'	+47'	132°	53°05'	+48'	133°	6
7	57°40'	+41'	126°	57°04'	+42'	127°	56°28'	+43'	128°	55°50'	+44'	129°	55°12'	+45'	130°	54°33'	+46'	131°	53°52'	+47'	132°	7
8	58°21'	+40'	124°	57°46'	+41'	126°	57°11'	+42'	127°	56°34'	+43'	128°	55°57'	+45'	129°	55°19'	+45'	130°	54°39'	+46'	131°	8
9	59°01'	+39'	123°	58°28'	+40'	124°	57°53'	+42'	125°	57°18'	+43'	127°	56°42'	+44'	128°	56°04'	+45'	129°	55°26'	+46'	130°	9
10	59°40'	+38'	121°	59°08'	+39'	123°	58°35'	+41'	124°	58°01'	+42'	125°	57°25'	+43'	127°	56°49'	+44'	128°	56°12'	+45'	129°	10
11	60°18'	+37'	120°	59°47'	+38'	121°	59°16'	+40'	123°	58°43'	+41'	124°	58°08'	+42'	125°	57°33'	+43'	127°	56°57'	+44'	128°	11
12	60°55'	+36'	118°	60°26'	+37'	120°	59°55'	+39'	121°	59°23'	+40'	123°	58°50'	+41'	124°	58°16'	+42'	125°	57°41'	+44'	127°	12
13	61°30'	+34'	116°	61°03'	+36'	118°	60°34'	+38'	120°	60°03'	+39'	121°	59°32'	+40'	123°	58°59'	+42'	124°	58°25'	+43'	125°	13
14	62°05'	+33'	115°	61°39'	+35'	116°	61°11'	+36'	118°	60°42'	+38'	120°	60°12'	+39'	121°	59°40'	+41'	123°	59°07'	+42'	124°	14
15	62°38'	+32'	113°	62°14'	+33'	115°	61°48'	+35'	116°	61°20'	+37'	118°	60°51'	+38'	120°	60°21'	+40'	121°	59°49'	+41'	123°	15
16	63°09'	+30'	111°	62°47'	+32'	113°	62°23'	+34'	115°	61°57'	+35'	116°	61°30'	+37'	118°	61°01'	+39'	120°	60°30'	+40'	121°	16
17	63°40'	+29'	109°	63°19'	+30'	111°	62°57'	+32'	113°	62°32'	+34'	115°	62°07'	+36'	116°	61°39'	+37'	118°	61°10'	+39'	120°	17
18	64°08'	+27'	107°	63°49'	+29'	109°	63°29'	+31'	111°	63°07'	+33'	113°	62°42'	+34'	115°	62°17'	+36'	116°	61°49'	+38'	118°	18
19	64°35'	+25'	105°	64°18'	+27'	107°	64°00'	+29'	109°	63°39'	+31'	111°	63°17'	+33'	113°	62°53'	+35'	115°	62°27'	+36'	116°	19
20	65°00'	+23'	103°	64°45'	+25'	105°	64°29'	+27'	107°	64°10'	+30'	109°	63°50'	+32'	111°	63°28'	+33'	113°	63°03'	+35'	115°	20
21	65°23'	+21'	101°	65°11'	+23'	103°	64°56'	+26'	105°	64°40'	+28'	107°	64°21'	+30'	109°	64°01'	+32'	111°	63°39'	+34'	113°	21
22	65°44'	+19'	98°	65°34'	+21'	101°	65°22'	+24'	103°	65°08'	+26'	105°	64°51'	+28'	107°	64°33'	+30'	109°	64°12'	+32'	111°	22
23	66°03'	+17'	96°	65°56'	+19'	98°	65°46'	+22'	101°	65°34'	+24'	103°	65°19'	+26'	105°	65°03'	+29'	107°	64°45'	+31'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	51°53'	+45'	133°	51°12'	+46'	134°	50°30'	+47'	134°	49°48'	+48'	135°	49°05'	+48'	136°	48°21'	+49'	137°	47°37'	+50'	138°	0
1	52°38'	+45'	132°	51°58'	+46'	133°	51°17'	+46'	133°	50°35'	+47'	134°	49°53'	+48'	135°	49°10'	+49'	136°	48°27'	+49'	137°	1
2	53°23'	+44'	130°	52°43'	+45'	131°	52°03'	+46'	132°	51°23'	+47'	133°	50°41'	+47'	134°	49°59'	+48'	135°	49°16'	+49'	136°	2
3	54°07'	+43'	129°	53°28'	+44'	130°	52°49'	+45'	131°	52°09'	+46'	132°	51°28'	+47'	133°	50°47'	+48'	134°	50°05'	+48'	135°	3
4	54°50'	+43'	128°	54°13'	+44'	129°	53°34'	+45'	130°	52°55'	+46'	131°	52°15'	+46'	132°	51°35'	+47'	133°	50°53'	+48'	134°	4
5	55°33'	+42'	127°	54°57'	+43'	128°	54°19'	+44'	129°	53°41'	+45'	130°	53°02'	+46'	131°	52°22'	+47'	132°	51°41'	+47'	133°	5
6	56°15'	+41'	126°	55°40'	+42'	127°	55°03'	+43'	128°	54°26'	+44'	129°	53°47'	+45'	130°	53°08'	+46'	131°	52°28'	+47'	132°	6
7	56°56'	+40'	124°	56°22'	+41'	126°	55°46'	+43'	127°	55°10'	+44'	128°	54°33'	+45'	129°	53°54'	+45'	130°	53°15'	+46'	131°	7
8	57°36'	+39'	123°	57°03'	+41'	124°	56°29'	+42'	125°	55°54'	+43'	127°	55°17'	+44'	128°	54°40'	+45'	129°	54°02'	+46'	130°	8
9	58°16'	+38'	122°	57°44'	+40'	123°	57°11'	+41'	124°	56°36'	+42'	125°	56°01'	+43'	127°	55°25'	+44'	128°	54°47'	+45'	129°	9
10	58°54'	+37'	120°	58°23'	+39'	121°	57°52'	+40'	123°	57°18'	+41'	124°	56°44'	+42'	125°	56°09'	+43'	127°	55°33'	+44'	128°	10
11	59°31'	+36'	119°	59°02'	+38'	120°	58°31'	+39'	121°	58°00'	+40'	123°	57°27'	+41'	124°	56°52'	+43'	125°	56°17'	+44'	127°	11
12	60°08'	+35'	117°	59°40'	+37'	118°	59°10'	+38'	120°	58°40'	+39'	121°	58°08'	+41'	123°	57°35'	+42'	124°	57°01'	+43'	125°	12
13	60°43'	+34'	115°	60°16'	+35'	117°	59°48'	+37'	118°	59°19'	+38'	120°	58°49'	+40'	121°	58°17'	+41'	123°	57°44'	+42'	124°	13
14	61°16'	+32'	114°	60°52'	+34'	115°	60°25'	+36'	117°	59°57'	+37'	118°	59°28'	+39'	120°	58°58'	+40'	121°	58°26'	+41'	123°	14
15	61°49'	+31'	112°	61°26'	+33'	114°	61°01'	+34'	115°	60°35'	+36'	117°	60°07'	+38'	118°	59°38'	+39'	120°	59°07'	+40'	121°	15
16	62°20'	+30'	110°	61°58'	+31'	112°	61°35'	+33'	113°	61°11'	+35'	115°	60°44'	+36'	117°	60°17'	+38'	118°	59°47'	+39'	120°	16
17	62°49'	+28'	108°	62°30'	+30'	110°	62°08'	+32'	112°	61°45'	+33'	113°	61°21'	+35'	115°	60°55'	+37'	117°	60°27'	+38'	118°	17
18	63°17'	+26'	106°	63°00'	+28'	108°	62°40'	+30'	110°	62°19'	+32'	112°	61°56'	+34'	113°	61°31'	+35'	115°	61°05'	+37'	117°	18
19	63°44'	+25'	104°	63°28'	+27'	106°	63°10'	+29'	108°	62°51'	+31'	110°	62°30'	+32'	112°	62°07'	+34'	113°	61°42'	+36'	115°	19
20	64°08'	+23'	102°	63°55'	+25'	104°	63°39'	+27'	106°	63°22'	+29'	108°	63°02'	+31'	110°	62°41'	+33'	112°	62°18'	+35'	113°	20
21	64°31'	+21'	100°	64°20'	+23'	102°	64°06'	+25'	104°	63°51'	+27'	106°	63°33'	+29'	108°	63°14'	+31'	110°	62°52'	+33'	112°	21
22	64°52'	+19'	98°	64°43'	+21'	100°	64°31'	+23'	102°	64°18'	+26'	104°	64°02'	+28'	106°	63°45'	+30'	108°	63°26'	+32'	110°	22
23	65°11'	+17'	95°	65°04'	+19'	98°	64°55'	+21'	100°	64°44'	+24'	102°	64°30'	+26'	104°	64°15'	+28'	106°	63°57'	+30'	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°
	28			29			30			31			32			33			34			

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

Dec°	28 Hc°	28 d'	28 Z°	29 Hc°	29 d'	29 Z°	30 Hc°	30 d'	30 Z°	31 Hc°	31 d'	31 Z°	32 Hc°	32 d'	32 Z°	33 Hc°	33 d'	33 Z°	34 Hc°	34 d'	34 Z°	Dec°
0	51°13'	+45'	131°	50°33'	+46'	132°	49°53'	+46'	133°	49°11'	+47'	134°	48°29'	+48'	135°	47°46'	+48'	136°	47°03'	+49'	136°	0
1	51°58'	+44'	130°	51°19'	+45'	131°	50°39'	+46'	132°	49°58'	+47'	133°	49°17'	+47'	134°	48°35'	+48'	135°	47°52'	+49'	136°	1
2	52°42'	+43'	129°	52°04'	+44'	130°	51°25'	+45'	131°	50°45'	+46'	132°	50°04'	+47'	133°	49°23'	+48'	134°	48°41'	+48'	135°	2
3	53°26'	+43'	128°	52°48'	+44'	129°	52°10'	+45'	130°	51°31'	+45'	131°	50°51'	+46'	132°	50°10'	+47'	133°	49°29'	+48'	134°	3
4	54°08'	+42'	127°	53°32'	+43'	128°	52°54'	+44'	129°	52°16'	+45'	130°	51°37'	+46'	131°	50°58'	+47'	132°	50°17'	+47'	133°	4
5	54°50'	+41'	126°	54°15'	+42'	127°	53°38'	+43'	128°	53°01'	+44'	129°	52°23'	+45'	130°	51°44'	+46'	131°	51°04'	+47'	132°	5
6	55°32'	+40'	124°	54°57'	+42'	126°	54°22'	+43'	127°	53°45'	+44'	128°	53°08'	+45'	129°	52°30'	+45'	130°	51°51'	+46'	131°	6
7	56°12'	+40'	123°	55°39'	+41'	124°	55°04'	+42'	126°	54°29'	+43'	127°	53°53'	+44'	128°	53°16'	+45'	129°	52°38'	+46'	130°	7
8	56°52'	+39'	122°	56°20'	+40'	123°	55°46'	+41'	124°	55°12'	+42'	125°	54°37'	+43'	127°	54°00'	+44'	128°	53°23'	+45'	129°	8
9	57°30'	+38'	120°	56°59'	+39'	122°	56°27'	+40'	123°	55°54'	+41'	124°	55°20'	+42'	125°	54°45'	+44'	127°	54°08'	+45'	128°	9
10	58°08'	+37'	119°	57°38'	+38'	120°	57°08'	+39'	122°	56°36'	+41'	123°	56°02'	+42'	124°	55°28'	+43'	125°	54°53'	+44'	127°	10
11	58°45'	+36'	117°	58°16'	+37'	119°	57°47'	+38'	120°	57°16'	+40'	122°	56°44'	+41'	123°	56°11'	+42'	124°	55°37'	+43'	125°	11
12	59°20'	+34'	116°	58°53'	+36'	117°	58°25'	+37'	119°	57°56'	+39'	120°	57°25'	+40'	121°	56°53'	+41'	123°	56°20'	+42'	124°	12
13	59°54'	+33'	114°	59°29'	+35'	116°	59°02'	+36'	117°	58°34'	+38'	119°	58°05'	+39'	120°	57°34'	+40'	121°	57°02'	+42'	123°	13
14	60°28'	+32'	112°	60°04'	+33'	114°	59°39'	+35'	116°	59°12'	+37'	117°	58°44'	+38'	119°	58°14'	+39'	120°	57°44'	+41'	121°	14
15	60°59'	+30'	111°	60°37'	+32'	112°	60°14'	+34'	114°	59°48'	+35'	116°	59°22'	+37'	117°	58°54'	+38'	119°	58°24'	+40'	120°	15
16	61°30'	+29'	109°	61°10'	+31'	111°	60°48'	+33'	112°	60°24'	+34'	114°	59°59'	+36'	116°	59°32'	+37'	117°	59°04'	+39'	119°	16
17	61°59'	+27'	107°	61°40'	+29'	109°	61°20'	+31'	111°	60°58'	+33'	112°	60°34'	+35'	114°	60°09'	+36'	116°	59°43'	+38'	117°	17
18	62°26'	+26'	105°	62°10'	+28'	107°	61°51'	+30'	109°	61°31'	+32'	111°	61°09'	+33'	112°	60°45'	+35'	114°	60°20'	+36'	116°	18
19	62°52'	+24'	103°	62°37'	+26'	105°	62°21'	+28'	107°	62°02'	+30'	109°	61°42'	+32'	111°	61°20'	+34'	112°	60°57'	+35'	114°	19
20	63°16'	+22'	101°	63°04'	+24'	103°	62°49'	+27'	105°	62°32'	+29'	107°	62°14'	+30'	109°	61°54'	+32'	111°	61°32'	+34'	112°	20
21	63°39'	+21'	99°	63°28'	+23'	101°	63°16'	+25'	103°	63°01'	+27'	105°	62°45'	+29'	107°	62°26'	+31'	109°	62°06'	+33'	110°	21
22	63°59'	+19'	97°	63°51'	+21'	99°	63°40'	+23'	101°	63°28'	+25'	103°	63°13'	+27'	105°	62°57'	+29'	107°	62°39'	+31'	109°	22
23	64°18'	+17'	95°	64°12'	+19'	97°	64°03'	+21'	99°	63°53'	+23'	101°	63°41'	+26'	103°	63°26'	+28'	105°	63°10'	+30'	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°
	28			29			30			31			32			33			34			

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

Dec°	28 Hc°	28 d'	28 Z°	29 Hc°	29 d'	29 Z°	30 Hc°	30 d'	30 Z°	31 Hc°	31 d'	31 Z°	32 Hc°	32 d'	32 Z°	33 Hc°	33 d'	33 Z°	34 Hc°	34 d'	34 Z°	Dec°
0	50°33'	+44'	130°	49°54'	+45'	131°	49°14'	+46'	132°	48°34'	+46'	133°	47°53'	+47'	134°	47°11'	+48'	134°	46°29'	+49'	135°	0
1	51°17'	+43'	129°	50°39'	+44'	130°	50°00'	+45'	131°	49°20'	+46'	132°	48°40'	+47'	133°	47°59'	+47'	134°	47°17'	+48'	134°	1
2	52°01'	+43'	128°	51°23'	+44'	129°	50°45'	+45'	130°	50°06'	+45'	131°	49°27'	+46'	132°	48°46'	+47'	133°	48°05'	+48'	134°	2
3	52°44'	+42'	127°	52°07'	+43'	128°	51°30'	+44'	129°	50°52'	+45'	130°	50°13'	+46'	131°	49°33'	+47'	132°	48°53'	+47'	133°	3
4	53°26'	+41'	126°	52°50'	+42'	127°	52°14'	+43'	128°	51°37'	+44'	129°	50°59'	+45'	130°	50°20'	+46'	131°	49°40'	+47'	132°	4
5	54°07'	+41'	125°	53°33'	+42'	126°	52°57'	+43'	127°	52°21'	+44'	128°	51°44'	+45'	129°	51°06'	+45'	130°	50°27'	+46'	131°	5
6	54°48'	+40'	123°	54°14'	+41'	124°	53°40'	+42'	126°	53°05'	+43'	127°	52°28'	+44'	128°	51°51'	+45'	129°	51°13'	+46'	130°	6
7	55°27'	+39'	122°	54°55'	+40'	123°	54°22'	+41'	124°	53°48'	+42'	125°	53°12'	+43'	127°	52°36'	+44'	128°	51°59'	+45'	129°	7
8	56°06'	+38'	121°	55°35'	+39'	122°	55°03'	+40'	123°	54°30'	+42'	124°	53°56'	+43'	125°	53°20'	+44'	126°	52°44'	+45'	128°	8
9	56°44'	+37'	119°	56°14'	+38'	120°	55°43'	+40'	122°	55°11'	+41'	123°	54°38'	+42'	124°	54°04'	+43'	125°	53°29'	+44'	126°	9
10	57°21'	+36'	118°	56°53'	+37'	119°	56°23'	+39'	120°	55°52'	+40'	122°	55°20'	+41'	123°	54°47'	+42'	124°	54°13'	+43'	125°	10
11	57°57'	+35'	116°	57°30'	+36'	118°	57°02'	+38'	119°	56°32'	+39'	120°	56°01'	+40'	122°	55°29'	+41'	123°	54°56'	+43'	124°	11
12	58°32'	+34'	115°	58°06'	+35'	116°	57°39'	+37'	118°	57°11'	+38'	119°	56°41'	+39'	120°	56°10'	+41'	122°	55°38'	+42'	123°	12
13	59°06'	+33'	113°	58°42'	+34'	115°	58°16'	+36'	116°	57°49'	+37'	118°	57°21'	+38'	119°	56°51'	+40'	120°	56°20'	+41'	122°	13
14	59°38'	+31'	111°	59°16'	+33'	113°	58°52'	+34'	115°	58°26'	+36'	116°	57°59'	+37'	117°	57°31'	+39'	119°	57°01'	+40'	120°	14
15	60°10'	+30'	110°	59°49'	+32'	111°	59°26'	+33'	113°	59°02'	+35'	114°	58°36'	+36'	116°	58°09'	+38'	117°	57°41'	+39'	119°	15
16	60°40'	+28'	108°	60°20'	+30'	110°	59°59'	+32'	111°	59°37'	+34'	113°	59°13'	+35'	114°	58°47'	+37'	116°	58°20'	+38'	117°	16
17	61°08'	+27'	106°	60°51'	+29'	108°	60°31'	+31'	110°	60°10'	+32'	111°	59°48'	+34'	113°	59°24'	+36'	114°	58°58'	+37'	116°	17
18	61°35'	+25'	104°	61°19'	+27'	106°	61°02'	+29'	108°	60°43'	+31'	110°	60°22'	+33'	111°	59°59'	+34'	113°	59°35'	+36'	114°	18
19	62°00'	+24'	102°	61°47'	+26'	104°	61°31'	+28'	106°	61°14'	+30'	108°	60°54'	+31'	109°	60°34'	+33'	111°	60°11'	+35'	113°	19
20	62°24'	+22'	100°	62°12'	+24'	102°	61°59'	+26'	104°	61°43'	+28'	106°	61°26'	+30'	108°	61°07'	+32'	109°	60°46'	+33'	111°	20
21	62°46'	+20'	98°	62°37'	+22'	100°	62°25'	+24'	102°	62°11'	+26'	104°	61°56'	+28'	106°	61°38'	+30'	108°	61°19'	+32'	109°	21
22	63°07'	+18'	96°	62°59'	+21'	98°	62°49'	+23'	100°	62°38'	+25'	102°	62°24'	+27'	104°	62°09'	+29'	106°	61°51'	+31'	108°	22
23	63°25'	+17'	94°	63°20'	+19'	96°	63°12'	+21'	98°	63°03'	+23'	100°	62°51'	+25'	102°	62°37'	+27'	104°	62°22'	+29'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	49°53'	+43'	129°	49°14'	+44'	130°	48°35'	+45'	131°	47°56'	+46'	132°	47°16'	+47'	133°	46°35'	+47'	133°	45°53'	+48'	134°	0
1	50°36'	+43'	128°	49°59'	+44'	129°	49°21'	+45'	130°	48°42'	+45'	131°	48°02'	+46'	132°	47°22'	+47'	132°	46°41'	+48'	133°	1
2	51°19'	+42'	127°	50°42'	+43'	128°	50°05'	+44'	129°	49°27'	+45'	130°	48°48'	+46'	131°	48°09'	+46'	132°	47°29'	+47'	132°	2
3	52°01'	+41'	126°	51°25'	+42'	127°	50°49'	+43'	128°	50°12'	+44'	129°	49°34'	+45'	130°	48°55'	+46'	131°	48°16'	+47'	131°	3
4	52°42'	+41'	125°	52°08'	+42'	126°	51°32'	+43'	127°	50°56'	+44'	128°	50°19'	+45'	129°	49°41'	+45'	130°	49°03'	+46'	130°	4
5	53°23'	+40'	123°	52°50'	+41'	124°	52°15'	+42'	126°	51°40'	+43'	127°	51°04'	+44'	128°	50°27'	+45'	129°	49°49'	+46'	129°	5
6	54°03'	+39'	122°	53°31'	+40'	123°	52°57'	+41'	124°	52°23'	+42'	125°	51°48'	+43'	126°	51°12'	+44'	127°	50°35'	+45'	128°	6
7	54°42'	+38'	121°	54°11'	+39'	122°	53°39'	+41'	123°	53°05'	+42'	124°	52°31'	+43'	125°	51°56'	+44'	126°	51°20'	+45'	127°	7
8	55°20'	+37'	119°	54°50'	+39'	121°	54°19'	+40'	122°	53°47'	+41'	123°	53°14'	+42'	124°	52°40'	+43'	125°	52°04'	+44'	126°	8
9	55°58'	+36'	118°	55°29'	+38'	119°	54°59'	+39'	121°	54°28'	+40'	122°	53°56'	+41'	123°	53°23'	+42'	124°	52°48'	+43'	125°	9
10	56°34'	+35'	117°	56°07'	+37'	118°	55°38'	+38'	119°	55°08'	+39'	121°	54°37'	+40'	122°	54°05'	+42'	123°	53°32'	+43'	124°	10
11	57°10'	+34'	115°	56°43'	+36'	117°	56°16'	+37'	118°	55°47'	+38'	119°	55°17'	+40'	120°	54°46'	+41'	122°	54°14'	+42'	123°	11
12	57°44'	+33'	114°	57°19'	+35'	115°	56°53'	+36'	116°	56°26'	+37'	118°	55°57'	+39'	119°	55°27'	+40'	120°	54°56'	+41'	122°	12
13	58°17'	+32'	112°	57°54'	+34'	114°	57°29'	+35'	115°	57°03'	+36'	116°	56°36'	+38'	118°	56°07'	+39'	119°	55°37'	+40'	120°	13
14	58°49'	+31'	110°	58°27'	+32'	112°	58°04'	+34'	113°	57°40'	+35'	115°	57°14'	+37'	116°	56°46'	+38'	118°	56°18'	+39'	119°	14
15	59°20'	+29'	109°	59°00'	+31'	110°	58°38'	+33'	112°	58°15'	+34'	113°	57°50'	+36'	115°	57°24'	+37'	116°	56°57'	+39'	118°	15
16	59°49'	+28'	107°	59°31'	+30'	109°	59°11'	+31'	110°	58°49'	+33'	112°	58°26'	+35'	113°	58°02'	+36'	115°	57°36'	+38'	116°	16
17	60°17'	+27'	105°	60°00'	+28'	107°	59°42'	+30'	109°	59°22'	+32'	110°	59°01'	+33'	112°	58°38'	+35'	113°	58°13'	+36'	115°	17
18	60°44'	+25'	103°	60°29'	+27'	105°	60°12'	+29'	107°	59°54'	+30'	109°	59°34'	+32'	110°	59°13'	+34'	112°	58°50'	+35'	113°	18
19	61°09'	+23'	102°	60°56'	+25'	103°	60°41'	+27'	105°	60°24'	+29'	107°	60°06'	+31'	108°	59°47'	+33'	110°	59°25'	+34'	112°	19
20	61°32'	+22'	100°	61°21'	+24'	101°	61°08'	+26'	103°	60°54'	+28'	105°	60°37'	+29'	107°	60°19'	+31'	108°	59°59'	+33'	110°	20
21	61°54'	+20'	98°	61°45'	+22'	100°	61°34'	+24'	101°	61°21'	+26'	103°	61°07'	+28'	105°	60°50'	+30'	107°	60°32'	+32'	108°	21
22	62°14'	+18'	96°	62°07'	+20'	98°	61°58'	+22'	99°	61°47'	+25'	101°	61°35'	+26'	103°	61°20'	+28'	105°	61°04'	+30'	107°	22
23	62°32'	+16'	94°	62°27'	+19'	96°	62°21'	+21'	97°	62°12'	+23'	99°	62°01'	+25'	101°	61°49'	+27'	103°	61°34'	+29'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	49°11'	+43'	128°	48°34'	+44'	129°	47°56'	+45'	130°	47°17'	+45'	131°	46°38'	+46'	131°	45°58'	+47'	132°	45°17'	+47'	133°	0
1	49°54'	+42'	127°	49°18'	+43'	128°	48°40'	+44'	129°	48°02'	+45'	130°	47°24'	+46'	130°	46°45'	+46'	131°	46°05'	+47'	132°	1
2	50°36'	+42'	126°	50°01'	+42'	127°	49°24'	+43'	128°	48°47'	+44'	129°	48°09'	+45'	130°	47°31'	+46'	130°	46°52'	+47'	131°	2
3	51°18'	+41'	125°	50°43'	+42'	126°	50°08'	+43'	127°	49°31'	+44'	128°	48°54'	+45'	129°	48°17'	+45'	129°	47°38'	+46'	130°	3
4	51°58'	+40'	123°	51°25'	+41'	125°	50°50'	+42'	126°	50°15'	+43'	127°	49°39'	+44'	127°	49°02'	+45'	128°	48°25'	+46'	129°	4
5	52°39'	+39'	122°	52°06'	+40'	123°	51°33'	+41'	124°	50°58'	+42'	125°	50°23'	+43'	126°	49°47'	+44'	127°	49°10'	+45'	128°	5
6	53°18'	+39'	121°	52°46'	+40'	122°	52°14'	+41'	123°	51°41'	+42'	124°	51°06'	+43'	125°	50°31'	+44'	126°	49°55'	+45'	127°	6
7	53°56'	+38'	120°	53°26'	+39'	121°	52°55'	+40'	122°	52°23'	+41'	123°	51°49'	+42'	124°	51°15'	+43'	125°	50°40'	+44'	126°	7
8	54°34'	+37'	118°	54°05'	+38'	120°	53°35'	+39'	121°	53°04'	+40'	122°	52°31'	+41'	123°	51°58'	+42'	124°	51°24'	+43'	125°	8
9	55°11'	+36'	117°	54°43'	+37'	118°	54°14'	+38'	120°	53°44'	+40'	121°	53°13'	+41'	122°	52°41'	+42'	123°	52°07'	+43'	124°	9
10	55°47'	+35'	116°	55°20'	+36'	117°	54°52'	+37'	118°	54°23'	+39'	119°	53°53'	+40'	121°	53°22'	+41'	122°	52°50'	+42'	123°	10
11	56°21'	+34'	114°	55°56'	+35'	115°	55°30'	+37'	117°	55°02'	+38'	118°	54°33'	+39'	119°	54°03'	+40'	121°	53°32'	+41'	122°	11
12	56°55'	+33'	113°	56°31'	+34'	114°	56°06'	+36'	115°	55°40'	+37'	117°	55°12'	+38'	118°	54°44'	+39'	119°	54°14'	+41'	120°	12
13	57°28'	+31'	111°	57°05'	+33'	113°	56°42'	+34'	114°	56°17'	+36'	115°	55°51'	+37'	117°	55°23'	+39'	118°	54°54'	+40'	119°	13
14	57°59'	+30'	109°	57°38'	+32'	111°	57°16'	+33'	112°	56°53'	+35'	114°	56°28'	+36'	115°	56°02'	+38'	117°	55°34'	+39'	118°	14
15	58°29'	+29'	108°	58°10'	+31'	109°	57°50'	+32'	111°	57°28'	+34'	112°	57°04'	+35'	114°	56°39'	+37'	115°	56°13'	+38'	117°	15
16	58°58'	+28'	106°	58°41'	+29'	108°	58°22'	+31'	109°	58°01'	+33'	111°	57°39'	+34'	112°	57°16'	+36'	114°	56°51'	+37'	115°	16
17	59°26'	+26'	104°	59°10'	+28'	106°	58°53'	+30'	108°	58°34'	+31'	109°	58°13'	+33'	111°	57°51'	+34'	112°	57°28'	+36'	114°	17
18	59°52'	+25'	103°	59°38'	+27'	104°	59°22'	+28'	106°	59°05'	+30'	108°	58°46'	+32'	109°	58°26'	+33'	111°	58°04'	+35'	112°	18
19	60°17'	+23'	101°	60°05'	+25'	103°	59°51'	+27'	104°	59°35'	+29'	106°	59°18'	+30'	107°	58°59'	+32'	109°	58°39'	+34'	111°	19
20	60°40'	+22'	99°	60°30'	+23'	101°	60°18'	+25'	102°	60°04'	+27'	104°	59°48'	+29'	106°	59°31'	+31'	107°	59°12'	+32'	109°	20
21	61°01'	+20'	97°	60°53'	+22'	99°	60°43'	+24'	101°	60°31'	+26'	102°	60°17'	+28'	104°	60°02'	+29'	106°	59°45'	+31'	107°	21
22	61°21'	+18'	95°	61°15'	+20'	97°	61°07'	+22'	99°	60°57'	+24'	100°	60°45'	+26'	102°	60°31'	+28'	104°	60°16'	+30'	106°	22
23	61°39'	+16'	93°	61°35'	+18'	95°	61°29'	+21'	97°	61°21'	+23'	99°	61°11'	+25'	100°	60°59'	+27'	102°	60°46'	+28'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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°29'	+42'	127°	47°53'	+43'	128°	47°16'	+44'	129°	46°38'	+45'	129°	45°59'	+46'	130°	45°20'	+46'	131°	44°40'	+47'	132°	0
1	49°11'	+42'	126°	48°36'	+43'	127°	47°59'	+43'	128°	47°22'	+44'	129°	46°45'	+45'	129°	46°06'	+46'	130°	45°27'	+47'	131°	1
2	49°53'	+41'	125°	49°18'	+42'	126°	48°43'	+43'	127°	48°07'	+44'	128°	47°30'	+45'	128°	46°52'	+45'	129°	46°14'	+46'	130°	2
3	50°34'	+40'	124°	50°00'	+41'	125°	49°26'	+42'	126°	48°50'	+43'	126°	48°14'	+44'	127°	47°38'	+45'	128°	47°00'	+46'	129°	3
4	51°14'	+40'	122°	50°41'	+41'	123°	50°08'	+42'	124°	49°34'	+43'	125°	48°58'	+43'	126°	48°22'	+44'	127°	47°46'	+45'	128°	4
5	51°54'	+39'	121°	51°22'	+40'	122°	50°49'	+41'	123°	50°16'	+42'	124°	49°42'	+43'	125°	49°07'	+44'	126°	48°31'	+45'	127°	5
6	52°32'	+38'	120°	52°02'	+39'	121°	51°30'	+40'	122°	50°58'	+41'	123°	50°25'	+42'	124°	49°51'	+43'	125°	49°16'	+44'	126°	6
7	53°10'	+37'	119°	52°41'	+38'	120°	52°11'	+39'	121°	51°39'	+41'	122°	51°07'	+42'	123°	50°34'	+43'	124°	50°00'	+44'	125°	7
8	53°47'	+36'	117°	53°19'	+37'	119°	52°50'	+39'	120°	52°20'	+40'	121°	51°48'	+41'	122°	51°16'	+42'	123°	50°43'	+43'	124°	8
9	54°23'	+35'	116°	53°57'	+37'	117°	53°29'	+38'	118°	52°59'	+39'	120°	52°29'	+40'	121°	51°58'	+41'	122°	51°26'	+42'	123°	9
10	54°59'	+34'	115°	54°33'	+36'	116°	54°06'	+37'	117°	53°38'	+38'	118°	53°09'	+39'	120°	52°39'	+40'	121°	52°08'	+42'	122°	10
11	55°33'	+33'	113°	55°09'	+35'	114°	54°43'	+36'	116°	54°17'	+37'	117°	53°49'	+38'	118°	53°20'	+40'	119°	52°50'	+41'	121°	11
12	56°06'	+32'	112°	55°43'	+34'	113°	55°19'	+35'	114°	54°54'	+36'	116°	54°27'	+38'	117°	53°59'	+39'	118°	53°31'	+40'	119°	12
13	56°38'	+31'	110°	56°17'	+32'	112°	55°54'	+34'	113°	55°30'	+35'	114°	55°05'	+37'	116°	54°38'	+38'	117°	54°11'	+39'	118°	13
14	57°09'	+30'	109°	56°49'	+31'	110°	56°28'	+33'	111°	56°05'	+34'	113°	55°42'	+36'	114°	55°16'	+37'	116°	54°50'	+38'	117°	14
15	57°39'	+28'	107°	57°21'	+30'	108°	57°01'	+32'	110°	56°40'	+33'	111°	56°17'	+35'	113°	55°53'	+36'	114°	55°28'	+37'	115°	15
16	58°07'	+27'	105°	57°51'	+29'	107°	57°33'	+30'	108°	57°13'	+32'	110°	56°52'	+34'	111°	56°29'	+35'	113°	56°06'	+36'	114°	16
17	58°35'	+26'	104°	58°20'	+28'	105°	58°03'	+29'	107°	57°45'	+31'	108°	57°26'	+32'	110°	57°05'	+34'	111°	56°42'	+35'	113°	17
18	59°00'	+24'	102°	58°47'	+26'	103°	58°32'	+28'	105°	58°16'	+30'	107°	57°58'	+31'	108°	57°39'	+33'	110°	57°18'	+34'	111°	18
19	59°25'	+23'	100°	59°13'	+25'	102°	59°00'	+27'	103°	58°46'	+28'	105°	58°29'	+30'	107°	58°11'	+32'	108°	57°52'	+33'	110°	19
20	59°47'	+21'	98°	59°38'	+23'	100°	59°27'	+25'	102°	59°14'	+27'	103°	58°59'	+29'	105°	58°43'	+30'	106°	58°25'	+32'	108°	20
21	60°09'	+20'	96°	60°01'	+22'	98°	59°52'	+24'	100°	59°41'	+25'	101°	59°28'	+27'	103°	59°13'	+29'	105°	58°57'	+31'	106°	21
22	60°28'	+18'	94°	60°23'	+20'	96°	60°15'	+22'	98°	60°06'	+24'	100°	59°55'	+26'	101°	59°43'	+28'	103°	59°28'	+29'	105°	22
23	60°46'	+16'	93°	60°43'	+18'	94°	60°37'	+20'	96°	60°30'	+22'	98°	60°21'	+24'	100°	60°10'	+26'	101°	59°58'	+28'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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'	+42'	126°	47°11'	+43'	127°	46°35'	+43'	128°	45°58'	+44'	128°	45°20'	+45'	129°	44°42'	+46'	130°	44°03'	+46'	131°	0
1	48°28'	+41'	125°	47°53'	+42'	126°	47°18'	+43'	127°	46°42'	+44'	127°	46°05'	+45'	128°	45°28'	+45'	129°	44°49'	+46'	130°	1
2	49°09'	+40'	124°	48°35'	+41'	125°	48°01'	+42'	126°	47°26'	+43'	126°	46°50'	+44'	127°	46°13'	+45'	128°	45°36'	+46'	129°	2
3	49°49'	+40'	123°	49°17'	+41'	124°	48°43'	+42'	124°	48°09'	+43'	125°	47°34'	+43'	126°	46°58'	+44'	127°	46°21'	+45'	128°	3
4	50°29'	+39'	121°	49°57'	+40'	122°	49°25'	+41'	123°	48°51'	+42'	124°	48°17'	+43'	125°	47°42'	+44'	126°	47°06'	+45'	127°	4
5	51°08'	+38'	120°	50°37'	+39'	121°	50°06'	+40'	122°	49°33'	+41'	123°	49°00'	+42'	124°	48°26'	+43'	125°	47°51'	+44'	126°	5
6	51°46'	+37'	119°	51°17'	+39'	120°	50°46'	+40'	121°	50°15'	+41'	122°	49°42'	+42'	123°	49°09'	+43'	124°	48°35'	+44'	125°	6
7	52°23'	+37'	118°	51°55'	+38'	119°	51°26'	+39'	120°	50°55'	+40'	121°	50°24'	+41'	122°	49°52'	+42'	123°	49°19'	+43'	124°	7
8	53°00'	+36'	116°	52°33'	+37'	118°	52°05'	+38'	119°	51°35'	+39'	120°	51°05'	+40'	121°	50°34'	+41'	122°	50°02'	+42'	123°	8
9	53°36'	+35'	115°	53°10'	+36'	116°	52°43'	+37'	117°	52°14'	+38'	119°	51°45'	+40'	120°	51°15'	+41'	121°	50°44'	+42'	122°	9
10	54°10'	+34'	114°	53°46'	+35'	115°	53°20'	+36'	116°	52°53'	+38'	117°	52°25'	+39'	118°	51°56'	+40'	120°	51°26'	+41'	121°	10
11	54°44'	+33'	112°	54°21'	+34'	113°	53°56'	+35'	115°	53°31'	+37'	116°	53°04'	+38'	117°	52°36'	+39'	118°	52°07'	+40'	119°	11
12	55°17'	+32'	111°	54°55'	+33'	112°	54°32'	+34'	113°	54°07'	+36'	115°	53°42'	+37'	116°	53°15'	+38'	117°	52°47'	+40'	118°	12
13	55°48'	+30'	109°	55°28'	+32'	111°	55°06'	+33'	112°	54°43'	+35'	113°	54°19'	+36'	115°	53°53'	+37'	116°	53°27'	+39'	117°	13
14	56°19'	+29'	108°	56°00'	+31'	109°	55°40'	+32'	110°	55°18'	+34'	112°	54°55'	+35'	113°	54°31'	+37'	114°	54°05'	+38'	116°	14
15	56°48'	+28'	106°	56°31'	+30'	108°	56°12'	+31'	109°	55°52'	+33'	110°	55°30'	+34'	112°	55°07'	+36'	113°	54°43'	+37'	114°	15
16	57°16'	+27'	104°	57°00'	+28'	106°	56°43'	+30'	107°	56°24'	+32'	109°	56°04'	+33'	110°	55°43'	+35'	112°	55°20'	+36'	113°	16
17	57°43'	+25'	103°	57°29'	+27'	104°	57°13'	+29'	106°	56°56'	+30'	107°	56°38'	+32'	109°	56°17'	+34'	110°	55°56'	+35'	112°	17
18	58°08'	+24'	101°	57°56'	+26'	103°	57°42'	+28'	104°	57°27'	+29'	106°	57°10'	+31'	107°	56°51'	+32'	109°	56°31'	+34'	110°	18
19	58°32'	+23'	99°	58°22'	+24'	101°	58°10'	+26'	103°	57°56'	+28'	104°	57°40'	+30'	106°	57°23'	+31'	107°	57°05'	+33'	109°	19
20	58°55'	+21'	98°	58°46'	+23'	99°	58°36'	+25'	101°	58°24'	+27'	102°	58°10'	+28'	104°	57°55'	+30'	106°	57°38'	+32'	107°	20
21	59°16'	+20'	96°	59°09'	+21'	97°	59°01'	+23'	99°	58°50'	+25'	101°	58°38'	+27'	102°	58°25'	+29'	104°	58°09'	+30'	105°	21
22	59°36'	+18'	94°	59°31'	+20'	96°	59°24'	+22'	97°	59°15'	+24'	99°	59°05'	+26'	101°	58°53'	+27'	102°	58°40'	+29'	104°	22
23	59°53'	+16'	92°	59°50'	+18'	94°	59°46'	+20'	95°	59°39'	+22'	97°	59°31'	+24'	99°	59°21'	+26'	100°	59°09'	+28'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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'	+41'	125°	46°29'	+42'	126°	45°53'	+43'	127°	45°17'	+44'	127°	44°40'	+44'	128°	44°03'	+45'	129°	43°25'	+46'	130°	0
1	47°44'	+40'	124°	47°11'	+41'	125°	46°36'	+42'	126°	46°01'	+43'	126°	45°25'	+44'	127°	44°48'	+45'	128°	44°11'	+46'	129°	1
2	48°25'	+40'	123°	47°52'	+41'	124°	47°18'	+42'	124°	46°44'	+43'	125°	46°09'	+43'	126°	45°33'	+44'	127°	44°57'	+45'	128°	2
3	49°04'	+39'	122°	48°33'	+40'	122°	48°00'	+41'	123°	47°27'	+42'	124°	46°52'	+43'	125°	46°17'	+44'	126°	45°42'	+45'	127°	3
4	49°44'	+38'	120°	49°13'	+39'	121°	48°41'	+40'	122°	48°09'	+41'	123°	47°35'	+42'	124°	47°01'	+43'	125°	46°26'	+44'	126°	4
5	50°22'	+38'	119°	49°52'	+39'	120°	49°22'	+40'	121°	48°50'	+41'	122°	48°18'	+42'	123°	47°44'	+43'	124°	47°10'	+44'	125°	5
6	51°00'	+37'	118°	50°31'	+38'	119°	50°01'	+39'	120°	49°31'	+40'	121°	48°59'	+41'	122°	48°27'	+42'	123°	47°54'	+43'	124°	6
7	51°36'	+36'	117°	51°09'	+37'	118°	50°40'	+38'	119°	50°11'	+39'	120°	49°41'	+40'	121°	49°09'	+42'	122°	48°37'	+42'	123°	7
8	52°12'	+35'	115°	51°46'	+36'	117°	51°19'	+38'	118°	50°50'	+39'	119°	50°21'	+40'	120°	49°51'	+41'	121°	49°20'	+42'	122°	8
9	52°47'	+34'	114°	52°22'	+35'	115°	51°56'	+37'	116°	51°29'	+38'	118°	51°01'	+39'	119°	50°32'	+40'	120°	50°01'	+41'	121°	9
10	53°22'	+33'	113°	52°58'	+35'	114°	52°33'	+36'	115°	52°07'	+37'	116°	51°40'	+38'	117°	51°12'	+39'	119°	50°43'	+41'	120°	10
11	53°55'	+32'	111°	53°32'	+34'	113°	53°09'	+35'	114°	52°44'	+36'	115°	52°18'	+37'	116°	51°51'	+39'	117°	51°23'	+40'	118°	11
12	54°27'	+31'	110°	54°06'	+33'	111°	53°44'	+34'	112°	53°20'	+35'	114°	52°56'	+37'	115°	52°30'	+38'	116°	52°03'	+39'	117°	12
13	54°58'	+30'	108°	54°39'	+32'	110°	54°18'	+33'	111°	53°56'	+34'	112°	53°32'	+36'	114°	53°08'	+37'	115°	52°42'	+38'	116°	13
14	55°28'	+29'	107°	55°10'	+30'	108°	54°51'	+32'	110°	54°30'	+33'	111°	54°08'	+35'	112°	53°45'	+36'	113°	53°20'	+37'	115°	14
15	55°57'	+28'	105°	55°41'	+29'	107°	55°23'	+31'	108°	55°03'	+32'	109°	54°43'	+34'	111°	54°21'	+35'	112°	53°58'	+36'	113°	15
16	56°25'	+26'	104°	56°10'	+28'	105°	55°53'	+30'	107°	55°36'	+31'	108°	55°16'	+33'	109°	54°56'	+34'	111°	54°34'	+36'	112°	16
17	56°51'	+25'	102°	56°38'	+27'	104°	56°23'	+28'	105°	56°07'	+30'	106°	55°49'	+32'	108°	55°30'	+33'	109°	55°10'	+35'	111°	17
18	57°16'	+24'	100°	57°05'	+26'	102°	56°52'	+27'	103°	56°37'	+29'	105°	56°21'	+30'	106°	56°03'	+32'	108°	55°44'	+34'	109°	18
19	57°40'	+22'	99°	57°30'	+24'	100°	57°19'	+26'	102°	57°06'	+28'	103°	56°51'	+29'	105°	56°35'	+31'	106°	56°18'	+32'	108°	19
20	58°02'	+21'	97°	57°54'	+23'	99°	57°45'	+25'	100°	57°33'	+26'	102°	57°21'	+28'	103°	57°06'	+30'	105°	56°50'	+31'	106°	20
21	58°23'	+19'	95°	58°17'	+21'	97°	58°09'	+23'	98°	58°00'	+25'	100°	57°49'	+27'	102°	57°36'	+28'	103°	57°21'	+30'	105°	21
22	58°43'	+18'	93°	58°38'	+20'	95°	58°32'	+22'	97°	58°25'	+23'	98°	58°15'	+25'	100°	58°04'	+27'	101°	57°51'	+29'	103°	22
23	59°01'	+16'	91°	58°58'	+18'	93°	58°54'	+20'	95°	58°48'	+22'	96°	58°40'	+24'	98°	58°31'	+26'	100°	58°20'	+27'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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°19'	+40'	124°	45°46'	+41'	125°	45°11'	+42'	126°	44°36'	+43'	126°	44°00'	+44'	127°	43°24'	+45'	128°	42°46'	+46'	129°	0
1	47°00'	+40'	123°	46°27'	+41'	124°	45°53'	+42'	125°	45°19'	+43'	125°	44°44'	+43'	126°	44°08'	+44'	127°	43°32'	+45'	128°	1
2	47°40'	+39'	122°	47°08'	+40'	123°	46°35'	+41'	123°	46°02'	+42'	124°	45°28'	+43'	125°	44°53'	+44'	126°	44°17'	+45'	127°	2
3	48°19'	+39'	121°	47°48'	+40'	121°	47°16'	+41'	122°	46°44'	+42'	123°	46°11'	+42'	124°	45°36'	+43'	125°	45°02'	+44'	126°	3
4	48°58'	+38'	119°	48°28'	+39'	120°	47°57'	+40'	121°	47°25'	+41'	122°	46°53'	+42'	123°	46°20'	+43'	124°	45°46'	+44'	125°	4
5	49°35'	+37'	118°	49°07'	+38'	119°	48°37'	+39'	120°	48°06'	+40'	121°	47°35'	+41'	122°	47°03'	+42'	123°	46°29'	+43'	124°	5
6	50°13'	+36'	117°	49°45'	+37'	118°	49°16'	+39'	119°	48°47'	+40'	120°	48°16'	+41'	121°	47°45'	+42'	122°	47°13'	+43'	123°	6
7	50°49'	+35'	116°	50°22'	+37'	117°	49°55'	+38'	118°	49°26'	+39'	119°	48°57'	+40'	120°	48°26'	+41'	121°	47°55'	+42'	122°	7
8	51°24'	+35'	114°	50°59'	+36'	116°	50°33'	+37'	117°	50°05'	+38'	118°	49°37'	+39'	119°	49°07'	+40'	120°	48°37'	+41'	121°	8
9	51°59'	+34'	113°	51°35'	+35'	114°	51°10'	+36'	115°	50°43'	+37'	117°	50°16'	+39'	118°	49°48'	+40'	119°	49°18'	+41'	120°	9
10	52°33'	+33'	112°	52°10'	+34'	113°	51°46'	+35'	114°	51°21'	+37'	115°	50°55'	+38'	116°	50°27'	+39'	117°	49°59'	+40'	119°	10
11	53°05'	+32'	110°	52°44'	+33'	112°	52°21'	+34'	113°	51°57'	+36'	114°	51°32'	+37'	115°	51°06'	+38'	116°	50°39'	+39'	117°	11
12	53°37'	+31'	109°	53°17'	+32'	110°	52°56'	+34'	111°	52°33'	+35'	113°	52°09'	+36'	114°	51°44'	+37'	115°	51°19'	+39'	116°	12
13	54°08'	+30'	107°	53°49'	+31'	109°	53°29'	+33'	110°	53°08'	+34'	111°	52°45'	+35'	113°	52°22'	+37'	114°	51°57'	+38'	115°	13
14	54°37'	+29'	106°	54°20'	+30'	107°	54°02'	+32'	109°	53°42'	+33'	110°	53°21'	+34'	111°	52°58'	+36'	112°	52°35'	+37'	114°	14
15	55°06'	+27'	104°	54°50'	+29'	106°	54°33'	+30'	107°	54°15'	+32'	109°	53°55'	+33'	110°	53°34'	+35'	111°	53°12'	+36'	112°	15
16	55°33'	+26'	103°	55°19'	+28'	104°	55°04'	+29'	106°	54°47'	+31'	107°	54°28'	+32'	108°	54°09'	+34'	110°	53°48'	+35'	111°	16
17	55°59'	+25'	101°	55°47'	+26'	103°	55°33'	+28'	104°	55°17'	+30'	106°	55°01'	+31'	107°	54°42'	+33'	108°	54°23'	+34'	110°	17
18	56°24'	+24'	100°	56°13'	+25'	101°	56°01'	+27'	103°	55°47'	+29'	104°	55°32'	+30'	105°	55°15'	+32'	107°	54°57'	+33'	108°	18
19	56°48'	+22'	98°	56°39'	+24'	99°	56°28'	+26'	101°	56°16'	+27'	102°	56°02'	+29'	104°	55°47'	+31'	105°	55°30'	+32'	107°	19
20	57°10'	+21'	96°	57°02'	+23'	98°	56°53'	+24'	99°	56°43'	+26'	101°	56°31'	+28'	102°	56°17'	+29'	104°	56°02'	+31'	105°	20
21	57°31'	+19'	95°	57°25'	+21'	96°	57°18'	+23'	98°	57°09'	+25'	99°	56°59'	+26'	101°	56°47'	+28'	102°	56°33'	+30'	104°	21
22	57°50'	+18'	93°	57°46'	+20'	94°	57°41'	+21'	96°	57°34'	+23'	98°	57°25'	+25'	99°	57°15'	+27'	101°	57°03'	+29'	102°	22
23	58°08'	+16'	91°	58°06'	+18'	93°	58°02'	+20'	94°	57°57'	+22'	96°	57°50'	+24'	97°	57°42'	+25'	99°	57°31'	+27'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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°35'	+40'	123°	45°02'	+41'	124°	44°29'	+42'	125°	43°54'	+43'	125°	43°19'	+43'	126°	42°44'	+44'	127°	42°07'	+45'	128°	0
1	46°15'	+39'	122°	45°43'	+40'	123°	45°10'	+41'	124°	44°37'	+42'	124°	44°03'	+43'	125°	43°28'	+44'	126°	42°52'	+45'	127°	1
2	46°55'	+39'	121°	46°23'	+40'	122°	45°52'	+41'	122°	45°19'	+42'	123°	44°46'	+42'	124°	44°12'	+43'	125°	43°37'	+44'	126°	2
3	47°33'	+38'	120°	47°03'	+39'	121°	46°32'	+40'	121°	46°01'	+41'	122°	45°28'	+42'	123°	44°55'	+43'	124°	44°21'	+44'	125°	3
4	48°11'	+37'	118°	47°42'	+38'	119°	47°12'	+39'	120°	46°42'	+40'	121°	46°10'	+41'	122°	45°38'	+42'	123°	45°05'	+43'	124°	4
5	48°49'	+37'	117°	48°21'	+38'	118°	47°52'	+39'	119°	47°22'	+40'	120°	46°51'	+41'	121°	46°20'	+42'	122°	45°48'	+43'	123°	5
6	49°25'	+36'	116°	48°58'	+37'	117°	48°31'	+38'	118°	48°02'	+39'	119°	47°32'	+40'	120°	47°02'	+41'	121°	46°31'	+42'	122°	6
7	50°01'	+35'	115°	49°35'	+36'	116°	49°09'	+37'	117°	48°41'	+38'	118°	48°12'	+39'	119°	47°43'	+41'	120°	47°13'	+42'	121°	7
8	50°36'	+34'	114°	50°11'	+35'	115°	49°46'	+37'	116°	49°19'	+38'	117°	48°52'	+39'	118°	48°23'	+40'	119°	47°54'	+41'	120°	8
9	51°10'	+33'	112°	50°47'	+35'	113°	50°22'	+36'	114°	49°57'	+37'	116°	49°31'	+38'	117°	49°03'	+39'	118°	48°35'	+40'	119°	9
10	51°43'	+32'	111°	51°21'	+34'	112°	50°58'	+35'	113°	50°34'	+36'	114°	50°09'	+37'	115°	49°43'	+38'	116°	49°15'	+40'	118°	10
11	52°15'	+31'	110°	51°55'	+33'	111°	51°33'	+34'	112°	51°10'	+35'	113°	50°46'	+37'	114°	50°21'	+38'	115°	49°55'	+39'	116°	11
12	52°47'	+30'	108°	52°28'	+32'	109°	52°07'	+33'	111°	51°45'	+34'	112°	51°23'	+36'	113°	50°59'	+37'	114°	50°34'	+38'	115°	12
13	53°17'	+29'	107°	52°59'	+31'	108°	52°40'	+32'	109°	52°20'	+33'	110°	51°58'	+35'	112°	51°36'	+36'	113°	51°12'	+37'	114°	13
14	53°46'	+28'	105°	53°30'	+30'	107°	53°12'	+31'	108°	52°53'	+33'	109°	52°33'	+34'	110°	52°12'	+35'	111°	51°49'	+36'	113°	14
15	54°14'	+27'	104°	54°00'	+29'	105°	53°43'	+30'	106°	53°26'	+32'	108°	53°07'	+33'	109°	52°47'	+34'	110°	52°26'	+36'	111°	15
16	54°41'	+26'	102°	54°28'	+27'	104°	54°13'	+29'	105°	53°57'	+30'	106°	53°40'	+32'	108°	53°21'	+33'	109°	53°01'	+35'	110°	16
17	55°07'	+25'	101°	54°56'	+26'	102°	54°42'	+28'	103°	54°28'	+29'	105°	54°12'	+31'	106°	53°55'	+32'	107°	53°36'	+34'	109°	17
18	55°32'	+23'	99°	55°22'	+25'	100°	55°10'	+27'	102°	54°57'	+28'	103°	54°43'	+30'	105°	54°27'	+31'	106°	54°10'	+33'	107°	18
19	55°55'	+22'	97°	55°47'	+24'	99°	55°37'	+25'	100°	55°25'	+27'	102°	55°12'	+29'	103°	54°58'	+30'	104°	54°42'	+32'	106°	19
20	56°17'	+21'	96°	56°10'	+22'	97°	56°02'	+24'	99°	55°52'	+26'	100°	55°41'	+27'	102°	55°28'	+29'	103°	55°14'	+31'	104°	20
21	56°38'	+19'	94°	56°33'	+21'	95°	56°26'	+23'	97°	56°18'	+24'	98°	56°09'	+26'	100°	55°57'	+28'	101°	55°45'	+29'	103°	21
22	56°57'	+18'	92°	56°54'	+20'	94°	56°49'	+21'	95°	56°43'	+23'	97°	56°35'	+25'	98°	56°25'	+27'	100°	56°14'	+28'	101°	22
23	57°15'	+16'	90°	57°13'	+18'	92°	57°10'	+20'	94°	57°06'	+22'	95°	57°00'	+24'	97°	56°52'	+25'	98°	56°42'	+27'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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°51'	+39'	122°	44°18'	+40'	123°	43°46'	+41'	124°	43°12'	+42'	124°	42°38'	+43'	125°	42°03'	+44'	126°	41°28'	+45'	127°	0
1	45°30'	+39'	121°	44°59'	+40'	122°	44°27'	+41'	123°	43°54'	+42'	123°	43°21'	+42'	124°	42°47'	+43'	125°	42°12'	+44'	126°	1
2	46°09'	+38'	120°	45°39'	+39'	121°	45°08'	+40'	122°	44°36'	+41'	122°	44°03'	+42'	123°	43°30'	+43'	124°	42°56'	+44'	125°	2
3	46°47'	+38'	119°	46°18'	+39'	120°	45°48'	+40'	120°	45°17'	+41'	121°	44°45'	+41'	122°	44°13'	+42'	123°	43°40'	+43'	124°	3
4	47°24'	+37'	117°	46°56'	+38'	118°	46°27'	+39'	119°	45°57'	+40'	120°	45°27'	+41'	121°	44°55'	+42'	122°	44°23'	+43'	123°	4
5	48°01'	+36'	116°	47°34'	+37'	117°	47°06'	+38'	118°	46°37'	+39'	119°	46°08'	+40'	120°	45°37'	+41'	121°	45°06'	+42'	122°	5
6	48°37'	+35'	115°	48°11'	+36'	116°	47°44'	+38'	117°	47°17'	+39'	118°	46°48'	+40'	119°	46°18'	+41'	120°	45°48'	+42'	121°	6
7	49°13'	+34'	114°	48°48'	+36'	115°	48°22'	+37'	116°	47°55'	+38'	117°	47°28'	+39'	118°	46°59'	+40'	119°	46°30'	+41'	120°	7
8	49°47'	+34'	113°	49°24'	+35'	114°	48°59'	+36'	115°	48°33'	+37'	116°	48°07'	+38'	117°	47°39'	+39'	118°	47°11'	+40'	119°	8
9	50°21'	+33'	111°	49°58'	+34'	112°	49°35'	+35'	114°	49°10'	+36'	115°	48°45'	+38'	116°	48°19'	+39'	117°	47°51'	+40'	118°	9
10	50°54'	+32'	110°	50°32'	+33'	111°	50°10'	+34'	112°	49°47'	+36'	113°	49°23'	+37'	114°	48°57'	+38'	116°	48°31'	+39'	117°	10
11	51°25'	+31'	109°	51°06'	+32'	110°	50°45'	+34'	111°	50°23'	+35'	112°	50°00'	+36'	113°	49°35'	+37'	114°	49°10'	+38'	115°	11
12	51°56'	+30'	107°	51°38'	+31'	108°	51°18'	+33'	110°	50°57'	+34'	111°	50°36'	+35'	112°	50°13'	+36'	113°	49°49'	+38'	114°	12
13	52°26'	+29'	106°	52°09'	+30'	107°	51°51'	+32'	108°	51°31'	+33'	110°	51°11'	+34'	111°	50°49'	+36'	112°	50°26'	+37'	113°	13
14	52°55'	+28'	104°	52°40'	+29'	106°	52°23'	+31'	107°	52°05'	+32'	108°	51°45'	+33'	109°	51°25'	+35'	111°	51°03'	+36'	112°	14
15	53°23'	+27'	103°	53°09'	+28'	104°	52°53'	+30'	106°	52°37'	+31'	107°	52°19'	+33'	108°	52°00'	+34'	109°	51°39'	+35'	110°	15
16	53°50'	+26'	101°	53°37'	+27'	103°	53°23'	+29'	104°	53°08'	+30'	105°	52°51'	+32'	107°	52°33'	+33'	108°	52°14'	+34'	109°	16
17	54°15'	+24'	100°	54°04'	+26'	101°	53°52'	+28'	103°	53°38'	+29'	104°	53°23'	+31'	105°	53°06'	+32'	107°	52°49'	+33'	108°	17
18	54°39'	+23'	98°	54°30'	+25'	100°	54°19'	+26'	101°	54°07'	+28'	102°	53°53'	+29'	104°	53°38'	+31'	105°	53°22'	+32'	106°	18
19	55°03'	+22'	97°	54°55'	+23'	98°	54°46'	+25'	100°	54°35'	+27'	101°	54°23'	+28'	102°	54°09'	+30'	104°	53°55'	+31'	105°	19
20	55°24'	+20'	95°	55°18'	+22'	97°	55°11'	+24'	98°	55°02'	+26'	99°	54°51'	+27'	101°	54°39'	+29'	102°	54°26'	+30'	104°	20
21	55°45'	+19'	93°	55°40'	+21'	95°	55°35'	+23'	96°	55°27'	+24'	98°	55°18'	+26'	99°	55°08'	+28'	101°	54°56'	+29'	102°	21
22	56°04'	+18'	92°	56°01'	+19'	93°	55°57'	+21'	95°	55°52'	+23'	96°	55°44'	+25'	98°	55°36'	+26'	99°	55°25'	+28'	101°	22
23	56°22'	+16'	90°	56°21'	+18'	92°	56°18'	+20'	93°	56°14'	+22'	95°	56°09'	+23'	96°	56°02'	+25'	97°	55°53'	+27'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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°05'	+39'	121°	43°34'	+40'	122°	43°02'	+41'	123°	42°29'	+42'	123°	41°56'	+43'	124°	41°22'	+43'	125°	40°47'	+44'	126°	0
1	44°44'	+38'	120°	44°14'	+39'	121°	43°43'	+40'	122°	43°11'	+41'	122°	42°39'	+42'	123°	42°05'	+43'	124°	41°32'	+44'	125°	1
2	45°23'	+38'	119°	44°53'	+39'	120°	44°23'	+40'	121°	43°52'	+41'	121°	43°21'	+42'	122°	42°48'	+42'	123°	42°15'	+43'	124°	2
3	46°00'	+37'	118°	45°32'	+38'	119°	45°03'	+39'	120°	44°33'	+40'	120°	44°02'	+41'	121°	43°31'	+42'	122°	42°58'	+43'	123°	3
4	46°37'	+36'	117°	46°10'	+37'	118°	45°42'	+38'	118°	45°13'	+39'	119°	44°43'	+40'	120°	44°12'	+41'	121°	43°41'	+42'	122°	4
5	47°14'	+36'	115°	46°47'	+37'	116°	46°20'	+38'	117°	45°52'	+39'	118°	45°23'	+40'	119°	44°54'	+41'	120°	44°23'	+42'	121°	5
6	47°49'	+35'	114°	47°24'	+36'	115°	46°58'	+37'	116°	46°31'	+38'	117°	46°03'	+39'	118°	45°35'	+40'	119°	45°05'	+41'	120°	6
7	48°24'	+34'	113°	48°00'	+35'	114°	47°35'	+36'	115°	47°09'	+37'	116°	46°42'	+39'	117°	46°15'	+40'	118°	45°46'	+41'	119°	7
8	48°58'	+33'	112°	48°35'	+34'	113°	48°12'	+36'	114°	47°47'	+37'	115°	47°21'	+38'	116°	46°54'	+39'	117°	46°27'	+40'	118°	8
9	49°31'	+32'	110°	49°10'	+34'	112°	48°47'	+35'	113°	48°24'	+36'	114°	47°59'	+37'	115°	47°33'	+38'	116°	47°07'	+39'	117°	9
10	50°04'	+31'	109°	49°43'	+33'	110°	49°22'	+34'	111°	49°00'	+35'	112°	48°36'	+36'	114°	48°12'	+38'	115°	47°46'	+39'	116°	10
11	50°35'	+31'	108°	50°16'	+32'	109°	49°56'	+33'	110°	49°35'	+34'	111°	49°13'	+36'	112°	48°49'	+37'	113°	48°25'	+38'	114°	11
12	51°06'	+30'	106°	50°48'	+31'	108°	50°29'	+32'	109°	50°09'	+34'	110°	49°48'	+35'	111°	49°26'	+36'	112°	49°03'	+37'	113°	12
13	51°35'	+29'	105°	51°19'	+30'	106°	51°02'	+31'	107°	50°43'	+33'	109°	50°23'	+34'	110°	50°02'	+35'	111°	49°40'	+36'	112°	13
14	52°04'	+27'	104°	51°49'	+29'	105°	51°33'	+30'	106°	51°16'	+32'	107°	50°57'	+33'	109°	50°38'	+34'	110°	50°17'	+36'	111°	14
15	52°31'	+26'	102°	52°18'	+28'	103°	52°03'	+29'	105°	51°47'	+31'	106°	51°30'	+32'	107°	51°12'	+34'	108°	50°52'	+35'	110°	15
16	52°58'	+25'	101°	52°46'	+27'	102°	52°33'	+28'	103°	52°18'	+30'	105°	52°02'	+31'	106°	51°45'	+33'	107°	51°27'	+34'	108°	16
17	53°23'	+24'	99°	53°13'	+26'	101°	53°01'	+27'	102°	52°48'	+29'	103°	52°34'	+30'	104°	52°18'	+32'	106°	52°01'	+33'	107°	17
18	53°47'	+23'	98°	53°38'	+25'	99°	53°28'	+26'	100°	53°17'	+28'	102°	53°04'	+29'	103°	52°50'	+31'	104°	52°34'	+32'	106°	18
19	54°10'	+22'	96°	54°03'	+23'	97°	53°54'	+25'	99°	53°44'	+27'	100°	53°33'	+28'	102°	53°20'	+30'	103°	53°06'	+31'	104°	19
20	54°32'	+20'	95°	54°26'	+22'	96°	54°19'	+24'	97°	54°11'	+25'	99°	54°01'	+27'	100°	53°50'	+28'	101°	53°37'	+30'	103°	20
21	54°52'	+19'	93°	54°48'	+21'	94°	54°43'	+22'	96°	54°36'	+24'	97°	54°28'	+26'	99°	54°18'	+27'	100°	54°07'	+29'	101°	21
22	55°11'	+18'	91°	55°09'	+19'	93°	55°05'	+21'	94°	55°00'	+23'	96°	54°54'	+25'	97°	54°46'	+26'	98°	54°36'	+28'	100°	22
23	55°29'	+16'	90°	55°28'	+18'	91°	55°27'	+20'	92°	55°23'	+22'	94°	55°18'	+23'	95°	55°12'	+25'	97°	55°04'	+27'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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°20'	+38'	120°	42°49'	+39'	121°	42°18'	+40'	122°	41°46'	+41'	122°	41°14'	+42'	123°	40°41'	+43'	124°	40°07'	+44'	125°	0
1	43°58'	+38'	119°	43°29'	+39'	120°	42°58'	+40'	121°	42°27'	+41'	121°	41°56'	+42'	122°	41°23'	+42'	123°	40°50'	+43'	124°	1
2	44°36'	+37'	118°	44°07'	+38'	119°	43°38'	+39'	120°	43°08'	+40'	120°	42°37'	+41'	121°	42°06'	+42'	122°	41°34'	+43'	123°	2
3	45°13'	+37'	117°	44°46'	+38'	118°	44°17'	+39'	119°	43°48'	+40'	119°	43°18'	+41'	120°	42°48'	+41'	121°	42°16'	+42'	122°	3
4	45°50'	+36'	116°	45°23'	+37'	117°	44°56'	+38'	118°	44°28'	+39'	118°	43°59'	+40'	119°	43°29'	+41'	120°	42°59'	+42'	121°	4
5	46°26'	+35'	115°	46°00'	+36'	116°	45°34'	+37'	116°	45°07'	+38'	117°	44°39'	+39'	118°	44°10'	+40'	119°	43°41'	+41'	120°	5
6	47°01'	+34'	113°	46°36'	+36'	114°	46°11'	+37'	115°	45°45'	+38'	116°	45°18'	+39'	117°	44°50'	+40'	118°	44°22'	+41'	119°	6
7	47°35'	+34'	112°	47°12'	+35'	113°	46°48'	+36'	114°	46°23'	+37'	115°	45°57'	+38'	116°	45°30'	+39'	117°	45°03'	+40'	118°	7
8	48°09'	+33'	111°	47°47'	+34'	112°	47°24'	+35'	113°	47°00'	+36'	114°	46°35'	+37'	115°	46°09'	+39'	116°	45°43'	+40'	117°	8
9	48°42'	+32'	110°	48°21'	+33'	111°	47°59'	+34'	112°	47°36'	+36'	113°	47°13'	+37'	114°	46°48'	+38'	115°	46°22'	+39'	116°	9
10	49°13'	+31'	108°	48°54'	+32'	109°	48°33'	+34'	111°	48°12'	+35'	112°	47°49'	+36'	113°	47°26'	+37'	114°	47°01'	+38'	115°	10
11	49°45'	+30'	107°	49°26'	+32'	108°	49°07'	+33'	109°	48°47'	+34'	110°	48°25'	+35'	111°	48°03'	+36'	112°	47°40'	+38'	113°	11
12	50°15'	+29'	106°	49°58'	+31'	107°	49°40'	+32'	108°	49°21'	+33'	109°	49°01'	+34'	110°	48°39'	+36'	111°	48°17'	+37'	112°	12
13	50°44'	+28'	104°	50°28'	+30'	106°	50°12'	+31'	107°	49°54'	+32'	108°	49°35'	+34'	109°	49°15'	+35'	110°	48°54'	+36'	111°	13
14	51°12'	+27'	103°	50°58'	+29'	104°	50°43'	+30'	105°	50°26'	+31'	107°	50°09'	+33'	108°	49°50'	+34'	109°	49°30'	+35'	110°	14
15	51°39'	+26'	102°	51°27'	+28'	103°	51°13'	+29'	104°	50°58'	+30'	105°	50°42'	+32'	106°	50°24'	+33'	108°	50°05'	+34'	109°	15
16	52°06'	+25'	100°	51°54'	+27'	101°	51°42'	+28'	103°	51°28'	+30'	104°	51°13'	+31'	105°	50°57'	+32'	106°	50°40'	+34'	107°	16
17	52°31'	+24'	99°	52°21'	+25'	100°	52°10'	+27'	101°	51°58'	+28'	102°	51°44'	+30'	104°	51°30'	+31'	105°	51°14'	+33'	106°	17
18	52°54'	+23'	97°	52°46'	+24'	98°	52°37'	+26'	100°	52°26'	+27'	101°	52°14'	+29'	102°	52°01'	+30'	103°	51°46'	+32'	105°	18
19	53°17'	+22'	96°	53°11'	+23'	97°	53°03'	+25'	98°	52°54'	+26'	99°	52°43'	+28'	101°	52°31'	+29'	102°	52°18'	+31'	103°	19
20	53°39'	+20'	94°	53°34'	+22'	95°	53°28'	+24'	97°	53°20'	+25'	98°	53°11'	+27'	99°	53°01'	+28'	101°	52°49'	+30'	102°	20
21	53°59'	+19'	92°	53°56'	+21'	94°	53°51'	+22'	95°	53°45'	+24'	96°	53°38'	+26'	98°	53°29'	+27'	99°	53°19'	+29'	100°	21
22	54°18'	+18'	91°	54°16'	+19'	92°	54°14'	+21'	94°	54°09'	+23'	95°	54°03'	+24'	96°	53°56'	+26'	98°	53°47'	+28'	99°	22
23	54°36'	+16'	89°	54°36'	+18'	91°	54°35'	+20'	92°	54°32'	+21'	93°	54°28'	+23'	95°	54°22'	+25'	96°	54°15'	+26'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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°34'	+38'	119°	42°04'	+39'	120°	41°34'	+40'	121°	41°03'	+41'	122°	40°31'	+42'	122°	39°59'	+42'	123°	39°26'	+43'	124°	0
1	43°12'	+37'	118°	42°43'	+38'	119°	42°13'	+39'	120°	41°43'	+40'	121°	41°12'	+41'	121°	40°41'	+42'	122°	40°09'	+43'	123°	1
2	43°49'	+37'	117°	43°21'	+38'	118°	42°53'	+39'	119°	42°24'	+40'	120°	41°54'	+41'	120°	41°23'	+41'	121°	40°52'	+42'	122°	2
3	44°26'	+36'	116°	43°59'	+37'	117°	43°32'	+38'	118°	43°03'	+39'	119°	42°34'	+40'	119°	42°04'	+41'	120°	41°34'	+42'	121°	3
4	45°02'	+35'	115°	44°36'	+36'	116°	44°10'	+38'	117°	43°42'	+39'	117°	43°14'	+40'	118°	42°45'	+40'	119°	42°16'	+41'	120°	4
5	45°37'	+35'	114°	45°13'	+36'	115°	44°47'	+37'	116°	44°21'	+38'	116°	43°54'	+39'	117°	43°26'	+40'	118°	42°57'	+41'	119°	5
6	46°12'	+34'	113°	45°48'	+35'	113°	45°24'	+36'	114°	44°59'	+37'	115°	44°33'	+38'	116°	44°06'	+39'	117°	43°38'	+40'	118°	6
7	46°46'	+33'	111°	46°24'	+34'	112°	46°00'	+36'	113°	45°36'	+37'	114°	45°11'	+38'	115°	44°45'	+39'	116°	44°18'	+40'	117°	7
8	47°19'	+32'	110°	46°58'	+34'	111°	46°36'	+35'	112°	46°13'	+36'	113°	45°49'	+37'	114°	45°24'	+38'	115°	44°58'	+39'	116°	8
9	47°52'	+32'	109°	47°32'	+33'	110°	47°11'	+34'	111°	46°49'	+35'	112°	46°26'	+36'	113°	46°02'	+37'	114°	45°37'	+39'	115°	9
10	48°23'	+31'	108°	48°04'	+32'	109°	47°45'	+33'	110°	47°24'	+34'	111°	47°02'	+36'	112°	46°40'	+37'	113°	46°16'	+38'	114°	10
11	48°54'	+30'	106°	48°36'	+31'	107°	48°18'	+32'	108°	47°58'	+34'	110°	47°38'	+35'	111°	47°16'	+36'	112°	46°54'	+37'	113°	11
12	49°24'	+29'	105°	49°08'	+30'	106°	48°50'	+32'	107°	48°32'	+33'	108°	48°13'	+34'	109°	47°52'	+35'	110°	47°31'	+37'	111°	12
13	49°53'	+28'	104°	49°38'	+29'	105°	49°22'	+31'	106°	49°05'	+32'	107°	48°47'	+33'	108°	48°28'	+35'	109°	48°07'	+36'	110°	13
14	50°20'	+27'	102°	50°07'	+28'	103°	49°53'	+30'	105°	49°37'	+31'	106°	49°20'	+32'	107°	49°02'	+34'	108°	48°43'	+35'	109°	14
15	50°47'	+26'	101°	50°36'	+27'	102°	50°22'	+29'	103°	50°08'	+30'	104°	49°53'	+32'	106°	49°36'	+33'	107°	49°18'	+34'	108°	15
16	51°13'	+25'	99°	51°03'	+26'	101°	50°51'	+28'	102°	50°38'	+29'	103°	50°24'	+31'	104°	50°09'	+32'	105°	49°52'	+33'	107°	16
17	51°38'	+24'	98°	51°29'	+25'	99°	51°19'	+27'	100°	51°08'	+28'	102°	50°55'	+30'	103°	50°41'	+31'	104°	50°26'	+32'	105°	17
18	52°02'	+23'	96°	51°54'	+24'	98°	51°46'	+26'	99°	51°36'	+27'	100°	51°24'	+29'	101°	51°12'	+30'	103°	50°58'	+32'	104°	18
19	52°24'	+21'	95°	52°19'	+23'	96°	52°11'	+25'	98°	52°03'	+26'	99°	51°53'	+28'	100°	51°42'	+29'	101°	51°30'	+31'	103°	19
20	52°46'	+20'	93°	52°42'	+22'	95°	52°36'	+23'	96°	52°29'	+25'	97°	52°21'	+27'	99°	52°11'	+28'	100°	52°00'	+30'	101°	20
21	53°06'	+19'	92°	53°03'	+21'	93°	52°59'	+22'	94°	52°54'	+24'	96°	52°47'	+25'	97°	52°39'	+27'	98°	52°30'	+28'	100°	21
22	53°25'	+18'	90°	53°24'	+19'	92°	53°22'	+21'	93°	53°18'	+23'	94°	53°13'	+24'	96°	53°06'	+26'	97°	52°58'	+27'	98°	22
23	53°43'	+16'	89°	53°43'	+18'	90°	53°43'	+20'	91°	53°41'	+21'	93°	53°37'	+23'	94°	53°32'	+25'	95°	53°26'	+26'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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°47'	+37'	118°	41°18'	+38'	119°	40°49'	+39'	120°	40°19'	+40'	121°	39°48'	+41'	121°	39°16'	+42'	122°	38°44'	+43'	123°	0
1	42°25'	+37'	117°	41°57'	+38'	118°	41°28'	+39'	119°	40°59'	+40'	120°	40°29'	+41'	120°	39°58'	+42'	121°	39°27'	+42'	122°	1
2	43°02'	+36'	116°	42°35'	+37'	117°	42°07'	+38'	118°	41°39'	+39'	119°	41°09'	+40'	119°	40°40'	+41'	120°	40°09'	+42'	121°	2
3	43°38'	+36'	115°	43°12'	+37'	116°	42°45'	+38'	117°	42°18'	+39'	118°	41°50'	+40'	118°	41°21'	+41'	119°	40°51'	+41'	120°	3
4	44°14'	+35'	114°	43°49'	+36'	115°	43°23'	+37'	116°	42°57'	+38'	117°	42°29'	+39'	117°	42°01'	+40'	118°	41°33'	+41'	119°	4
5	44°49'	+34'	113°	44°25'	+35'	114°	44°00'	+36'	115°	43°35'	+38'	116°	43°08'	+39'	116°	42°41'	+40'	117°	42°13'	+40'	118°	5
6	45°23'	+34'	112°	45°00'	+35'	113°	44°37'	+36'	114°	44°12'	+37'	114°	43°47'	+38'	115°	43°21'	+39'	116°	42°54'	+40'	117°	6
7	45°56'	+33'	111°	45°35'	+34'	112°	45°12'	+35'	112°	44°49'	+36'	113°	44°25'	+37'	114°	44°00'	+38'	115°	43°34'	+39'	116°	7
8	46°29'	+32'	109°	46°09'	+33'	110°	45°48'	+34'	111°	45°25'	+36'	112°	45°02'	+37'	113°	44°38'	+38'	114°	44°13'	+39'	115°	8
9	47°01'	+31'	108°	46°42'	+32'	109°	46°22'	+34'	110°	46°01'	+35'	111°	45°39'	+36'	112°	45°16'	+37'	113°	44°52'	+38'	114°	9
10	47°32'	+30'	107°	47°15'	+32'	108°	46°56'	+33'	109°	46°36'	+34'	110°	46°15'	+35'	111°	45°53'	+36'	112°	45°30'	+38'	113°	10
11	48°03'	+30'	106°	47°46'	+31'	107°	47°29'	+32'	108°	47°10'	+33'	109°	46°50'	+35'	110°	46°29'	+36'	111°	46°08'	+37'	112°	11
12	48°32'	+29'	104°	48°17'	+30'	105°	48°01'	+31'	106°	47°43'	+33'	107°	47°25'	+34'	109°	47°05'	+35'	110°	46°45'	+36'	111°	12
13	49°01'	+28'	103°	48°47'	+29'	104°	48°32'	+30'	105°	48°16'	+32'	106°	47°58'	+33'	107°	47°40'	+34'	108°	47°21'	+35'	109°	13
14	49°29'	+27'	102°	49°16'	+28'	103°	49°02'	+29'	104°	48°47'	+31'	105°	48°31'	+32'	106°	48°14'	+33'	107°	47°56'	+35'	108°	14
15	49°55'	+26'	100°	49°44'	+27'	101°	49°32'	+29'	102°	49°18'	+30'	104°	49°03'	+31'	105°	48°48'	+33'	106°	48°31'	+34'	107°	15
16	50°21'	+25'	99°	50°11'	+26'	100°	50°00'	+28'	101°	49°48'	+29'	102°	49°35'	+30'	103°	49°20'	+32'	105°	49°05'	+33'	106°	16
17	50°46'	+24'	97°	50°37'	+25'	99°	50°28'	+27'	100°	50°17'	+28'	101°	50°05'	+29'	102°	49°52'	+31'	103°	49°38'	+32'	104°	17
18	51°09'	+22'	96°	51°02'	+24'	97°	50°54'	+25'	98°	50°45'	+27'	100°	50°35'	+28'	101°	50°23'	+30'	102°	50°10'	+31'	103°	18
19	51°32'	+21'	94°	51°26'	+23'	96°	51°20'	+24'	97°	51°12'	+26'	98°	51°03'	+27'	99°	50°53'	+29'	101°	50°41'	+30'	102°	19
20	51°53'	+20'	93°	51°49'	+22'	94°	51°44'	+23'	95°	51°38'	+25'	97°	51°30'	+26'	98°	51°21'	+28'	99°	51°11'	+29'	100°	20
21	52°13'	+19'	91°	52°11'	+21'	93°	52°08'	+22'	94°	52°03'	+24'	95°	51°57'	+25'	96°	51°49'	+27'	98°	51°41'	+28'	99°	21
22	52°32'	+18'	90°	52°32'	+19'	91°	52°30'	+21'	92°	52°27'	+23'	94°	52°22'	+24'	95°	52°16'	+26'	96°	52°09'	+27'	98°	22
23	52°50'	+16'	88°	52°51'	+18'	90°	52°51'	+20'	91°	52°49'	+21'	92°	52°46'	+23'	93°	52°42'	+25'	95°	52°36'	+26'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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'	+37'	118°	40°32'	+38'	118°	40°04'	+39'	119°	39°34'	+40'	120°	39°04'	+41'	120°	38°33'	+42'	121°	38°02'	+42'	122°	0
1	41°37'	+36'	116°	41°10'	+37'	117°	40°43'	+38'	118°	40°14'	+39'	119°	39°45'	+40'	120°	39°15'	+41'	120°	38°44'	+42'	121°	1
2	42°14'	+36'	115°	41°48'	+37'	116°	41°21'	+38'	117°	40°53'	+39'	118°	40°25'	+40'	119°	39°56'	+41'	119°	39°26'	+42'	120°	2
3	42°50'	+35'	114°	42°25'	+36'	115°	41°59'	+37'	116°	41°32'	+38'	117°	41°05'	+39'	118°	40°37'	+40'	118°	40°08'	+41'	119°	3
4	43°25'	+35'	113°	43°01'	+36'	114°	42°36'	+37'	115°	42°10'	+38'	116°	41°44'	+39'	117°	41°17'	+40'	117°	40°49'	+41'	118°	4
5	44°00'	+34'	112°	43°37'	+35'	113°	43°13'	+36'	114°	42°48'	+37'	115°	42°23'	+38'	116°	41°56'	+39'	116°	41°29'	+40'	117°	5
6	44°34'	+33'	111°	44°12'	+34'	112°	43°49'	+35'	113°	43°25'	+36'	114°	43°01'	+38'	114°	42°36'	+39'	115°	42°09'	+40'	116°	6
7	45°07'	+32'	110°	44°46'	+34'	111°	44°24'	+35'	112°	44°02'	+36'	113°	43°38'	+37'	113°	43°14'	+38'	114°	42°49'	+39'	115°	7
8	45°39'	+32'	109°	45°20'	+33'	110°	44°59'	+34'	110°	44°38'	+35'	111°	44°15'	+36'	112°	43°52'	+37'	113°	43°28'	+38'	114°	8
9	46°11'	+31'	107°	45°52'	+32'	108°	45°33'	+33'	109°	45°13'	+34'	110°	44°52'	+36'	111°	44°29'	+37'	112°	44°06'	+38'	113°	9
10	46°42'	+30'	106°	46°25'	+31'	107°	46°06'	+33'	108°	45°47'	+34'	109°	45°27'	+35'	110°	45°06'	+36'	111°	44°44'	+37'	112°	10
11	47°12'	+29'	105°	46°56'	+31'	106°	46°39'	+32'	107°	46°21'	+33'	108°	46°02'	+34'	109°	45°42'	+35'	110°	45°21'	+36'	111°	11
12	47°41'	+28'	104°	47°26'	+30'	105°	47°11'	+31'	106°	46°54'	+32'	107°	46°36'	+33'	108°	46°18'	+35'	109°	45°58'	+36'	110°	12
13	48°09'	+27'	102°	47°56'	+29'	103°	47°42'	+30'	104°	47°26'	+31'	105°	47°10'	+33'	106°	46°52'	+34'	108°	46°34'	+35'	109°	13
14	48°37'	+26'	101°	48°25'	+28'	102°	48°12'	+29'	103°	47°58'	+31'	104°	47°42'	+32'	105°	47°26'	+33'	106°	47°09'	+34'	107°	14
15	49°03'	+25'	100°	48°53'	+27'	101°	48°41'	+28'	102°	48°28'	+30'	103°	48°14'	+31'	104°	47°59'	+32'	105°	47°43'	+34'	106°	15
16	49°29'	+24'	98°	49°20'	+26'	99°	49°09'	+27'	100°	48°58'	+29'	102°	48°45'	+30'	103°	48°31'	+31'	104°	48°17'	+33'	105°	16
17	49°53'	+23'	97°	49°45'	+25'	98°	49°37'	+26'	99°	49°27'	+28'	100°	49°15'	+29'	101°	49°03'	+31'	102°	48°49'	+32'	104°	17
18	50°16'	+22'	95°	50°10'	+24'	96°	50°03'	+25'	98°	49°54'	+27'	99°	49°44'	+28'	100°	49°33'	+30'	101°	49°21'	+31'	102°	18
19	50°39'	+21'	94°	50°34'	+23'	95°	50°28'	+24'	96°	50°21'	+26'	97°	50°13'	+27'	99°	50°03'	+29'	100°	49°52'	+30'	101°	19
20	51°00'	+20'	92°	50°57'	+22'	94°	50°53'	+23'	95°	50°47'	+25'	96°	50°40'	+26'	97°	50°32'	+28'	98°	50°22'	+29'	100°	20
21	51°20'	+19'	91°	51°19'	+21'	92°	51°16'	+22'	93°	51°12'	+24'	95°	51°06'	+25'	96°	50°59'	+27'	97°	50°51'	+28'	98°	21
22	51°39'	+18'	89°	51°39'	+19'	91°	51°38'	+21'	92°	51°35'	+23'	93°	51°31'	+24'	94°	51°26'	+26'	96°	51°20'	+27'	97°	22
23	51°57'	+16'	88°	51°58'	+18'	89°	51°59'	+20'	90°	51°58'	+21'	92°	51°55'	+23'	93°	51°52'	+24'	94°	51°47'	+26'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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°13'	+37'	117°	39°46'	+38'	117°	39°18'	+39'	118°	38°49'	+39'	119°	38°20'	+40'	120°	37°50'	+41'	120°	37°19'	+42'	121°	0
1	40°50'	+36'	116°	40°24'	+37'	116°	39°56'	+38'	117°	39°29'	+39'	118°	39°00'	+40'	119°	38°31'	+41'	119°	38°01'	+42'	120°	1
2	41°26'	+35'	115°	41°01'	+36'	115°	40°34'	+37'	116°	40°08'	+38'	117°	39°40'	+39'	118°	39°12'	+40'	118°	38°43'	+41'	119°	2
3	42°01'	+35'	114°	41°37'	+36'	114°	41°12'	+37'	115°	40°46'	+38'	116°	40°19'	+39'	117°	39°52'	+40'	117°	39°24'	+41'	118°	3
4	42°36'	+34'	112°	42°13'	+35'	113°	41°49'	+36'	114°	41°24'	+37'	115°	40°58'	+38'	116°	40°32'	+39'	116°	40°05'	+40'	117°	4
5	43°10'	+34'	111°	42°48'	+35'	112°	42°25'	+36'	113°	42°01'	+37'	114°	41°37'	+38'	115°	41°11'	+39'	115°	40°45'	+40'	116°	5
6	43°44'	+33'	110°	43°23'	+34'	111°	43°01'	+35'	112°	42°38'	+36'	113°	42°14'	+37'	114°	41°50'	+38'	114°	41°25'	+39'	115°	6
7	44°17'	+32'	109°	43°57'	+33'	110°	43°36'	+34'	111°	43°14'	+35'	112°	42°51'	+37'	113°	42°28'	+38'	113°	42°04'	+39'	114°	7
8	44°49'	+31'	108°	44°30'	+33'	109°	44°10'	+34'	110°	43°50'	+35'	111°	43°28'	+36'	111°	43°06'	+37'	112°	42°42'	+38'	113°	8
9	45°20'	+31'	107°	45°03'	+32'	108°	44°44'	+33'	109°	44°24'	+34'	109°	44°04'	+35'	110°	43°43'	+36'	111°	43°20'	+37'	112°	9
10	45°51'	+30'	105°	45°34'	+31'	106°	45°17'	+32'	107°	44°59'	+33'	108°	44°39'	+35'	109°	44°19'	+36'	110°	43°58'	+37'	111°	10
11	46°20'	+29'	104°	46°05'	+30'	105°	45°49'	+31'	106°	45°32'	+33'	107°	45°14'	+34'	108°	44°55'	+35'	109°	44°35'	+36'	110°	11
12	46°49'	+28'	103°	46°36'	+29'	104°	46°21'	+31'	105°	46°05'	+32'	106°	45°48'	+33'	107°	45°30'	+34'	108°	45°11'	+35'	109°	12
13	47°17'	+27'	102°	47°05'	+29'	103°	46°51'	+30'	104°	46°37'	+31'	105°	46°21'	+32'	106°	46°04'	+34'	107°	45°46'	+35'	108°	13
14	47°45'	+26'	100°	47°33'	+28'	101°	47°21'	+29'	102°	47°08'	+30'	103°	46°53'	+32'	104°	46°38'	+33'	106°	46°21'	+34'	107°	14
15	48°11'	+25'	99°	48°01'	+27'	100°	47°50'	+28'	101°	47°38'	+29'	102°	47°25'	+31'	103°	47°10'	+32'	104°	46°55'	+33'	105°	15
16	48°36'	+24'	98°	48°28'	+26'	99°	48°18'	+27'	100°	48°07'	+29'	101°	47°55'	+30'	102°	47°42'	+31'	103°	47°28'	+32'	104°	16
17	49°00'	+23'	96°	48°53'	+25'	97°	48°45'	+26'	98°	48°36'	+28'	100°	48°25'	+29'	101°	48°14'	+30'	102°	48°01'	+32'	103°	17
18	49°24'	+22'	95°	49°18'	+24'	96°	49°11'	+25'	97°	49°03'	+27'	98°	48°54'	+28'	99°	48°44'	+29'	100°	48°33'	+31'	102°	18
19	49°46'	+21'	93°	49°42'	+23'	94°	49°37'	+24'	96°	49°30'	+26'	97°	49°22'	+27'	98°	49°13'	+28'	99°	49°03'	+30'	100°	19
20	50°07'	+20'	92°	50°05'	+22'	93°	50°01'	+23'	94°	49°56'	+25'	95°	49°49'	+26'	97°	49°42'	+28'	98°	49°33'	+29'	99°	20
21	50°27'	+19'	90°	50°26'	+20'	92°	50°24'	+22'	93°	50°20'	+24'	94°	50°15'	+25'	95°	50°09'	+27'	96°	50°02'	+28'	98°	21
22	50°46'	+18'	89°	50°47'	+19'	90°	50°46'	+21'	91°	50°44'	+22'	93°	50°41'	+24'	94°	50°36'	+25'	95°	50°30'	+27'	96°	22
23	51°04'	+17'	87°	51°06'	+18'	89°	51°07'	+20'	90°	51°06'	+21'	91°	51°05'	+23'	92°	51°01'	+24'	94°	50°57'	+26'	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°
	28			29			30			31			32			33			34			

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

Dec°	28			29			30			31			32			33			34			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	39°26'	+36'	116°	38°59'	+37'	117°	38°32'	+38'	117°	38°04'	+39'	118°	37°36'	+40'	119°	37°06'	+41'	119°	36°37'	+42'	120°	0
1	40°02'	+36'	115°	39°36'	+37'	116°	39°10'	+38'	116°	38°43'	+39'	117°	38°15'	+39'	118°	37°47'	+40'	118°	37°18'	+41'	119°	1
2	40°38'	+35'	114°	40°13'	+36'	115°	39°48'	+37'	115°	39°22'	+38'	116°	38°55'	+39'	117°	38°27'	+40'	118°	37°59'	+41'	118°	2
3	41°13'	+34'	113°	40°49'	+35'	114°	40°25'	+36'	114°	40°00'	+37'	115°	39°34'	+38'	116°	39°07'	+39'	117°	38°40'	+40'	117°	3
4	41°47'	+34'	112°	41°25'	+35'	112°	41°01'	+36'	113°	40°37'	+37'	114°	40°12'	+38'	115°	39°47'	+39'	116°	39°20'	+40'	116°	4
5	42°21'	+33'	111°	41°59'	+34'	111°	41°37'	+35'	112°	41°14'	+36'	113°	40°50'	+37'	114°	40°26'	+38'	115°	40°00'	+39'	115°	5
6	42°54'	+32'	109°	42°34'	+34'	110°	42°12'	+35'	111°	41°50'	+36'	112°	41°28'	+37'	113°	41°04'	+38'	114°	40°39'	+39'	114°	6
7	43°27'	+32'	108°	43°07'	+33'	109°	42°47'	+34'	110°	42°26'	+35'	111°	42°04'	+36'	112°	41°42'	+37'	113°	41°18'	+38'	113°	7
8	43°58'	+31'	107°	43°40'	+32'	108°	43°21'	+33'	109°	43°01'	+34'	110°	42°41'	+36'	111°	42°19'	+37'	112°	41°57'	+38'	112°	8
9	44°29'	+30'	106°	44°12'	+31'	107°	43°55'	+33'	108°	43°36'	+34'	109°	43°16'	+35'	110°	42°56'	+36'	110°	42°34'	+37'	111°	9
10	45°00'	+29'	105°	44°44'	+31'	106°	44°27'	+32'	107°	44°10'	+33'	108°	43°51'	+34'	108°	43°32'	+35'	109°	43°11'	+36'	110°	10
11	45°29'	+29'	103°	45°15'	+30'	104°	44°59'	+31'	105°	44°43'	+32'	106°	44°25'	+34'	107°	44°07'	+35'	108°	43°48'	+36'	109°	11
12	45°58'	+28'	102°	45°44'	+29'	103°	45°30'	+30'	104°	45°15'	+32'	105°	44°59'	+33'	106°	44°42'	+34'	107°	44°24'	+35'	108°	12
13	46°25'	+27'	101°	46°14'	+28'	102°	46°01'	+30'	103°	45°47'	+31'	104°	45°32'	+32'	105°	45°16'	+33'	106°	44°59'	+34'	107°	13
14	46°52'	+26'	100°	46°42'	+27'	101°	46°30'	+29'	102°	46°18'	+30'	103°	46°04'	+31'	104°	45°49'	+33'	105°	45°33'	+34'	106°	14
15	47°18'	+25'	98°	47°09'	+26'	99°	46°59'	+28'	100°	46°48'	+29'	101°	46°35'	+30'	102°	46°22'	+32'	104°	46°07'	+33'	105°	15
16	47°44'	+24'	97°	47°36'	+26'	98°	47°27'	+27'	99°	47°17'	+28'	100°	47°06'	+30'	101°	46°53'	+31'	102°	46°40'	+32'	103°	16
17	48°08'	+23'	96°	48°01'	+25'	97°	47°54'	+26'	98°	47°45'	+27'	99°	47°35'	+29'	100°	47°24'	+30'	101°	47°12'	+31'	102°	17
18	48°31'	+22'	94°	48°26'	+24'	95°	48°20'	+25'	96°	48°12'	+26'	98°	48°04'	+28'	99°	47°54'	+29'	100°	47°44'	+31'	101°	18
19	48°53'	+21'	93°	48°50'	+23'	94°	48°45'	+24'	95°	48°39'	+26'	96°	48°32'	+27'	97°	48°24'	+28'	98°	48°14'	+30'	100°	19
20	49°14'	+20'	91°	49°12'	+22'	93°	49°09'	+23'	94°	49°04'	+25'	95°	48°59'	+26'	96°	48°52'	+27'	97°	48°44'	+29'	98°	20
21	49°34'	+19'	90°	49°34'	+20'	91°	49°32'	+22'	92°	49°29'	+23'	93°	49°25'	+25'	95°	49°19'	+26'	96°	49°13'	+28'	97°	21
22	49°53'	+18'	88°	49°54'	+19'	90°	49°54'	+21'	91°	49°52'	+22'	92°	49°50'	+24'	93°	49°46'	+25'	94°	49°41'	+27'	96°	22
23	50°11'	+17'	87°	50°14'	+18'	88°	50°15'	+20'	89°	50°15'	+21'	91°	50°14'	+23'	92°	50°11'	+24'	93°	50°08'	+26'	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°
	28			29			30			31			32			33			34			

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

Dec°	28			29			30			31			32			33			34			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	38°38'	+36'	115°	38°12'	+37'	116°	37°46'	+38'	117°	37°19'	+39'	117°	36°51'	+40'	118°	36°22'	+40'	119°	35°53'	+41'	119°	0
1	39°14'	+35'	114°	38°49'	+36'	115°	38°23'	+37'	116°	37°57'	+38'	116°	37°30'	+39'	117°	37°03'	+40'	118°	36°35'	+41'	118°	1
2	39°49'	+35'	113°	39°25'	+36'	114°	39°01'	+37'	115°	38°35'	+38'	115°	38°09'	+39'	116°	37°43'	+39'	117°	37°15'	+40'	117°	2
3	40°24'	+34'	112°	40°01'	+35'	113°	39°37'	+36'	114°	39°13'	+37'	114°	38°48'	+38'	115°	38°22'	+39'	116°	37°56'	+40'	116°	3
4	40°58'	+33'	111°	40°36'	+35'	112°	40°13'	+36'	113°	39°50'	+37'	113°	39°26'	+38'	114°	39°01'	+39'	115°	38°36'	+39'	116°	4
5	41°31'	+33'	110°	41°10'	+34'	111°	40°49'	+35'	111°	40°27'	+36'	112°	40°03'	+37'	113°	39°40'	+38'	114°	39°15'	+39'	115°	5
6	42°04'	+32'	109°	41°44'	+33'	110°	41°24'	+34'	110°	41°03'	+35'	111°	40°40'	+36'	112°	40°18'	+37'	113°	39°54'	+38'	114°	6
7	42°36'	+31'	108°	42°18'	+33'	108°	41°58'	+34'	109°	41°38'	+35'	110°	41°17'	+36'	111°	40°55'	+37'	112°	40°32'	+38'	113°	7
8	43°08'	+31'	106°	42°50'	+32'	107°	42°32'	+33'	108°	42°13'	+34'	109°	41°53'	+35'	110°	41°32'	+36'	111°	41°10'	+37'	112°	8
9	43°38'	+30'	105°	43°22'	+31'	106°	43°05'	+32'	107°	42°47'	+34'	108°	42°28'	+35'	109°	42°08'	+36'	110°	41°48'	+37'	110°	9
10	44°08'	+29'	104°	43°53'	+30'	105°	43°37'	+32'	106°	43°20'	+33'	107°	43°03'	+34'	108°	42°44'	+35'	109°	42°25'	+36'	109°	10
11	44°37'	+28'	103°	44°24'	+30'	104°	44°09'	+31'	105°	43°53'	+32'	106°	43°37'	+33'	107°	43°19'	+34'	107°	43°01'	+36'	108°	11
12	45°06'	+28'	102°	44°53'	+29'	103°	44°40'	+30'	103°	44°25'	+31'	104°	44°10'	+33'	105°	43°54'	+34'	106°	43°36'	+35'	107°	12
13	45°33'	+27'	100°	45°22'	+28'	101°	45°10'	+29'	102°	44°57'	+31'	103°	44°42'	+32'	104°	44°27'	+33'	105°	44°11'	+34'	106°	13
14	46°00'	+26'	99°	45°50'	+27'	100°	45°39'	+29'	101°	45°27'	+30'	102°	45°14'	+31'	103°	45°00'	+32'	104°	44°45'	+34'	105°	14
15	46°26'	+25'	98°	46°17'	+26'	99°	46°08'	+28'	100°	45°57'	+29'	101°	45°45'	+30'	102°	45°33'	+32'	103°	45°19'	+33'	104°	15
16	46°51'	+24'	96°	46°44'	+25'	97°	46°35'	+27'	98°	46°26'	+28'	100°	46°16'	+29'	101°	46°04'	+31'	102°	45°52'	+32'	103°	16
17	47°15'	+23'	95°	47°09'	+24'	96°	47°02'	+26'	97°	46°54'	+27'	98°	46°45'	+29'	99°	46°35'	+30'	100°	46°24'	+31'	101°	17
18	47°38'	+22'	94°	47°34'	+24'	95°	47°28'	+25'	96°	47°21'	+26'	97°	47°14'	+28'	98°	47°05'	+29'	99°	46°55'	+30'	100°	18
19	48°00'	+21'	92°	47°57'	+23'	93°	47°53'	+24'	94°	47°48'	+25'	96°	47°41'	+27'	97°	47°34'	+28'	98°	47°25'	+30'	99°	19
20	48°21'	+20'	91°	48°20'	+22'	92°	48°17'	+23'	93°	48°13'	+24'	94°	48°08'	+26'	95°	48°02'	+27'	96°	47°55'	+29'	98°	20
21	48°41'	+19'	89°	48°41'	+20'	91°	48°40'	+22'	92°	48°38'	+23'	93°	48°34'	+25'	94°	48°29'	+26'	95°	48°23'	+28'	96°	21
22	49°00'	+18'	88°	49°02'	+19'	89°	49°02'	+21'	90°	49°01'	+22'	91°	48°59'	+24'	93°	48°56'	+25'	94°	48°51'	+27'	95°	22
23	49°18'	+17'	87°	49°21'	+18'	88°	49°23'	+20'	89°	49°23'	+21'	90°	49°23'	+23'	91°	49°21'	+24'	92°	49°18'	+26'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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°50'	+35'	114°	37°25'	+36'	115°	36°59'	+37'	116°	36°33'	+38'	116°	36°06'	+39'	117°	35°38'	+40'	118°	35°10'	+41'	118°	0
1	38°25'	+35'	113°	38°01'	+36'	114°	37°36'	+37'	115°	37°11'	+38'	115°	36°45'	+39'	116°	36°18'	+40'	117°	35°51'	+40'	117°	1
2	39°00'	+34'	112°	38°37'	+35'	113°	38°13'	+36'	114°	37°49'	+37'	115°	37°23'	+38'	115°	36°58'	+39'	116°	36°31'	+40'	117°	2
3	39°34'	+34'	111°	39°12'	+35'	112°	38°49'	+36'	113°	38°26'	+37'	114°	38°02'	+38'	114°	37°37'	+39'	115°	37°11'	+40'	116°	3
4	40°08'	+33'	110°	39°47'	+34'	111°	39°25'	+35'	112°	39°03'	+36'	112°	38°39'	+37'	113°	38°15'	+38'	114°	37°51'	+39'	115°	4
5	40°41'	+32'	109°	40°21'	+34'	110°	40°00'	+35'	111°	39°39'	+36'	111°	39°17'	+37'	112°	38°53'	+38'	113°	38°30'	+39'	114°	5
6	41°14'	+32'	108°	40°55'	+33'	109°	40°35'	+34'	110°	40°14'	+35'	110°	39°53'	+36'	111°	39°31'	+37'	112°	39°08'	+38'	113°	6
7	41°45'	+31'	107°	41°28'	+32'	108°	41°09'	+33'	109°	40°50'	+34'	109°	40°29'	+36'	110°	40°08'	+37'	111°	39°46'	+38'	112°	7
8	42°17'	+30'	106°	42°00'	+32'	107°	41°42'	+33'	107°	41°24'	+34'	108°	41°05'	+35'	109°	40°45'	+36'	110°	40°24'	+37'	111°	8
9	42°47'	+30'	105°	42°32'	+31'	105°	42°15'	+32'	106°	41°58'	+33'	107°	41°40'	+34'	108°	41°21'	+35'	109°	41°01'	+36'	110°	9
10	43°17'	+29'	103°	43°02'	+30'	104°	42°47'	+31'	105°	42°31'	+33'	106°	42°14'	+34'	107°	41°56'	+35'	108°	41°37'	+36'	109°	10
11	43°46'	+28'	102°	43°33'	+29'	103°	43°19'	+31'	104°	43°04'	+32'	105°	42°48'	+33'	106°	42°31'	+34'	107°	42°13'	+35'	108°	11
12	44°14'	+27'	101°	44°02'	+29'	102°	43°49'	+30'	103°	43°35'	+31'	104°	43°21'	+32'	105°	43°05'	+33'	106°	42°49'	+35'	106°	12
13	44°41'	+27'	100°	44°31'	+28'	101°	44°19'	+29'	102°	44°07'	+30'	103°	43°53'	+32'	103°	43°39'	+33'	104°	43°23'	+34'	105°	13
14	45°08'	+26'	98°	44°59'	+27'	99°	44°48'	+28'	100°	44°37'	+30'	101°	44°25'	+31'	102°	44°11'	+32'	103°	43°57'	+33'	104°	14
15	45°33'	+25'	97°	45°26'	+26'	98°	45°17'	+27'	99°	45°07'	+29'	100°	44°56'	+30'	101°	44°43'	+31'	102°	44°30'	+33'	103°	15
16	45°58'	+24'	96°	45°52'	+25'	97°	45°44'	+27'	98°	45°35'	+28'	99°	45°26'	+29'	100°	45°15'	+31'	101°	45°03'	+32'	102°	16
17	46°22'	+23'	94°	46°17'	+24'	96°	46°11'	+26'	97°	46°03'	+27'	98°	45°55'	+28'	99°	45°45'	+30'	100°	45°35'	+31'	101°	17
18	46°45'	+22'	93°	46°41'	+23'	94°	46°36'	+25'	95°	46°30'	+26'	96°	46°23'	+28'	97°	46°15'	+29'	98°	46°06'	+30'	99°	18
19	47°07'	+21'	92°	47°05'	+22'	93°	47°01'	+24'	94°	46°57'	+25'	95°	46°51'	+27'	96°	46°44'	+28'	97°	46°36'	+29'	98°	19
20	47°28'	+20'	90°	47°27'	+21'	91°	47°25'	+23'	93°	47°22'	+24'	94°	47°18'	+26'	95°	47°12'	+27'	96°	47°05'	+29'	97°	20
21	47°48'	+19'	89°	47°49'	+20'	90°	47°48'	+22'	91°	47°46'	+23'	92°	47°43'	+25'	93°	47°39'	+26'	94°	47°34'	+28'	96°	21
22	48°07'	+18'	88°	48°09'	+19'	89°	48°10'	+21'	90°	48°10'	+22'	91°	48°08'	+24'	92°	48°05'	+25'	93°	48°02'	+27'	94°	22
23	48°25'	+17'	86°	48°29'	+18'	87°	48°31'	+20'	88°	48°32'	+21'	90°	48°32'	+23'	91°	48°31'	+24'	92°	48°28'	+26'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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°02'	+35'	114°	36°37'	+36'	114°	36°12'	+37'	115°	35°46'	+38'	116°	35°20'	+39'	116°	34°53'	+40'	117°	34°26'	+40'	118°	0
1	37°37'	+34'	113°	37°13'	+35'	113°	36°49'	+36'	114°	36°24'	+37'	115°	35°59'	+38'	115°	35°33'	+39'	116°	35°06'	+40'	117°	1
2	38°11'	+34'	112°	37°49'	+35'	112°	37°25'	+36'	113°	37°02'	+37'	114°	36°37'	+38'	114°	36°12'	+39'	115°	35°46'	+40'	116°	2
3	38°45'	+33'	111°	38°24'	+34'	111°	38°01'	+35'	112°	37°39'	+36'	113°	37°15'	+37'	113°	36°51'	+38'	114°	36°26'	+39'	115°	3
4	39°18'	+33'	109°	38°58'	+34'	110°	38°37'	+35'	111°	38°15'	+36'	112°	37°52'	+37'	112°	37°29'	+38'	113°	37°05'	+39'	114°	4
5	39°51'	+32'	108°	39°32'	+33'	109°	39°12'	+34'	110°	38°51'	+35'	111°	38°29'	+36'	111°	38°07'	+37'	112°	37°44'	+38'	113°	5
6	40°23'	+31'	107°	40°05'	+33'	108°	39°46'	+34'	109°	39°26'	+35'	110°	39°06'	+36'	110°	38°44'	+37'	111°	38°22'	+38'	112°	6
7	40°55'	+31'	106°	40°38'	+32'	107°	40°20'	+33'	108°	40°01'	+34'	109°	39°41'	+35'	109°	39°21'	+36'	110°	39°00'	+37'	111°	7
8	41°26'	+30'	105°	41°10'	+31'	106°	40°53'	+32'	107°	40°35'	+34'	108°	40°17'	+35'	108°	39°57'	+36'	109°	39°37'	+37'	110°	8
9	41°56'	+29'	104°	41°41'	+31'	105°	41°25'	+32'	106°	41°09'	+33'	106°	40°51'	+34'	107°	40°33'	+35'	108°	40°14'	+36'	109°	9
10	42°25'	+29'	103°	42°12'	+30'	104°	41°57'	+31'	104°	41°42'	+32'	105°	41°25'	+33'	106°	41°08'	+35'	107°	40°50'	+36'	108°	10
11	42°54'	+28'	101°	42°41'	+29'	102°	42°28'	+30'	103°	42°14'	+32'	104°	41°59'	+33'	105°	41°43'	+34'	106°	41°26'	+35'	107°	11
12	43°22'	+27'	100°	43°11'	+28'	101°	42°58'	+30'	102°	42°45'	+31'	103°	42°31'	+32'	104°	42°17'	+33'	105°	42°01'	+34'	106°	12
13	43°49'	+26'	99°	43°39'	+28'	100°	43°28'	+29'	101°	43°16'	+30'	102°	43°04'	+31'	103°	42°50'	+33'	104°	42°35'	+34'	105°	13
14	44°15'	+26'	98°	44°07'	+27'	99°	43°57'	+28'	100°	43°46'	+29'	101°	43°35'	+31'	102°	43°22'	+32'	103°	43°09'	+33'	103°	14
15	44°41'	+25'	97°	44°34'	+26'	98°	44°25'	+27'	98°	44°16'	+29'	99°	44°06'	+30'	100°	43°54'	+31'	101°	43°42'	+32'	102°	15
16	45°06'	+24'	95°	45°00'	+25'	96°	44°53'	+26'	97°	44°44'	+28'	98°	44°35'	+29'	99°	44°25'	+30'	100°	44°14'	+32'	101°	16
17	45°29'	+23'	94°	45°25'	+24'	95°	45°19'	+26'	96°	45°12'	+27'	97°	45°04'	+28'	98°	44°56'	+30'	99°	44°46'	+31'	100°	17
18	45°52'	+22'	93°	45°49'	+23'	94°	45°45'	+25'	95°	45°39'	+26'	96°	45°33'	+27'	97°	45°25'	+29'	98°	45°17'	+30'	99°	18
19	46°14'	+21'	91°	46°12'	+22'	92°	46°09'	+24'	93°	46°05'	+25'	94°	46°00'	+27'	95°	45°54'	+28'	96°	45°47'	+29'	97°	19
20	46°35'	+20'	90°	46°35'	+21'	91°	46°33'	+23'	92°	46°31'	+24'	93°	46°27'	+26'	94°	46°22'	+27'	95°	46°16'	+28'	96°	20
21	46°55'	+19'	89°	46°56'	+20'	90°	46°56'	+22'	91°	46°55'	+23'	92°	46°52'	+25'	93°	46°49'	+26'	94°	46°44'	+28'	95°	21
22	47°14'	+18'	87°	47°17'	+19'	88°	47°18'	+21'	89°	47°18'	+22'	90°	47°17'	+24'	91°	47°15'	+25'	93°	47°12'	+27'	94°	22
23	47°32'	+17'	86°	47°36'	+18'	87°	47°39'	+20'	88°	47°41'	+21'	89°	47°41'	+23'	90°	47°40'	+24'	91°	47°39'	+26'	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°
	28			29			30			31			32			33			34			

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

Dec°	28			29			30			31			32			33			34			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	36°13'	+35'	113°	35°49'	+36'	114°	35°25'	+37'	114°	35°00'	+37'	115°	34°34'	+38'	116°	34°08'	+39'	116°	33°42'	+40'	117°	0
1	36°48'	+34'	112°	36°25'	+35'	113°	36°01'	+36'	113°	35°37'	+37'	114°	35°13'	+38'	115°	34°48'	+39'	115°	34°22'	+40'	116°	1
2	37°22'	+34'	111°	37°00'	+35'	112°	36°38'	+36'	112°	36°14'	+37'	113°	35°51'	+38'	114°	35°26'	+38'	114°	35°01'	+39'	115°	2
3	37°55'	+33'	110°	37°35'	+34'	111°	37°13'	+35'	111°	36°51'	+36'	112°	36°28'	+37'	113°	36°05'	+38'	113°	35°41'	+39'	114°	3
4	38°28'	+32'	109°	38°09'	+33'	110°	37°48'	+35'	110°	37°27'	+36'	111°	37°05'	+37'	112°	36°43'	+37'	112°	36°20'	+38'	113°	4
5	39°01'	+32'	108°	38°42'	+33'	108°	38°23'	+34'	109°	38°03'	+35'	110°	37°42'	+36'	111°	37°20'	+37'	111°	36°58'	+38'	112°	5
6	39°33'	+31'	107°	39°15'	+32'	107°	38°57'	+33'	108°	38°38'	+34'	109°	38°18'	+35'	110°	37°57'	+36'	110°	37°36'	+37'	111°	6
7	40°04'	+31'	105°	39°47'	+32'	106°	39°30'	+33'	107°	39°12'	+34'	108°	38°53'	+35'	109°	38°34'	+36'	109°	38°13'	+37'	110°	7
8	40°34'	+30'	104°	40°19'	+31'	105°	40°03'	+32'	106°	39°46'	+33'	107°	39°28'	+34'	108°	39°10'	+35'	108°	38°50'	+36'	109°	8
9	41°04'	+29'	103°	40°50'	+30'	104°	40°35'	+32'	105°	40°19'	+33'	106°	40°03'	+34'	107°	39°45'	+35'	107°	39°27'	+36'	108°	9
10	41°33'	+28'	102°	41°20'	+30'	103°	41°07'	+31'	104°	40°52'	+32'	105°	40°36'	+33'	105°	40°20'	+34'	106°	40°03'	+35'	107°	10
11	42°02'	+28'	101°	41°50'	+29'	102°	41°37'	+30'	103°	41°24'	+31'	103°	41°10'	+33'	104°	40°54'	+34'	105°	40°38'	+35'	106°	11
12	42°30'	+27'	100°	42°19'	+28'	101°	42°08'	+29'	101°	41°55'	+31'	102°	41°42'	+32'	103°	41°28'	+33'	104°	41°13'	+34'	105°	12
13	42°57'	+26'	98°	42°47'	+27'	99°	42°37'	+29'	100°	42°26'	+30'	101°	42°14'	+31'	102°	42°01'	+32'	103°	41°47'	+33'	104°	13
14	43°23'	+25'	97°	43°15'	+27'	98°	43°06'	+28'	99°	42°56'	+29'	100°	42°45'	+30'	101°	42°33'	+32'	102°	42°20'	+33'	103°	14
15	43°48'	+25'	96°	43°41'	+26'	97°	43°34'	+27'	98°	43°25'	+28'	99°	43°15'	+30'	100°	43°05'	+31'	101°	42°53'	+32'	102°	15
16	44°13'	+24'	95°	44°07'	+25'	96°	44°01'	+26'	97°	43°54'	+28'	98°	43°45'	+29'	99°	43°36'	+30'	99°	43°25'	+31'	100°	16
17	44°36'	+23'	93°	44°32'	+24'	94°	44°27'	+26'	95°	44°21'	+27'	96°	44°14'	+28'	97°	44°06'	+29'	98°	43°57'	+31'	99°	17
18	44°59'	+22'	92°	44°57'	+23'	93°	44°53'	+25'	94°	44°48'	+26'	95°	44°42'	+27'	96°	44°35'	+29'	97°	44°27'	+30'	98°	18
19	45°21'	+21'	91°	45°20'	+22'	92°	45°17'	+24'	93°	45°14'	+25'	94°	45°10'	+26'	95°	45°04'	+28'	96°	44°57'	+29'	97°	19
20	45°42'	+20'	89°	45°42'	+21'	90°	45°41'	+23'	91°	45°39'	+24'	93°	45°36'	+26'	94°	45°32'	+27'	95°	45°26'	+28'	96°	20
21	46°02'	+19'	88°	46°04'	+21'	89°	46°04'	+22'	90°	46°03'	+23'	91°	46°02'	+25'	92°	45°59'	+26'	93°	45°55'	+27'	94°	21
22	46°21'	+18'	87°	46°24'	+20'	88°	46°26'	+21'	89°	46°27'	+22'	90°	46°26'	+24'	91°	46°25'	+25'	92°	46°22'	+27'	93°	22
23	46°40'	+17'	85°	46°44'	+19'	86°	46°47'	+20'	87°	46°49'	+21'	89°	46°50'	+23'	90°	46°50'	+24'	91°	46°49'	+26'	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°
	28			29			30			31			32			33			34			

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

Dec°	28			29			30			31			32			33			34			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	35°24'	+34'	112°	35°01'	+35'	113°	34°37'	+36'	113°	34°13'	+37'	114°	33°48'	+38'	115°	33°23'	+39'	115°	32°57'	+40'	116°	0
1	35°58'	+34'	111°	35°36'	+35'	112°	35°14'	+36'	113°	34°50'	+37'	113°	34°26'	+38'	114°	34°02'	+39'	114°	33°37'	+39'	115°	1
2	36°32'	+33'	110°	36°11'	+34'	111°	35°49'	+35'	112°	35°27'	+36'	112°	35°04'	+37'	113°	34°40'	+38'	113°	34°16'	+39'	114°	2
3	37°05'	+33'	109°	36°45'	+34'	110°	36°25'	+35'	111°	36°03'	+36'	111°	35°41'	+37'	112°	35°18'	+38'	113°	34°55'	+39'	113°	3
4	37°38'	+32'	108°	37°19'	+33'	109°	36°59'	+34'	110°	36°39'	+35'	110°	36°18'	+36'	111°	35°56'	+37'	112°	35°34'	+38'	112°	4
5	38°10'	+32'	107°	37°52'	+33'	108°	37°34'	+34'	108°	37°14'	+35'	109°	36°54'	+36'	110°	36°33'	+37'	111°	36°12'	+38'	111°	5
6	38°42'	+31'	106°	38°25'	+32'	107°	38°07'	+33'	107°	37°49'	+34'	108°	37°30'	+35'	109°	37°10'	+36'	110°	36°49'	+37'	110°	6
7	39°13'	+30'	105°	38°57'	+31'	106°	38°40'	+33'	106°	38°23'	+34'	107°	38°05'	+35'	108°	37°46'	+36'	109°	37°27'	+37'	109°	7
8	39°43'	+30'	104°	39°28'	+31'	104°	39°13'	+32'	105°	38°57'	+33'	106°	38°40'	+34'	107°	38°22'	+35'	108°	38°03'	+36'	108°	8
9	40°13'	+29'	103°	39°59'	+30'	103°	39°45'	+31'	104°	39°30'	+32'	105°	39°14'	+34'	106°	38°57'	+35'	107°	38°40'	+36'	107°	9
10	40°42'	+28'	101°	40°29'	+29'	102°	40°16'	+31'	103°	40°02'	+32'	104°	39°47'	+33'	105°	39°32'	+34'	106°	39°15'	+35'	106°	10
11	41°10'	+28'	100°	40°59'	+29'	101°	40°47'	+30'	102°	40°34'	+31'	103°	40°20'	+32'	104°	40°06'	+33'	104°	39°50'	+34'	105°	11
12	41°37'	+27'	99°	41°27'	+28'	100°	41°17'	+29'	101°	41°05'	+30'	102°	40°52'	+32'	103°	40°39'	+33'	103°	40°25'	+34'	104°	12
13	42°04'	+26'	98°	41°55'	+27'	99°	41°46'	+29'	100°	41°35'	+30'	101°	41°24'	+31'	101°	41°12'	+32'	102°	40°59'	+33'	103°	13
14	42°30'	+25'	97°	42°23'	+27'	98°	42°14'	+28'	98°	42°05'	+29'	99°	41°55'	+30'	100°	41°44'	+31'	101°	41°32'	+33'	102°	14
15	42°55'	+24'	95°	42°49'	+26'	96°	42°42'	+27'	97°	42°34'	+28'	98°	42°25'	+30'	99°	42°15'	+31'	100°	42°04'	+32'	101°	15
16	43°20'	+24'	94°	43°15'	+25'	95°	43°09'	+26'	96°	43°03'	+28'	97°	42°55'	+29'	98°	42°46'	+30'	99°	42°36'	+31'	100°	16
17	43°44'	+23'	93°	43°40'	+24'	94°	43°36'	+25'	95°	43°30'	+27'	96°	43°24'	+28'	97°	43°16'	+29'	98°	43°08'	+31'	99°	17
18	44°06'	+22'	92°	44°04'	+23'	93°	44°01'	+25'	94°	43°57'	+26'	94°	43°52'	+27'	95°	43°45'	+29'	96°	43°38'	+30'	97°	18
19	44°28'	+21'	90°	44°27'	+22'	91°	44°26'	+24'	92°	44°23'	+25'	93°	44°19'	+26'	94°	44°14'	+28'	95°	44°08'	+29'	96°	19
20	44°49'	+20'	89°	44°50'	+21'	90°	44°49'	+23'	91°	44°48'	+24'	92°	44°45'	+26'	93°	44°42'	+27'	94°	44°37'	+28'	95°	20
21	45°09'	+19'	88°	45°11'	+21'	89°	45°12'	+22'	90°	45°12'	+23'	91°	45°11'	+25'	92°	45°09'	+26'	93°	45°05'	+27'	94°	21
22	45°29'	+18'	86°	45°32'	+20'	87°	45°34'	+21'	88°	45°35'	+22'	89°	45°35'	+24'	90°	45°35'	+25'	91°	45°33'	+27'	92°	22
23	45°47'	+17'	85°	45°51'	+19'	86°	45°55'	+20'	87°	45°58'	+21'	88°	45°59'	+23'	89°	46°00'	+24'	90°	45°59'	+26'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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°35'	+34'	112°	34°12'	+35'	112°	33°50'	+36'	113°	33°26'	+37'	113°	33°02'	+38'	114°	32°37'	+39'	115°	32°12'	+39'	115°	0
1	35°09'	+33'	110°	34°47'	+34'	111°	34°25'	+35'	112°	34°03'	+36'	112°	33°40'	+37'	113°	33°16'	+38'	114°	32°52'	+39'	114°	1
2	35°42'	+33'	109°	35°22'	+34'	110°	35°01'	+35'	111°	34°39'	+36'	111°	34°17'	+37'	112°	33°54'	+38'	113°	33°31'	+39'	113°	2
3	36°15'	+32'	108°	35°56'	+33'	109°	35°36'	+34'	110°	35°15'	+35'	110°	34°54'	+36'	111°	34°32'	+37'	112°	34°09'	+38'	112°	3
4	36°48'	+32'	107°	36°29'	+33'	108°	36°10'	+34'	109°	35°51'	+35'	109°	35°30'	+36'	110°	35°09'	+37'	111°	34°48'	+38'	111°	4
5	37°19'	+31'	106°	37°02'	+32'	107°	36°44'	+33'	108°	36°25'	+34'	108°	36°06'	+35'	109°	35°46'	+36'	110°	35°25'	+37'	111°	5
6	37°51'	+31'	105°	37°34'	+32'	106°	37°18'	+33'	107°	37°00'	+34'	107°	36°42'	+35'	108°	36°22'	+36'	109°	36°03'	+37'	110°	6
7	38°21'	+30'	104°	38°06'	+31'	105°	37°50'	+32'	106°	37°34'	+33'	106°	37°16'	+34'	107°	36°58'	+35'	108°	36°40'	+36'	109°	7
8	38°51'	+29'	103°	38°37'	+31'	104°	38°23'	+32'	105°	38°07'	+33'	105°	37°51'	+34'	106°	37°34'	+35'	107°	37°16'	+36'	108°	8
9	39°21'	+29'	102°	39°08'	+30'	103°	38°54'	+31'	104°	38°40'	+32'	104°	38°25'	+33'	105°	38°09'	+34'	106°	37°52'	+35'	107°	9
10	39°50'	+28'	101°	39°38'	+29'	102°	39°25'	+30'	102°	39°12'	+32'	103°	38°58'	+33'	104°	38°43'	+34'	105°	38°27'	+35'	106°	10
11	40°18'	+27'	100°	40°07'	+29'	100°	39°56'	+30'	101°	39°44'	+31'	102°	39°31'	+32'	103°	39°17'	+33'	104°	39°02'	+34'	105°	11
12	40°45'	+27'	98°	40°36'	+28'	99°	40°26'	+29'	100°	40°15'	+30'	101°	40°03'	+31'	102°	39°50'	+33'	103°	39°36'	+34'	103°	12
13	41°12'	+26'	97°	41°04'	+27'	98°	40°55'	+28'	99°	40°45'	+30'	100°	40°34'	+31'	101°	40°22'	+32'	102°	40°10'	+33'	102°	13
14	41°38'	+25'	96°	41°31'	+26'	97°	41°23'	+28'	98°	41°14'	+29'	99°	41°05'	+30'	100°	40°54'	+31'	100°	40°43'	+32'	101°	14
15	42°03'	+24'	95°	41°57'	+26'	96°	41°51'	+27'	97°	41°43'	+28'	98°	41°35'	+29'	98°	41°26'	+31'	99°	41°16'	+32'	100°	15
16	42°27'	+24'	94°	42°23'	+25'	95°	42°18'	+26'	95°	42°11'	+27'	96°	42°04'	+29'	97°	41°56'	+30'	98°	41°47'	+31'	99°	16
17	42°51'	+23'	92°	42°48'	+24'	93°	42°44'	+25'	94°	42°39'	+27'	95°	42°33'	+28'	96°	42°26'	+29'	97°	42°18'	+30'	98°	17
18	43°13'	+22'	91°	43°12'	+23'	92°	43°09'	+25'	93°	43°05'	+26'	94°	43°01'	+27'	95°	42°55'	+28'	96°	42°49'	+30'	97°	18
19	43°35'	+21'	90°	43°35'	+22'	91°	43°34'	+24'	92°	43°31'	+25'	93°	43°28'	+26'	94°	43°24'	+28'	95°	43°18'	+29'	96°	19
20	43°56'	+20'	89°	43°57'	+22'	89°	43°57'	+23'	90°	43°56'	+24'	91°	43°54'	+26'	92°	43°51'	+27'	93°	43°47'	+28'	94°	20
21	44°16'	+19'	87°	44°19'	+21'	88°	44°20'	+22'	89°	44°21'	+23'	90°	44°20'	+25'	91°	44°18'	+26'	92°	44°16'	+27'	93°	21
22	44°36'	+18'	86°	44°39'	+20'	87°	44°42'	+21'	88°	44°44'	+22'	89°	44°45'	+24'	90°	44°44'	+25'	91°	44°43'	+27'	92°	22
23	44°54'	+17'	85°	44°59'	+19'	86°	45°03'	+20'	87°	45°06'	+22'	88°	45°08'	+23'	89°	45°09'	+24'	90°	45°09'	+26'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	33°45'	+34'	111°	33°24'	+35'	111°	33°02'	+36'	112°	32°39'	+36'	113°	32°15'	+37'	113°	31°51'	+38'	114°	31°27'	+39'	114°	0
1	34°19'	+33'	110°	33°58'	+34'	110°	33°37'	+35'	111°	33°15'	+36'	112°	32°53'	+37'	112°	32°30'	+38'	113°	32°06'	+39'	113°	1
2	34°52'	+33'	109°	34°32'	+34'	109°	34°12'	+35'	110°	33°51'	+36'	111°	33°30'	+37'	111°	33°08'	+37'	112°	32°45'	+38'	113°	2
3	35°25'	+32'	108°	35°06'	+33'	108°	34°47'	+34'	109°	34°27'	+35'	110°	34°06'	+36'	110°	33°45'	+37'	111°	33°23'	+38'	112°	3
4	35°57'	+32'	107°	35°39'	+33'	107°	35°21'	+34'	108°	35°02'	+35'	109°	34°42'	+36'	109°	34°22'	+37'	110°	34°01'	+38'	111°	4
5	36°28'	+31'	106°	36°12'	+32'	106°	35°55'	+33'	107°	35°37'	+34'	108°	35°18'	+35'	108°	34°59'	+36'	109°	34°39'	+37'	110°	5
6	36°59'	+30'	105°	36°44'	+32'	105°	36°28'	+33'	106°	36°11'	+34'	107°	35°53'	+35'	107°	35°35'	+36'	108°	35°16'	+37'	109°	6
7	37°30'	+30'	104°	37°15'	+31'	104°	37°00'	+32'	105°	36°44'	+33'	106°	36°28'	+34'	106°	36°10'	+35'	107°	35°52'	+36'	108°	7
8	38°00'	+29'	102°	37°46'	+30'	103°	37°32'	+31'	104°	37°17'	+33'	105°	37°02'	+34'	105°	36°46'	+35'	106°	36°29'	+36'	107°	8
9	38°29'	+29'	101°	38°17'	+30'	102°	38°04'	+31'	103°	37°50'	+32'	104°	37°35'	+33'	104°	37°20'	+34'	105°	37°04'	+35'	106°	9
10	38°57'	+28'	100°	38°46'	+29'	101°	38°35'	+30'	102°	38°22'	+31'	103°	38°08'	+32'	103°	37°54'	+34'	104°	37°39'	+35'	105°	10
11	39°25'	+27'	99°	39°15'	+28'	100°	39°05'	+30'	101°	38°53'	+31'	101°	38°41'	+32'	102°	38°28'	+33'	103°	38°14'	+34'	104°	11
12	39°53'	+27'	98°	39°44'	+28'	99°	39°34'	+29'	100°	39°24'	+30'	100°	39°13'	+31'	101°	39°01'	+32'	102°	38°48'	+33'	103°	12
13	40°19'	+26'	97°	40°12'	+27'	98°	40°03'	+28'	98°	39°54'	+29'	99°	39°44'	+31'	100°	39°33'	+32'	101°	39°21'	+33'	102°	13
14	40°45'	+25'	96°	40°39'	+26'	96°	40°31'	+28'	97°	40°23'	+29'	98°	40°15'	+30'	99°	40°05'	+31'	100°	39°54'	+32'	101°	14
15	41°10'	+24'	94°	41°05'	+26'	95°	40°59'	+27'	96°	40°52'	+28'	97°	40°45'	+29'	98°	40°36'	+30'	99°	40°27'	+32'	99°	15
16	41°34'	+24'	93°	41°30'	+25'	94°	41°26'	+26'	95°	41°20'	+27'	96°	41°14'	+29'	97°	41°06'	+30'	97°	40°58'	+31'	98°	16
17	41°58'	+23'	92°	41°55'	+24'	93°	41°52'	+25'	94°	41°48'	+27'	95°	41°42'	+28'	95°	41°36'	+29'	96°	41°29'	+30'	97°	17
18	42°20'	+22'	91°	42°19'	+23'	92°	42°17'	+25'	92°	42°14'	+26'	93°	42°10'	+27'	94°	42°05'	+28'	95°	41°59'	+30'	96°	18
19	42°42'	+21'	89°	42°43'	+22'	90°	42°42'	+24'	91°	42°40'	+25'	92°	42°37'	+26'	93°	42°34'	+28'	94°	42°29'	+29'	95°	19
20	43°03'	+20'	88°	43°05'	+22'	89°	43°05'	+23'	90°	43°05'	+24'	91°	43°04'	+26'	92°	43°01'	+27'	93°	42°58'	+28'	94°	20
21	43°24'	+19'	87°	43°26'	+21'	88°	43°28'	+22'	89°	43°29'	+23'	90°	43°29'	+25'	91°	43°28'	+26'	92°	43°26'	+27'	92°	21
22	43°43'	+18'	85°	43°47'	+20'	86°	43°50'	+21'	87°	43°53'	+22'	88°	43°54'	+24'	89°	43°54'	+25'	90°	43°53'	+26'	91°	22
23	44°01'	+17'	84°	44°07'	+19'	85°	44°11'	+20'	86°	44°15'	+22'	87°	44°18'	+23'	88°	44°19'	+24'	89°	44°20'	+26'	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°
	28			29			30			31			32			33			34			

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

Dec°	28			29			30			31			32			33			34			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	32°56'	+33'	110°	32°35'	+34'	111°	32°13'	+35'	111°	31°51'	+36'	112°	31°28'	+37'	112°	31°05'	+38'	113°	30°41'	+39'	114°	0
1	33°29'	+33'	109°	33°09'	+34'	110°	32°48'	+35'	110°	32°27'	+36'	111°	32°06'	+37'	112°	31°43'	+38'	112°	31°20'	+38'	113°	1
2	34°02'	+32'	108°	33°43'	+33'	109°	33°23'	+34'	109°	33°03'	+35'	110°	32°42'	+36'	111°	32°21'	+37'	111°	31°59'	+38'	112°	2
3	34°34'	+32'	107°	34°16'	+33'	108°	33°58'	+34'	108°	33°38'	+35'	109°	33°18'	+36'	110°	32°58'	+37'	110°	32°37'	+38'	111°	3
4	35°06'	+31'	106°	34°49'	+32'	107°	34°31'	+33'	107°	34°13'	+34'	108°	33°54'	+35'	109°	33°35'	+36'	109°	33°14'	+37'	110°	4
5	35°37'	+31'	105°	35°21'	+32'	106°	35°05'	+33'	106°	34°48'	+34'	107°	34°30'	+35'	108°	34°11'	+36'	108°	33°52'	+37'	109°	5
6	36°08'	+30'	104°	35°53'	+31'	105°	35°38'	+32'	105°	35°21'	+33'	106°	35°04'	+34'	107°	34°47'	+35'	107°	34°29'	+36'	108°	6
7	36°38'	+30'	103°	36°25'	+31'	104°	36°10'	+32'	104°	35°55'	+33'	105°	35°39'	+34'	106°	35°22'	+35'	106°	35°05'	+36'	107°	7
8	37°08'	+29'	102°	36°55'	+30'	103°	36°42'	+31'	103°	36°28'	+32'	104°	36°13'	+33'	105°	35°57'	+34'	105°	35°41'	+35'	106°	8
9	37°37'	+28'	101°	37°25'	+30'	101°	37°13'	+31'	102°	37°00'	+32'	103°	36°46'	+33'	104°	36°32'	+34'	104°	36°16'	+35'	105°	9
10	38°05'	+28'	100°	37°55'	+29'	100°	37°44'	+30'	101°	37°32'	+31'	102°	37°19'	+32'	103°	37°05'	+33'	103°	36°51'	+34'	104°	10
11	38°33'	+27'	98°	38°24'	+28'	99°	38°14'	+29'	100°	38°03'	+31'	101°	37°51'	+32'	102°	37°39'	+33'	102°	37°26'	+34'	103°	11
12	39°00'	+26'	97°	38°52'	+28'	98°	38°43'	+29'	99°	38°33'	+30'	100°	38°23'	+31'	100°	38°11'	+32'	101°	37°59'	+33'	102°	12
13	39°26'	+26'	96°	39°20'	+27'	97°	39°12'	+28'	98°	39°03'	+29'	99°	38°54'	+30'	99°	38°44'	+32'	100°	38°33'	+33'	101°	13
14	39°52'	+25'	95°	39°46'	+26'	96°	39°40'	+27'	97°	39°33'	+29'	97°	39°24'	+30'	98°	39°15'	+31'	99°	39°05'	+32'	100°	14
15	40°17'	+24'	94°	40°13'	+25'	95°	40°07'	+27'	95°	40°01'	+28'	96°	39°54'	+29'	97°	39°46'	+30'	98°	39°37'	+31'	99°	15
16	40°41'	+23'	93°	40°38'	+25'	93°	40°34'	+26'	94°	40°29'	+27'	95°	40°23'	+28'	96°	40°17'	+30'	97°	40°09'	+31'	98°	16
17	41°05'	+23'	91°	41°03'	+24'	92°	41°00'	+25'	93°	40°56'	+26'	94°	40°52'	+28'	95°	40°46'	+29'	96°	40°40'	+30'	97°	17
18	41°27'	+22'	90°	41°27'	+23'	91°	41°25'	+24'	92°	41°23'	+26'	93°	41°19'	+27'	94°	41°15'	+28'	95°	41°10'	+29'	95°	18
19	41°49'	+21'	89°	41°50'	+22'	90°	41°50'	+24'	91°	41°49'	+25'	92°	41°46'	+26'	92°	41°43'	+28'	93°	41°39'	+29'	94°	19
20	42°10'	+20'	88°	42°12'	+22'	89°	42°13'	+23'	89°	42°14'	+24'	90°	42°13'	+25'	91°	42°11'	+27'	92°	42°08'	+28'	93°	20
21	42°31'	+19'	86°	42°34'	+21'	87°	42°36'	+22'	88°	42°38'	+23'	89°	42°38'	+25'	90°	42°38'	+26'	91°	42°36'	+27'	92°	21
22	42°50'	+19'	85°	42°55'	+20'	86°	42°58'	+21'	87°	43°01'	+23'	88°	43°03'	+24'	89°	43°04'	+25'	90°	43°03'	+26'	91°	22
23	43°09'	+18'	84°	43°15'	+19'	85°	43°20'	+20'	86°	43°24'	+22'	87°	43°27'	+23'	88°	43°29'	+24'	88°	43°30'	+26'	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°
	28			29			30			31			32			33			34			

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

Dec°	28			29			30			31			32			33			34			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	32°06'	+33'	109°	31°46'	+34'	110°	31°25'	+35'	111°	31°03'	+36'	111°	30°41'	+37'	112°	30°19'	+38'	112°	29°56'	+39'	113°	0
1	32°39'	+33'	108°	32°20'	+34'	109°	32°00'	+35'	110°	31°39'	+35'	110°	31°18'	+36'	111°	30°56'	+37'	111°	30°34'	+38'	112°	1
2	33°11'	+32'	107°	32°53'	+33'	108°	32°34'	+34'	109°	32°15'	+35'	109°	31°54'	+36'	110°	31°34'	+37'	110°	31°12'	+38'	111°	2
3	33°44'	+32'	106°	33°26'	+33'	107°	33°08'	+34'	108°	32°50'	+35'	108°	32°30'	+36'	109°	32°11'	+36'	110°	31°50'	+37'	110°	3
4	34°15'	+31'	105°	33°59'	+32'	106°	33°42'	+33'	107°	33°24'	+34'	107°	33°06'	+35'	108°	32°47'	+36'	109°	32°28'	+37'	109°	4
5	34°46'	+31'	104°	34°31'	+32'	105°	34°15'	+33'	106°	33°58'	+34'	106°	33°41'	+35'	107°	33°23'	+36'	108°	33°05'	+37'	108°	5
6	35°17'	+30'	103°	35°02'	+31'	104°	34°48'	+32'	105°	34°32'	+33'	105°	34°16'	+34'	106°	33°59'	+35'	107°	33°41'	+36'	107°	6
7	35°47'	+29'	102°	35°33'	+30'	103°	35°20'	+32'	104°	35°05'	+33'	104°	34°50'	+34'	105°	34°34'	+35'	106°	34°17'	+36'	106°	7
8	36°16'	+29'	101°	36°04'	+30'	102°	35°51'	+31'	103°	35°38'	+32'	103°	35°23'	+33'	104°	35°09'	+34'	105°	34°53'	+35'	105°	8
9	36°45'	+28'	100°	36°34'	+29'	101°	36°22'	+30'	102°	36°10'	+32'	102°	35°57'	+33'	103°	35°43'	+34'	104°	35°28'	+35'	104°	9
10	37°13'	+28'	99°	37°03'	+29'	100°	36°53'	+30'	101°	36°41'	+31'	101°	36°29'	+32'	102°	36°16'	+33'	103°	36°03'	+34'	103°	10
11	37°41'	+27'	98°	37°32'	+28'	99°	37°22'	+29'	99°	37°12'	+30'	100°	37°01'	+31'	101°	36°50'	+33'	102°	36°37'	+34'	102°	11
12	38°07'	+26'	97°	38°00'	+27'	98°	37°52'	+29'	98°	37°43'	+30'	99°	37°33'	+31'	100°	37°22'	+32'	101°	37°11'	+33'	101°	12
13	38°34'	+26'	96°	38°27'	+27'	96°	38°20'	+28'	97°	38°12'	+29'	98°	38°04'	+30'	99°	37°54'	+31'	100°	37°44'	+33'	100°	13
14	38°59'	+25'	94°	38°54'	+26'	95°	38°48'	+27'	96°	38°42'	+28'	97°	38°34'	+30'	98°	38°26'	+31'	98°	38°16'	+32'	99°	14
15	39°24'	+24'	93°	39°20'	+25'	94°	39°16'	+27'	95°	39°10'	+28'	96°	39°04'	+29'	97°	38°56'	+30'	97°	38°48'	+31'	98°	15
16	39°48'	+23'	92°	39°46'	+25'	93°	39°42'	+26'	94°	39°38'	+27'	95°	39°33'	+28'	95°	39°27'	+30'	96°	39°20'	+31'	97°	16
17	40°12'	+23'	91°	40°10'	+24'	92°	40°08'	+25'	93°	40°05'	+26'	93°	40°01'	+28'	94°	39°56'	+29'	95°	39°50'	+30'	96°	17
18	40°34'	+22'	90°	40°34'	+23'	91°	40°33'	+24'	91°	40°31'	+26'	92°	40°29'	+27'	93°	40°25'	+28'	94°	40°20'	+29'	95°	18
19	40°56'	+21'	88°	40°58'	+22'	89°	40°58'	+24'	90°	40°57'	+25'	91°	40°56'	+26'	92°	40°53'	+27'	93°	40°50'	+29'	94°	19
20	41°18'	+20'	87°	41°20'	+22'	88°	41°21'	+23'	89°	41°22'	+24'	90°	41°22'	+25'	91°	41°21'	+27'	92°	41°18'	+28'	92°	20
21	41°38'	+19'	86°	41°42'	+21'	87°	41°44'	+22'	88°	41°46'	+23'	89°	41°47'	+25'	90°	41°47'	+26'	90°	41°46'	+27'	91°	21
22	41°57'	+19'	85°	42°02'	+20'	86°	42°07'	+21'	86°	42°10'	+23'	87°	42°12'	+24'	88°	42°13'	+25'	89°	42°14'	+26'	90°	22
23	42°16'	+18'	83°	42°22'	+19'	84°	42°28'	+20'	85°	42°32'	+22'	86°	42°36'	+23'	87°	42°38'	+24'	88°	42°40'	+26'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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°16'	+33'	109°	30°56'	+34'	109°	30°36'	+35'	110°	30°15'	+36'	111°	29°54'	+36'	111°	29°32'	+37'	112°	29°10'	+38'	112°	0
1	31°49'	+32'	108°	31°30'	+33'	108°	31°11'	+34'	109°	30°51'	+35'	110°	30°30'	+36'	110°	30°09'	+37'	111°	29°48'	+38'	111°	1
2	32°21'	+32'	107°	32°03'	+33'	107°	31°45'	+34'	108°	31°26'	+35'	109°	31°07'	+36'	109°	30°46'	+37'	110°	30°26'	+38'	110°	2
3	32°53'	+31'	106°	32°36'	+32'	106°	32°19'	+33'	107°	32°01'	+34'	108°	31°42'	+35'	108°	31°23'	+36'	109°	31°03'	+37'	109°	3
4	33°24'	+31'	105°	33°08'	+32'	105°	32°52'	+33'	106°	32°35'	+34'	107°	32°17'	+35'	107°	31°59'	+36'	108°	31°41'	+37'	109°	4
5	33°55'	+30'	104°	33°40'	+31'	104°	33°25'	+32'	105°	33°09'	+33'	106°	32°52'	+34'	106°	32°35'	+35'	107°	32°17'	+36'	108°	5
6	34°25'	+30'	103°	34°11'	+31'	103°	33°57'	+32'	104°	33°42'	+33'	105°	33°27'	+34'	105°	33°10'	+35'	106°	32°54'	+36'	107°	6
7	34°55'	+29'	102°	34°42'	+30'	102°	34°29'	+31'	103°	34°15'	+32'	104°	34°01'	+33'	104°	33°45'	+34'	105°	33°29'	+35'	106°	7
8	35°24'	+29'	101°	35°13'	+30'	101°	35°00'	+31'	102°	34°48'	+32'	103°	34°34'	+33'	103°	34°20'	+34'	104°	34°05'	+35'	105°	8
9	35°53'	+28'	100°	35°42'	+29'	100°	35°31'	+30'	101°	35°19'	+31'	102°	35°07'	+32'	102°	34°54'	+33'	103°	34°40'	+34'	104°	9
10	36°21'	+27'	98°	36°11'	+29'	99°	36°01'	+30'	100°	35°51'	+31'	101°	35°39'	+32'	101°	35°27'	+33'	102°	35°14'	+34'	103°	10
11	36°48'	+27'	97°	36°40'	+28'	98°	36°31'	+29'	99°	36°22'	+30'	100°	36°11'	+31'	100°	36°00'	+32'	101°	35°48'	+33'	102°	11
12	37°15'	+26'	96°	37°08'	+27'	97°	37°00'	+28'	98°	36°52'	+30'	98°	36°43'	+31'	99°	36°33'	+32'	100°	36°22'	+33'	101°	12
13	37°41'	+25'	95°	37°35'	+27'	96°	37°29'	+28'	97°	37°21'	+29'	97°	37°13'	+30'	98°	37°04'	+31'	99°	36°55'	+32'	100°	13
14	38°06'	+25'	94°	38°02'	+26'	95°	37°57'	+27'	96°	37°50'	+28'	96°	37°43'	+30'	97°	37°36'	+31'	98°	37°27'	+32'	99°	14
15	38°31'	+24'	93°	38°28'	+25'	94°	38°24'	+27'	94°	38°19'	+28'	95°	38°13'	+29'	96°	38°06'	+30'	97°	37°59'	+31'	98°	15
16	38°55'	+23'	92°	38°53'	+25'	92°	38°50'	+26'	93°	38°47'	+27'	94°	38°42'	+28'	95°	38°36'	+29'	96°	38°30'	+31'	96°	16
17	39°19'	+23'	90°	39°18'	+24'	91°	39°16'	+25'	92°	39°14'	+26'	93°	39°10'	+28'	94°	39°06'	+29'	95°	39°01'	+30'	95°	17
18	39°42'	+22'	89°	39°42'	+23'	90°	39°41'	+24'	91°	39°40'	+26'	92°	39°38'	+27'	93°	39°35'	+28'	93°	39°31'	+29'	94°	18
19	40°03'	+21'	88°	40°05'	+22'	89°	40°06'	+24'	90°	40°06'	+25'	91°	40°05'	+26'	91°	40°03'	+27'	92°	40°00'	+29'	93°	19
20	40°25'	+20'	87°	40°28'	+22'	88°	40°30'	+23'	88°	40°31'	+24'	89°	40°31'	+25'	90°	40°30'	+27'	91°	40°29'	+28'	92°	20
21	40°45'	+20'	86°	40°49'	+21'	86°	40°52'	+22'	87°	40°55'	+23'	88°	40°56'	+25'	89°	40°57'	+26'	90°	40°57'	+27'	91°	21
22	41°05'	+19'	84°	41°10'	+20'	85°	41°15'	+21'	86°	41°18'	+23'	87°	41°21'	+24'	88°	41°23'	+25'	89°	41°24'	+26'	90°	22
23	41°23'	+18'	83°	41°30'	+19'	84°	41°36'	+21'	85°	41°41'	+22'	86°	41°45'	+23'	87°	41°48'	+24'	87°	41°50'	+26'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	30°26'	+32'	108°	30°07'	+33'	109°	29°47'	+34'	109°	29°27'	+35'	110°	29°06'	+36'	110°	28°45'	+37'	111°	28°24'	+38'	111°	0
1	30°58'	+32'	107°	30°40'	+33'	108°	30°21'	+34'	108°	30°02'	+35'	109°	29°43'	+36'	109°	29°22'	+37'	110°	29°02'	+38'	111°	1
2	31°30'	+32'	106°	31°13'	+33'	107°	30°55'	+34'	107°	30°37'	+34'	108°	30°18'	+35'	109°	29°59'	+36'	109°	29°39'	+37'	110°	2
3	32°02'	+31'	105°	31°46'	+32'	106°	31°29'	+33'	106°	31°12'	+34'	107°	30°54'	+35'	108°	30°35'	+36'	108°	30°16'	+37'	109°	3
4	32°33'	+31'	104°	32°18'	+32'	105°	32°02'	+33'	105°	31°46'	+34'	106°	31°29'	+35'	107°	31°11'	+36'	107°	30°53'	+36'	108°	4
5	33°03'	+30'	103°	32°49'	+31'	104°	32°35'	+32'	104°	32°19'	+33'	105°	32°03'	+34'	106°	31°47'	+35'	106°	31°30'	+36'	107°	5
6	33°33'	+30'	102°	33°20'	+31'	103°	33°07'	+32'	103°	32°52'	+33'	104°	32°38'	+34'	105°	32°22'	+35'	105°	32°06'	+36'	106°	6
7	34°03'	+29'	101°	33°51'	+30'	102°	33°38'	+31'	102°	33°25'	+32'	103°	33°11'	+33'	104°	32°57'	+34'	104°	32°42'	+35'	105°	7
8	34°32'	+28'	100°	34°21'	+30'	101°	34°10'	+31'	101°	33°57'	+32'	102°	33°44'	+33'	103°	33°31'	+34'	103°	33°17'	+35'	104°	8
9	35°00'	+28'	99°	34°51'	+29'	100°	34°40'	+30'	100°	34°29'	+31'	101°	34°17'	+32'	102°	34°05'	+33'	102°	33°51'	+34'	103°	9
10	35°28'	+27'	98°	35°20'	+28'	99°	35°10'	+30'	99°	35°00'	+31'	100°	34°49'	+32'	101°	34°38'	+33'	101°	34°26'	+34'	102°	10
11	35°55'	+27'	97°	35°48'	+28'	98°	35°40'	+29'	98°	35°31'	+30'	99°	35°21'	+31'	100°	35°11'	+32'	100°	35°00'	+33'	101°	11
12	36°22'	+26'	96°	36°16'	+27'	96°	36°09'	+28'	97°	36°01'	+29'	98°	35°52'	+31'	99°	35°43'	+32'	99°	35°33'	+33'	100°	12
13	36°48'	+25'	95°	36°43'	+27'	95°	36°37'	+28'	96°	36°30'	+29'	97°	36°23'	+30'	98°	36°15'	+31'	98°	36°06'	+32'	99°	13
14	37°14'	+25'	93°	37°10'	+26'	94°	37°05'	+27'	95°	36°59'	+28'	96°	36°53'	+29'	96°	36°46'	+31'	97°	36°38'	+32'	98°	14
15	37°38'	+24'	92°	37°36'	+25'	93°	37°32'	+26'	94°	37°28'	+28'	95°	37°22'	+29'	95°	37°16'	+30'	96°	37°10'	+31'	97°	15
16	38°02'	+23'	91°	38°01'	+25'	92°	37°58'	+26'	93°	37°55'	+27'	93°	37°51'	+28'	94°	37°46'	+29'	95°	37°41'	+31'	96°	16
17	38°26'	+23'	90°	38°25'	+24'	91°	38°24'	+25'	92°	38°22'	+26'	92°	38°19'	+28'	93°	38°16'	+29'	94°	38°11'	+30'	95°	17
18	38°49'	+22'	89°	38°49'	+23'	90°	38°49'	+24'	90°	38°49'	+26'	91°	38°47'	+27'	92°	38°44'	+28'	93°	38°41'	+29'	94°	18
19	39°11'	+21'	88°	39°13'	+22'	88°	39°14'	+24'	89°	39°14'	+25'	90°	39°14'	+26'	91°	39°13'	+27'	92°	39°10'	+29'	92°	19
20	39°32'	+20'	86°	39°35'	+22'	87°	39°38'	+23'	88°	39°39'	+24'	89°	39°40'	+25'	90°	39°40'	+27'	90°	39°39'	+28'	91°	20
21	39°52'	+20'	85°	39°57'	+21'	86°	40°01'	+22'	87°	40°04'	+24'	88°	40°06'	+25'	88°	40°07'	+26'	89°	40°07'	+27'	90°	21
22	40°12'	+19'	84°	40°18'	+20'	85°	40°23'	+21'	86°	40°27'	+23'	86°	40°30'	+24'	87°	40°33'	+25'	88°	40°34'	+27'	89°	22
23	40°31'	+18'	83°	40°38'	+19'	84°	40°44'	+21'	84°	40°50'	+22'	85°	40°54'	+23'	86°	40°58'	+25'	87°	41°01'	+26'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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°35'	+32'	108°	29°17'	+33'	108°	28°58'	+34'	109°	28°38'	+35'	109°	28°19'	+36'	110°	27°58'	+37'	110°	27°37'	+38'	111°	0
1	30°07'	+32'	107°	29°50'	+33'	107°	29°32'	+34'	108°	29°13'	+35'	108°	28°54'	+36'	109°	28°35'	+36'	109°	28°15'	+37'	110°	1
2	30°39'	+31'	106°	30°23'	+32'	106°	30°06'	+33'	107°	29°48'	+34'	107°	29°30'	+35'	108°	29°11'	+36'	108°	28°52'	+37'	109°	2
3	31°10'	+31'	105°	30°55'	+32'	105°	30°39'	+33'	106°	30°22'	+34'	106°	30°05'	+35'	107°	29°47'	+36'	107°	29°29'	+37'	108°	3
4	31°41'	+30'	104°	31°27'	+31'	104°	31°12'	+32'	105°	30°56'	+33'	105°	30°40'	+34'	106°	30°23'	+35'	107°	30°06'	+36'	107°	4
5	32°12'	+30'	103°	31°58'	+31'	103°	31°44'	+32'	104°	31°30'	+33'	104°	31°14'	+34'	105°	30°58'	+35'	106°	30°42'	+36'	106°	5
6	32°41'	+29'	102°	32°29'	+30'	102°	32°16'	+31'	103°	32°02'	+32'	103°	31°48'	+33'	104°	31°33'	+34'	105°	31°18'	+35'	105°	6
7	33°11'	+29'	101°	33°00'	+30'	101°	32°48'	+31'	102°	32°35'	+32'	102°	32°22'	+33'	103°	32°08'	+34'	104°	31°53'	+35'	104°	7
8	33°40'	+28'	99°	33°29'	+29'	100°	33°19'	+30'	101°	33°07'	+32'	101°	32°55'	+33'	102°	32°42'	+34'	103°	32°28'	+35'	103°	8
9	34°08'	+28'	98°	33°59'	+29'	99°	33°49'	+30'	100°	33°38'	+31'	100°	33°27'	+32'	101°	33°15'	+33'	102°	33°03'	+34'	102°	9
10	34°36'	+27'	97°	34°28'	+28'	98°	34°19'	+29'	99°	34°09'	+30'	99°	33°59'	+32'	100°	33°49'	+33'	101°	33°37'	+34'	101°	10
11	35°03'	+27'	96°	34°56'	+28'	97°	34°48'	+29'	98°	34°40'	+30'	98°	34°31'	+31'	99°	34°21'	+32'	100°	34°11'	+33'	100°	11
12	35°29'	+26'	95°	35°24'	+27'	96°	35°17'	+28'	97°	35°10'	+29'	97°	35°02'	+30'	98°	34°53'	+32'	99°	34°44'	+33'	99°	12
13	35°55'	+25'	94°	35°51'	+27'	95°	35°45'	+28'	95°	35°39'	+29'	96°	35°32'	+30'	97°	35°25'	+31'	98°	35°16'	+32'	98°	13
14	36°21'	+25'	93°	36°17'	+26'	94°	36°13'	+27'	94°	36°08'	+28'	95°	36°02'	+29'	96°	35°56'	+30'	97°	35°49'	+32'	97°	14
15	36°45'	+24'	92°	36°43'	+25'	93°	36°40'	+26'	93°	36°36'	+28'	94°	36°32'	+29'	95°	36°26'	+30'	96°	36°20'	+31'	96°	15
16	37°09'	+23'	91°	37°08'	+25'	91°	37°07'	+26'	92°	37°04'	+27'	93°	37°00'	+28'	94°	36°56'	+29'	94°	36°51'	+30'	95°	16
17	37°33'	+23'	89°	37°33'	+24'	90°	37°32'	+25'	91°	37°31'	+26'	92°	37°29'	+28'	93°	37°26'	+29'	93°	37°22'	+30'	94°	17
18	37°56'	+22'	88°	37°57'	+23'	89°	37°57'	+24'	90°	37°57'	+26'	91°	37°56'	+27'	91°	37°54'	+28'	92°	37°51'	+29'	93°	18
19	38°18'	+21'	87°	38°20'	+23'	88°	38°22'	+24'	89°	38°23'	+25'	90°	38°23'	+26'	90°	38°22'	+27'	91°	38°21'	+29'	92°	19
20	38°39'	+21'	86°	38°43'	+22'	87°	38°46'	+23'	88°	38°48'	+24'	88°	38°49'	+26'	89°	38°50'	+27'	90°	38°49'	+28'	91°	20
21	38°59'	+20'	85°	39°04'	+21'	86°	39°09'	+22'	86°	39°12'	+24'	87°	39°15'	+25'	88°	39°16'	+26'	89°	39°17'	+27'	90°	21
22	39°19'	+19'	84°	39°26'	+20'	84°	39°31'	+22'	85°	39°36'	+23'	86°	39°39'	+24'	87°	39°42'	+25'	88°	39°44'	+27'	88°	22
23	39°38'	+18'	82°	39°46'	+20'	83°	39°53'	+21'	84°	39°59'	+22'	85°	40°04'	+23'	86°	40°08'	+25'	86°	40°11'	+26'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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°45'	+32'	107°	28°27'	+33'	107°	28°09'	+34'	108°	27°50'	+35'	108°	27°31'	+36'	109°	27°11'	+37'	109°	26°50'	+37'	110°	0
1	29°17'	+31'	106°	29°00'	+32'	107°	28°42'	+33'	107°	28°25'	+34'	108°	28°06'	+35'	108°	27°47'	+36'	109°	27°28'	+37'	109°	1
2	29°48'	+31'	105°	29°32'	+32'	106°	29°16'	+33'	106°	28°59'	+34'	107°	28°41'	+35'	107°	28°24'	+36'	108°	28°05'	+37'	108°	2
3	30°19'	+31'	104°	30°04'	+32'	105°	29°49'	+33'	105°	29°33'	+34'	106°	29°16'	+35'	106°	28°59'	+35'	107°	28°42'	+36'	107°	3
4	30°50'	+30'	103°	30°36'	+31'	104°	30°21'	+32'	104°	30°07'	+33'	105°	29°51'	+34'	105°	29°35'	+35'	106°	29°18'	+36'	106°	4
5	31°20'	+30'	102°	31°07'	+31'	103°	30°54'	+32'	103°	30°40'	+33'	104°	30°25'	+34'	104°	30°10'	+35'	105°	29°54'	+36'	105°	5
6	31°49'	+29'	101°	31°38'	+30'	102°	31°25'	+31'	102°	31°12'	+32'	103°	30°59'	+33'	103°	30°45'	+34'	104°	30°30'	+35'	105°	6
7	32°19'	+29'	100°	32°08'	+30'	101°	31°57'	+31'	101°	31°45'	+32'	102°	31°32'	+33'	102°	31°19'	+34'	103°	31°05'	+35'	104°	7
8	32°47'	+28'	99°	32°38'	+29'	100°	32°27'	+30'	100°	32°16'	+31'	101°	32°05'	+32'	101°	31°53'	+33'	102°	31°40'	+34'	103°	8
9	33°15'	+28'	98°	33°07'	+29'	99°	32°58'	+30'	99°	32°48'	+31'	100°	32°37'	+32'	100°	32°26'	+33'	101°	32°14'	+34'	102°	9
10	33°43'	+27'	97°	33°36'	+28'	97°	33°27'	+29'	98°	33°19'	+30'	99°	33°09'	+31'	99°	32°59'	+32'	100°	32°48'	+33'	101°	10
11	34°10'	+26'	96°	34°04'	+28'	96°	33°57'	+29'	97°	33°49'	+30'	98°	33°41'	+31'	98°	33°32'	+32'	99°	33°22'	+33'	100°	11
12	34°37'	+26'	95°	34°31'	+27'	95°	34°25'	+28'	96°	34°19'	+29'	97°	34°12'	+30'	97°	34°03'	+31'	98°	33°55'	+33'	99°	12
13	35°02'	+25'	94°	34°58'	+26'	94°	34°54'	+28'	95°	34°48'	+29'	96°	34°42'	+30'	96°	34°35'	+31'	97°	34°27'	+32'	98°	13
14	35°28'	+25'	92°	35°25'	+26'	93°	35°21'	+27'	94°	35°17'	+28'	95°	35°12'	+29'	95°	35°06'	+30'	96°	34°59'	+31'	97°	14
15	35°52'	+24'	91°	35°51'	+25'	92°	35°48'	+26'	93°	35°45'	+28'	93°	35°41'	+29'	94°	35°36'	+30'	95°	35°31'	+31'	96°	15
16	36°17'	+23'	90°	36°16'	+25'	91°	36°15'	+26'	92°	36°13'	+27'	92°	36°10'	+28'	93°	36°06'	+29'	94°	36°02'	+30'	95°	16
17	36°40'	+23'	89°	36°41'	+24'	90°	36°40'	+25'	91°	36°39'	+26'	91°	36°38'	+27'	92°	36°35'	+29'	93°	36°32'	+30'	93°	17
18	37°03'	+22'	88°	37°04'	+23'	89°	37°06'	+24'	89°	37°06'	+26'	90°	37°05'	+27'	91°	37°04'	+28'	92°	37°02'	+29'	92°	18
19	37°25'	+21'	87°	37°28'	+23'	87°	37°30'	+24'	88°	37°31'	+25'	89°	37°32'	+26'	90°	37°32'	+27'	91°	37°31'	+29'	91°	19
20	37°46'	+21'	86°	37°50'	+22'	86°	37°54'	+23'	87°	37°56'	+24'	88°	37°58'	+26'	89°	37°59'	+27'	89°	38°00'	+28'	90°	20
21	38°07'	+20'	84°	38°12'	+21'	85°	38°17'	+22'	86°	38°21'	+24'	87°	38°24'	+25'	87°	38°26'	+26'	88°	38°27'	+27'	89°	21
22	38°27'	+19'	83°	38°33'	+20'	84°	38°39'	+22'	85°	38°44'	+23'	86°	38°49'	+24'	86°	38°52'	+25'	87°	38°55'	+27'	88°	22
23	38°46'	+18'	82°	38°54'	+20'	83°	39°01'	+21'	84°	39°07'	+22'	84°	39°13'	+23'	85°	39°18'	+25'	86°	39°21'	+26'	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°
	28			29			30			31			32			33			34			

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

Dec°	28			29			30			31			32			33			34			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	27°54'	+32'	106°	27°37'	+33'	107°	27°19'	+34'	107°	27°01'	+35'	108°	26°42'	+35'	108°	26°23'	+36'	109°	26°04'	+37'	109°	0
1	28°26'	+31'	105°	28°09'	+32'	106°	27°53'	+33'	106°	27°35'	+34'	107°	27°18'	+35'	107°	27°00'	+36'	108°	26°41'	+37'	108°	1
2	28°57'	+31'	104°	28°42'	+32'	105°	28°26'	+33'	105°	28°10'	+34'	106°	27°53'	+35'	106°	27°35'	+36'	107°	27°18'	+37'	107°	2
3	29°28'	+30'	103°	29°13'	+31'	104°	28°59'	+32'	105°	28°43'	+33'	105°	28°27'	+34'	106°	28°11'	+35'	106°	27°54'	+36'	107°	3
4	29°58'	+30'	102°	29°45'	+31'	103°	29°31'	+32'	104°	29°17'	+33'	104°	29°02'	+34'	105°	28°46'	+35'	105°	28°30'	+36'	106°	4
5	30°28'	+29'	101°	30°16'	+31'	102°	30°03'	+32'	103°	29°50'	+33'	103°	29°36'	+34'	104°	29°21'	+34'	104°	29°06'	+35'	105°	5
6	30°57'	+29'	100°	30°46'	+30'	101°	30°35'	+31'	102°	30°22'	+32'	102°	30°09'	+33'	103°	29°56'	+34'	103°	29°42'	+35'	104°	6
7	31°26'	+29'	99°	31°16'	+30'	100°	31°06'	+31'	101°	30°54'	+32'	101°	30°42'	+33'	102°	30°30'	+34'	102°	30°17'	+35'	103°	7
8	31°55'	+28'	98°	31°46'	+29'	99°	31°36'	+30'	100°	31°26'	+31'	100°	31°15'	+32'	101°	31°03'	+33'	101°	30°51'	+34'	102°	8
9	32°23'	+27'	97°	32°15'	+29'	98°	32°06'	+30'	99°	31°57'	+31'	99°	31°47'	+32'	100°	31°37'	+33'	100°	31°26'	+34'	101°	9
10	32°50'	+27'	96°	32°44'	+28'	97°	32°36'	+29'	98°	32°28'	+30'	98°	32°19'	+31'	99°	32°09'	+32'	99°	31°59'	+33'	100°	10
11	33°17'	+26'	95°	33°12'	+28'	96°	33°05'	+29'	96°	32°58'	+30'	97°	32°50'	+31'	98°	32°42'	+32'	98°	32°33'	+33'	99°	11
12	33°44'	+26'	94°	33°39'	+27'	95°	33°34'	+28'	95°	33°28'	+29'	96°	33°21'	+30'	97°	33°14'	+31'	97°	33°06'	+32'	98°	12
13	34°10'	+25'	93°	34°06'	+26'	94°	34°02'	+28'	94°	33°57'	+29'	95°	33°51'	+30'	96°	33°45'	+31'	96°	33°38'	+32'	97°	13
14	34°35'	+25'	92°	34°32'	+26'	93°	34°29'	+27'	93°	34°26'	+28'	94°	34°21'	+29'	95°	34°16'	+30'	95°	34°10'	+31'	96°	14
15	34°59'	+24'	91°	34°58'	+25'	92°	34°56'	+26'	92°	34°54'	+28'	93°	34°50'	+29'	94°	34°46'	+30'	94°	34°41'	+31'	95°	15
16	35°24'	+23'	90°	35°23'	+25'	90°	35°23'	+26'	91°	35°21'	+27'	92°	35°19'	+28'	93°	35°16'	+29'	93°	35°12'	+30'	94°	16
17	35°47'	+23'	89°	35°48'	+24'	89°	35°48'	+25'	90°	35°48'	+26'	91°	35°47'	+27'	91°	35°45'	+29'	92°	35°42'	+30'	93°	17
18	36°10'	+22'	87°	36°12'	+23'	88°	36°14'	+25'	89°	36°14'	+26'	90°	36°14'	+27'	90°	36°14'	+28'	91°	36°12'	+29'	92°	18
19	36°32'	+21'	86°	36°35'	+23'	87°	36°38'	+24'	88°	36°40'	+25'	88°	36°41'	+26'	89°	36°42'	+27'	90°	36°41'	+29'	91°	19
20	36°53'	+21'	85°	36°58'	+22'	86°	37°02'	+23'	87°	37°05'	+24'	87°	37°07'	+26'	88°	37°09'	+27'	89°	37°10'	+28'	90°	20
21	37°14'	+20'	84°	37°20'	+21'	85°	37°25'	+22'	85°	37°29'	+24'	86°	37°33'	+25'	87°	37°36'	+26'	88°	37°38'	+27'	89°	21
22	37°34'	+19'	83°	37°41'	+21'	84°	37°48'	+22'	84°	37°53'	+23'	85°	37°58'	+24'	86°	38°02'	+25'	87°	38°05'	+27'	87°	22
23	37°53'	+19'	82°	38°02'	+20'	82°	38°09'	+21'	83°	38°16'	+22'	84°	38°22'	+24'	85°	38°27'	+25'	85°	38°32'	+26'	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°
	28			29			30			31			32			33			34			

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

Dec°	28			29			30			31			32			33			34			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	27°03'	+31'	106°	26°46'	+32'	106°	26°29'	+33'	107°	26°12'	+34'	107°	25°54'	+35'	108°	25°35'	+36'	108°	25°17'	+37'	109°	0
1	27°34'	+31'	105°	27°19'	+32'	105°	27°03'	+33'	106°	26°46'	+34'	106°	26°29'	+35'	107°	26°12'	+36'	107°	25°54'	+37'	108°	1
2	28°05'	+31'	104°	27°51'	+32'	104°	27°36'	+33'	105°	27°20'	+34'	105°	27°04'	+34'	106°	26°47'	+35'	106°	26°30'	+36'	107°	2
3	28°36'	+30'	103°	28°22'	+31'	103°	28°08'	+32'	104°	27°54'	+33'	104°	27°38'	+34'	105°	27°23'	+35'	105°	27°06'	+36'	106°	3
4	29°06'	+30'	102°	28°54'	+31'	102°	28°40'	+32'	103°	28°27'	+33'	103°	28°12'	+34'	104°	27°58'	+35'	105°	27°42'	+36'	105°	4
5	29°36'	+29'	101°	29°24'	+30'	101°	29°12'	+31'	102°	28°59'	+32'	103°	28°46'	+33'	103°	28°32'	+34'	104°	28°18'	+35'	104°	5
6	30°05'	+29'	100°	29°55'	+30'	100°	29°44'	+31'	101°	29°32'	+32'	102°	29°20'	+33'	102°	29°07'	+34'	103°	28°53'	+35'	103°	6
7	30°34'	+28'	99°	30°25'	+29'	99°	30°14'	+30'	100°	30°04'	+31'	101°	29°52'	+32'	101°	29°41'	+33'	102°	29°28'	+34'	102°	7
8	31°03'	+28'	98°	30°54'	+29'	98°	30°45'	+30'	99°	30°35'	+31'	100°	30°25'	+32'	100°	30°14'	+33'	101°	30°03'	+34'	101°	8
9	31°30'	+27'	97°	31°23'	+28'	97°	31°15'	+30'	98°	31°06'	+31'	99°	30°57'	+32'	99°	30°47'	+33'	100°	30°37'	+34'	100°	9
10	31°58'	+27'	96°	31°51'	+28'	96°	31°44'	+29'	97°	31°37'	+30'	98°	31°29'	+31'	98°	31°20'	+32'	99°	31°10'	+33'	99°	10
11	32°25'	+26'	95°	32°19'	+27'	95°	32°14'	+29'	96°	32°07'	+30'	97°	32°00'	+31'	97°	31°52'	+32'	98°	31°43'	+33'	98°	11
12	32°51'	+26'	94°	32°47'	+27'	94°	32°42'	+28'	95°	32°37'	+29'	96°	32°30'	+30'	96°	32°24'	+31'	97°	32°16'	+32'	97°	12
13	33°17'	+25'	93°	33°14'	+26'	93°	33°10'	+27'	94°	33°06'	+29'	94°	33°01'	+30'	95°	32°55'	+31'	96°	32°49'	+32'	96°	13
14	33°42'	+25'	91°	33°40'	+26'	92°	33°37'	+27'	93°	33°34'	+28'	93°	33°30'	+29'	94°	33°26'	+30'	95°	33°20'	+31'	95°	14
15	34°07'	+24'	90°	34°06'	+25'	91°	34°04'	+26'	92°	34°02'	+27'	92°	33°59'	+29'	93°	33°56'	+30'	94°	33°52'	+31'	94°	15
16	34°31'	+23'	89°	34°31'	+25'	90°	34°31'	+26'	91°	34°30'	+27'	91°	34°28'	+28'	92°	34°26'	+29'	93°	34°22'	+30'	93°	16
17	34°54'	+23'	88°	34°56'	+24'	89°	34°56'	+25'	90°	34°57'	+26'	90°	34°56'	+27'	91°	34°55'	+29'	92°	34°53'	+30'	92°	17
18	35°17'	+22'	87°	35°20'	+23'	88°	35°22'	+25'	88°	35°23'	+26'	89°	35°23'	+27'	90°	35°23'	+28'	91°	35°22'	+29'	91°	18
19	35°39'	+22'	86°	35°43'	+23'	87°	35°46'	+24'	87°	35°49'	+25'	88°	35°50'	+26'	89°	35°51'	+27'	89°	35°51'	+29'	90°	19
20	36°00'	+21'	85°	36°06'	+22'	85°	36°10'	+23'	86°	36°14'	+24'	87°	36°17'	+26'	88°	36°19'	+27'	88°	36°20'	+28'	89°	20
21	36°21'	+20'	84°	36°28'	+21'	84°	36°33'	+23'	85°	36°38'	+24'	86°	36°42'	+25'	86°	36°45'	+26'	87°	36°48'	+27'	88°	21
22	36°41'	+19'	82°	36°49'	+21'	83°	36°56'	+22'	84°	37°02'	+23'	85°	37°07'	+24'	85°	37°12'	+26'	86°	37°15'	+27'	87°	22
23	37°01'	+19'	81°	37°10'	+20'	82°	37°18'	+21'	83°	37°25'	+22'	83°	37°32'	+24'	84°	37°37'	+25'	85°	37°42'	+26'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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°12'	+31'	105°	25°56'	+32'	106°	25°40'	+33'	106°	25°23'	+34'	107°	25°05'	+35'	107°	24°48'	+36'	107°	24°29'	+37'	108°	0
1	26°43'	+31'	104°	26°28'	+32'	105°	26°13'	+33'	105°	25°57'	+34'	106°	25°40'	+35'	106°	25°23'	+36'	107°	25°06'	+36'	107°	1
2	27°14'	+30'	103°	27°00'	+31'	104°	26°45'	+32'	104°	26°30'	+33'	105°	26°15'	+34'	105°	25°59'	+35'	106°	25°42'	+36'	106°	2
3	27°44'	+30'	102°	27°31'	+31'	103°	27°18'	+32'	103°	27°04'	+33'	104°	26°49'	+34'	104°	26°34'	+35'	105°	26°19'	+36'	105°	3
4	28°14'	+30'	101°	28°02'	+31'	102°	27°50'	+32'	102°	27°37'	+33'	103°	27°23'	+34'	103°	27°09'	+34'	104°	26°54'	+35'	104°	4
5	28°44'	+29'	100°	28°33'	+30'	101°	28°21'	+31'	101°	28°09'	+32'	102°	27°57'	+33'	102°	27°43'	+34'	103°	27°30'	+35'	103°	5
6	29°13'	+29'	99°	29°03'	+30'	100°	28°53'	+31'	100°	28°41'	+32'	101°	28°30'	+33'	101°	28°18'	+34'	102°	28°05'	+35'	103°	6
7	29°42'	+28'	98°	29°33'	+29'	99°	29°23'	+30'	99°	29°13'	+31'	100°	29°02'	+32'	101°	28°51'	+33'	101°	28°39'	+34'	102°	7
8	30°10'	+28'	97°	30°02'	+29'	98°	29°54'	+30'	98°	29°45'	+31'	99°	29°35'	+32'	100°	29°25'	+33'	100°	29°14'	+34'	101°	8
9	30°38'	+27'	96°	30°31'	+28'	97°	30°23'	+29'	97°	30°15'	+30'	98°	30°07'	+31'	99°	29°58'	+32'	99°	29°48'	+33'	100°	9
10	31°05'	+27'	95°	30°59'	+28'	96°	30°53'	+29'	96°	30°46'	+30'	97°	30°38'	+31'	98°	30°30'	+32'	98°	30°21'	+33'	99°	10
11	31°32'	+26'	94°	31°27'	+27'	95°	31°22'	+28'	95°	31°16'	+30'	96°	31°09'	+31'	97°	31°02'	+32'	97°	30°54'	+33'	98°	11
12	31°58'	+26'	93°	31°54'	+27'	94°	31°50'	+28'	94°	31°45'	+29'	95°	31°40'	+30'	96°	31°34'	+31'	96°	31°27'	+32'	97°	12
13	32°24'	+25'	92°	32°21'	+26'	93°	32°18'	+27'	93°	32°14'	+29'	94°	32°10'	+30'	95°	32°05'	+31'	95°	31°59'	+32'	96°	13
14	32°49'	+25'	91°	32°48'	+26'	92°	32°46'	+27'	92°	32°43'	+28'	93°	32°39'	+29'	94°	32°35'	+30'	94°	32°31'	+31'	95°	14
15	33°14'	+24'	90°	33°13'	+25'	91°	33°12'	+26'	91°	33°11'	+27'	92°	33°09'	+29'	92°	33°06'	+30'	93°	33°02'	+31'	94°	15
16	33°38'	+23'	89°	33°39'	+25'	89°	33°39'	+26'	90°	33°38'	+27'	91°	33°37'	+28'	91°	33°35'	+29'	92°	33°33'	+30'	93°	16
17	34°01'	+23'	88°	34°03'	+24'	88°	34°05'	+25'	89°	34°05'	+26'	90°	34°05'	+27'	90°	34°04'	+29'	91°	34°03'	+30'	92°	17
18	34°24'	+22'	87°	34°27'	+23'	87°	34°30'	+25'	88°	34°31'	+26'	89°	34°33'	+27'	89°	34°33'	+28'	90°	34°33'	+29'	91°	18
19	34°46'	+22'	85°	34°51'	+23'	86°	34°54'	+24'	87°	34°57'	+25'	88°	34°59'	+26'	88°	35°01'	+27'	89°	35°02'	+29'	90°	19
20	35°08'	+21'	84°	35°13'	+22'	85°	35°18'	+23'	86°	35°22'	+25'	86°	35°26'	+26'	87°	35°28'	+27'	88°	35°30'	+28'	89°	20
21	35°29'	+20'	83°	35°35'	+22'	84°	35°42'	+23'	85°	35°47'	+24'	85°	35°51'	+25'	86°	35°55'	+26'	87°	35°58'	+27'	87°	21
22	35°49'	+20'	82°	35°57'	+21'	83°	36°04'	+22'	83°	36°11'	+23'	84°	36°16'	+24'	85°	36°21'	+26'	86°	36°26'	+27'	86°	22
23	36°09'	+19'	81°	36°18'	+20'	82°	36°26'	+21'	82°	36°34'	+23'	83°	36°41'	+24'	84°	36°47'	+25'	84°	36°52'	+26'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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°21'	+31'	105°	25°05'	+32'	105°	24°50'	+33'	105°	24°33'	+34'	106°	24°17'	+35'	106°	23°59'	+36'	107°	23°42'	+36'	107°	0
1	25°52'	+31'	104°	25°37'	+32'	104°	25°22'	+33'	105°	25°07'	+33'	105°	24°51'	+34'	105°	24°35'	+35'	106°	24°18'	+36'	106°	1
2	26°22'	+30'	103°	26°09'	+31'	103°	25°55'	+32'	104°	25°41'	+33'	104°	25°26'	+34'	105°	25°10'	+35'	105°	24°55'	+36'	105°	2
3	26°52'	+30'	102°	26°40'	+31'	102°	26°27'	+32'	103°	26°14'	+33'	103°	26°00'	+34'	104°	25°45'	+35'	104°	25°30'	+36'	105°	3
4	27°22'	+29'	101°	27°11'	+30'	101°	26°59'	+31'	102°	26°46'	+32'	102°	26°33'	+33'	103°	26°20'	+34'	103°	26°06'	+35'	104°	4
5	27°52'	+29'	100°	27°41'	+30'	100°	27°30'	+31'	101°	27°19'	+32'	101°	27°07'	+33'	102°	26°54'	+34'	102°	26°41'	+35'	103°	5
6	28°21'	+29'	99°	28°11'	+30'	99°	28°01'	+31'	100°	27°51'	+32'	100°	27°40'	+33'	101°	27°28'	+34'	101°	27°16'	+35'	102°	6
7	28°49'	+28'	98°	28°41'	+29'	98°	28°32'	+30'	99°	28°22'	+31'	99°	28°12'	+32'	100°	28°02'	+33'	100°	27°51'	+34'	101°	7
8	29°17'	+28'	97°	29°10'	+29'	97°	29°02'	+30'	98°	28°54'	+31'	98°	28°45'	+32'	99°	28°35'	+33'	99°	28°25'	+34'	100°	8
9	29°45'	+27'	96°	29°39'	+28'	96°	29°32'	+29'	97°	29°24'	+30'	97°	29°16'	+31'	98°	29°08'	+32'	99°	28°59'	+33'	99°	9
10	30°12'	+27'	95°	30°07'	+28'	95°	30°01'	+29'	96°	29°55'	+30'	96°	29°48'	+31'	97°	29°40'	+32'	98°	29°32'	+33'	98°	10
11	30°39'	+26'	94°	30°35'	+27'	94°	30°30'	+28'	95°	30°25'	+29'	95°	30°19'	+30'	96°	30°12'	+32'	97°	30°05'	+33'	97°	11
12	31°05'	+26'	93°	31°02'	+27'	93°	30°58'	+28'	94°	30°54'	+29'	94°	30°49'	+30'	95°	30°44'	+31'	96°	30°37'	+32'	96°	12
13	31°31'	+25'	92°	31°29'	+26'	92°	31°26'	+27'	93°	31°23'	+28'	93°	31°19'	+30'	94°	31°15'	+31'	95°	31°10'	+32'	95°	13
14	31°56'	+25'	90°	31°55'	+26'	91°	31°54'	+27'	92°	31°51'	+28'	92°	31°49'	+29'	93°	31°45'	+30'	94°	31°41'	+31'	94°	14
15	32°21'	+24'	89°	32°21'	+25'	90°	32°20'	+26'	91°	32°19'	+27'	91°	32°18'	+29'	92°	32°15'	+30'	93°	32°12'	+31'	93°	15
16	32°45'	+23'	88°	32°46'	+25'	89°	32°47'	+26'	90°	32°47'	+27'	90°	32°46'	+28'	91°	32°45'	+29'	92°	32°43'	+30'	92°	16
17	33°08'	+23'	87°	33°11'	+24'	88°	33°13'	+25'	89°	33°14'	+26'	89°	33°14'	+27'	90°	33°14'	+29'	91°	33°13'	+30'	91°	17
18	33°31'	+22'	86°	33°35'	+23'	87°	33°38'	+25'	87°	33°40'	+26'	88°	33°42'	+27'	89°	33°43'	+28'	89°	33°43'	+29'	90°	18
19	33°53'	+22'	85°	33°58'	+23'	86°	34°02'	+24'	86°	34°06'	+25'	87°	34°09'	+26'	88°	34°11'	+27'	88°	34°12'	+29'	89°	19
20	34°15'	+21'	84°	34°21'	+22'	85°	34°26'	+23'	85°	34°31'	+25'	86°	34°35'	+26'	87°	34°38'	+27'	87°	34°41'	+28'	88°	20
21	34°36'	+20'	83°	34°43'	+22'	83°	34°50'	+23'	84°	34°56'	+24'	85°	35°01'	+25'	86°	35°05'	+26'	86°	35°09'	+27'	87°	21
22	34°57'	+20'	82°	35°05'	+21'	82°	35°13'	+22'	83°	35°20'	+23'	84°	35°26'	+25'	84°	35°31'	+26'	85°	35°36'	+27'	86°	22
23	35°16'	+19'	80°	35°26'	+20'	81°	35°35'	+22'	82°	35°43'	+23'	83°	35°50'	+24'	83°	35°57'	+25'	84°	36°03'	+26'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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°29'	+31'	104°	24°15'	+32'	104°	23°59'	+33'	105°	23°44'	+34'	105°	23°28'	+35'	106°	23°11'	+35'	106°	22°54'	+36'	107°	0
1	25°00'	+30'	103°	24°46'	+31'	104°	24°32'	+32'	104°	24°17'	+33'	104°	24°02'	+34'	105°	23°47'	+35'	105°	23°31'	+36'	106°	1
2	25°31'	+30'	102°	25°18'	+31'	103°	25°04'	+32'	103°	24°51'	+33'	103°	24°36'	+34'	104°	24°22'	+35'	104°	24°07'	+36'	105°	2
3	26°01'	+30'	101°	25°49'	+31'	102°	25°36'	+32'	102°	25°24'	+33'	103°	25°10'	+34'	103°	24°57'	+34'	103°	24°42'	+35'	104°	3
4	26°30'	+29'	100°	26°19'	+30'	101°	26°08'	+31'	101°	25°56'	+32'	102°	25°44'	+33'	102°	25°31'	+34'	103°	25°18'	+35'	103°	4
5	26°59'	+29'	99°	26°50'	+30'	100°	26°39'	+31'	100°	26°28'	+32'	101°	26°17'	+33'	101°	26°05'	+34'	102°	25°53'	+35'	102°	5
6	27°28'	+28'	98°	27°19'	+29'	99°	27°10'	+30'	99°	27°00'	+31'	100°	26°50'	+32'	100°	26°39'	+33'	101°	26°27'	+34'	101°	6
7	27°57'	+28'	97°	27°49'	+29'	98°	27°41'	+30'	98°	27°32'	+31'	99°	27°22'	+32'	99°	27°12'	+33'	100°	27°02'	+34'	100°	7
8	28°25'	+28'	96°	28°18'	+29'	97°	28°11'	+30'	97°	28°03'	+31'	98°	27°54'	+32'	98°	27°45'	+33'	99°	27°36'	+34'	99°	8
9	28°52'	+27'	95°	28°47'	+28'	96°	28°40'	+29'	96°	28°33'	+30'	97°	28°26'	+31'	97°	28°18'	+32'	98°	28°09'	+33'	98°	9
10	29°19'	+27'	94°	29°15'	+28'	95°	29°09'	+29'	95°	29°04'	+30'	96°	28°57'	+31'	96°	28°50'	+32'	97°	28°43'	+33'	98°	10
11	29°46'	+26'	93°	29°42'	+27'	94°	29°38'	+28'	94°	29°33'	+29'	95°	29°28'	+30'	95°	29°22'	+31'	96°	29°16'	+32'	97°	11
12	30°12'	+26'	92°	30°10'	+27'	93°	30°07'	+28'	93°	30°03'	+29'	94°	29°58'	+30'	94°	29°54'	+31'	95°	29°48'	+32'	96°	12
13	30°38'	+25'	91°	30°36'	+26'	92°	30°34'	+27'	92°	30°32'	+28'	93°	30°28'	+29'	93°	30°24'	+31'	94°	30°20'	+32'	95°	13
14	31°03'	+25'	90°	31°03'	+26'	91°	31°02'	+27'	91°	31°00'	+28'	92°	30°58'	+29'	92°	30°55'	+30'	93°	30°52'	+31'	94°	14
15	31°28'	+24'	89°	31°28'	+25'	90°	31°29'	+26'	90°	31°28'	+27'	91°	31°27'	+29'	91°	31°25'	+30'	92°	31°23'	+31'	93°	15
16	31°52'	+24'	88°	31°54'	+25'	88°	31°55'	+26'	89°	31°55'	+27'	90°	31°55'	+28'	90°	31°55'	+29'	91°	31°53'	+30'	92°	16
17	32°15'	+23'	87°	32°18'	+24'	87°	32°21'	+25'	88°	32°22'	+26'	89°	32°23'	+27'	89°	32°24'	+29'	90°	32°23'	+30'	91°	17
18	32°38'	+22'	86°	32°42'	+24'	86°	32°46'	+25'	87°	32°49'	+26'	88°	32°51'	+27'	88°	32°52'	+28'	89°	32°53'	+29'	90°	18
19	33°01'	+22'	85°	33°06'	+23'	85°	33°11'	+24'	86°	33°14'	+25'	87°	33°18'	+26'	87°	33°20'	+28'	88°	33°22'	+29'	89°	19
20	33°22'	+21'	83°	33°29'	+22'	84°	33°35'	+24'	85°	33°40'	+25'	85°	33°44'	+26'	86°	33°48'	+27'	87°	33°51'	+28'	87°	20
21	33°44'	+21'	82°	33°51'	+22'	83°	33°58'	+23'	84°	34°04'	+24'	84°	34°10'	+25'	85°	34°15'	+26'	86°	34°19'	+28'	86°	21
22	34°04'	+20'	81°	34°13'	+21'	82°	34°21'	+22'	83°	34°29'	+23'	83°	34°35'	+25'	84°	34°41'	+26'	85°	34°46'	+27'	85°	22
23	34°24'	+19'	80°	34°34'	+21'	81°	34°43'	+22'	81°	34°52'	+23'	82°	35°00'	+24'	83°	35°07'	+25'	84°	35°13'	+26'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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°38'	+31'	103°	23°24'	+32'	104°	23°09'	+32'	104°	22°54'	+33'	105°	22°39'	+34'	105°	22°23'	+35'	106°	22°07'	+36'	106°	0
1	24°08'	+30'	103°	23°55'	+31'	103°	23°42'	+32'	103°	23°27'	+33'	104°	23°13'	+34'	104°	22°58'	+35'	105°	22°43'	+36'	105°	1
2	24°39'	+30'	102°	24°26'	+31'	102°	24°14'	+32'	102°	24°01'	+33'	103°	23°47'	+34'	103°	23°33'	+35'	104°	23°18'	+36'	104°	2
3	25°09'	+29'	101°	24°57'	+30'	101°	24°46'	+31'	102°	24°33'	+32'	102°	24°21'	+33'	102°	24°08'	+34'	103°	23°54'	+35'	103°	3
4	25°38'	+29'	100°	25°28'	+30'	100°	25°17'	+31'	101°	25°06'	+32'	101°	24°54'	+33'	101°	24°42'	+34'	102°	24°29'	+35'	102°	4
5	26°07'	+29'	99°	25°58'	+30'	99°	25°48'	+31'	100°	25°38'	+32'	100°	25°27'	+33'	101°	25°16'	+34'	101°	25°04'	+35'	102°	5
6	26°36'	+28'	98°	26°28'	+29'	98°	26°19'	+30'	99°	26°09'	+31'	99°	26°00'	+32'	100°	25°49'	+33'	100°	25°39'	+34'	101°	6
7	27°04'	+28'	97°	26°57'	+29'	97°	26°49'	+30'	98°	26°41'	+31'	98°	26°32'	+32'	99°	26°23'	+33'	99°	26°13'	+34'	100°	7
8	27°32'	+27'	96°	27°26'	+29'	96°	27°19'	+30'	97°	27°12'	+31'	97°	27°04'	+32'	98°	26°56'	+33'	98°	26°47'	+34'	99°	8
9	28°00'	+27'	95°	27°54'	+28'	95°	27°49'	+29'	96°	27°42'	+30'	96°	27°35'	+31'	97°	27°28'	+32'	97°	27°20'	+33'	98°	9
10	28°27'	+27'	94°	28°22'	+28'	94°	28°18'	+29'	95°	28°12'	+30'	95°	28°07'	+31'	96°	28°00'	+32'	96°	27°53'	+33'	97°	10
11	28°53'	+26'	93°	28°50'	+27'	93°	28°46'	+28'	94°	28°42'	+29'	94°	28°37'	+30'	95°	28°32'	+31'	95°	28°26'	+32'	96°	11
12	29°19'	+26'	92°	29°17'	+27'	92°	29°15'	+28'	93°	29°11'	+29'	93°	29°08'	+30'	94°	29°03'	+31'	94°	28°58'	+32'	95°	12
13	29°45'	+25'	91°	29°44'	+26'	91°	29°42'	+27'	92°	29°40'	+28'	92°	29°38'	+29'	93°	29°34'	+30'	93°	29°30'	+32'	94°	13
14	30°10'	+25'	90°	30°10'	+26'	90°	30°10'	+27'	91°	30°09'	+28'	91°	30°07'	+29'	92°	30°05'	+30'	92°	30°02'	+31'	93°	14
15	30°35'	+24'	88°	30°36'	+25'	89°	30°37'	+26'	90°	30°37'	+27'	90°	30°36'	+28'	91°	30°35'	+30'	91°	30°33'	+31'	92°	15
16	30°59'	+24'	87°	31°01'	+25'	88°	31°03'	+26'	89°	31°04'	+27'	89°	31°04'	+28'	90°	31°04'	+29'	90°	31°04'	+30'	91°	16
17	31°22'	+23'	86°	31°26'	+24'	87°	31°29'	+25'	88°	31°31'	+26'	88°	31°32'	+27'	89°	31°33'	+29'	89°	31°34'	+30'	90°	17
18	31°45'	+22'	85°	31°50'	+24'	86°	31°54'	+25'	87°	31°57'	+26'	87°	32°00'	+27'	88°	32°02'	+28'	88°	32°03'	+29'	89°	18
19	32°08'	+22'	84°	32°14'	+23'	85°	32°19'	+24'	85°	32°23'	+25'	86°	32°27'	+26'	87°	32°30'	+28'	87°	32°33'	+29'	88°	19
20	32°30'	+21'	83°	32°37'	+22'	84°	32°43'	+24'	84°	32°49'	+25'	85°	32°53'	+26'	86°	32°58'	+27'	86°	33°01'	+28'	87°	20
21	32°51'	+21'	82°	32°59'	+22'	83°	33°07'	+23'	83°	33°13'	+24'	84°	33°19'	+25'	85°	33°25'	+26'	85°	33°29'	+28'	86°	21
22	33°12'	+20'	81°	33°21'	+21'	81°	33°30'	+22'	82°	33°37'	+24'	83°	33°45'	+25'	83°	33°51'	+26'	84°	33°57'	+27'	85°	22
23	33°32'	+20'	80°	33°42'	+21'	80°	33°52'	+22'	81°	34°01'	+23'	82°	34°09'	+24'	82°	34°17'	+25'	83°	34°24'	+26'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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°46'	+30'	103°	22°33'	+31'	103°	22°19'	+32'	104°	22°04'	+33'	104°	21°49'	+34'	104°	21°34'	+35'	105°	21°19'	+36'	105°	0
1	23°17'	+30'	102°	23°04'	+31'	102°	22°51'	+32'	103°	22°37'	+33'	103°	22°24'	+34'	104°	22°09'	+35'	104°	21°55'	+36'	104°	1
2	23°47'	+30'	101°	23°35'	+31'	101°	23°23'	+32'	102°	23°10'	+33'	102°	22°57'	+34'	103°	22°44'	+34'	103°	22°30'	+35'	104°	2
3	24°16'	+29'	100°	24°06'	+30'	101°	23°55'	+31'	101°	23°43'	+32'	101°	23°31'	+33'	102°	23°18'	+34'	102°	23°05'	+35'	103°	3
4	24°46'	+29'	99°	24°36'	+30'	100°	24°26'	+31'	100°	24°15'	+32'	100°	24°04'	+33'	101°	23°53'	+34'	101°	23°40'	+35'	102°	4
5	25°15'	+29'	98°	25°06'	+30'	99°	24°57'	+31'	99°	24°47'	+32'	100°	24°37'	+33'	100°	24°26'	+33'	100°	24°15'	+34'	101°	5
6	25°43'	+28'	97°	25°36'	+29'	98°	25°27'	+30'	98°	25°19'	+31'	99°	25°09'	+32'	99°	25°00'	+33'	100°	24°50'	+34'	100°	6
7	26°12'	+28'	96°	26°05'	+29'	97°	25°58'	+30'	97°	25°50'	+31'	98°	25°42'	+32'	98°	25°33'	+33'	99°	25°24'	+34'	99°	7
8	26°39'	+27'	95°	26°34'	+28'	96°	26°27'	+29'	96°	26°21'	+30'	97°	26°13'	+31'	97°	26°06'	+32'	98°	25°57'	+33'	98°	8
9	27°07'	+27'	94°	27°02'	+28'	95°	26°57'	+29'	95°	26°51'	+30'	96°	26°45'	+31'	96°	26°38'	+32'	97°	26°31'	+33'	97°	9
10	27°34'	+27'	93°	27°30'	+28'	94°	27°26'	+29'	94°	27°21'	+30'	95°	27°16'	+31'	95°	27°10'	+32'	96°	27°04'	+33'	96°	10
11	28°00'	+26'	92°	27°58'	+27'	93°	27°55'	+28'	93°	27°51'	+29'	94°	27°47'	+30'	94°	27°42'	+31'	95°	27°37'	+32'	95°	11
12	28°26'	+26'	91°	28°25'	+27'	92°	28°23'	+28'	92°	28°20'	+29'	93°	28°17'	+30'	93°	28°13'	+31'	94°	28°09'	+32'	94°	12
13	28°52'	+25'	90°	28°51'	+26'	91°	28°50'	+27'	91°	28°49'	+28'	92°	28°47'	+29'	92°	28°44'	+30'	93°	28°41'	+31'	93°	13
14	29°17'	+25'	89°	29°18'	+26'	90°	29°18'	+27'	90°	29°17'	+28'	91°	29°16'	+29'	91°	29°14'	+30'	92°	29°12'	+31'	92°	14
15	29°42'	+24'	88°	29°43'	+25'	89°	29°45'	+26'	89°	29°45'	+27'	90°	29°45'	+28'	90°	29°44'	+30'	91°	29°43'	+31'	91°	15
16	30°06'	+24'	87°	30°09'	+25'	88°	30°11'	+26'	88°	30°13'	+27'	89°	30°14'	+28'	89°	30°14'	+29'	90°	30°14'	+30'	90°	16
17	30°29'	+23'	86°	30°33'	+24'	87°	30°37'	+25'	87°	30°40'	+26'	88°	30°42'	+28'	88°	30°43'	+29'	89°	30°44'	+30'	89°	17
18	30°53'	+23'	85°	30°58'	+24'	85°	31°02'	+25'	86°	31°06'	+26'	87°	31°09'	+27'	87°	31°12'	+28'	88°	31°14'	+29'	88°	18
19	31°15'	+22'	84°	31°21'	+23'	84°	31°27'	+24'	85°	31°32'	+25'	86°	31°36'	+27'	86°	31°40'	+28'	87°	31°43'	+29'	87°	19
20	31°37'	+21'	83°	31°45'	+23'	83°	31°51'	+24'	84°	31°57'	+25'	85°	32°03'	+26'	85°	32°07'	+27'	86°	32°12'	+28'	86°	20
21	31°59'	+21'	82°	32°07'	+22'	82°	32°15'	+23'	83°	32°22'	+24'	83°	32°29'	+25'	84°	32°35'	+27'	85°	32°40'	+28'	85°	21
22	32°20'	+20'	80°	32°29'	+21'	81°	32°38'	+23'	82°	32°46'	+24'	82°	32°54'	+25'	83°	33°01'	+26'	84°	33°07'	+27'	84°	22
23	32°40'	+20'	79°	32°51'	+21'	80°	33°01'	+22'	81°	33°10'	+23'	81°	33°19'	+24'	82°	33°27'	+25'	83°	33°35'	+27'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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°55'	+30'	102°	21°42'	+31'	103°	21°28'	+32'	103°	21°14'	+33'	104°	21°00'	+34'	104°	20°46'	+35'	104°	20°31'	+36'	105°	0
1	22°25'	+30'	101°	22°13'	+31'	102°	22°00'	+32'	102°	21°47'	+33'	103°	21°34'	+34'	103°	21°20'	+35'	103°	21°06'	+35'	104°	1
2	22°55'	+30'	100°	22°44'	+31'	101°	22°32'	+31'	101°	22°20'	+32'	102°	22°08'	+33'	102°	21°55'	+34'	102°	21°42'	+35'	103°	2
3	23°24'	+29'	100°	23°14'	+30'	100°	23°03'	+31'	100°	22°52'	+32'	101°	22°41'	+33'	101°	22°29'	+34'	102°	22°17'	+35'	102°	3
4	23°53'	+29'	99°	23°44'	+30'	99°	23°35'	+31'	99°	23°25'	+32'	100°	23°14'	+33'	100°	23°03'	+34'	101°	22°52'	+35'	101°	4
5	24°22'	+28'	98°	24°14'	+29'	98°	24°05'	+30'	99°	23°56'	+31'	99°	23°47'	+32'	99°	23°37'	+33'	100°	23°26'	+34'	100°	5
6	24°51'	+28'	97°	24°44'	+29'	97°	24°36'	+30'	98°	24°28'	+31'	98°	24°19'	+32'	98°	24°10'	+33'	99°	24°01'	+34'	99°	6
7	25°19'	+28'	96°	25°13'	+29'	96°	25°06'	+30'	97°	24°59'	+31'	97°	24°51'	+32'	98°	24°43'	+33'	98°	24°35'	+34'	98°	7
8	25°47'	+27'	95°	25°41'	+28'	95°	25°36'	+29'	96°	25°30'	+30'	96°	25°23'	+31'	97°	25°16'	+32'	97°	25°08'	+33'	98°	8
9	26°14'	+27'	94°	26°10'	+28'	94°	26°05'	+29'	95°	26°00'	+30'	95°	25°54'	+31'	96°	25°48'	+32'	96°	25°42'	+33'	97°	9
10	26°41'	+26'	93°	26°38'	+28'	93°	26°34'	+29'	94°	26°30'	+30'	94°	26°25'	+31'	95°	26°20'	+32'	95°	26°14'	+33'	96°	10
11	27°07'	+26'	92°	27°05'	+27'	92°	27°03'	+28'	93°	27°00'	+29'	93°	26°56'	+30'	94°	26°52'	+31'	94°	26°47'	+32'	95°	11
12	27°33'	+26'	91°	27°32'	+27'	91°	27°31'	+28'	92°	27°29'	+29'	92°	27°26'	+30'	93°	27°23'	+31'	93°	27°19'	+32'	94°	12
13	27°59'	+25'	90°	27°59'	+26'	90°	27°59'	+27'	91°	27°57'	+28'	91°	27°56'	+29'	92°	27°54'	+30'	92°	27°51'	+31'	93°	13
14	28°24'	+25'	89°	28°25'	+26'	89°	28°26'	+27'	90°	28°26'	+28'	90°	28°25'	+29'	91°	28°24'	+30'	91°	28°22'	+31'	92°	14
15	28°49'	+24'	88°	28°51'	+25'	88°	28°53'	+26'	89°	28°54'	+27'	89°	28°54'	+28'	90°	28°54'	+30'	90°	28°54'	+31'	91°	15
16	29°13'	+24'	87°	29°16'	+25'	87°	29°19'	+26'	88°	29°21'	+27'	88°	29°23'	+28'	89°	29°24'	+29'	89°	29°24'	+30'	90°	16
17	29°37'	+23'	85°	29°41'	+24'	86°	29°45'	+25'	87°	29°48'	+26'	87°	29°51'	+28'	88°	29°53'	+29'	88°	29°54'	+30'	89°	17
18	30°00'	+23'	84°	30°05'	+24'	85°	30°10'	+25'	86°	30°15'	+26'	86°	30°18'	+27'	87°	30°21'	+28'	87°	30°24'	+29'	88°	18
19	30°23'	+22'	83°	30°29'	+23'	84°	30°35'	+24'	85°	30°41'	+25'	85°	30°45'	+27'	86°	30°50'	+28'	86°	30°53'	+29'	87°	19
20	30°45'	+22'	82°	30°52'	+23'	83°	31°00'	+24'	83°	31°06'	+25'	84°	31°12'	+26'	85°	31°17'	+27'	85°	31°22'	+28'	86°	20
21	31°06'	+21'	81°	31°15'	+22'	82°	31°23'	+23'	82°	31°31'	+24'	83°	31°38'	+26'	84°	31°44'	+27'	84°	31°50'	+28'	85°	21
22	31°27'	+21'	80°	31°37'	+22'	81°	31°47'	+23'	81°	31°56'	+24'	82°	32°04'	+25'	83°	32°11'	+26'	83°	32°18'	+27'	84°	22
23	31°48'	+20'	79°	31°59'	+21'	80°	32°10'	+22'	80°	32°19'	+23'	81°	32°29'	+24'	81°	32°37'	+26'	82°	32°45'	+27'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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°03'	+30'	102°	20°50'	+31'	102°	20°37'	+32'	103°	20°24'	+33'	103°	20°11'	+34'	103°	19°57'	+35'	104°	19°42'	+36'	104°	0
1	21°33'	+30'	101°	21°21'	+31'	101°	21°09'	+32'	102°	20°57'	+33'	102°	20°44'	+33'	102°	20°31'	+34'	103°	20°18'	+35'	103°	1
2	22°03'	+29'	100°	21°52'	+30'	100°	21°41'	+31'	101°	21°30'	+32'	101°	21°18'	+33'	102°	21°06'	+34'	102°	20°53'	+35'	102°	2
3	22°32'	+29'	99°	22°22'	+30'	99°	22°12'	+31'	100°	22°02'	+32'	100°	21°51'	+33'	101°	21°40'	+34'	101°	21°28'	+35'	101°	3
4	23°01'	+29'	98°	22°52'	+30'	98°	22°43'	+31'	99°	22°34'	+32'	99°	22°24'	+33'	100°	22°14'	+34'	100°	22°03'	+34'	101°	4
5	23°30'	+28'	97°	23°22'	+29'	98°	23°14'	+30'	98°	23°05'	+31'	98°	22°57'	+32'	99°	22°47'	+33'	99°	22°37'	+34'	100°	5
6	23°58'	+28'	96°	23°51'	+29'	97°	23°44'	+30'	97°	23°37'	+31'	97°	23°29'	+32'	98°	23°20'	+33'	98°	23°11'	+34'	99°	6
7	24°26'	+28'	95°	24°20'	+29'	96°	24°14'	+30'	96°	24°08'	+31'	97°	24°01'	+32'	97°	23°53'	+33'	97°	23°45'	+34'	98°	7
8	24°54'	+27'	94°	24°49'	+28'	95°	24°44'	+29'	95°	24°38'	+30'	96°	24°32'	+31'	96°	24°26'	+32'	96°	24°19'	+33'	97°	8
9	25°21'	+27'	93°	25°17'	+28'	94°	25°13'	+29'	94°	25°09'	+30'	95°	25°04'	+31'	95°	24°58'	+32'	96°	24°52'	+33'	96°	9
10	25°48'	+26'	92°	25°45'	+27'	93°	25°42'	+29'	93°	25°39'	+30'	94°	25°35'	+31'	94°	25°30'	+32'	95°	25°25'	+33'	95°	10
11	26°14'	+26'	91°	26°13'	+27'	92°	26°11'	+28'	92°	26°08'	+29'	93°	26°05'	+30'	93°	26°02'	+31'	94°	25°57'	+32'	94°	11
12	26°40'	+26'	90°	26°40'	+27'	91°	26°39'	+28'	91°	26°37'	+29'	92°	26°35'	+30'	92°	26°33'	+31'	93°	26°30'	+32'	93°	12
13	27°06'	+25'	89°	27°07'	+26'	90°	27°07'	+27'	90°	27°06'	+28'	91°	27°05'	+29'	91°	27°03'	+30'	92°	27°01'	+31'	92°	13
14	27°31'	+25'	88°	27°33'	+26'	89°	27°34'	+27'	89°	27°34'	+28'	90°	27°34'	+29'	90°	27°34'	+30'	91°	27°33'	+31'	91°	14
15	27°56'	+24'	87°	27°59'	+25'	88°	28°01'	+26'	88°	28°02'	+27'	89°	28°03'	+29'	89°	28°04'	+30'	90°	28°04'	+31'	90°	15
16	28°20'	+24'	86°	28°24'	+25'	87°	28°27'	+26'	87°	28°30'	+27'	88°	28°32'	+28'	88°	28°33'	+29'	89°	28°34'	+30'	89°	16
17	28°44'	+23'	85°	28°49'	+24'	86°	28°53'	+25'	86°	28°57'	+27'	87°	29°00'	+28'	87°	29°03'	+29'	88°	29°05'	+30'	88°	17
18	29°07'	+23'	84°	29°13'	+24'	85°	29°19'	+25'	85°	29°23'	+26'	86°	29°28'	+27'	86°	29°31'	+28'	87°	29°34'	+29'	87°	18
19	29°30'	+22'	83°	29°37'	+23'	84°	29°43'	+24'	84°	29°49'	+26'	85°	29°55'	+27'	85°	29°59'	+28'	86°	30°04'	+29'	86°	19
20	29°52'	+22'	82°	30°00'	+23'	82°	30°08'	+24'	83°	30°15'	+25'	84°	30°21'	+26'	84°	30°27'	+27'	85°	30°32'	+28'	85°	20
21	30°14'	+21'	81°	30°23'	+22'	81°	30°32'	+23'	82°	30°40'	+25'	83°	30°48'	+26'	83°	30°54'	+27'	84°	31°01'	+28'	84°	21
22	30°35'	+21'	80°	30°46'	+22'	80°	30°55'	+23'	81°	31°05'	+24'	81°	31°13'	+25'	82°	31°21'	+26'	83°	31°28'	+27'	83°	22
23	30°56'	+20'	79°	31°07'	+21'	79°	31°18'	+22'	80°	31°29'	+23'	80°	31°38'	+25'	81°	31°47'	+26'	82°	31°56'	+27'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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°11'	+30'	101°	19°59'	+31'	102°	19°47'	+32'	102°	19°34'	+33'	102°	19°21'	+34'	103°	19°08'	+34'	103°	18°54'	+35'	103°	0
1	20°41'	+30'	100°	20°30'	+31'	101°	20°18'	+31'	101°	20°07'	+32'	101°	19°55'	+33'	102°	19°42'	+34'	102°	19°29'	+35'	102°	1
2	21°10'	+29'	99°	21°00'	+30'	100°	20°50'	+31'	100°	20°39'	+32'	101°	20°28'	+33'	101°	20°16'	+34'	101°	20°04'	+35'	102°	2
3	21°40'	+29'	98°	21°31'	+30'	99°	21°21'	+31'	99°	21°11'	+32'	100°	21°01'	+33'	100°	20°50'	+34'	100°	20°39'	+35'	101°	3
4	22°09'	+29'	98°	22°00'	+30'	98°	21°52'	+31'	98°	21°43'	+32'	99°	21°34'	+32'	99°	21°24'	+33'	100°	21°14'	+34'	100°	4
5	22°37'	+28'	97°	22°30'	+29'	97°	22°23'	+30'	97°	22°15'	+31'	98°	22°06'	+32'	98°	21°57'	+33'	99°	21°48'	+34'	99°	5
6	23°05'	+28'	96°	22°59'	+29'	96°	22°53'	+30'	96°	22°46'	+31'	97°	22°38'	+32'	97°	22°31'	+33'	98°	22°22'	+34'	98°	6
7	23°33'	+28'	95°	23°28'	+29'	95°	23°23'	+30'	96°	23°17'	+31'	96°	23°10'	+32'	96°	23°03'	+32'	97°	22°56'	+33'	97°	7
8	24°01'	+27'	94°	23°57'	+28'	94°	23°52'	+29'	95°	23°47'	+30'	95°	23°42'	+31'	95°	23°36'	+32'	96°	23°29'	+33'	96°	8
9	24°28'	+27'	93°	24°25'	+28'	93°	24°21'	+29'	94°	24°17'	+30'	94°	24°13'	+31'	95°	24°08'	+32'	95°	24°03'	+33'	95°	9
10	24°55'	+26'	92°	24°53'	+27'	92°	24°50'	+28'	93°	24°47'	+29'	93°	24°44'	+30'	94°	24°40'	+31'	94°	24°35'	+32'	94°	10
11	25°21'	+26'	91°	25°20'	+27'	91°	25°19'	+28'	92°	25°17'	+29'	92°	25°14'	+30'	93°	25°11'	+31'	93°	25°08'	+32'	94°	11
12	25°47'	+26'	90°	25°47'	+27'	90°	25°47'	+28'	91°	25°46'	+29'	91°	25°44'	+30'	92°	25°42'	+31'	92°	25°40'	+32'	93°	12
13	26°13'	+25'	89°	26°14'	+26'	89°	26°15'	+27'	90°	26°15'	+28'	90°	26°14'	+29'	91°	26°13'	+30'	91°	26°12'	+31'	92°	13
14	26°38'	+25'	88°	26°40'	+26'	88°	26°42'	+27'	89°	26°43'	+28'	89°	26°44'	+29'	90°	26°44'	+30'	90°	26°43'	+31'	91°	14
15	27°03'	+24'	87°	27°06'	+25'	87°	27°09'	+26'	88°	27°11'	+27'	88°	27°12'	+29'	89°	27°14'	+30'	89°	27°14'	+31'	90°	15
16	27°27'	+24'	86°	27°31'	+25'	86°	27°35'	+26'	87°	27°38'	+27'	87°	27°41'	+28'	88°	27°43'	+29'	88°	27°45'	+30'	89°	16
17	27°51'	+23'	85°	27°56'	+24'	85°	28°01'	+26'	86°	28°05'	+27'	86°	28°09'	+28'	87°	28°12'	+29'	87°	28°15'	+30'	88°	17
18	28°14'	+23'	84°	28°21'	+24'	84°	28°27'	+25'	85°	28°32'	+26'	85°	28°37'	+27'	86°	28°41'	+28'	86°	28°45'	+29'	87°	18
19	28°37'	+22'	83°	28°45'	+24'	83°	28°52'	+25'	84°	28°58'	+26'	84°	29°04'	+27'	85°	29°09'	+28'	85°	29°14'	+29'	86°	19
20	29°00'	+22'	81°	29°08'	+23'	82°	29°16'	+24'	83°	29°24'	+25'	83°	29°31'	+26'	84°	29°37'	+27'	84°	29°43'	+28'	85°	20
21	29°22'	+21'	80°	29°31'	+23'	81°	29°41'	+24'	82°	29°49'	+25'	82°	29°57'	+26'	83°	30°04'	+27'	83°	30°11'	+28'	84°	21
22	29°43'	+21'	79°	29°54'	+22'	80°	30°04'	+23'	80°	30°14'	+24'	81°	30°23'	+25'	82°	30°31'	+26'	82°	30°39'	+27'	83°	22
23	30°04'	+20'	78°	30°16'	+21'	79°	30°27'	+23'	79°	30°38'	+24'	80°	30°48'	+25'	81°	30°58'	+26'	81°	31°07'	+27'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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°19'	+30'	101°	19°08'	+31'	101°	18°56'	+32'	101°	18°44'	+33'	102°	18°31'	+33'	102°	18°19'	+34'	102°	18°06'	+35'	103°	0
1	19°49'	+29'	100°	19°38'	+30'	100°	19°27'	+31'	101°	19°16'	+32'	101°	19°05'	+33'	101°	18°53'	+34'	102°	18°41'	+35'	102°	1
2	20°18'	+29'	99°	20°09'	+30'	99°	19°59'	+31'	100°	19°49'	+32'	100°	19°38'	+33'	100°	19°27'	+34'	101°	19°16'	+35'	101°	2
3	20°47'	+29'	98°	20°39'	+30'	98°	20°30'	+31'	99°	20°20'	+32'	99°	20°11'	+33'	99°	20°01'	+34'	100°	19°50'	+34'	100°	3
4	21°16'	+29'	97°	21°08'	+29'	97°	21°01'	+30'	98°	20°52'	+31'	98°	20°43'	+32'	99°	20°34'	+33'	99°	20°25'	+34'	99°	4
5	21°44'	+28'	96°	21°38'	+29'	96°	21°31'	+30'	97°	21°24'	+31'	97°	21°16'	+32'	98°	21°08'	+33'	98°	20°59'	+34'	98°	5
6	22°13'	+28'	95°	22°07'	+29'	96°	22°01'	+30'	96°	21°55'	+31'	96°	21°48'	+32'	97°	21°41'	+33'	97°	21°33'	+34'	98°	6
7	22°41'	+28'	94°	22°36'	+29'	95°	22°31'	+29'	95°	22°26'	+30'	95°	22°20'	+31'	96°	22°13'	+32'	96°	22°07'	+33'	97°	7
8	23°08'	+27'	93°	23°04'	+28'	94°	23°00'	+29'	94°	22°56'	+30'	94°	22°51'	+31'	95°	22°46'	+32'	95°	22°40'	+33'	96°	8
9	23°35'	+27'	92°	23°33'	+28'	93°	23°30'	+29'	93°	23°26'	+30'	94°	23°22'	+31'	94°	23°18'	+32'	94°	23°13'	+33'	95°	9
10	24°02'	+26'	91°	24°00'	+27'	92°	23°58'	+28'	92°	23°56'	+29'	93°	23°53'	+30'	93°	23°50'	+31'	93°	23°46'	+32'	94°	10
11	24°28'	+26'	90°	24°28'	+27'	91°	24°27'	+28'	91°	24°25'	+29'	92°	24°23'	+30'	92°	24°21'	+31'	93°	24°18'	+32'	93°	11
12	24°54'	+26'	89°	24°55'	+27'	90°	24°55'	+28'	90°	24°54'	+29'	91°	24°54'	+30'	91°	24°52'	+31'	92°	24°50'	+32'	92°	12
13	25°20'	+25'	88°	25°22'	+26'	89°	25°23'	+27'	89°	25°23'	+28'	90°	25°23'	+29'	90°	25°23'	+30'	91°	25°22'	+31'	91°	13
14	25°45'	+25'	87°	25°48'	+26'	88°	25°50'	+27'	88°	25°52'	+28'	89°	25°53'	+29'	89°	25°53'	+30'	90°	25°53'	+31'	90°	14
15	26°10'	+24'	86°	26°14'	+25'	87°	26°17'	+26'	87°	26°19'	+28'	88°	26°22'	+29'	88°	26°23'	+30'	89°	26°24'	+31'	89°	15
16	26°34'	+24'	85°	26°39'	+25'	86°	26°43'	+26'	86°	26°47'	+27'	87°	26°50'	+28'	87°	26°53'	+29'	88°	26°55'	+30'	88°	16
17	26°58'	+23'	84°	27°04'	+25'	85°	27°09'	+26'	85°	27°14'	+27'	86°	27°18'	+28'	86°	27°22'	+29'	87°	27°25'	+30'	87°	17
18	27°22'	+23'	83°	27°29'	+24'	84°	27°35'	+25'	84°	27°41'	+26'	85°	27°46'	+27'	85°	27°51'	+28'	86°	27°55'	+29'	86°	18
19	27°45'	+23'	82°	27°53'	+24'	83°	28°00'	+25'	83°	28°07'	+26'	84°	28°13'	+27'	84°	28°19'	+28'	85°	28°24'	+29'	85°	19
20	28°07'	+22'	81°	28°16'	+23'	82°	28°25'	+24'	82°	28°33'	+25'	83°	28°40'	+26'	83°	28°47'	+27'	84°	28°53'	+29'	84°	20
21	28°30'	+22'	80°	28°40'	+23'	81°	28°49'	+24'	81°	28°58'	+25'	82°	29°07'	+26'	82°	29°14'	+27'	83°	29°22'	+28'	83°	21
22	28°51'	+21'	79°	29°02'	+22'	80°	29°13'	+23'	80°	29°23'	+24'	81°	29°33'	+25'	81°	29°41'	+27'	82°	29°50'	+28'	82°	22
23	29°12'	+21'	78°	29°24'	+22'	78°	29°36'	+23'	79°	29°47'	+24'	80°	29°58'	+25'	80°	30°08'	+26'	81°	30°17'	+27'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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°27'	+30'	100°	18°16'	+31'	101°	18°05'	+31'	101°	17°53'	+32'	101°	17°42'	+33'	101°	17°29'	+34'	102°	17°17'	+35'	102°	0
1	18°56'	+29'	99°	18°46'	+30'	100°	18°36'	+31'	100°	18°26'	+32'	100°	18°15'	+33'	101°	18°04'	+34'	101°	17°52'	+35'	101°	1
2	19°26'	+29'	98°	19°17'	+30'	99°	19°07'	+31'	99°	18°58'	+32'	99°	18°48'	+33'	100°	18°38'	+34'	100°	18°27'	+35'	100°	2
3	19°55'	+29'	97°	19°47'	+30'	98°	19°38'	+31'	98°	19°30'	+32'	99°	19°21'	+33'	99°	19°11'	+33'	99°	19°01'	+34'	100°	3
4	20°23'	+28'	97°	20°16'	+29'	97°	20°09'	+30'	97°	20°01'	+31'	98°	19°53'	+32'	98°	19°45'	+33'	98°	19°36'	+34'	99°	4
5	20°52'	+28'	96°	20°46'	+29'	96°	20°39'	+30'	96°	20°33'	+31'	97°	20°25'	+32'	97°	20°18'	+33'	97°	20°10'	+34'	98°	5
6	21°20'	+28'	95°	21°15'	+29'	95°	21°09'	+30'	95°	21°04'	+31'	96°	20°57'	+32'	96°	20°51'	+33'	97°	20°44'	+34'	97°	6
7	21°48'	+27'	94°	21°44'	+28'	94°	21°39'	+29'	94°	21°34'	+30'	95°	21°29'	+31'	95°	21°23'	+32'	96°	21°17'	+33'	96°	7
8	22°15'	+27'	93°	22°12'	+28'	93°	22°09'	+29'	94°	22°05'	+30'	94°	22°00'	+31'	94°	21°56'	+32'	95°	21°50'	+33'	95°	8
9	22°42'	+27'	92°	22°40'	+28'	92°	22°38'	+29'	93°	22°35'	+30'	93°	22°31'	+31'	93°	22°28'	+32'	94°	22°23'	+33'	94°	9
10	23°09'	+26'	91°	23°08'	+27'	91°	23°06'	+28'	92°	23°05'	+29'	92°	23°02'	+30'	92°	22°59'	+31'	93°	22°56'	+32'	93°	10
11	23°35'	+26'	90°	23°35'	+27'	90°	23°35'	+28'	91°	23°34'	+29'	91°	23°33'	+30'	92°	23°31'	+31'	92°	23°28'	+32'	92°	11
12	24°01'	+26'	89°	24°02'	+27'	89°	24°03'	+28'	90°	24°03'	+29'	90°	24°03'	+30'	91°	24°02'	+31'	91°	24°01'	+32'	91°	12
13	24°27'	+25'	88°	24°29'	+26'	88°	24°31'	+27'	89°	24°32'	+28'	89°	24°32'	+29'	90°	24°33'	+30'	90°	24°32'	+31'	91°	13
14	24°52'	+25'	87°	24°55'	+26'	87°	24°58'	+27'	88°	25°00'	+28'	88°	25°02'	+29'	89°	25°03'	+30'	89°	25°04'	+31'	90°	14
15	25°17'	+24'	86°	25°21'	+26'	86°	25°25'	+27'	87°	25°28'	+28'	87°	25°31'	+29'	88°	25°33'	+30'	88°	25°35'	+31'	89°	15
16	25°42'	+24'	85°	25°47'	+25'	85°	25°52'	+26'	86°	25°56'	+27'	86°	25°59'	+28'	87°	26°03'	+29'	87°	26°05'	+30'	88°	16
17	26°06'	+24'	84°	26°12'	+25'	84°	26°18'	+26'	85°	26°23'	+27'	85°	26°28'	+28'	86°	26°32'	+29'	86°	26°35'	+30'	87°	17
18	26°29'	+23'	83°	26°37'	+24'	83°	26°43'	+25'	84°	26°50'	+26'	84°	26°55'	+27'	85°	27°01'	+28'	85°	27°05'	+29'	86°	18
19	26°52'	+23'	82°	27°01'	+24'	82°	27°09'	+25'	83°	27°16'	+26'	83°	27°23'	+27'	84°	27°29'	+28'	84°	27°35'	+29'	85°	19
20	27°15'	+22'	81°	27°25'	+23'	81°	27°33'	+24'	82°	27°42'	+25'	82°	27°50'	+27'	83°	27°57'	+28'	83°	28°04'	+29'	84°	20
21	27°37'	+22'	80°	27°48'	+23'	80°	27°58'	+24'	81°	28°07'	+25'	81°	28°16'	+26'	82°	28°25'	+27'	82°	28°32'	+28'	83°	21
22	27°59'	+21'	79°	28°11'	+22'	79°	28°22'	+23'	80°	28°32'	+25'	80°	28°42'	+26'	81°	28°52'	+27'	81°	29°01'	+28'	82°	22
23	28°20'	+21'	78°	28°33'	+22'	78°	28°45'	+23'	79°	28°57'	+24'	79°	29°08'	+25'	80°	29°18'	+26'	80°	29°28'	+27'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	17°35'	+29'	100°	17°24'	+30'	100°	17°14'	+31'	100°	17°03'	+32'	101°	16°52'	+33'	101°	16°40'	+34'	101°	16°28'	+35'	102°	0
1	18°04'	+29'	99°	17°55'	+30'	99°	17°45'	+31'	99°	17°35'	+32'	100°	17°25'	+33'	100°	17°14'	+34'	100°	17°03'	+35'	101°	1
2	18°33'	+29'	98°	18°25'	+30'	98°	18°16'	+31'	99°	18°07'	+32'	99°	17°58'	+33'	99°	17°48'	+34'	99°	17°38'	+34'	100°	2
3	19°02'	+29'	97°	18°55'	+30'	97°	18°47'	+31'	98°	18°39'	+31'	98°	18°30'	+32'	98°	18°21'	+33'	99°	18°12'	+34'	99°	3
4	19°31'	+28'	96°	19°24'	+29'	96°	19°17'	+30'	97°	19°10'	+31'	97°	19°03'	+32'	97°	18°55'	+33'	98°	18°47'	+34'	98°	4
5	19°59'	+28'	95°	19°54'	+29'	95°	19°48'	+30'	96°	19°41'	+31'	96°	19°35'	+32'	96°	19°28'	+33'	97°	19°21'	+34'	97°	5
6	20°27'	+28'	94°	20°23'	+29'	94°	20°18'	+30'	95°	20°12'	+31'	95°	20°07'	+32'	96°	20°01'	+33'	96°	19°54'	+33'	96°	6
7	20°55'	+27'	93°	20°51'	+28'	94°	20°47'	+29'	94°	20°43'	+30'	94°	20°38'	+31'	95°	20°33'	+32'	95°	20°28'	+33'	95°	7
8	21°22'	+27'	92°	21°20'	+28'	93°	21°17'	+29'	93°	21°13'	+30'	93°	21°10'	+31'	94°	21°05'	+32'	94°	21°01'	+33'	95°	8
9	21°49'	+27'	91°	21°48'	+28'	92°	21°46'	+29'	92°	21°43'	+30'	92°	21°41'	+31'	93°	21°37'	+32'	93°	21°34'	+33'	94°	9
10	22°16'	+26'	90°	22°15'	+27'	91°	22°15'	+28'	91°	22°13'	+29'	92°	22°11'	+30'	92°	22°09'	+31'	92°	22°06'	+32'	93°	10
11	22°42'	+26'	89°	22°43'	+27'	90°	22°43'	+28'	90°	22°43'	+29'	91°	22°42'	+30'	91°	22°40'	+31'	91°	22°39'	+32'	92°	11
12	23°08'	+26'	88°	23°10'	+27'	89°	23°11'	+28'	89°	23°12'	+29'	90°	23°12'	+30'	90°	23°12'	+31'	90°	23°11'	+32'	91°	12
13	23°34'	+25'	87°	23°37'	+26'	88°	23°39'	+27'	88°	23°40'	+28'	89°	23°42'	+29'	89°	23°42'	+30'	90°	23°42'	+31'	90°	13
14	23°59'	+25'	86°	24°03'	+26'	87°	24°06'	+27'	87°	24°09'	+28'	88°	24°11'	+29'	88°	24°13'	+30'	89°	24°14'	+31'	89°	14
15	24°24'	+25'	85°	24°29'	+26'	86°	24°33'	+27'	86°	24°37'	+28'	87°	24°40'	+29'	87°	24°43'	+30'	88°	24°45'	+31'	88°	15
16	24°49'	+24'	84°	24°55'	+25'	85°	25°00'	+26'	85°	25°04'	+27'	86°	25°09'	+28'	86°	25°12'	+29'	87°	25°15'	+30'	87°	16
17	25°13'	+24'	83°	25°20'	+25'	84°	25°26'	+26'	84°	25°32'	+27'	85°	25°37'	+28'	85°	25°42'	+29'	86°	25°46'	+30'	86°	17
18	25°37'	+23'	82°	25°44'	+24'	83°	25°52'	+25'	83°	25°58'	+26'	84°	26°05'	+27'	84°	26°10'	+29'	85°	26°16'	+30'	85°	18
19	26°00'	+23'	81°	26°09'	+24'	82°	26°17'	+25'	82°	26°25'	+26'	83°	26°32'	+27'	83°	26°39'	+28'	84°	26°45'	+29'	84°	19
20	26°23'	+22'	80°	26°33'	+23'	81°	26°42'	+25'	81°	26°51'	+26'	82°	26°59'	+27'	82°	27°07'	+28'	83°	27°14'	+29'	83°	20
21	26°45'	+22'	79°	26°56'	+23'	80°	27°07'	+24'	80°	27°17'	+25'	81°	27°26'	+26'	81°	27°35'	+27'	82°	27°43'	+28'	82°	21
22	27°07'	+21'	78°	27°19'	+23'	79°	27°31'	+24'	79°	27°42'	+25'	80°	27°52'	+26'	80°	28°02'	+27'	81°	28°11'	+28'	81°	22
23	27°29'	+21'	77°	27°42'	+22'	78°	27°54'	+23'	78°	28°06'	+24'	79°	28°18'	+25'	79°	28°29'	+26'	80°	28°39'	+27'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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°42'	+29'	99°	16°33'	+30'	99°	16°23'	+31'	100°	16°12'	+32'	100°	16°02'	+33'	100°	15°51'	+34'	101°	15°40'	+35'	101°	0
1	17°12'	+29'	98°	17°03'	+30'	99°	16°54'	+31'	99°	16°44'	+32'	99°	16°35'	+33'	99°	16°25'	+34'	100°	16°14'	+35'	100°	1
2	17°41'	+29'	97°	17°33'	+30'	98°	17°25'	+31'	98°	17°16'	+32'	98°	17°07'	+33'	99°	16°58'	+33'	99°	16°49'	+34'	99°	2
3	18°09'	+29'	96°	18°03'	+29'	97°	17°55'	+30'	97°	17°48'	+31'	97°	17°40'	+32'	98°	17°32'	+33'	98°	17°23'	+34'	98°	3
4	18°38'	+28'	96°	18°32'	+29'	96°	18°26'	+30'	96°	18°19'	+31'	97°	18°12'	+32'	97°	18°05'	+33'	97°	17°57'	+34'	97°	4
5	19°06'	+28'	95°	19°01'	+29'	95°	18°56'	+30'	95°	18°50'	+31'	96°	18°44'	+32'	96°	18°38'	+33'	96°	18°31'	+34'	97°	5
6	19°34'	+28'	94°	19°30'	+29'	94°	19°26'	+30'	94°	19°21'	+31'	95°	19°16'	+32'	95°	19°11'	+32'	95°	19°05'	+33'	96°	6
7	20°02'	+27'	93°	19°59'	+28'	93°	19°55'	+29'	93°	19°52'	+30'	94°	19°48'	+31'	94°	19°43'	+32'	94°	19°38'	+33'	95°	7
8	20°29'	+27'	92°	20°27'	+28'	92°	20°25'	+29'	92°	20°22'	+30'	93°	20°19'	+31'	93°	20°15'	+32'	94°	20°11'	+33'	94°	8
9	20°56'	+27'	91°	20°55'	+28'	91°	20°54'	+29'	92°	20°52'	+30'	92°	20°50'	+31'	92°	20°47'	+32'	93°	20°44'	+33'	93°	9
10	21°23'	+26'	90°	21°23'	+27'	90°	21°23'	+28'	91°	21°22'	+29'	91°	21°20'	+30'	91°	21°19'	+31'	92°	21°17'	+32'	92°	10
11	21°49'	+26'	89°	21°50'	+27'	89°	21°51'	+28'	90°	21°51'	+29'	90°	21°51'	+30'	90°	21°50'	+31'	91°	21°49'	+32'	91°	11
12	22°16'	+26'	88°	22°18'	+27'	88°	22°19'	+28'	89°	22°20'	+29'	89°	22°21'	+30'	90°	22°21'	+31'	90°	22°21'	+32'	90°	12
13	22°41'	+25'	87°	22°44'	+26'	87°	22°47'	+27'	88°	22°49'	+28'	88°	22°51'	+29'	89°	22°52'	+30'	89°	22°53'	+31'	89°	13
14	23°07'	+25'	86°	23°11'	+26'	86°	23°14'	+27'	87°	23°17'	+28'	87°	23°20'	+29'	88°	23°22'	+30'	88°	23°24'	+31'	89°	14
15	23°32'	+25'	85°	23°37'	+26'	85°	23°41'	+27'	86°	23°45'	+28'	86°	23°49'	+29'	87°	23°52'	+30'	87°	23°55'	+31'	88°	15
16	23°56'	+24'	84°	24°02'	+25'	84°	24°08'	+26'	85°	24°13'	+27'	85°	24°18'	+28'	86°	24°22'	+29'	86°	24°26'	+30'	87°	16
17	24°20'	+24'	83°	24°28'	+25'	83°	24°34'	+26'	84°	24°40'	+27'	84°	24°46'	+28'	85°	24°51'	+29'	85°	24°56'	+30'	86°	17
18	24°44'	+23'	82°	24°52'	+24'	82°	25°00'	+26'	83°	25°07'	+27'	83°	25°14'	+28'	84°	25°20'	+29'	84°	25°26'	+30'	85°	18
19	25°08'	+23'	81°	25°17'	+24'	81°	25°26'	+25'	82°	25°34'	+26'	82°	25°42'	+27'	83°	25°49'	+28'	83°	25°56'	+29'	84°	19
20	25°31'	+23'	80°	25°41'	+24'	80°	25°51'	+25'	81°	26°00'	+26'	81°	26°09'	+27'	82°	26°17'	+28'	82°	26°25'	+29'	83°	20
21	25°53'	+22'	79°	26°05'	+23'	79°	26°15'	+24'	80°	26°26'	+25'	80°	26°36'	+26'	81°	26°45'	+27'	81°	26°54'	+28'	82°	21
22	26°15'	+22'	78°	26°28'	+23'	78°	26°40'	+24'	79°	26°51'	+25'	79°	27°02'	+26'	80°	27°12'	+27'	80°	27°22'	+28'	81°	22
23	26°37'	+21'	77°	26°51'	+22'	77°	27°04'	+23'	78°	27°16'	+24'	78°	27°28'	+25'	79°	27°39'	+27'	79°	27°50'	+28'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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°50'	+29'	99°	15°41'	+30'	99°	15°31'	+31'	99°	15°22'	+32'	100°	15°12'	+33'	100°	15°01'	+34'	100°	14°51'	+35'	100°	0
1	16°19'	+29'	98°	16°11'	+30'	98°	16°02'	+31'	98°	15°54'	+32'	99°	15°44'	+33'	99°	15°35'	+34'	99°	15°25'	+34'	99°	1
2	16°48'	+29'	97°	16°41'	+30'	97°	16°33'	+31'	97°	16°25'	+32'	98°	16°17'	+32'	98°	16°08'	+33'	98°	16°00'	+34'	99°	2
3	17°17'	+28'	96°	17°10'	+29'	96°	17°04'	+30'	97°	16°57'	+31'	97°	16°49'	+32'	97°	16°42'	+33'	97°	16°34'	+34'	98°	3
4	17°45'	+28'	95°	17°40'	+29'	95°	17°34'	+30'	96°	17°28'	+31'	96°	17°22'	+32'	96°	17°15'	+33'	97°	17°08'	+34'	97°	4
5	18°13'	+28'	94°	18°09'	+29'	94°	18°04'	+30'	95°	17°59'	+31'	95°	17°54'	+32'	95°	17°48'	+33'	96°	17°42'	+34'	96°	5
6	18°41'	+28'	93°	18°38'	+29'	93°	18°34'	+30'	94°	18°30'	+31'	94°	18°25'	+31'	94°	18°20'	+32'	95°	18°15'	+33'	95°	6
7	19°09'	+27'	92°	19°06'	+28'	93°	19°04'	+29'	93°	19°00'	+30'	93°	18°57'	+31'	94°	18°53'	+32'	94°	18°49'	+33'	94°	7
8	19°36'	+27'	91°	19°35'	+28'	92°	19°33'	+29'	92°	19°31'	+30'	92°	19°28'	+31'	93°	19°25'	+32'	93°	19°22'	+33'	93°	8
9	20°03'	+27'	90°	20°03'	+28'	91°	20°02'	+29'	91°	20°01'	+30'	91°	19°59'	+31'	92°	19°57'	+32'	92°	19°54'	+33'	92°	9
10	20°30'	+26'	89°	20°31'	+27'	90°	20°31'	+28'	90°	20°30'	+29'	90°	20°30'	+30'	91°	20°29'	+31'	91°	20°27'	+32'	92°	10
11	20°56'	+26'	88°	20°58'	+27'	89°	20°59'	+28'	89°	21°00'	+29'	90°	21°00'	+30'	90°	21°00'	+31'	90°	20°59'	+32'	91°	11
12	21°23'	+26'	87°	21°25'	+27'	88°	21°27'	+28'	88°	21°29'	+29'	89°	21°30'	+30'	89°	21°31'	+31'	89°	21°31'	+32'	90°	12
13	21°48'	+25'	86°	21°52'	+26'	87°	21°55'	+27'	87°	21°58'	+28'	88°	22°00'	+29'	88°	22°02'	+30'	88°	22°03'	+31'	89°	13
14	22°14'	+25'	85°	22°18'	+26'	86°	22°22'	+27'	86°	22°26'	+28'	87°	22°29'	+29'	87°	22°32'	+30'	88°	22°34'	+31'	88°	14
15	22°39'	+25'	85°	22°44'	+26'	85°	22°49'	+27'	85°	22°54'	+28'	86°	22°58'	+29'	86°	23°02'	+30'	87°	23°05'	+31'	87°	15
16	23°04'	+24'	84°	23°10'	+25'	84°	23°16'	+26'	84°	23°22'	+27'	85°	23°27'	+28'	85°	23°32'	+29'	86°	23°36'	+30'	86°	16
17	23°28'	+24'	83°	23°35'	+25'	83°	23°43'	+26'	83°	23°49'	+27'	84°	23°56'	+28'	84°	24°01'	+29'	85°	24°07'	+30'	85°	17
18	23°52'	+24'	82°	24°00'	+25'	82°	24°09'	+26'	82°	24°16'	+27'	83°	24°24'	+28'	83°	24°30'	+29'	84°	24°37'	+30'	84°	18
19	24°15'	+23'	81°	24°25'	+24'	81°	24°34'	+25'	81°	24°43'	+26'	82°	24°51'	+27'	82°	24°59'	+28'	83°	25°06'	+29'	83°	19
20	24°39'	+23'	79°	24°49'	+24'	80°	25°00'	+25'	80°	25°09'	+26'	81°	25°19'	+27'	81°	25°27'	+28'	82°	25°36'	+29'	82°	20
21	25°01'	+22'	78°	25°13'	+23'	79°	25°24'	+24'	79°	25°35'	+25'	80°	25°45'	+26'	80°	25°55'	+28'	81°	26°05'	+29'	81°	21
22	25°24'	+22'	77°	25°36'	+23'	78°	25°49'	+24'	78°	26°01'	+25'	79°	26°12'	+26'	79°	26°23'	+27'	80°	26°33'	+28'	80°	22
23	25°46'	+21'	76°	25°59'	+23'	77°	26°13'	+24'	77°	26°26'	+25'	78°	26°38'	+26'	78°	26°50'	+27'	79°	27°01'	+28'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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°58'	+29'	98°	14°49'	+30'	98°	14°40'	+31'	99°	14°31'	+32'	99°	14°21'	+33'	99°	14°12'	+34'	99°	14°02'	+34'	100°	0
1	15°27'	+29'	97°	15°19'	+30'	98°	15°11'	+31'	98°	15°03'	+32'	98°	14°54'	+33'	98°	14°45'	+33'	99°	14°36'	+34'	99°	1
2	15°55'	+29'	96°	15°49'	+30'	97°	15°42'	+30'	97°	15°34'	+31'	97°	15°27'	+32'	97°	15°19'	+33'	98°	15°10'	+34'	98°	2
3	16°24'	+28'	95°	16°18'	+29'	96°	16°12'	+30'	96°	16°06'	+31'	96°	15°59'	+32'	97°	15°52'	+33'	97°	15°45'	+34'	97°	3
4	16°52'	+28'	95°	16°48'	+29'	95°	16°42'	+30'	95°	16°37'	+31'	95°	16°31'	+32'	96°	16°25'	+33'	96°	16°18'	+34'	96°	4
5	17°21'	+28'	94°	17°17'	+29'	94°	17°12'	+30'	94°	17°08'	+31'	95°	17°03'	+32'	95°	16°58'	+33'	95°	16°52'	+33'	95°	5
6	17°48'	+28'	93°	17°45'	+29'	93°	17°42'	+30'	93°	17°39'	+30'	94°	17°35'	+31'	94°	17°30'	+32'	94°	17°26'	+33'	95°	6
7	18°16'	+27'	92°	18°14'	+28'	92°	18°12'	+29'	92°	18°09'	+30'	93°	18°06'	+31'	93°	18°03'	+32'	93°	17°59'	+33'	94°	7
8	18°43'	+27'	91°	18°42'	+28'	91°	18°41'	+29'	91°	18°39'	+30'	92°	18°37'	+31'	92°	18°35'	+32'	92°	18°32'	+33'	93°	8
9	19°10'	+27'	90°	19°10'	+28'	90°	19°10'	+29'	91°	19°09'	+30'	91°	19°08'	+31'	91°	19°07'	+32'	92°	19°05'	+33'	92°	9
10	19°37'	+26'	89°	19°38'	+27'	89°	19°39'	+28'	90°	19°39'	+29'	90°	19°39'	+30'	90°	19°38'	+31'	91°	19°37'	+32'	91°	10
11	20°04'	+26'	88°	20°05'	+27'	88°	20°07'	+28'	89°	20°08'	+29'	89°	20°09'	+30'	89°	20°10'	+31'	90°	20°10'	+32'	90°	11
12	20°30'	+26'	87°	20°33'	+27'	87°	20°35'	+28'	88°	20°37'	+29'	88°	20°39'	+30'	88°	20°41'	+31'	89°	20°42'	+32'	89°	12
13	20°55'	+25'	86°	20°59'	+26'	86°	21°03'	+27'	87°	21°06'	+28'	87°	21°09'	+29'	88°	21°11'	+30'	88°	21°13'	+31'	88°	13
14	21°21'	+25'	85°	21°26'	+26'	85°	21°31'	+27'	86°	21°35'	+28'	86°	21°38'	+29'	87°	21°42'	+30'	87°	21°45'	+31'	87°	14
15	21°46'	+25'	84°	21°52'	+26'	84°	21°58'	+27'	85°	22°03'	+28'	85°	22°08'	+29'	86°	22°12'	+30'	86°	22°16'	+31'	86°	15
16	22°11'	+24'	83°	22°18'	+25'	83°	22°25'	+26'	84°	22°31'	+27'	84°	22°36'	+28'	85°	22°42'	+29'	85°	22°47'	+30'	86°	16
17	22°35'	+24'	82°	22°43'	+25'	83°	22°51'	+26'	83°	22°58'	+27'	83°	23°05'	+28'	84°	23°11'	+29'	84°	23°17'	+30'	85°	17
18	22°59'	+24'	81°	23°09'	+25'	82°	23°17'	+26'	82°	23°25'	+27'	82°	23°33'	+28'	83°	23°40'	+29'	83°	23°47'	+30'	84°	18
19	23°23'	+23'	80°	23°33'	+24'	81°	23°43'	+25'	81°	23°52'	+26'	81°	24°01'	+27'	82°	24°09'	+28'	82°	24°17'	+29'	83°	19
20	23°47'	+23'	79°	23°58'	+24'	80°	24°08'	+25'	80°	24°19'	+26'	80°	24°28'	+27'	81°	24°38'	+28'	81°	24°46'	+29'	82°	20
21	24°09'	+23'	78°	24°22'	+24'	79°	24°33'	+25'	79°	24°45'	+26'	79°	24°55'	+27'	80°	25°06'	+28'	80°	25°15'	+29'	81°	21
22	24°32'	+22'	77°	24°45'	+23'	78°	24°58'	+24'	78°	25°10'	+25'	78°	25°22'	+26'	79°	25°33'	+27'	79°	25°44'	+28'	80°	22
23	24°54'	+22'	76°	25°08'	+23'	77°	25°22'	+24'	77°	25°35'	+25'	77°	25°48'	+26'	78°	26°01'	+27'	78°	26°12'	+28'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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°05'	+29'	98°	13°57'	+30'	98°	13°49'	+31'	98°	13°40'	+32'	98°	13°31'	+33'	99°	13°22'	+34'	99°	13°13'	+34'	99°	0
1	14°34'	+29'	97°	14°27'	+30'	97°	14°19'	+31'	97°	14°12'	+32'	98°	14°04'	+32'	98°	13°55'	+33'	98°	13°47'	+34'	98°	1
2	15°03'	+29'	96°	14°57'	+29'	96°	14°50'	+30'	96°	14°43'	+31'	97°	14°36'	+32'	97°	14°29'	+33'	97°	14°21'	+34'	97°	2
3	15°31'	+28'	95°	15°26'	+29'	95°	15°20'	+30'	95°	15°15'	+31'	96°	15°08'	+32'	96°	15°02'	+33'	96°	14°55'	+34'	97°	3
4	16°00'	+28'	94°	15°55'	+29'	94°	15°51'	+30'	95°	15°46'	+31'	95°	15°40'	+32'	95°	15°35'	+33'	95°	15°29'	+34'	96°	4
5	16°28'	+28'	93°	16°24'	+29'	93°	16°21'	+30'	94°	16°17'	+31'	94°	16°12'	+32'	94°	16°08'	+33'	95°	16°03'	+33'	95°	5
6	16°55'	+28'	92°	16°53'	+29'	92°	16°50'	+29'	93°	16°47'	+30'	93°	16°44'	+31'	93°	16°40'	+32'	94°	16°36'	+33'	94°	6
7	17°23'	+27'	91°	17°22'	+28'	92°	17°20'	+29'	92°	17°18'	+30'	92°	17°15'	+31'	92°	17°12'	+32'	93°	17°09'	+33'	93°	7
8	17°50'	+27'	90°	17°50'	+28'	91°	17°49'	+29'	91°	17°48'	+30'	91°	17°46'	+31'	92°	17°44'	+32'	92°	17°42'	+33'	92°	8
9	18°17'	+27'	89°	18°18'	+28'	90°	18°18'	+29'	90°	18°18'	+30'	90°	18°17'	+31'	91°	18°16'	+32'	91°	18°15'	+33'	91°	9
10	18°44'	+26'	88°	18°46'	+27'	89°	18°47'	+28'	89°	18°47'	+29'	89°	18°48'	+30'	90°	18°48'	+31'	90°	18°48'	+32'	90°	10
11	19°11'	+26'	87°	19°13'	+27'	88°	19°15'	+28'	88°	19°17'	+29'	89°	19°18'	+30'	89°	19°19'	+31'	89°	19°20'	+32'	90°	11
12	19°37'	+26'	87°	19°40'	+27'	87°	19°43'	+28'	87°	19°46'	+29'	88°	19°48'	+30'	88°	19°50'	+31'	88°	19°52'	+32'	89°	12
13	20°03'	+26'	86°	20°07'	+27'	86°	20°11'	+28'	86°	20°15'	+29'	87°	20°18'	+30'	87°	20°21'	+30'	87°	20°24'	+31'	88°	13
14	20°28'	+25'	85°	20°34'	+26'	85°	20°39'	+27'	85°	20°43'	+28'	86°	20°48'	+29'	86°	20°52'	+30'	86°	20°55'	+31'	87°	14
15	20°53'	+25'	84°	21°00'	+26'	84°	21°06'	+27'	84°	21°12'	+28'	85°	21°17'	+29'	85°	21°22'	+30'	86°	21°26'	+31'	86°	15
16	21°18'	+25'	83°	21°26'	+26'	83°	21°33'	+27'	83°	21°40'	+28'	84°	21°46'	+29'	84°	21°52'	+30'	85°	21°57'	+31'	85°	16
17	21°43'	+24'	82°	21°51'	+25'	82°	21°59'	+26'	82°	22°07'	+27'	83°	22°14'	+28'	83°	22°21'	+29'	84°	22°28'	+30'	84°	17
18	22°07'	+24'	81°	22°17'	+25'	81°	22°26'	+26'	82°	22°34'	+27'	82°	22°43'	+28'	82°	22°50'	+29'	83°	22°58'	+30'	83°	18
19	22°31'	+24'	80°	22°42'	+25'	80°	22°52'	+26'	81°	23°01'	+27'	81°	23°11'	+28'	81°	23°19'	+29'	82°	23°28'	+30'	82°	19
20	22°55'	+23'	79°	23°06'	+24'	79°	23°17'	+25'	80°	23°28'	+26'	80°	23°38'	+27'	80°	23°48'	+28'	81°	23°57'	+29'	81°	20
21	23°18'	+23'	78°	23°30'	+24'	78°	23°42'	+25'	79°	23°54'	+26'	79°	24°05'	+27'	79°	24°16'	+28'	80°	24°26'	+29'	80°	21
22	23°40'	+22'	77°	23°54'	+23'	77°	24°07'	+24'	78°	24°20'	+25'	78°	24°32'	+26'	78°	24°44'	+27'	79°	24°55'	+28'	79°	22
23	24°03'	+22'	76°	24°17'	+23'	76°	24°32'	+24'	77°	24°45'	+25'	77°	24°59'	+26'	77°	25°11'	+27'	78°	25°24'	+28'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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°13'	+29'	97°	13°05'	+30'	97°	12°57'	+31'	98°	12°49'	+32'	98°	12°41'	+33'	98°	12°32'	+33'	98°	12°23'	+34'	99°	0
1	13°41'	+29'	96°	13°35'	+30'	97°	13°28'	+31'	97°	13°21'	+31'	97°	13°13'	+32'	97°	13°06'	+33'	97°	12°58'	+34'	98°	1
2	14°10'	+28'	95°	14°04'	+29'	96°	13°58'	+30'	96°	13°52'	+31'	96°	13°46'	+32'	96°	13°39'	+33'	97°	13°32'	+34'	97°	2
3	14°39'	+28'	94°	14°34'	+29'	95°	14°29'	+30'	95°	14°23'	+31'	95°	14°18'	+32'	95°	14°12'	+33'	96°	14°06'	+34'	96°	3
4	15°07'	+28'	94°	15°03'	+29'	94°	14°59'	+30'	94°	14°54'	+31'	94°	14°50'	+32'	95°	14°45'	+33'	95°	14°40'	+34'	95°	4
5	15°35'	+28'	93°	15°32'	+29'	93°	15°29'	+30'	93°	15°25'	+31'	93°	15°21'	+32'	94°	15°17'	+32'	94°	15°13'	+33'	94°	5
6	16°03'	+28'	92°	16°01'	+29'	92°	15°58'	+29'	92°	15°56'	+30'	93°	15°53'	+31'	93°	15°50'	+32'	93°	15°46'	+33'	93°	6
7	16°30'	+27'	91°	16°29'	+28'	91°	16°28'	+29'	91°	16°26'	+30'	92°	16°24'	+31'	92°	16°22'	+32'	92°	16°20'	+33'	93°	7
8	16°57'	+27'	90°	16°57'	+28'	90°	16°57'	+29'	90°	16°56'	+30'	91°	16°55'	+31'	91°	16°54'	+32'	91°	16°53'	+33'	92°	8
9	17°24'	+27'	89°	17°25'	+28'	89°	17°26'	+29'	90°	17°26'	+30'	90°	17°26'	+31'	90°	17°26'	+32'	90°	17°25'	+33'	91°	9
10	17°51'	+27'	88°	17°53'	+27'	88°	17°55'	+28'	89°	17°56'	+29'	89°	17°57'	+30'	89°	17°58'	+31'	90°	17°58'	+32'	90°	10
11	18°18'	+26'	87°	18°21'	+27'	87°	18°23'	+28'	88°	18°25'	+29'	88°	18°27'	+30'	88°	18°29'	+31'	89°	18°30'	+32'	89°	11
12	18°44'	+26'	86°	18°48'	+27'	86°	18°51'	+28'	87°	18°55'	+29'	87°	18°57'	+30'	87°	19°00'	+31'	88°	19°02'	+32'	88°	12
13	19°10'	+26'	85°	19°15'	+27'	85°	19°19'	+28'	86°	19°23'	+29'	86°	19°27'	+30'	87°	19°31'	+31'	87°	19°34'	+31'	87°	13
14	19°35'	+25'	84°	19°41'	+26'	85°	19°47'	+27'	85°	19°52'	+28'	85°	19°57'	+29'	86°	20°01'	+30'	86°	20°05'	+31'	86°	14
15	20°01'	+25'	83°	20°08'	+26'	84°	20°14'	+27'	84°	20°20'	+28'	84°	20°26'	+29'	85°	20°32'	+30'	85°	20°37'	+31'	85°	15
16	20°26'	+25'	82°	20°34'	+26'	83°	20°41'	+27'	83°	20°48'	+28'	83°	20°55'	+29'	84°	21°02'	+30'	84°	21°07'	+31'	85°	16
17	20°51'	+24'	81°	20°59'	+25'	82°	21°08'	+26'	82°	21°16'	+27'	82°	21°24'	+28'	83°	21°31'	+29'	83°	21°38'	+30'	84°	17
18	21°15'	+24'	80°	21°25'	+25'	81°	21°34'	+26'	81°	21°43'	+27'	81°	21°52'	+28'	82°	22°01'	+29'	82°	22°08'	+30'	83°	18
19	21°39'	+24'	79°	21°50'	+25'	80°	22°00'	+26'	80°	22°11'	+27'	80°	22°20'	+28'	81°	22°30'	+29'	81°	22°38'	+30'	82°	19
20	22°03'	+23'	78°	22°15'	+24'	79°	22°26'	+25'	79°	22°37'	+26'	80°	22°48'	+27'	80°	22°58'	+28'	80°	23°08'	+29'	81°	20
21	22°26'	+23'	77°	22°39'	+24'	78°	22°51'	+25'	78°	23°04'	+26'	79°	23°15'	+27'	79°	23°27'	+28'	79°	23°37'	+29'	80°	21
22	22°49'	+23'	76°	23°03'	+24'	77°	23°16'	+25'	77°	23°30'	+26'	78°	23°42'	+27'	78°	23°55'	+28'	78°	24°06'	+29'	79°	22
23	23°11'	+22'	75°	23°26'	+23'	76°	23°41'	+24'	76°	23°55'	+25'	77°	24°09'	+26'	77°	24°22'	+27'	77°	24°35'	+28'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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°20'	+29'	97°	12°13'	+30'	97°	12°06'	+31'	97°	11°58'	+32'	97°	11°50'	+32'	98°	11°42'	+33'	98°	11°34'	+34'	98°	0
1	12°49'	+29'	96°	12°43'	+29'	96°	12°36'	+30'	96°	12°30'	+31'	96°	12°23'	+32'	97°	12°16'	+33'	97°	12°08'	+34'	97°	1
2	13°17'	+28'	95°	13°12'	+29'	95°	13°07'	+30'	95°	13°01'	+31'	96°	12°55'	+32'	96°	12°49'	+33'	96°	12°42'	+34'	96°	2
3	13°46'	+28'	94°	13°41'	+29'	94°	13°37'	+30'	94°	13°32'	+31'	95°	13°27'	+32'	95°	13°22'	+33'	95°	13°16'	+34'	95°	3
4	14°14'	+28'	93°	14°11'	+29'	93°	14°07'	+30'	94°	14°03'	+31'	94°	13°59'	+32'	94°	13°55'	+33'	94°	13°50'	+34'	95°	4
5	14°42'	+28'	92°	14°39'	+29'	92°	14°37'	+30'	93°	14°34'	+31'	93°	14°31'	+32'	93°	14°27'	+32'	93°	14°23'	+33'	94°	5
6	15°10'	+28'	91°	15°08'	+28'	91°	15°06'	+29'	92°	15°04'	+30'	92°	15°02'	+31'	92°	15°00'	+32'	93°	14°57'	+33'	93°	6
7	15°37'	+27'	90°	15°37'	+28'	91°	15°36'	+29'	91°	15°35'	+30'	91°	15°33'	+31'	91°	15°32'	+32'	92°	15°30'	+33'	92°	7
8	16°04'	+27'	89°	16°05'	+28'	90°	16°05'	+29'	90°	16°05'	+30'	90°	16°05'	+31'	91°	16°04'	+32'	91°	16°03'	+33'	91°	8
9	16°31'	+27'	88°	16°33'	+28'	89°	16°34'	+29'	89°	16°35'	+30'	89°	16°35'	+31'	90°	16°36'	+32'	90°	16°36'	+33'	90°	9
10	16°58'	+27'	88°	17°01'	+28'	88°	17°03'	+28'	88°	17°05'	+29'	88°	17°06'	+30'	89°	17°07'	+31'	89°	17°08'	+32'	89°	10
11	17°25'	+26'	87°	17°28'	+27'	87°	17°31'	+28'	87°	17°34'	+29'	88°	17°36'	+30'	88°	17°39'	+31'	88°	17°40'	+32'	88°	11
12	17°51'	+26'	86°	17°55'	+27'	86°	18°00'	+28'	86°	18°03'	+29'	87°	18°07'	+30'	87°	18°10'	+31'	87°	18°12'	+32'	88°	12
13	18°17'	+26'	85°	18°22'	+27'	85°	18°28'	+28'	85°	18°32'	+29'	86°	18°37'	+30'	86°	18°41'	+31'	86°	18°44'	+32'	87°	13
14	18°43'	+25'	84°	18°49'	+26'	84°	18°55'	+27'	84°	19°01'	+28'	85°	19°06'	+29'	85°	19°11'	+30'	85°	19°16'	+31'	86°	14
15	19°08'	+25'	83°	19°16'	+26'	83°	19°23'	+27'	83°	19°29'	+28'	84°	19°36'	+29'	84°	19°41'	+30'	85°	19°47'	+31'	85°	15
16	19°33'	+25'	82°	19°42'	+26'	82°	19°50'	+27'	83°	19°57'	+28'	83°	20°05'	+29'	83°	20°11'	+30'	84°	20°18'	+31'	84°	16
17	19°58'	+25'	81°	20°08'	+26'	81°	20°17'	+27'	82°	20°25'	+27'	82°	20°33'	+28'	82°	20°41'	+29'	83°	20°49'	+30'	83°	17
18	20°23'	+24'	80°	20°33'	+25'	80°	20°43'	+26'	81°	20°53'	+27'	81°	21°02'	+28'	81°	21°11'	+29'	82°	21°19'	+30'	82°	18
19	20°47'	+24'	79°	20°58'	+25'	79°	21°09'	+26'	80°	21°20'	+27'	80°	21°30'	+28'	80°	21°40'	+29'	81°	21°49'	+30'	81°	19
20	21°11'	+24'	78°	21°23'	+25'	78°	21°35'	+26'	79°	21°47'	+27'	79°	21°58'	+28'	79°	22°09'	+28'	80°	22°19'	+29'	80°	20
21	21°34'	+23'	77°	21°48'	+24'	77°	22°01'	+25'	78°	22°13'	+26'	78°	22°25'	+27'	79°	22°37'	+28'	79°	22°48'	+29'	79°	21
22	21°57'	+23'	76°	22°12'	+24'	76°	22°26'	+25'	77°	22°39'	+26'	77°	22°53'	+27'	78°	23°05'	+28'	78°	23°18'	+29'	78°	22
23	22°20'	+22'	75°	22°36'	+23'	75°	22°51'	+24'	76°	23°05'	+25'	76°	23°19'	+26'	77°	23°33'	+27'	77°	23°46'	+28'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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°27'	+29'	96°	11°21'	+30'	96°	11°14'	+31'	97°	11°07'	+31'	97°	11°00'	+32'	97°	10°52'	+33'	97°	10°45'	+34'	97°	0
1	11°56'	+28'	95°	11°50'	+29'	95°	11°45'	+30'	96°	11°38'	+31'	96°	11°32'	+32'	96°	11°26'	+33'	96°	11°19'	+34'	97°	1
2	12°25'	+28'	94°	12°20'	+29'	95°	12°15'	+30'	95°	12°10'	+31'	95°	12°04'	+32'	95°	11°59'	+33'	95°	11°53'	+34'	96°	2
3	12°53'	+28'	93°	12°49'	+29'	94°	12°45'	+30'	94°	12°41'	+31'	94°	12°36'	+32'	94°	12°32'	+33'	95°	12°27'	+34'	95°	3
4	13°21'	+28'	93°	13°18'	+29'	93°	13°15'	+30'	93°	13°12'	+31'	93°	13°08'	+32'	94°	13°04'	+33'	94°	13°00'	+33'	94°	4
5	13°49'	+28'	92°	13°47'	+29'	92°	13°45'	+30'	92°	13°42'	+31'	92°	13°40'	+31'	93°	13°37'	+32'	93°	13°34'	+33'	93°	5
6	14°17'	+28'	91°	14°16'	+28'	91°	14°14'	+29'	91°	14°13'	+30'	92°	14°11'	+31'	92°	14°09'	+32'	92°	14°07'	+33'	92°	6
7	14°44'	+27'	90°	14°44'	+28'	90°	14°44'	+29'	90°	14°43'	+30'	91°	14°43'	+31'	91°	14°42'	+32'	91°	14°40'	+33'	91°	7
8	15°11'	+27'	89°	15°12'	+28'	89°	15°13'	+29'	89°	15°14'	+30'	90°	15°14'	+31'	90°	15°14'	+32'	90°	15°13'	+33'	91°	8
9	15°38'	+27'	88°	15°40'	+28'	88°	15°42'	+29'	89°	15°43'	+30'	89°	15°45'	+31'	89°	15°45'	+32'	89°	15°46'	+33'	90°	9
10	16°05'	+27'	87°	16°08'	+28'	87°	16°11'	+29'	88°	16°13'	+29'	88°	16°15'	+30'	88°	16°17'	+31'	89°	16°18'	+32'	89°	10
11	16°32'	+26'	86°	16°36'	+27'	86°	16°39'	+28'	87°	16°43'	+29'	87°	16°46'	+30'	87°	16°48'	+31'	88°	16°51'	+32'	88°	11
12	16°58'	+26'	85°	17°03'	+27'	85°	17°08'	+28'	86°	17°12'	+29'	86°	17°16'	+30'	86°	17°19'	+31'	87°	17°23'	+32'	87°	12
13	17°24'	+26'	84°	17°30'	+27'	85°	17°36'	+28'	85°	17°41'	+29'	85°	17°46'	+30'	86°	17°50'	+31'	86°	17°55'	+32'	86°	13
14	17°50'	+26'	83°	17°57'	+27'	84°	18°04'	+28'	84°	18°10'	+28'	84°	18°15'	+29'	85°	18°21'	+30'	85°	18°26'	+31'	85°	14
15	18°16'	+25'	82°	18°24'	+26'	83°	18°31'	+27'	83°	18°38'	+28'	83°	18°45'	+29'	84°	18°51'	+30'	84°	18°57'	+31'	84°	15
16	18°41'	+25'	81°	18°50'	+26'	82°	18°58'	+27'	82°	19°06'	+28'	82°	19°14'	+29'	83°	19°21'	+30'	83°	19°29'	+31'	83°	16
17	19°06'	+25'	80°	19°16'	+26'	81°	19°25'	+27'	81°	19°34'	+28'	81°	19°43'	+29'	82°	19°51'	+30'	82°	19°59'	+31'	83°	17
18	19°31'	+24'	79°	19°41'	+25'	80°	19°52'	+26'	80°	20°02'	+27'	81°	20°12'	+28'	81°	20°21'	+29'	81°	20°30'	+30'	82°	18
19	19°55'	+24'	78°	20°07'	+25'	79°	20°18'	+26'	79°	20°29'	+27'	80°	20°40'	+28'	80°	20°50'	+29'	80°	21°00'	+30'	81°	19
20	20°19'	+24'	78°	20°32'	+25'	78°	20°44'	+26'	78°	20°56'	+27'	79°	21°08'	+28'	79°	21°19'	+29'	79°	21°30'	+30'	80°	20
21	20°43'	+23'	77°	20°57'	+24'	77°	21°10'	+25'	77°	21°23'	+26'	78°	21°36'	+27'	78°	21°48'	+28'	78°	22°00'	+29'	79°	21
22	21°06'	+23'	76°	21°21'	+24'	76°	21°35'	+25'	76°	21°49'	+26'	77°	22°03'	+27'	77°	22°16'	+28'	77°	22°29'	+29'	78°	22
23	21°29'	+23'	75°	21°45'	+24'	75°	22°00'	+25'	75°	22°15'	+26'	76°	22°30'	+27'	76°	22°44'	+28'	77°	22°58'	+29'	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°
	28			29			30			31			32			33			34			

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

Dec°	28			29			30			31			32			33			34			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	10°35'	+29'	96°	10°29'	+30'	96°	10°22'	+30'	96°	10°16'	+31'	96°	10°09'	+32'	96°	10°03'	+33'	97°	9°56'	+34'	97°	0
1	11°03'	+28'	95°	10°58'	+29'	95°	10°53'	+30'	95°	10°47'	+31'	95°	10°42'	+32'	96°	10°36'	+33'	96°	10°30'	+34'	96°	1
2	11°32'	+28'	94°	11°27'	+29'	94°	11°23'	+30'	94°	11°18'	+31'	95°	11°14'	+32'	95°	11°09'	+33'	95°	11°03'	+34'	95°	2
3	12°00'	+28'	93°	11°57'	+29'	93°	11°53'	+30'	93°	11°50'	+31'	94°	11°46'	+32'	94°	11°41'	+33'	94°	11°37'	+34'	94°	3
4	12°28'	+28'	92°	12°26'	+29'	92°	12°23'	+30'	93°	12°20'	+31'	93°	12°17'	+32'	93°	12°14'	+33'	93°	12°11'	+33'	93°	4
5	12°56'	+28'	91°	12°55'	+29'	91°	12°53'	+30'	92°	12°51'	+31'	92°	12°49'	+31'	92°	12°47'	+32'	92°	12°44'	+33'	93°	5
6	13°24'	+28'	90°	13°23'	+28'	91°	13°23'	+29'	91°	13°22'	+30'	91°	13°20'	+31'	91°	13°19'	+32'	91°	13°17'	+33'	92°	6
7	13°51'	+27'	89°	13°52'	+28'	90°	13°52'	+29'	90°	13°52'	+30'	90°	13°52'	+31'	90°	13°51'	+32'	91°	13°50'	+33'	91°	7
8	14°18'	+27'	88°	14°20'	+28'	89°	14°21'	+29'	89°	14°22'	+30'	89°	14°23'	+31'	89°	14°23'	+32'	90°	14°23'	+33'	90°	8
9	14°46'	+27'	88°	14°48'	+28'	88°	14°50'	+29'	88°	14°52'	+30'	88°	14°54'	+31'	89°	14°55'	+32'	89°	14°56'	+33'	89°	9
10	15°12'	+27'	87°	15°16'	+28'	87°	15°19'	+29'	87°	15°22'	+30'	87°	15°24'	+30'	88°	15°27'	+31'	88°	15°29'	+32'	88°	10
11	15°39'	+26'	86°	15°43'	+27'	86°	15°48'	+28'	86°	15°51'	+29'	87°	15°55'	+30'	87°	15°58'	+31'	87°	16°01'	+32'	87°	11
12	16°05'	+26'	85°	16°11'	+27'	85°	16°16'	+28'	85°	16°21'	+29'	86°	16°25'	+30'	86°	16°29'	+31'	86°	16°33'	+32'	86°	12
13	16°32'	+26'	84°	16°38'	+27'	84°	16°44'	+28'	84°	16°50'	+29'	85°	16°55'	+30'	85°	17°00'	+31'	85°	17°05'	+32'	86°	13
14	16°58'	+26'	83°	17°05'	+27'	83°	17°12'	+28'	83°	17°19'	+29'	84°	17°25'	+30'	84°	17°31'	+30'	84°	17°37'	+31'	85°	14
15	17°23'	+25'	82°	17°32'	+26'	82°	17°39'	+27'	83°	17°47'	+28'	83°	17°54'	+29'	83°	18°01'	+30'	83°	18°08'	+31'	84°	15
16	17°49'	+25'	81°	17°58'	+26'	81°	18°07'	+27'	82°	18°15'	+28'	82°	18°24'	+29'	82°	18°32'	+30'	83°	18°39'	+31'	83°	16
17	18°14'	+25'	80°	18°24'	+26'	80°	18°34'	+27'	81°	18°43'	+28'	81°	18°53'	+29'	81°	19°02'	+30'	82°	19°10'	+31'	82°	17
18	18°39'	+25'	79°	18°50'	+26'	79°	19°01'	+27'	80°	19°11'	+27'	80°	19°21'	+28'	80°	19°31'	+29'	81°	19°41'	+30'	81°	18
19	19°03'	+24'	78°	19°15'	+25'	78°	19°27'	+26'	79°	19°39'	+27'	79°	19°50'	+28'	79°	20°01'	+29'	80°	20°11'	+30'	80°	19
20	19°27'	+24'	77°	19°41'	+25'	77°	19°53'	+26'	78°	20°06'	+27'	78°	20°18'	+28'	79°	20°30'	+29'	79°	20°41'	+30'	79°	20
21	19°51'	+24'	76°	20°05'	+25'	76°	20°19'	+26'	77°	20°33'	+27'	77°	20°46'	+28'	78°	20°59'	+29'	78°	21°11'	+29'	78°	21
22	20°15'	+23'	75°	20°30'	+24'	76°	20°45'	+25'	76°	20°59'	+26'	76°	21°13'	+27'	77°	21°27'	+28'	77°	21°40'	+29'	77°	22
23	20°38'	+23'	74°	20°54'	+24'	75°	21°10'	+25'	75°	21°26'	+26'	75°	21°41'	+27'	76°	21°55'	+28'	76°	22°09'	+29'	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°
	28			29			30			31			32			33			34			

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

Dec°	28			29			30			31			32			33			34			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	9°42'	+29'	95°	9°36'	+29'	95°	9°31'	+30'	96°	9°25'	+31'	96°	9°19'	+32'	96°	9°13'	+33'	96°	9°06'	+34'	96°	0
1	10°10'	+28'	94°	10°06'	+29'	94°	10°01'	+30'	95°	9°56'	+31'	95°	9°51'	+32'	95°	9°46'	+33'	95°	9°40'	+34'	95°	1
2	10°39'	+28'	93°	10°35'	+29'	94°	10°31'	+30'	94°	10°27'	+31'	94°	10°23'	+32'	94°	10°18'	+33'	94°	10°14'	+34'	95°	2
3	11°07'	+28'	93°	11°04'	+29'	93°	11°01'	+30'	93°	10°58'	+31'	93°	10°55'	+32'	93°	10°51'	+33'	93°	10°47'	+34'	94°	3
4	11°35'	+28'	92°	11°33'	+29'	92°	11°31'	+30'	92°	11°29'	+31'	92°	11°27'	+32'	92°	11°24'	+32'	93°	11°21'	+33'	93°	4
5	12°03'	+28'	91°	12°02'	+29'	91°	12°01'	+30'	91°	12°00'	+31'	91°	11°58'	+31'	92°	11°56'	+32'	92°	11°54'	+33'	92°	5
6	12°31'	+28'	90°	12°31'	+28'	90°	12°31'	+29'	90°	12°30'	+30'	90°	12°30'	+31'	91°	12°29'	+32'	91°	12°28'	+33'	91°	6
7	12°58'	+27'	89°	12°59'	+28'	89°	13°00'	+29'	89°	13°01'	+30'	90°	13°01'	+31'	90°	13°01'	+32'	90°	13°01'	+33'	90°	7
8	13°26'	+27'	88°	13°27'	+28'	88°	13°29'	+29'	88°	13°31'	+30'	89°	13°32'	+31'	89°	13°33'	+32'	89°	13°34'	+33'	89°	8
9	13°53'	+27'	87°	13°56'	+28'	87°	13°58'	+29'	88°	14°01'	+30'	88°	14°03'	+31'	88°	14°05'	+32'	88°	14°06'	+33'	89°	9
10	14°20'	+27'	86°	14°23'	+28'	86°	14°27'	+29'	87°	14°30'	+30'	87°	14°34'	+31'	87°	14°36'	+31'	87°	14°39'	+32'	88°	10
11	14°46'	+26'	85°	14°51'	+27'	85°	14°56'	+28'	86°	15°00'	+29'	86°	15°04'	+30'	86°	15°08'	+31'	87°	15°11'	+32'	87°	11
12	15°13'	+26'	84°	15°19'	+27'	85°	15°24'	+28'	85°	15°29'	+29'	85°	15°34'	+30'	85°	15°39'	+31'	86°	15°43'	+32'	86°	12
13	15°39'	+26'	83°	15°46'	+27'	84°	15°52'	+28'	84°	15°59'	+29'	84°	16°04'	+30'	84°	16°10'	+31'	85°	16°15'	+32'	85°	13
14	16°05'	+26'	82°	16°13'	+27'	83°	16°20'	+28'	83°	16°27'	+29'	83°	16°34'	+30'	84°	16°41'	+31'	84°	16°47'	+31'	84°	14
15	16°31'	+26'	81°	16°40'	+26'	82°	16°48'	+27'	82°	16°56'	+28'	82°	17°04'	+29'	83°	17°11'	+30'	83°	17°19'	+31'	83°	15
16	16°56'	+25'	81°	17°06'	+26'	81°	17°15'	+27'	81°	17°25'	+28'	81°	17°33'	+29'	82°	17°42'	+30'	82°	17°50'	+31'	82°	16
17	17°22'	+25'	80°	17°32'	+26'	80°	17°43'	+27'	80°	17°53'	+28'	81°	18°02'	+29'	81°	18°12'	+30'	81°	18°21'	+31'	81°	17
18	17°47'	+25'	79°	17°58'	+26'	79°	18°10'	+27'	79°	18°21'	+28'	80°	18°31'	+29'	80°	18°42'	+30'	80°	18°52'	+30'	81°	18
19	18°11'	+24'	78°	18°24'	+25'	78°	18°36'	+26'	78°	18°48'	+27'	79°	19°00'	+28'	79°	19°11'	+29'	79°	19°22'	+30'	80°	19
20	18°36'	+24'	77°	18°49'	+25'	77°	19°03'	+26'	77°	19°16'	+27'	78°	19°28'	+28'	78°	19°40'	+29'	78°	19°52'	+30'	79°	20
21	19°00'	+24'	76°	19°14'	+25'	76°	19°29'	+26'	76°	19°43'	+27'	77°	19°56'	+28'	77°	20°09'	+29'	77°	20°22'	+30'	78°	21
22	19°24'	+24'	75°	19°39'	+24'	75°	19°54'	+25'	75°	20°09'	+26'	76°	20°24'	+27'	76°	20°38'	+28'	77°	20°52'	+29'	77°	22
23	19°47'	+23'	74°	20°04'	+24'	74°	20°20'	+25'	75°	20°36'	+26'	75°	20°51'	+27'	75°	21°06'	+28'	76°	21°21'	+29'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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°49'	+28'	95°	8°44'	+29'	95°	8°39'	+30'	95°	8°34'	+31'	95°	8°28'	+32'	95°	8°22'	+33'	95°	8°17'	+34'	96°	0
1	9°18'	+28'	94°	9°14'	+29'	94°	9°09'	+30'	94°	9°05'	+31'	94°	9°00'	+32'	94°	8°55'	+33'	95°	8°50'	+34'	95°	1
2	9°46'	+28'	93°	9°43'	+29'	93°	9°39'	+30'	93°	9°36'	+31'	93°	9°32'	+32'	94°	9°28'	+33'	94°	9°24'	+34'	94°	2
3	10°14'	+28'	92°	10°12'	+29'	92°	10°09'	+30'	92°	10°07'	+31'	93°	10°04'	+32'	93°	10°01'	+33'	93°	9°58'	+33'	93°	3
4	10°42'	+28'	91°	10°41'	+29'	91°	10°39'	+30'	92°	10°38'	+31'	92°	10°36'	+32'	92°	10°34'	+32'	92°	10°31'	+33'	92°	4
5	11°10'	+28'	90°	11°10'	+29'	90°	11°09'	+30'	91°	11°08'	+31'	91°	11°07'	+31'	91°	11°06'	+32'	91°	11°05'	+33'	91°	5
6	11°38'	+28'	89°	11°38'	+28'	90°	11°39'	+29'	90°	11°39'	+30'	90°	11°39'	+31'	90°	11°38'	+32'	90°	11°38'	+33'	91°	6
7	12°05'	+27'	88°	12°07'	+28'	89°	12°08'	+29'	89°	12°09'	+30'	89°	12°10'	+31'	89°	12°11'	+32'	90°	12°11'	+33'	90°	7
8	12°33'	+27'	88°	12°35'	+28'	88°	12°37'	+29'	88°	12°39'	+30'	88°	12°41'	+31'	88°	12°43'	+32'	89°	12°44'	+33'	89°	8
9	13°00'	+27'	87°	13°03'	+28'	87°	13°06'	+29'	87°	13°09'	+30'	87°	13°12'	+31'	88°	13°14'	+32'	88°	13°17'	+33'	88°	9
10	13°27'	+27'	86°	13°31'	+28'	86°	13°35'	+29'	86°	13°39'	+30'	86°	13°43'	+31'	87°	13°46'	+31'	87°	13°49'	+32'	87°	10
11	13°53'	+27'	85°	13°59'	+28'	85°	14°04'	+28'	85°	14°09'	+29'	86°	14°13'	+30'	86°	14°18'	+31'	86°	14°22'	+32'	86°	11
12	14°20'	+26'	84°	14°26'	+27'	84°	14°32'	+28'	84°	14°38'	+29'	85°	14°44'	+30'	85°	14°49'	+31'	85°	14°54'	+32'	85°	12
13	14°46'	+26'	83°	14°54'	+27'	83°	15°01'	+28'	83°	15°07'	+29'	84°	15°14'	+30'	84°	15°20'	+31'	84°	15°26'	+32'	85°	13
14	15°13'	+26'	82°	15°21'	+27'	82°	15°29'	+28'	83°	15°36'	+29'	83°	15°44'	+30'	83°	15°51'	+31'	83°	15°58'	+32'	84°	14
15	15°38'	+26'	81°	15°48'	+27'	81°	15°57'	+28'	82°	16°05'	+29'	82°	16°13'	+29'	82°	16°21'	+30'	82°	16°29'	+31'	83°	15
16	16°04'	+25'	80°	16°14'	+26'	80°	16°24'	+27'	81°	16°34'	+28'	81°	16°43'	+29'	81°	16°52'	+30'	82°	17°01'	+31'	82°	16
17	16°30'	+25'	79°	16°41'	+26'	79°	16°51'	+27'	80°	17°02'	+28'	80°	17°12'	+29'	80°	17°22'	+30'	81°	17°32'	+31'	81°	17
18	16°55'	+25'	78°	17°07'	+26'	79°	17°19'	+27'	79°	17°30'	+28'	79°	17°41'	+29'	79°	17°52'	+30'	80°	18°03'	+31'	80°	18
19	17°20'	+25'	77°	17°33'	+26'	78°	17°45'	+27'	78°	17°58'	+28'	78°	18°10'	+28'	79°	18°22'	+29'	79°	18°33'	+30'	79°	19
20	17°44'	+24'	76°	17°58'	+25'	77°	18°12'	+26'	77°	18°25'	+27'	77°	18°38'	+28'	78°	18°51'	+29'	78°	19°04'	+30'	78°	20
21	18°09'	+24'	75°	18°24'	+25'	76°	18°38'	+26'	76°	18°53'	+27'	76°	19°07'	+28'	77°	19°20'	+29'	77°	19°34'	+30'	77°	21
22	18°33'	+24'	74°	18°49'	+25'	75°	19°04'	+26'	75°	19°20'	+27'	75°	19°35'	+28'	76°	19°49'	+29'	76°	20°03'	+30'	76°	22
23	18°56'	+23'	73°	19°13'	+24'	74°	19°30'	+25'	74°	19°46'	+26'	74°	20°02'	+27'	75°	20°18'	+28'	75°	20°33'	+29'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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°56'	+28'	94°	7°52'	+29'	94°	7°47'	+30'	95°	7°42'	+31'	95°	7°37'	+32'	95°	7°32'	+33'	95°	7°27'	+34'	95°	0
1	8°25'	+28'	93°	8°21'	+29'	94°	8°17'	+30'	94°	8°13'	+31'	94°	8°09'	+32'	94°	8°05'	+33'	94°	8°01'	+34'	94°	1
2	8°53'	+28'	92°	8°50'	+29'	93°	8°48'	+30'	93°	8°45'	+31'	93°	8°41'	+32'	93°	8°38'	+33'	93°	8°35'	+34'	93°	2
3	9°21'	+28'	92°	9°19'	+29'	92°	9°17'	+30'	92°	9°15'	+31'	92°	9°13'	+32'	92°	9°11'	+33'	92°	9°08'	+33'	93°	3
4	9°49'	+28'	91°	9°48'	+29'	91°	9°47'	+30'	91°	9°46'	+31'	91°	9°45'	+32'	91°	9°43'	+32'	92°	9°42'	+33'	92°	4
5	10°17'	+28'	90°	10°17'	+29'	90°	10°17'	+30'	90°	10°17'	+31'	90°	10°16'	+31'	91°	10°16'	+32'	91°	10°15'	+33'	91°	5
6	10°45'	+28'	89°	10°46'	+28'	89°	10°47'	+29'	89°	10°47'	+30'	89°	10°48'	+31'	90°	10°48'	+32'	90°	10°48'	+33'	90°	6
7	11°12'	+27'	88°	11°14'	+28'	88°	11°16'	+29'	88°	11°18'	+30'	89°	11°19'	+31'	89°	11°20'	+32'	89°	11°21'	+33'	89°	7
8	11°40'	+27'	87°	11°43'	+28'	87°	11°45'	+29'	87°	11°48'	+30'	88°	11°50'	+31'	88°	11°52'	+32'	88°	11°54'	+33'	88°	8
9	12°07'	+27'	86°	12°11'	+28'	86°	12°14'	+29'	87°	12°18'	+30'	87°	12°21'	+31'	87°	12°24'	+32'	87°	12°27'	+33'	87°	9
10	12°34'	+27'	85°	12°39'	+28'	85°	12°43'	+29'	86°	12°48'	+30'	86°	12°52'	+31'	86°	12°56'	+32'	86°	13°00'	+32'	87°	10
11	13°01'	+27'	84°	13°07'	+28'	85°	13°12'	+29'	85°	13°17'	+29'	85°	13°23'	+30'	85°	13°27'	+31'	85°	13°32'	+32'	86°	11
12	13°27'	+26'	83°	13°34'	+27'	84°	13°41'	+28'	84°	13°47'	+29'	84°	13°53'	+30'	84°	13°59'	+31'	85°	14°04'	+32'	85°	12
13	13°54'	+26'	82°	14°02'	+27'	83°	14°09'	+28'	83°	14°16'	+29'	83°	14°23'	+30'	83°	14°30'	+31'	84°	14°36'	+32'	84°	13
14	14°20'	+26'	82°	14°29'	+27'	82°	14°37'	+28'	82°	14°45'	+29'	82°	14°53'	+30'	83°	15°01'	+31'	83°	15°08'	+32'	83°	14
15	14°46'	+26'	81°	14°56'	+27'	81°	15°05'	+28'	81°	15°14'	+29'	81°	15°23'	+30'	82°	15°32'	+31'	82°	15°40'	+31'	82°	15
16	15°12'	+26'	80°	15°23'	+27'	80°	15°33'	+27'	80°	15°43'	+28'	81°	15°53'	+29'	81°	16°02'	+30'	81°	16°11'	+31'	81°	16
17	15°38'	+25'	79°	15°49'	+26'	79°	16°00'	+27'	79°	16°11'	+28'	80°	16°22'	+29'	80°	16°32'	+30'	80°	16°43'	+31'	80°	17
18	16°03'	+25'	78°	16°15'	+26'	78°	16°28'	+27'	78°	16°40'	+28'	79°	16°51'	+29'	79°	17°03'	+30'	79°	17°14'	+31'	80°	18
19	16°28'	+25'	77°	16°41'	+26'	77°	16°55'	+27'	77°	17°08'	+28'	78°	17°20'	+29'	78°	17°32'	+30'	78°	17°44'	+31'	79°	19
20	16°53'	+25'	76°	17°07'	+26'	76°	17°21'	+26'	77°	17°35'	+27'	77°	17°49'	+28'	77°	18°02'	+29'	77°	18°15'	+30'	78°	20
21	17°17'	+24'	75°	17°33'	+25'	75°	17°48'	+26'	76°	18°03'	+27'	76°	18°17'	+28'	76°	18°31'	+29'	77°	18°45'	+30'	77°	21
22	17°42'	+24'	74°	17°58'	+25'	74°	18°14'	+26'	75°	18°30'	+27'	75°	18°45'	+28'	75°	19°00'	+29'	76°	19°15'	+30'	76°	22
23	18°06'	+24'	73°	18°23'	+25'	73°	18°40'	+26'	74°	18°57'	+27'	74°	19°13'	+28'	74°	19°29'	+29'	75°	19°45'	+29'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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°04'	+28'	94°	6°59'	+29'	94°	6°55'	+30'	94°	6°51'	+31'	94°	6°47'	+32'	94°	6°42'	+33'	94°	6°38'	+34'	94°	0
1	7°32'	+28'	93°	7°29'	+29'	93°	7°26'	+30'	93°	7°22'	+31'	93°	7°19'	+32'	93°	7°15'	+33'	94°	7°11'	+34'	94°	1
2	8°00'	+28'	92°	7°58'	+29'	92°	7°56'	+30'	92°	7°53'	+31'	92°	7°51'	+32'	93°	7°48'	+33'	93°	7°45'	+34'	93°	2
3	8°28'	+28'	91°	8°27'	+29'	91°	8°26'	+30'	91°	8°24'	+31'	92°	8°22'	+32'	92°	8°20'	+33'	92°	8°18'	+33'	92°	3
4	8°56'	+28'	90°	8°56'	+29'	90°	8°55'	+30'	91°	8°55'	+31'	91°	8°54'	+32'	91°	8°53'	+32'	91°	8°52'	+33'	91°	4
5	9°24'	+28'	89°	9°25'	+29'	89°	9°25'	+30'	90°	9°25'	+31'	90°	9°26'	+31'	90°	9°25'	+32'	90°	9°25'	+33'	90°	5
6	9°52'	+28'	88°	9°53'	+29'	89°	9°55'	+29'	89°	9°56'	+30'	89°	9°57'	+31'	89°	9°58'	+32'	89°	9°58'	+33'	89°	6
7	10°19'	+27'	88°	10°22'	+28'	88°	10°24'	+29'	88°	10°26'	+30'	88°	10°28'	+31'	88°	10°30'	+32'	88°	10°32'	+33'	89°	7
8	10°47'	+27'	87°	10°50'	+28'	87°	10°53'	+29'	87°	10°57'	+30'	87°	10°59'	+31'	87°	11°02'	+32'	88°	11°04'	+33'	88°	8
9	11°14'	+27'	86°	11°18'	+28'	86°	11°23'	+29'	86°	11°27'	+30'	86°	11°30'	+31'	87°	11°34'	+32'	87°	11°37'	+33'	87°	9
10	11°41'	+27'	85°	11°46'	+28'	85°	11°52'	+29'	85°	11°57'	+30'	85°	12°01'	+31'	86°	12°06'	+32'	86°	12°10'	+32'	86°	10
11	12°08'	+27'	84°	12°14'	+28'	84°	12°20'	+29'	84°	12°26'	+30'	85°	12°32'	+31'	85°	12°37'	+31'	85°	12°42'	+32'	85°	11
12	12°35'	+27'	83°	12°42'	+28'	83°	12°49'	+28'	83°	12°56'	+29'	84°	13°02'	+30'	84°	13°09'	+31'	84°	13°15'	+32'	84°	12
13	13°01'	+26'	82°	13°10'	+27'	82°	13°18'	+28'	83°	13°25'	+29'	83°	13°33'	+30'	83°	13°40'	+31'	83°	13°47'	+32'	83°	13
14	13°28'	+26'	81°	13°37'	+27'	81°	13°46'	+28'	82°	13°54'	+29'	82°	14°03'	+30'	82°	14°11'	+31'	82°	14°19'	+32'	83°	14
15	13°54'	+26'	80°	14°04'	+27'	80°	14°14'	+28'	81°	14°23'	+29'	81°	14°33'	+30'	81°	14°42'	+31'	81°	14°51'	+32'	82°	15
16	14°20'	+26'	79°	14°31'	+27'	80°	14°42'	+28'	80°	14°52'	+29'	80°	15°02'	+30'	80°	15°12'	+30'	81°	15°22'	+31'	81°	16
17	14°46'	+26'	78°	14°58'	+26'	79°	15°09'	+27'	79°	15°21'	+28'	79°	15°32'	+29'	79°	15°43'	+30'	80°	15°54'	+31'	80°	17
18	15°11'	+25'	77°	15°24'	+26'	78°	15°37'	+27'	78°	15°49'	+28'	78°	16°01'	+29'	78°	16°13'	+30'	79°	16°25'	+31'	79°	18
19	15°36'	+25'	76°	15°50'	+26'	77°	16°04'	+27'	77°	16°17'	+28'	77°	16°30'	+29'	78°	16°43'	+30'	78°	16°56'	+31'	78°	19
20	16°01'	+25'	76°	16°16'	+26'	76°	16°31'	+27'	76°	16°45'	+28'	76°	16°59'	+29'	77°	17°13'	+30'	77°	17°26'	+30'	77°	20
21	16°26'	+25'	75°	16°42'	+25'	75°	16°58'	+26'	75°	17°13'	+27'	75°	17°28'	+28'	76°	17°42'	+29'	76°	17°57'	+30'	76°	21
22	16°51'	+24'	74°	17°08'	+25'	74°	17°24'	+26'	74°	17°40'	+27'	74°	17°56'	+28'	75°	18°12'	+29'	75°	18°27'	+30'	75°	22
23	17°15'	+24'	73°	17°33'	+25'	73°	17°50'	+26'	73°	18°07'	+27'	74°	18°24'	+28'	74°	18°41'	+29'	74°	18°57'	+30'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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°11'	+28'	93°	6°07'	+29'	93°	6°04'	+30'	94°	6°00'	+31'	94°	5°56'	+32'	94°	5°52'	+33'	94°	5°48'	+34'	94°	0
1	6°39'	+28'	92°	6°36'	+29'	93°	6°34'	+30'	93°	6°31'	+31'	93°	6°28'	+32'	93°	6°25'	+33'	93°	6°22'	+34'	93°	1
2	7°07'	+28'	92°	7°05'	+29'	92°	7°04'	+30'	92°	7°02'	+31'	92°	7°00'	+32'	92°	6°58'	+33'	92°	6°55'	+34'	92°	2
3	7°35'	+28'	91°	7°34'	+29'	91°	7°34'	+30'	91°	7°33'	+31'	91°	7°31'	+32'	91°	7°30'	+33'	91°	7°29'	+33'	91°	3
4	8°03'	+28'	90°	8°03'	+29'	90°	8°03'	+30'	90°	8°03'	+31'	90°	8°03'	+32'	90°	8°03'	+32'	90°	8°02'	+33'	91°	4
5	8°31'	+28'	89°	8°32'	+29'	89°	8°33'	+30'	89°	8°34'	+31'	89°	8°35'	+31'	89°	8°35'	+32'	90°	8°35'	+33'	90°	5
6	8°59'	+28'	88°	9°01'	+29'	88°	9°03'	+29'	88°	9°04'	+30'	88°	9°06'	+31'	89°	9°07'	+32'	89°	9°09'	+33'	89°	6
7	9°26'	+27'	87°	9°29'	+28'	87°	9°32'	+29'	87°	9°35'	+30'	88°	9°37'	+31'	88°	9°40'	+32'	88°	9°42'	+33'	88°	7
8	9°54'	+27'	86°	9°58'	+28'	86°	10°02'	+29'	86°	10°05'	+30'	87°	10°09'	+31'	87°	10°12'	+32'	87°	10°15'	+33'	87°	8
9	10°21'	+27'	85°	10°26'	+28'	85°	10°31'	+29'	86°	10°35'	+30'	86°	10°40'	+31'	86°	10°44'	+32'	86°	10°48'	+33'	86°	9
10	10°48'	+27'	84°	10°54'	+28'	85°	11°00'	+29'	85°	11°05'	+30'	85°	11°10'	+31'	85°	11°15'	+32'	85°	11°20'	+33'	86°	10
11	11°15'	+27'	83°	11°22'	+28'	84°	11°29'	+29'	84°	11°35'	+30'	84°	11°41'	+31'	84°	11°47'	+31'	84°	11°53'	+32'	85°	11
12	11°42'	+27'	83°	11°50'	+28'	83°	11°57'	+29'	83°	12°05'	+29'	83°	12°12'	+30'	83°	12°19'	+31'	84°	12°25'	+32'	84°	12
13	12°09'	+26'	82°	12°18'	+27'	82°	12°26'	+28'	82°	12°34'	+29'	82°	12°42'	+30'	82°	12°50'	+31'	83°	12°57'	+32'	83°	13
14	12°35'	+26'	81°	12°45'	+27'	81°	12°54'	+28'	81°	13°04'	+29'	81°	13°12'	+30'	82°	13°21'	+31'	82°	13°30'	+32'	82°	14
15	13°02'	+26'	80°	13°12'	+27'	80°	13°23'	+28'	80°	13°33'	+29'	80°	13°43'	+30'	81°	13°52'	+31'	81°	14°01'	+32'	81°	15
16	13°28'	+26'	79°	13°39'	+27'	79°	13°51'	+28'	79°	14°02'	+29'	80°	14°12'	+30'	80°	14°23'	+31'	80°	14°33'	+31'	80°	16
17	13°54'	+26'	78°	14°06'	+27'	78°	14°18'	+28'	78°	14°30'	+29'	79°	14°42'	+29'	79°	14°53'	+30'	79°	15°05'	+31'	79°	17
18	14°19'	+25'	77°	14°33'	+26'	77°	14°46'	+27'	77°	14°59'	+28'	78°	15°11'	+29'	78°	15°24'	+30'	78°	15°36'	+31'	79°	18
19	14°45'	+25'	76°	14°59'	+26'	76°	15°13'	+27'	77°	15°27'	+28'	77°	15°41'	+29'	77°	15°54'	+30'	77°	16°07'	+31'	78°	19
20	15°10'	+25'	75°	15°25'	+26'	75°	15°41'	+27'	76°	15°55'	+28'	76°	16°10'	+29'	76°	16°24'	+30'	76°	16°38'	+31'	77°	20
21	15°35'	+25'	74°	15°51'	+26'	74°	16°07'	+27'	75°	16°23'	+28'	75°	16°39'	+29'	75°	16°54'	+29'	76°	17°08'	+30'	76°	21
22	16°00'	+25'	73°	16°17'	+25'	73°	16°34'	+26'	74°	16°51'	+27'	74°	17°07'	+28'	74°	17°23'	+29'	75°	17°39'	+30'	75°	22
23	16°25'	+24'	72°	16°43'	+25'	73°	17°01'	+26'	73°	17°18'	+27'	73°	17°35'	+28'	73°	17°52'	+29'	74°	18°09'	+30'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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°18'	+28'	93°	5°15'	+29'	93°	5°12'	+30'	93°	5°08'	+31'	93°	5°05'	+32'	93°	5°02'	+33'	93°	4°58'	+34'	93°	0
1	5°46'	+28'	92°	5°44'	+29'	92°	5°42'	+30'	92°	5°39'	+31'	92°	5°37'	+32'	92°	5°35'	+33'	92°	5°32'	+34'	93°	1
2	6°14'	+28'	91°	6°13'	+29'	91°	6°12'	+30'	91°	6°10'	+31'	91°	6°09'	+32'	91°	6°07'	+33'	92°	6°06'	+33'	92°	2
3	6°42'	+28'	90°	6°42'	+29'	90°	6°42'	+30'	90°	6°41'	+31'	91°	6°41'	+32'	91°	6°40'	+33'	91°	6°39'	+33'	91°	3
4	7°10'	+28'	89°	7°11'	+29'	89°	7°11'	+30'	90°	7°12'	+31'	90°	7°12'	+32'	90°	7°12'	+32'	90°	7°12'	+33'	90°	4
5	7°38'	+28'	88°	7°40'	+29'	89°	7°41'	+30'	89°	7°43'	+31'	89°	7°44'	+31'	89°	7°45'	+32'	89°	7°46'	+33'	89°	5
6	8°06'	+28'	87°	8°08'	+29'	88°	8°11'	+30'	88°	8°13'	+30'	88°	8°15'	+31'	88°	8°17'	+32'	88°	8°19'	+33'	88°	6
7	8°34'	+28'	87°	8°37'	+28'	87°	8°40'	+29'	87°	8°44'	+30'	87°	8°47'	+31'	87°	8°49'	+32'	87°	8°52'	+33'	88°	7
8	9°01'	+27'	86°	9°05'	+28'	86°	9°10'	+29'	86°	9°14'	+30'	86°	9°18'	+31'	86°	9°22'	+32'	86°	9°25'	+33'	87°	8
9	9°28'	+27'	85°	9°34'	+28'	85°	9°39'	+29'	85°	9°44'	+30'	85°	9°49'	+31'	85°	9°54'	+32'	86°	9°58'	+33'	86°	9
10	9°56'	+27'	84°	10°02'	+28'	84°	10°08'	+29'	84°	10°14'	+30'	84°	10°20'	+31'	85°	10°25'	+32'	85°	10°31'	+33'	85°	10
11	10°23'	+27'	83°	10°30'	+28'	83°	10°37'	+29'	83°	10°44'	+30'	84°	10°51'	+31'	84°	10°57'	+32'	84°	11°03'	+32'	84°	11
12	10°50'	+27'	82°	10°58'	+28'	82°	11°06'	+29'	82°	11°14'	+30'	83°	11°21'	+31'	83°	11°29'	+31'	83°	11°36'	+32'	83°	12
13	11°17'	+27'	81°	11°26'	+28'	81°	11°35'	+29'	82°	11°43'	+29'	82°	11°52'	+30'	82°	12°00'	+31'	82°	12°08'	+32'	82°	13
14	11°43'	+26'	80°	11°53'	+27'	80°	12°03'	+28'	81°	12°13'	+29'	81°	12°22'	+30'	81°	12°31'	+31'	81°	12°40'	+32'	82°	14
15	12°10'	+26'	79°	12°21'	+27'	80°	12°31'	+28'	80°	12°42'	+29'	80°	12°52'	+30'	80°	13°02'	+31'	80°	13°12'	+32'	81°	15
16	12°36'	+26'	78°	12°48'	+27'	79°	13°00'	+28'	79°	13°11'	+29'	79°	13°22'	+30'	79°	13°33'	+31'	80°	13°44'	+32'	80°	16
17	13°02'	+26'	77°	13°15'	+27'	78°	13°28'	+28'	78°	13°40'	+29'	78°	13°52'	+30'	78°	14°04'	+31'	79°	14°16'	+31'	79°	17
18	13°28'	+26'	77°	13°42'	+27'	77°	13°55'	+28'	77°	14°09'	+28'	77°	14°22'	+29'	78°	14°35'	+30'	78°	14°47'	+31'	78°	18
19	13°54'	+25'	76°	14°08'	+26'	76°	14°23'	+27'	76°	14°37'	+28'	76°	14°51'	+29'	77°	15°05'	+30'	77°	15°18'	+31'	77°	19
20	14°19'	+25'	75°	14°35'	+26'	75°	14°50'	+27'	75°	15°05'	+28'	75°	15°20'	+29'	76°	15°35'	+30'	76°	15°49'	+31'	76°	20
21	14°44'	+25'	74°	15°01'	+26'	74°	15°17'	+27'	74°	15°34'	+28'	75°	15°49'	+29'	75°	16°05'	+30'	75°	16°20'	+31'	75°	21
22	15°09'	+25'	73°	15°27'	+26'	73°	15°44'	+27'	73°	16°01'	+28'	74°	16°18'	+29'	74°	16°35'	+29'	74°	16°51'	+30'	74°	22
23	15°34'	+25'	72°	15°53'	+25'	72°	16°11'	+26'	72°	16°29'	+27'	73°	16°47'	+28'	73°	17°04'	+29'	73°	17°21'	+30'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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°25'	+28'	92°	4°22'	+29'	92°	4°20'	+30'	93°	4°17'	+31'	93°	4°14'	+32'	93°	4°12'	+33'	93°	4°09'	+34'	93°	0
1	4°53'	+28'	91°	4°51'	+29'	92°	4°50'	+30'	92°	4°48'	+31'	92°	4°46'	+32'	92°	4°44'	+33'	92°	4°42'	+34'	92°	1
2	5°21'	+28'	91°	5°21'	+29'	91°	5°20'	+30'	91°	5°19'	+31'	91°	5°18'	+32'	91°	5°17'	+33'	91°	5°16'	+33'	91°	2
3	5°49'	+28'	90°	5°50'	+29'	90°	5°50'	+30'	90°	5°50'	+31'	90°	5°50'	+32'	90°	5°50'	+33'	90°	5°49'	+33'	90°	3
4	6°17'	+28'	89°	6°18'	+29'	89°	6°20'	+30'	89°	6°20'	+31'	89°	6°21'	+32'	89°	6°22'	+32'	89°	6°23'	+33'	89°	4
5	6°45'	+28'	88°	6°47'	+29'	88°	6°49'	+30'	88°	6°51'	+31'	88°	6°53'	+31'	88°	6°55'	+32'	89°	6°56'	+33'	89°	5
6	7°13'	+28'	87°	7°16'	+29'	87°	7°19'	+30'	87°	7°22'	+30'	87°	7°24'	+31'	88°	7°27'	+32'	88°	7°29'	+33'	88°	6
7	7°41'	+28'	86°	7°45'	+29'	86°	7°48'	+29'	86°	7°52'	+30'	87°	7°56'	+31'	87°	7°59'	+32'	87°	8°02'	+33'	87°	7
8	8°08'	+27'	85°	8°13'	+28'	85°	8°18'	+29'	86°	8°23'	+30'	86°	8°27'	+31'	86°	8°31'	+32'	86°	8°35'	+33'	86°	8
9	8°36'	+27'	84°	8°42'	+28'	84°	8°47'	+29'	85°	8°53'	+30'	85°	8°58'	+31'	85°	9°03'	+32'	85°	9°08'	+33'	85°	9
10	9°03'	+27'	83°	9°10'	+28'	84°	9°16'	+29'	84°	9°23'	+30'	84°	9°29'	+31'	84°	9°35'	+32'	84°	9°41'	+33'	84°	10
11	9°30'	+27'	83°	9°38'	+28'	83°	9°46'	+29'	83°	9°53'	+30'	83°	10°00'	+31'	83°	10°07'	+32'	83°	10°14'	+33'	84°	11
12	9°57'	+27'	82°	10°06'	+28'	82°	10°14'	+29'	82°	10°23'	+30'	82°	10°31'	+31'	82°	10°39'	+32'	83°	10°46'	+32'	83°	12
13	10°24'	+27'	81°	10°34'	+28'	81°	10°43'	+29'	81°	10°52'	+30'	81°	11°01'	+30'	81°	11°10'	+31'	82°	11°19'	+32'	82°	13
14	10°51'	+27'	80°	11°02'	+28'	80°	11°12'	+28'	80°	11°22'	+29'	80°	11°32'	+30'	81°	11°42'	+31'	81°	11°51'	+32'	81°	14
15	11°18'	+26'	79°	11°29'	+27'	79°	11°40'	+28'	79°	11°51'	+29'	79°	12°02'	+30'	80°	12°13'	+31'	80°	12°23'	+32'	80°	15
16	11°44'	+26'	78°	11°56'	+27'	78°	12°09'	+28'	78°	12°21'	+29'	79°	12°32'	+30'	79°	12°44'	+31'	79°	12°55'	+32'	79°	16
17	12°10'	+26'	77°	12°24'	+27'	77°	12°37'	+28'	77°	12°50'	+29'	78°	13°02'	+30'	78°	13°15'	+31'	78°	13°27'	+32'	78°	17
18	12°36'	+26'	76°	12°51'	+27'	76°	13°05'	+28'	77°	13°19'	+29'	77°	13°32'	+30'	77°	13°45'	+31'	77°	13°59'	+31'	78°	18
19	13°02'	+26'	75°	13°18'	+27'	75°	13°32'	+28'	76°	13°47'	+28'	76°	14°02'	+29'	76°	14°16'	+30'	76°	14°30'	+31'	77°	19
20	13°28'	+25'	74°	13°44'	+26'	75°	14°00'	+27'	75°	14°16'	+28'	75°	14°31'	+29'	75°	14°46'	+30'	75°	15°01'	+31'	76°	20
21	13°53'	+25'	73°	14°11'	+26'	74°	14°27'	+27'	74°	14°44'	+28'	74°	15°00'	+29'	74°	15°16'	+30'	75°	15°32'	+31'	75°	21
22	14°19'	+25'	72°	14°37'	+26'	73°	14°55'	+27'	73°	15°12'	+28'	73°	15°29'	+29'	73°	15°46'	+30'	74°	16°03'	+31'	74°	22
23	14°44'	+25'	71°	15°03'	+26'	72°	15°21'	+27'	72°	15°40'	+28'	72°	15°58'	+29'	73°	16°16'	+29'	73°	16°34'	+30'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	3°32'	+28'	92°	3°30'	+29'	92°	3°28'	+30'	92°	3°26'	+31'	92°	3°23'	+32'	92°	3°21'	+33'	92°	3°19'	+34'	92°	0
1	4°00'	+28'	91°	3°59'	+29'	91°	3°58'	+30'	91°	3°57'	+31'	91°	3°55'	+32'	91°	3°54'	+33'	91°	3°53'	+34'	91°	1
2	4°28'	+28'	90°	4°28'	+29'	90°	4°28'	+30'	90°	4°27'	+31'	90°	4°27'	+32'	90°	4°27'	+33'	90°	4°26'	+33'	91°	2
3	4°56'	+28'	89°	4°57'	+29'	89°	4°58'	+30'	89°	4°58'	+31'	89°	4°59'	+32'	90°	4°59'	+33'	90°	5°00'	+33'	90°	3
4	5°24'	+28'	88°	5°26'	+29'	88°	5°28'	+30'	89°	5°29'	+31'	89°	5°30'	+32'	89°	5°32'	+32'	89°	5°33'	+33'	89°	4
5	5°52'	+28'	87°	5°55'	+29'	88°	5°57'	+30'	88°	6°00'	+31'	88°	6°02'	+31'	88°	6°04'	+32'	88°	6°06'	+33'	88°	5
6	6°20'	+28'	87°	6°24'	+29'	87°	6°27'	+30'	87°	6°30'	+31'	87°	6°34'	+31'	87°	6°37'	+32'	87°	6°40'	+33'	87°	6
7	6°48'	+28'	86°	6°52'	+29'	86°	6°57'	+30'	86°	7°01'	+30'	86°	7°05'	+31'	86°	7°09'	+32'	86°	7°13'	+33'	86°	7
8	7°15'	+28'	85°	7°21'	+28'	85°	7°26'	+29'	85°	7°31'	+30'	85°	7°36'	+31'	85°	7°41'	+32'	85°	7°46'	+33'	86°	8
9	7°43'	+27'	84°	7°49'	+28'	84°	7°56'	+29'	84°	8°02'	+30'	84°	8°07'	+31'	84°	8°13'	+32'	85°	8°19'	+33'	85°	9
10	8°10'	+27'	83°	8°18'	+28'	83°	8°25'	+29'	83°	8°32'	+30'	83°	8°39'	+31'	84°	8°45'	+32'	84°	8°52'	+33'	84°	10
11	8°38'	+27'	82°	8°46'	+28'	82°	8°54'	+29'	82°	9°02'	+30'	83°	9°10'	+31'	83°	9°17'	+32'	83°	9°24'	+33'	83°	11
12	9°05'	+27'	81°	9°14'	+28'	81°	9°23'	+29'	81°	9°32'	+30'	82°	9°40'	+31'	82°	9°49'	+32'	82°	9°57'	+33'	82°	12
13	9°32'	+27'	80°	9°42'	+28'	80°	9°52'	+29'	81°	10°02'	+30'	81°	10°11'	+31'	81°	10°21'	+31'	81°	10°30'	+32'	81°	13
14	9°59'	+27'	79°	10°10'	+28'	80°	10°21'	+29'	80°	10°31'	+30'	80°	10°42'	+30'	80°	10°52'	+31'	80°	11°02'	+32'	80°	14
15	10°26'	+27'	78°	10°38'	+28'	79°	10°49'	+28'	79°	11°01'	+29'	79°	11°12'	+30'	79°	11°23'	+31'	79°	11°34'	+32'	80°	15
16	10°52'	+26'	78°	11°05'	+27'	78°	11°18'	+28'	78°	11°30'	+29'	78°	11°43'	+30'	78°	11°55'	+31'	79°	12°06'	+32'	79°	16
17	11°19'	+26'	77°	11°33'	+27'	77°	11°46'	+28'	77°	11°59'	+29'	77°	12°13'	+30'	77°	12°26'	+31'	78°	12°38'	+32'	78°	17
18	11°45'	+26'	76°	12°00'	+27'	76°	12°14'	+28'	76°	12°29'	+29'	76°	12°43'	+30'	77°	12°56'	+31'	77°	13°10'	+32'	77°	18
19	12°11'	+26'	75°	12°27'	+27'	75°	12°42'	+28'	75°	12°57'	+29'	75°	13°12'	+30'	76°	13°27'	+31'	76°	13°42'	+31'	76°	19
20	12°37'	+26'	74°	12°54'	+27'	74°	13°10'	+28'	74°	13°26'	+28'	75°	13°42'	+29'	75°	13°58'	+30'	75°	14°13'	+31'	75°	20
21	13°03'	+26'	73°	13°20'	+26'	73°	13°38'	+27'	73°	13°55'	+28'	74°	14°11'	+29'	74°	14°28'	+30'	74°	14°44'	+31'	74°	21
22	13°28'	+25'	72°	13°47'	+26'	72°	14°05'	+27'	72°	14°23'	+28'	73°	14°41'	+29'	73°	14°58'	+30'	73°	15°15'	+31'	73°	22
23	13°54'	+25'	71°	14°13'	+26'	71°	14°32'	+27'	72°	14°51'	+28'	72°	15°10'	+29'	72°	15°28'	+30'	72°	15°46'	+31'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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°39'	+28'	91°	2°37'	+29'	91°	2°36'	+30'	92°	2°34'	+31'	92°	2°33'	+32'	92°	2°31'	+33'	92°	2°29'	+34'	92°	0
1	3°07'	+28'	91°	3°07'	+29'	91°	3°06'	+30'	91°	3°05'	+31'	91°	3°04'	+32'	91°	3°04'	+33'	91°	3°03'	+34'	91°	1
2	3°35'	+28'	90°	3°36'	+29'	90°	3°36'	+30'	90°	3°36'	+31'	90°	3°36'	+32'	90°	3°36'	+33'	90°	3°36'	+33'	90°	2
3	4°03'	+28'	89°	4°05'	+29'	89°	4°06'	+30'	89°	4°07'	+31'	89°	4°08'	+32'	89°	4°09'	+33'	89°	4°10'	+33'	89°	3
4	4°31'	+28'	88°	4°34'	+29'	88°	4°36'	+30'	88°	4°38'	+31'	88°	4°40'	+32'	88°	4°41'	+32'	88°	4°43'	+33'	88°	4
5	4°59'	+28'	87°	5°02'	+29'	87°	5°05'	+30'	87°	5°08'	+31'	87°	5°11'	+32'	87°	5°14'	+32'	87°	5°17'	+33'	88°	5
6	5°27'	+28'	86°	5°31'	+29'	86°	5°35'	+30'	86°	5°39'	+31'	86°	5°43'	+31'	86°	5°46'	+32'	87°	5°50'	+33'	87°	6
7	5°55'	+28'	85°	6°00'	+29'	85°	6°05'	+30'	85°	6°10'	+30'	86°	6°14'	+31'	86°	6°19'	+32'	86°	6°23'	+33'	86°	7
8	6°23'	+28'	84°	6°29'	+29'	84°	6°34'	+29'	85°	6°40'	+30'	85°	6°46'	+31'	85°	6°51'	+32'	85°	6°56'	+33'	85°	8
9	6°50'	+28'	83°	6°57'	+28'	84°	7°04'	+29'	84°	7°10'	+30'	84°	7°17'	+31'	84°	7°23'	+32'	84°	7°29'	+33'	84°	9
10	7°18'	+27'	83°	7°26'	+28'	83°	7°33'	+29'	83°	7°41'	+30'	83°	7°48'	+31'	83°	7°55'	+32'	83°	8°02'	+33'	83°	10
11	7°45'	+27'	82°	7°54'	+28'	82°	8°03'	+29'	82°	8°11'	+30'	82°	8°19'	+31'	82°	8°27'	+32'	82°	8°35'	+33'	82°	11
12	8°13'	+27'	81°	8°22'	+28'	81°	8°32'	+29'	81°	8°41'	+30'	81°	8°50'	+31'	81°	8°59'	+32'	81°	9°08'	+33'	82°	12
13	8°40'	+27'	80°	8°50'	+28'	80°	9°01'	+29'	80°	9°11'	+30'	80°	9°21'	+31'	80°	9°31'	+32'	81°	9°41'	+33'	81°	13
14	9°07'	+27'	79°	9°18'	+28'	79°	9°30'	+29'	79°	9°41'	+30'	79°	9°52'	+31'	80°	10°02'	+31'	80°	10°13'	+32'	80°	14
15	9°34'	+27'	78°	9°46'	+28'	78°	9°58'	+29'	78°	10°10'	+30'	79°	10°22'	+30'	79°	10°34'	+31'	79°	10°45'	+32'	79°	15
16	10°01'	+27'	77°	10°14'	+28'	77°	10°27'	+28'	77°	10°40'	+29'	78°	10°53'	+30'	78°	11°05'	+31'	78°	11°18'	+32'	78°	16
17	10°27'	+26'	76°	10°41'	+27'	76°	10°56'	+28'	77°	11°09'	+29'	77°	11°23'	+30'	77°	11°36'	+31'	77°	11°50'	+32'	77°	17
18	10°54'	+26'	75°	11°09'	+27'	75°	11°24'	+28'	76°	11°39'	+29'	76°	11°53'	+30'	76°	12°08'	+31'	76°	12°22'	+32'	76°	18
19	11°20'	+26'	74°	11°36'	+27'	75°	11°52'	+28'	75°	12°08'	+29'	75°	12°23'	+30'	75°	12°38'	+31'	75°	12°53'	+32'	76°	19
20	11°46'	+26'	73°	12°03'	+27'	74°	12°20'	+28'	74°	12°37'	+29'	74°	12°53'	+30'	74°	13°09'	+31'	75°	13°25'	+31'	75°	20
21	12°12'	+26'	73°	12°30'	+27'	73°	12°48'	+28'	73°	13°05'	+29'	73°	13°23'	+29'	73°	13°40'	+30'	74°	13°56'	+31'	74°	21
22	12°38'	+26'	72°	12°57'	+27'	72°	13°15'	+27'	72°	13°34'	+28'	72°	13°52'	+29'	72°	14°10'	+30'	73°	14°28'	+31'	73°	22
23	13°04'	+25'	71°	13°23'	+26'	71°	13°43'	+27'	71°	14°02'	+28'	71°	14°21'	+29'	72°	14°40'	+30'	72°	14°59'	+31'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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°46'	+28'	91°	1°45'	+29'	91°	1°44'	+30'	91°	1°43'	+31'	91°	1°42'	+32'	91°	1°41'	+33'	91°	1°39'	+34'	91°	0
1	2°14'	+28'	90°	2°14'	+29'	90°	2°14'	+30'	90°	2°14'	+31'	90°	2°14'	+32'	90°	2°13'	+33'	90°	2°13'	+34'	90°	1
2	2°42'	+28'	89°	2°43'	+29'	89°	2°44'	+30'	89°	2°45'	+31'	89°	2°45'	+32'	89°	2°46'	+33'	89°	2°47'	+33'	89°	2
3	3°10'	+28'	88°	3°12'	+29'	88°	3°14'	+30'	88°	3°15'	+31'	88°	3°17'	+32'	89°	3°19'	+33'	89°	3°20'	+33'	89°	3
4	3°38'	+28'	87°	3°41'	+29'	87°	3°44'	+30'	88°	3°46'	+31'	88°	3°49'	+32'	88°	3°51'	+33'	88°	3°53'	+33'	88°	4
5	4°06'	+28'	87°	4°10'	+29'	87°	4°14'	+30'	87°	4°17'	+31'	87°	4°20'	+32'	87°	4°24'	+32'	87°	4°27'	+33'	87°	5
6	4°34'	+28'	86°	4°39'	+29'	86°	4°43'	+30'	86°	4°48'	+31'	86°	4°52'	+32'	86°	4°56'	+32'	86°	5°00'	+33'	86°	6
7	5°02'	+28'	85°	5°08'	+29'	85°	5°13'	+30'	85°	5°18'	+31'	85°	5°23'	+31'	85°	5°29'	+32'	85°	5°34'	+33'	85°	7
8	5°30'	+28'	84°	5°36'	+29'	84°	5°43'	+30'	84°	5°49'	+30'	84°	5°55'	+31'	84°	6°01'	+32'	84°	6°07'	+33'	84°	8
9	5°58'	+28'	83°	6°05'	+29'	83°	6°12'	+29'	83°	6°19'	+30'	83°	6°26'	+31'	83°	6°33'	+32'	84°	6°40'	+33'	84°	9
10	6°25'	+28'	82°	6°34'	+28'	82°	6°42'	+29'	82°	6°50'	+30'	82°	6°58'	+31'	83°	7°05'	+32'	83°	7°13'	+33'	83°	10
11	6°53'	+27'	81°	7°02'	+28'	81°	7°11'	+29'	81°	7°20'	+30'	82°	7°29'	+31'	82°	7°37'	+32'	82°	7°46'	+33'	82°	11
12	7°20'	+27'	80°	7°30'	+28'	80°	7°40'	+29'	81°	7°50'	+30'	81°	8°00'	+31'	81°	8°09'	+32'	81°	8°19'	+33'	81°	12
13	7°48'	+27'	79°	7°59'	+28'	80°	8°10'	+29'	80°	8°20'	+30'	80°	8°31'	+31'	80°	8°41'	+32'	80°	8°51'	+33'	80°	13
14	8°15'	+27'	78°	8°27'	+28'	79°	8°39'	+29'	79°	8°50'	+30'	79°	9°02'	+31'	79°	9°13'	+32'	79°	9°24'	+33'	79°	14
15	8°42'	+27'	78°	8°55'	+28'	78°	9°08'	+29'	78°	9°20'	+30'	78°	9°32'	+31'	78°	9°45'	+31'	78°	9°57'	+32'	79°	15
16	9°09'	+27'	77°	9°23'	+28'	77°	9°36'	+29'	77°	9°50'	+30'	77°	10°03'	+30'	77°	10°16'	+31'	78°	10°29'	+32'	78°	16
17	9°36'	+27'	76°	9°51'	+28'	76°	10°05'	+29'	76°	10°19'	+29'	76°	10°34'	+30'	76°	10°47'	+31'	77°	11°01'	+32'	77°	17
18	10°03'	+27'	75°	10°18'	+27'	75°	10°34'	+28'	75°	10°49'	+29'	75°	11°04'	+30'	76°	11°19'	+31'	76°	11°33'	+32'	76°	18
19	10°29'	+26'	74°	10°46'	+27'	74°	11°02'	+28'	74°	11°18'	+29'	74°	11°34'	+30'	75°	11°50'	+31'	75°	12°05'	+32'	75°	19
20	10°56'	+26'	73°	11°13'	+27'	73°	11°30'	+28'	73°	11°47'	+29'	74°	12°04'	+30'	74°	12°21'	+31'	74°	12°37'	+32'	74°	20
21	11°22'	+26'	72°	11°40'	+27'	72°	11°58'	+28'	73°	12°16'	+29'	73°	12°34'	+30'	73°	12°51'	+31'	73°	13°09'	+31'	73°	21
22	11°48'	+26'	71°	12°07'	+27'	71°	12°26'	+28'	72°	12°45'	+29'	72°	13°04'	+29'	72°	13°22'	+30'	72°	13°40'	+31'	72°	22
23	12°14'	+26'	70°	12°34'	+27'	70°	12°54'	+28'	71°	13°14'	+28'	71°	13°33'	+29'	71°	13°52'	+30'	71°	14°11'	+31'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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°53'	+28'	90°	0°52'	+29'	90°	0°52'	+30'	91°	0°51'	+31'	91°	0°51'	+32'	91°	0°50'	+33'	91°	0°50'	+34'	91°	0
1	1°21'	+28'	90°	1°22'	+29'	90°	1°22'	+30'	90°	1°22'	+31'	90°	1°23'	+32'	90°	1°23'	+33'	90°	1°23'	+34'	90°	1
2	1°49'	+28'	89°	1°51'	+29'	89°	1°52'	+30'	89°	1°53'	+31'	89°	1°54'	+32'	89°	1°56'	+33'	89°	1°57'	+34'	89°	2
3	2°17'	+28'	88°	2°20'	+29'	88°	2°22'	+30'	88°	2°24'	+31'	88°	2°26'	+32'	88°	2°28'	+33'	88°	2°30'	+33'	88°	3
4	2°45'	+28'	87°	2°49'	+29'	87°	2°52'	+30'	87°	2°55'	+31'	87°	2°58'	+32'	87°	3°01'	+33'	87°	3°04'	+33'	87°	4
5	3°14'	+28'	86°	3°18'	+29'	86°	3°22'	+30'	86°	3°26'	+31'	86°	3°30'	+32'	86°	3°33'	+33'	86°	3°37'	+33'	86°	5
6	3°42'	+28'	85°	3°47'	+29'	85°	3°52'	+30'	85°	3°56'	+31'	85°	4°01'	+32'	85°	4°06'	+32'	86°	4°11'	+33'	86°	6
7	4°09'	+28'	84°	4°15'	+29'	84°	4°21'	+30'	84°	4°27'	+31'	85°	4°33'	+32'	85°	4°38'	+32'	85°	4°44'	+33'	85°	7
8	4°37'	+28'	83°	4°44'	+29'	83°	4°51'	+30'	84°	4°58'	+31'	84°	5°04'	+31'	84°	5°11'	+32'	84°	5°17'	+33'	84°	8
9	5°05'	+28'	82°	5°13'	+29'	83°	5°21'	+30'	83°	5°28'	+30'	83°	5°36'	+31'	83°	5°43'	+32'	83°	5°50'	+33'	83°	9
10	5°33'	+28'	82°	5°42'	+29'	82°	5°50'	+29'	82°	5°59'	+30'	82°	6°07'	+31'	82°	6°15'	+32'	82°	6°24'	+33'	82°	10
11	6°01'	+28'	81°	6°10'	+28'	81°	6°20'	+29'	81°	6°29'	+30'	81°	6°38'	+31'	81°	6°48'	+32'	81°	6°57'	+33'	81°	11
12	6°28'	+27'	80°	6°39'	+28'	80°	6°49'	+29'	80°	6°59'	+30'	80°	7°10'	+31'	80°	7°20'	+32'	80°	7°30'	+33'	81°	12
13	6°56'	+27'	79°	7°07'	+28'	79°	7°18'	+29'	79°	7°30'	+30'	79°	7°41'	+31'	79°	7°52'	+32'	80°	8°02'	+33'	80°	13
14	7°23'	+27'	78°	7°35'	+28'	78°	7°48'	+29'	78°	8°00'	+30'	78°	8°12'	+31'	79°	8°24'	+32'	79°	8°35'	+33'	79°	14
15	7°50'	+27'	77°	8°04'	+28'	77°	8°17'	+29'	77°	8°30'	+30'	78°	8°43'	+31'	78°	8°55'	+32'	78°	9°08'	+33'	78°	15
16	8°18'	+27'	76°	8°32'	+28'	76°	8°46'	+29'	77°	9°00'	+30'	77°	9°13'	+31'	77°	9°27'	+32'	77°	9°40'	+32'	77°	16
17	8°45'	+27'	75°	9°00'	+28'	75°	9°15'	+29'	76°	9°29'	+30'	76°	9°44'	+31'	76°	9°59'	+31'	76°	10°13'	+32'	76°	17
18	9°11'	+27'	74°	9°28'	+28'	75°	9°43'	+29'	75°	9°59'	+29'	75°	10°15'	+30'	75°	10°30'	+31'	75°	10°45'	+32'	75°	18
19	9°38'	+27'	74°	9°55'	+28'	74°	10°12'	+28'	74°	10°29'	+29'	74°	10°45'	+30'	74°	11°01'	+31'	74°	11°17'	+32'	75°	19
20	10°05'	+26'	73°	10°23'	+27'	73°	10°40'	+28'	73°	10°58'	+29'	73°	11°15'	+30'	73°	11°32'	+31'	74°	11°49'	+32'	74°	20
21	10°31'	+26'	72°	10°50'	+27'	72°	11°09'	+28'	72°	11°27'	+29'	72°	11°45'	+30'	72°	12°03'	+31'	73°	12°21'	+32'	73°	21
22	10°58'	+26'	71°	11°17'	+27'	71°	11°37'	+28'	71°	11°56'	+29'	71°	12°15'	+30'	72°	12°34'	+31'	72°	12°53'	+31'	72°	22
23	11°24'	+26'	70°	11°44'	+27'	70°	12°05'	+28'	70°	12°25'	+29'	70°	12°45'	+30'	71°	13°05'	+30'	71°	13°24'	+31'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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'	+28'	90°	0°00'	+29'	90°	0°00'	+30'	90°	0°00'	+31'	90°	0°00'	+32'	90°	0°00'	+33'	90°	0°00'	+34'	90°	0
1	0°28'	+28'	89°	0°29'	+29'	89°	0°30'	+30'	89°	0°31'	+31'	89°	0°32'	+32'	89°	0°33'	+33'	89°	0°34'	+34'	89°	1
2	0°56'	+28'	88°	0°58'	+29'	88°	1°00'	+30'	88°	1°02'	+31'	88°	1°04'	+32'	88°	1°05'	+33'	88°	1°07'	+34'	88°	2
3	1°24'	+28'	87°	1°27'	+29'	87°	1°30'	+30'	87°	1°33'	+31'	87°	1°35'	+32'	87°	1°38'	+33'	87°	1°41'	+34'	88°	3
4	1°53'	+28'	86°	1°56'	+29'	87°	2°00'	+30'	87°	2°04'	+31'	87°	2°07'	+32'	87°	2°11'	+33'	87°	2°14'	+33'	87°	4
5	2°21'	+28'	86°	2°25'	+29'	86°	2°30'	+30'	86°	2°34'	+31'	86°	2°39'	+32'	86°	2°43'	+33'	86°	2°48'	+33'	86°	5
6	2°49'	+28'	85°	2°54'	+29'	85°	3°00'	+30'	85°	3°05'	+31'	85°	3°11'	+32'	85°	3°16'	+33'	85°	3°21'	+33'	85°	6
7	3°17'	+28'	84°	3°23'	+29'	84°	3°30'	+30'	84°	3°36'	+31'	84°	3°42'	+32'	84°	3°48'	+32'	84°	3°54'	+33'	84°	7
8	3°45'	+28'	83°	3°52'	+29'	83°	3°59'	+30'	83°	4°07'	+31'	83°	4°14'	+32'	83°	4°21'	+32'	83°	4°28'	+33'	83°	8
9	4°13'	+28'	82°	4°21'	+29'	82°	4°29'	+30'	82°	4°37'	+31'	82°	4°45'	+31'	82°	4°53'	+32'	82°	5°01'	+33'	83°	9
10	4°41'	+28'	81°	4°50'	+29'	81°	4°59'	+30'	81°	5°08'	+31'	81°	5°17'	+31'	81°	5°26'	+32'	82°	5°34'	+33'	82°	10
11	5°08'	+28'	80°	5°18'	+29'	80°	5°28'	+30'	80°	5°38'	+30'	81°	5°48'	+31'	81°	5°58'	+32'	81°	6°08'	+33'	81°	11
12	5°36'	+28'	79°	5°47'	+29'	79°	5°58'	+29'	80°	6°09'	+30'	80°	6°20'	+31'	80°	6°30'	+32'	80°	6°41'	+33'	80°	12
13	6°04'	+28'	78°	6°16'	+28'	79°	6°27'	+29'	79°	6°39'	+30'	79°	6°51'	+31'	79°	7°02'	+32'	79°	7°14'	+33'	79°	13
14	6°31'	+27'	78°	6°44'	+28'	78°	6°57'	+29'	78°	7°09'	+30'	78°	7°22'	+31'	78°	7°34'	+32'	78°	7°46'	+33'	78°	14
15	6°59'	+27'	77°	7°13'	+28'	77°	7°26'	+29'	77°	7°40'	+30'	77°	7°53'	+31'	77°	8°06'	+32'	77°	8°19'	+33'	77°	15
16	7°26'	+27'	76°	7°41'	+28'	76°	7°55'	+29'	76°	8°10'	+30'	76°	8°24'	+31'	76°	8°38'	+32'	76°	8°52'	+33'	77°	16
17	7°53'	+27'	75°	8°09'	+28'	75°	8°24'	+29'	75°	8°40'	+30'	75°	8°55'	+31'	75°	9°10'	+32'	76°	9°25'	+32'	76°	17
18	8°20'	+27'	74°	8°37'	+28'	74°	8°53'	+29'	74°	9°09'	+30'	74°	9°25'	+31'	75°	9°41'	+31'	75°	9°57'	+32'	75°	18
19	8°48'	+27'	73°	9°05'	+28'	73°	9°22'	+29'	73°	9°39'	+30'	74°	9°56'	+30'	74°	10°13'	+31'	74°	10°29'	+32'	74°	19
20	9°14'	+27'	72°	9°33'	+28'	72°	9°51'	+29'	73°	10°09'	+29'	73°	10°27'	+30'	73°	10°44'	+31'	73°	11°02'	+32'	73°	20
21	9°41'	+27'	71°	10°00'	+28'	71°	10°19'	+28'	72°	10°38'	+29'	72°	10°57'	+30'	72°	11°15'	+31'	72°	11°34'	+32'	72°	21
22	10°08'	+26'	70°	10°28'	+27'	71°	10°48'	+28'	71°	11°07'	+29'	71°	11°27'	+30'	71°	11°46'	+31'	71°	12°06'	+32'	71°	22
23	10°34'	+26'	69°	10°55'	+27'	70°	11°16'	+28'	70°	11°37'	+29'	70°	11°57'	+30'	70°	12°17'	+31'	70°	12°37'	+32'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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°53'**	**-28'**	**90°**	**0°52'**	**-29'**	**90°**	**0°52'**	**-30'**	**91°**	**0°51'**	**-31'**	**91°**	**0°51'**	**-32'**	**91°**	**0°50'**	**-33'**	**91°**	**0°50'**	**-34'**	**91°**	0
1	**0°25'**	**-28'**	**91°**	**0°23'**	**-29'**	**91°**	**0°22'**	**-30'**	**91°**	**0°21'**	**-31'**	**91°**	**0°19'**	**-32'**	**91°**	**0°18'**	**-33'**	**91°**	**0°16'**	**-34'**	**91°**	1
2	0°03'	+28'	88°	0°06'	+29'	88°	0°08'	+30'	88°	0°10'	+31'	88°	0°13'	+32'	88°	0°15'	+33'	88°	0°17'	+34'	88°	2
3	0°32'	+28'	87°	0°35'	+29'	87°	0°38'	+30'	87°	0°41'	+31'	87°	0°45'	+32'	87°	0°48'	+33'	87°	0°51'	+34'	87°	3
4	1°00'	+28'	86°	1°04'	+29'	86°	1°08'	+30'	86°	1°12'	+31'	86°	1°16'	+32'	86°	1°20'	+33'	86°	1°24'	+34'	86°	4
5	1°28'	+28'	85°	1°33'	+29'	85°	1°38'	+30'	85°	1°43'	+31'	85°	1°48'	+32'	85°	1°53'	+33'	85°	1°58'	+34'	85°	5
6	1°56'	+28'	84°	2°02'	+29'	84°	2°08'	+30'	84°	2°14'	+31'	84°	2°20'	+32'	84°	2°26'	+33'	84°	2°32'	+33'	84°	6
7	2°24'	+28'	83°	2°31'	+29'	83°	2°38'	+30'	83°	2°45'	+31'	83°	2°52'	+32'	84°	2°58'	+33'	84°	3°05'	+33'	84°	7
8	2°52'	+28'	82°	3°00'	+29'	83°	3°08'	+30'	83°	3°16'	+31'	83°	3°23'	+32'	83°	3°31'	+33'	83°	3°38'	+33'	83°	8
9	3°20'	+28'	82°	3°29'	+29'	82°	3°38'	+30'	82°	3°46'	+31'	82°	3°55'	+32'	82°	4°03'	+32'	82°	4°12'	+33'	82°	9
10	3°48'	+28'	81°	3°58'	+29'	81°	4°08'	+30'	81°	4°17'	+31'	81°	4°26'	+32'	81°	4°36'	+32'	81°	4°45'	+33'	81°	10
11	4°16'	+28'	80°	4°27'	+29'	80°	4°37'	+30'	80°	4°48'	+31'	80°	4°58'	+31'	80°	5°08'	+32'	80°	5°18'	+33'	80°	11
12	4°44'	+28'	79°	4°56'	+29'	79°	5°07'	+30'	79°	5°18'	+31'	79°	5°29'	+31'	79°	5°41'	+32'	79°	5°52'	+33'	79°	12
13	5°12'	+28'	78°	5°24'	+29'	78°	5°37'	+30'	78°	5°49'	+30'	78°	6°01'	+31'	78°	6°13'	+32'	79°	6°25'	+33'	79°	13
14	5°40'	+28'	77°	5°53'	+29'	77°	6°06'	+29'	77°	6°19'	+30'	77°	6°32'	+31'	78°	6°45'	+32'	78°	6°58'	+33'	78°	14
15	6°07'	+28'	76°	6°21'	+28'	76°	6°36'	+29'	76°	6°50'	+30'	77°	7°03'	+31'	77°	7°17'	+32'	77°	7°31'	+33'	77°	15
16	6°35'	+27'	75°	6°50'	+28'	75°	7°05'	+29'	76°	7°20'	+30'	76°	7°35'	+31'	76°	7°49'	+32'	76°	8°04'	+33'	76°	16
17	7°02'	+27'	74°	7°18'	+28'	75°	7°34'	+29'	75°	7°50'	+30'	75°	8°06'	+31'	75°	8°21'	+32'	75°	8°36'	+33'	75°	17
18	7°30'	+27'	74°	7°47'	+28'	74°	8°03'	+29'	74°	8°20'	+30'	74°	8°36'	+31'	74°	8°53'	+32'	74°	9°09'	+33'	74°	18
19	7°57'	+27'	73°	8°15'	+28'	73°	8°32'	+29'	73°	8°50'	+30'	73°	9°07'	+31'	73°	9°25'	+32'	73°	9°42'	+32'	74°	19
20	8°24'	+27'	72°	8°43'	+28'	72°	9°01'	+29'	72°	9°20'	+30'	72°	9°38'	+31'	72°	9°56'	+31'	73°	10°14'	+32'	73°	20
21	8°51'	+27'	71°	9°11'	+28'	71°	9°30'	+29'	71°	9°49'	+30'	71°	10°09'	+30'	71°	10°27'	+31'	72°	10°46'	+32'	72°	21
22	9°18'	+27'	70°	9°38'	+28'	70°	9°59'	+29'	70°	10°19'	+29'	70°	10°39'	+30'	71°	10°59'	+31'	71°	11°18'	+32'	71°	22
23	9°45'	+27'	69°	10°06'	+27'	69°	10°27'	+28'	69°	10°48'	+29'	70°	11°09'	+30'	70°	11°30'	+31'	70°	11°50'	+32'	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°
	28			29			30			31			32			33			34			

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°	28			29			30			31			32			33			34			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	1°46'	-28'	91°	1°45'	-29'	91°	1°44'	-30'	91°	1°43'	-31'	91°	1°42'	-32'	91°	1°41'	-33'	91°	1°39'	-34'	91°	0
1	1°18'	-28'	92°	1°16'	-29'	92°	1°14'	-30'	92°	1°12'	-31'	92°	1°10'	-32'	92°	1°08'	-33'	92°	1°06'	-34'	92°	1
2	0°50'	-28'	93°	0°47'	-29'	93°	0°44'	-30'	93°	0°41'	-31'	93°	0°38'	-32'	93°	0°35'	-33'	93°	0°32'	-34'	93°	2
3	0°21'	-28'	94°	0°18'	-29'	94°	0°14'	-30'	94°	0°10'	-31'	94°	0°06'	-32'	94°	0°02'	-33'	94°	0°01'	+34'	86°	3
4	0°07'	+28'	86°	0°12'	+29'	86°	0°16'	+30'	86°	0°21'	+31'	86°	0°26'	+32'	86°	0°30'	+33'	86°	0°35'	+34'	86°	4
5	0°35'	+28'	85°	0°41'	+29'	85°	0°46'	+30'	85°	0°52'	+31'	85°	0°57'	+32'	85°	1°03'	+33'	85°	1°08'	+34'	85°	5
6	1°03'	+28'	84°	1°10'	+29'	84°	1°16'	+30'	84°	1°23'	+31'	84°	1°29'	+32'	84°	1°36'	+33'	84°	1°42'	+34'	84°	6
7	1°32'	+28'	83°	1°39'	+29'	83°	1°46'	+30'	83°	1°54'	+31'	83°	2°01'	+32'	83°	2°08'	+33'	83°	2°16'	+34'	83°	7
8	2°00'	+28'	82°	2°08'	+29'	82°	2°16'	+30'	82°	2°25'	+31'	82°	2°33'	+32'	82°	2°41'	+33'	82°	2°49'	+33'	82°	8
9	2°28'	+28'	81°	2°37'	+29'	81°	2°46'	+30'	81°	2°55'	+31'	81°	3°05'	+32'	81°	3°14'	+33'	81°	3°23'	+33'	81°	9
10	2°56'	+28'	80°	3°06'	+29'	80°	3°16'	+30'	80°	3°26'	+31'	80°	3°36'	+32'	80°	3°46'	+33'	81°	3°56'	+33'	81°	10
11	3°24'	+28'	79°	3°35'	+29'	79°	3°46'	+30'	79°	3°57'	+31'	80°	4°08'	+32'	80°	4°19'	+32'	80°	4°29'	+33'	80°	11
12	3°52'	+28'	78°	4°04'	+29'	79°	4°16'	+30'	79°	4°28'	+31'	79°	4°40'	+32'	79°	4°51'	+32'	79°	5°03'	+33'	79°	12
13	4°20'	+28'	78°	4°33'	+29'	78°	4°46'	+30'	78°	4°58'	+31'	78°	5°11'	+31'	78°	5°24'	+32'	78°	5°36'	+33'	78°	13
14	4°48'	+28'	77°	5°02'	+29'	77°	5°15'	+30'	77°	5°29'	+31'	77°	5°43'	+31'	77°	5°56'	+32'	77°	6°09'	+33'	77°	14
15	5°16'	+28'	76°	5°31'	+29'	76°	5°45'	+30'	76°	6°00'	+30'	76°	6°14'	+31'	76°	6°28'	+32'	76°	6°42'	+33'	76°	15
16	5°44'	+28'	75°	5°59'	+29'	75°	6°15'	+29'	75°	6°30'	+30'	75°	6°45'	+31'	75°	7°00'	+32'	75°	7°15'	+33'	76°	16
17	6°11'	+28'	74°	6°28'	+28'	74°	6°44'	+29'	74°	7°00'	+30'	74°	7°16'	+31'	74°	7°32'	+32'	75°	7°48'	+33'	75°	17
18	6°39'	+27'	73°	6°56'	+28'	73°	7°13'	+29'	73°	7°31'	+30'	73°	7°48'	+31'	74°	8°04'	+32'	74°	8°21'	+33'	74°	18
19	7°06'	+27'	72°	7°25'	+28'	72°	7°43'	+29'	72°	8°01'	+30'	73°	8°19'	+31'	73°	8°36'	+32'	73°	8°54'	+33'	73°	19
20	7°34'	+27'	71°	7°53'	+28'	71°	8°12'	+29'	72°	8°31'	+30'	72°	8°50'	+31'	72°	9°08'	+32'	72°	9°27'	+33'	72°	20
21	8°01'	+27'	70°	8°21'	+28'	71°	8°41'	+29'	71°	9°01'	+30'	71°	9°20'	+31'	71°	9°40'	+32'	71°	9°59'	+32'	71°	21
22	8°28'	+27'	70°	8°49'	+28'	70°	9°10'	+29'	70°	9°31'	+30'	70°	9°51'	+31'	70°	10°11'	+31'	70°	10°31'	+32'	70°	22
23	8°55'	+27'	69°	9°17'	+28'	69°	9°39'	+29'	69°	10°00'	+30'	69°	10°22'	+30'	69°	10°43'	+31'	69°	11°04'	+32'	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°
	28			29			30			31			32			33			34			

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°	28			29			30			31			32			33			34			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	2°39'	-28'	91°	2°37'	-29'	91°	2°36'	-30'	92°	2°34'	-31'	92°	2°33'	-32'	92°	2°31'	-33'	92°	2°29'	-34'	92°	0
1	2°11'	-28'	92°	2°08'	-29'	92°	2°06'	-30'	92°	2°03'	-31'	92°	2°01'	-32'	92°	1°58'	-33'	92°	1°56'	-34'	93°	1
2	1°42'	-28'	93°	1°39'	-29'	93°	1°36'	-30'	93°	1°32'	-31'	93°	1°29'	-32'	93°	1°25'	-33'	93°	1°22'	-34'	93°	2
3	1°14'	-28'	94°	1°10'	-29'	94°	1°06'	-30'	94°	1°01'	-31'	94°	0°57'	-32'	94°	0°53'	-33'	94°	0°48'	-34'	94°	3
4	0°46'	-28'	95°	0°41'	-29'	95°	0°36'	-30'	95°	0°30'	-31'	95°	0°25'	-32'	95°	0°20'	-33'	95°	0°15'	-34'	95°	4
5	0°18'	-28'	96°	0°12'	-29'	96°	0°05'	-30'	96°	0°01'	+31'	84°	0°07'	+32'	84°	0°13'	+33'	84°	0°19'	+34'	84°	5
6	0°11'	+28'	83°	0°18'	+29'	83°	0°25'	+30'	83°	0°32'	+31'	83°	0°39'	+32'	83°	0°46'	+33'	83°	0°53'	+34'	83°	6
7	0°39'	+28'	82°	0°47'	+29'	82°	0°55'	+30'	82°	1°03'	+31'	82°	1°11'	+32'	82°	1°18'	+33'	82°	1°26'	+34'	83°	7
8	1°07'	+28'	82°	1°16'	+29'	82°	1°25'	+30'	82°	1°34'	+31'	82°	1°42'	+32'	82°	1°51'	+33'	82°	2°00'	+34'	82°	8
9	1°36'	+28'	81°	1°45'	+29'	81°	1°55'	+30'	81°	2°05'	+31'	81°	2°14'	+32'	81°	2°24'	+33'	81°	2°33'	+34'	81°	9
10	2°04'	+28'	80°	2°14'	+29'	80°	2°25'	+30'	80°	2°36'	+31'	80°	2°46'	+32'	80°	2°57'	+33'	80°	3°07'	+34'	80°	10
11	2°32'	+28'	79°	2°44'	+29'	79°	2°55'	+30'	79°	3°07'	+31'	79°	3°18'	+32'	79°	3°29'	+33'	79°	3°41'	+33'	79°	11
12	3°00'	+28'	78°	3°13'	+29'	78°	3°25'	+30'	78°	3°37'	+31'	78°	3°50'	+32'	78°	4°02'	+33'	78°	4°14'	+33'	78°	12
13	3°28'	+28'	77°	3°42'	+29'	77°	3°55'	+30'	77°	4°08'	+31'	77°	4°21'	+32'	77°	4°34'	+33'	77°	4°47'	+33'	78°	13
14	3°56'	+28'	76°	4°11'	+29'	76°	4°25'	+30'	76°	4°39'	+31'	76°	4°53'	+32'	77°	5°07'	+32'	77°	5°21'	+33'	77°	14
15	4°25'	+28'	75°	4°40'	+29'	75°	4°55'	+30'	76°	5°10'	+31'	76°	5°25'	+32'	76°	5°39'	+32'	76°	5°54'	+33'	76°	15
16	4°53'	+28'	74°	5°09'	+29'	75°	5°24'	+30'	75°	5°40'	+31'	75°	5°56'	+31'	75°	6°12'	+32'	75°	6°27'	+33'	75°	16
17	5°20'	+28'	74°	5°37'	+29'	74°	5°54'	+30'	74°	6°11'	+30'	74°	6°28'	+31'	74°	6°44'	+32'	74°	7°00'	+33'	74°	17
18	5°48'	+28'	73°	6°06'	+29'	73°	6°24'	+30'	73°	6°41'	+30'	73°	6°59'	+31'	73°	7°16'	+32'	73°	7°33'	+33'	73°	18
19	6°16'	+28'	72°	6°35'	+29'	72°	6°53'	+29'	72°	7°12'	+30'	72°	7°30'	+31'	72°	7°48'	+32'	72°	8°06'	+33'	73°	19
20	6°44'	+28'	71°	7°03'	+28'	71°	7°23'	+29'	71°	7°42'	+30'	71°	8°01'	+31'	71°	8°20'	+32'	72°	8°39'	+33'	72°	20
21	7°11'	+27'	70°	7°32'	+28'	70°	7°52'	+29'	70°	8°12'	+30'	70°	8°32'	+31'	71°	8°52'	+32'	71°	9°12'	+33'	71°	21
22	7°39'	+27'	69°	8°00'	+28'	69°	8°21'	+29'	69°	8°42'	+30'	70°	9°03'	+31'	70°	9°24'	+32'	70°	9°45'	+32'	70°	22
23	8°06'	+27'	68°	8°28'	+28'	68°	8°50'	+29'	68°	9°12'	+30'	69°	9°34'	+31'	69°	9°56'	+32'	69°	10°17'	+32'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	3°32'	-28'	92°	3°30'	-29'	92°	3°28'	-30'	92°	3°26'	-31'	92°	3°23'	-32'	92°	3°21'	-33'	92°	3°19'	-34'	92°	0
1	3°04'	-28'	93°	3°01'	-29'	93°	2°58'	-30'	93°	2°55'	-31'	93°	2°52'	-32'	93°	2°48'	-33'	93°	2°45'	-34'	93°	1
2	2°35'	-28'	94°	2°31'	-29'	94°	2°28'	-30'	94°	2°24'	-31'	94°	2°20'	-32'	94°	2°16'	-33'	94°	2°12'	-34'	94°	2
3	2°07'	-28'	95°	2°02'	-29'	95°	1°57'	-30'	95°	1°53'	-31'	95°	1°48'	-32'	95°	1°43'	-33'	95°	1°38'	-34'	95°	3
4	1°39'	-28'	95°	1°33'	-29'	95°	1°27'	-30'	95°	1°22'	-31'	95°	1°16'	-32'	96°	1°10'	-33'	96°	1°04'	-34'	96°	4
5	1°10'	-28'	96°	1°04'	-29'	96°	0°57'	-30'	96°	0°50'	-31'	96°	0°44'	-32'	96°	0°37'	-33'	96°	0°31'	-34'	96°	5
6	0°42'	-28'	97°	0°34'	-29'	97°	0°27'	-30'	97°	0°19'	-31'	97°	0°12'	-32'	97°	0°04'	-33'	97°	0°03'	+34'	83°	6
7	0°13'	-28'	98°	0°05'	-29'	98°	0°03'	+30'	82°	0°12'	+31'	82°	0°20'	+32'	82°	0°29'	+33'	82°	0°37'	+34'	82°	7
8	0°15'	+28'	81°	0°24'	+29'	81°	0°34'	+30'	81°	0°43'	+31'	81°	0°52'	+32'	81°	1°01'	+33'	81°	1°11'	+34'	81°	8
9	0°43'	+28'	80°	0°54'	+29'	80°	1°04'	+30'	80°	1°14'	+31'	80°	1°24'	+32'	80°	1°34'	+33'	80°	1°44'	+34'	80°	9
10	1°12'	+28'	79°	1°23'	+29'	79°	1°34'	+30'	79°	1°45'	+31'	79°	1°56'	+32'	79°	2°07'	+33'	79°	2°18'	+34'	79°	10
11	1°40'	+28'	78°	1°52'	+29'	78°	2°04'	+30'	78°	2°16'	+31'	79°	2°28'	+32'	79°	2°40'	+33'	79°	2°52'	+34'	79°	11
12	2°08'	+28'	78°	2°21'	+29'	78°	2°34'	+30'	78°	2°47'	+31'	78°	3°00'	+32'	78°	3°13'	+33'	78°	3°25'	+34'	78°	12
13	2°37'	+28'	77°	2°51'	+29'	77°	3°04'	+30'	77°	3°18'	+31'	77°	3°32'	+32'	77°	3°45'	+33'	77°	3°59'	+34'	77°	13
14	3°05'	+28'	76°	3°20'	+29'	76°	3°34'	+30'	76°	3°49'	+31'	76°	4°04'	+32'	76°	4°18'	+33'	76°	4°32'	+33'	76°	14
15	3°33'	+28'	75°	3°49'	+29'	75°	4°04'	+30'	75°	4°20'	+31'	75°	4°35'	+32'	75°	4°51'	+33'	75°	5°06'	+33'	75°	15
16	4°02'	+28'	74°	4°18'	+29'	74°	4°34'	+30'	74°	4°51'	+31'	74°	5°07'	+32'	74°	5°23'	+32'	74°	5°39'	+33'	74°	16
17	4°30'	+28'	73°	4°47'	+29'	73°	5°04'	+30'	73°	5°22'	+31'	73°	5°39'	+32'	73°	5°56'	+32'	74°	6°13'	+33'	74°	17
18	4°58'	+28'	72°	5°16'	+29'	72°	5°34'	+30'	72°	5°52'	+31'	73°	6°10'	+31'	73°	6°28'	+32'	73°	6°46'	+33'	73°	18
19	5°26'	+28'	71°	5°45'	+29'	71°	6°04'	+30'	72°	6°23'	+31'	72°	6°42'	+31'	72°	7°00'	+32'	72°	7°19'	+33'	72°	19
20	5°54'	+28'	70°	6°14'	+29'	71°	6°34'	+30'	71°	6°53'	+30'	71°	7°13'	+31'	71°	7°33'	+32'	71°	7°52'	+33'	71°	20
21	6°21'	+28'	70°	6°42'	+29'	70°	7°03'	+29'	70°	7°24'	+30'	70°	7°44'	+31'	70°	8°05'	+32'	70°	8°25'	+33'	70°	21
22	6°49'	+28'	69°	7°11'	+29'	69°	7°33'	+29'	69°	7°54'	+30'	69°	8°16'	+31'	69°	8°37'	+32'	69°	8°58'	+33'	69°	22
23	7°17'	+28'	68°	7°40'	+28'	68°	8°02'	+29'	68°	8°24'	+30'	68°	8°47'	+31'	68°	9°09'	+32'	68°	9°31'	+33'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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°25'	-28'	92°	4°22'	-29'	92°	4°20'	-30'	93°	4°17'	-31'	93°	4°14'	-32'	93°	4°12'	-33'	93°	4°09'	-34'	93°	0
1	3°57'	-28'	93°	3°53'	-29'	93°	3°50'	-30'	93°	3°46'	-31'	93°	3°42'	-32'	94°	3°39'	-33'	94°	3°35'	-34'	94°	1
2	3°28'	-28'	94°	3°24'	-29'	94°	3°19'	-30'	94°	3°15'	-31'	94°	3°10'	-32'	94°	3°06'	-33'	94°	3°01'	-34'	94°	2
3	3°00'	-28'	95°	2°55'	-29'	95°	2°49'	-30'	95°	2°44'	-31'	95°	2°38'	-32'	95°	2°33'	-33'	95°	2°27'	-34'	95°	3
4	2°31'	-28'	96°	2°25'	-29'	96°	2°19'	-30'	96°	2°13'	-31'	96°	2°06'	-32'	96°	2°00'	-33'	96°	1°54'	-34'	96°	4
5	2°03'	-28'	97°	1°56'	-29'	97°	1°49'	-30'	97°	1°42'	-31'	97°	1°34'	-32'	97°	1°27'	-33'	97°	1°20'	-34'	97°	5
6	1°34'	-29'	98°	1°26'	-29'	98°	1°18'	-30'	98°	1°10'	-31'	98°	1°02'	-32'	98°	0°54'	-33'	98°	0°46'	-34'	98°	6
7	1°06'	-29'	99°	0°57'	-29'	99°	0°48'	-30'	99°	0°39'	-31'	99°	0°30'	-32'	99°	0°21'	-33'	99°	0°12'	-34'	99°	7
8	0°37'	-29'	99°	0°28'	-29'	99°	0°18'	-30'	99°	0°08'	-31'	99°	0°02'	+32'	81°	0°12'	+33'	81°	0°22'	+34'	81°	8
9	0°09'	-29'	100°	0°02'	+29'	80°	0°13'	+30'	80°	0°23'	+31'	80°	0°34'	+32'	80°	0°45'	+33'	80°	0°55'	+34'	80°	9
10	0°20'	+29'	79°	0°31'	+29'	79°	0°43'	+30'	79°	0°55'	+31'	79°	1°06'	+32'	79°	1°18'	+33'	79°	1°29'	+34'	79°	10
11	0°48'	+29'	78°	1°01'	+29'	78°	1°13'	+30'	78°	1°26'	+31'	78°	1°38'	+32'	78°	1°51'	+33'	78°	2°03'	+34'	78°	11
12	1°17'	+29'	77°	1°30'	+29'	77°	1°44'	+30'	77°	1°57'	+31'	77°	2°10'	+32'	77°	2°24'	+33'	77°	2°37'	+34'	77°	12
13	1°45'	+28'	76°	2°00'	+29'	76°	2°14'	+30'	76°	2°28'	+31'	76°	2°42'	+32'	76°	2°56'	+33'	76°	3°11'	+34'	76°	13
14	2°14'	+28'	75°	2°29'	+29'	75°	2°44'	+30'	75°	2°59'	+31'	75°	3°14'	+32'	76°	3°29'	+33'	76°	3°44'	+34'	76°	14
15	2°42'	+28'	74°	2°58'	+29'	74°	3°14'	+30'	75°	3°30'	+31'	75°	3°46'	+32'	75°	4°02'	+33'	75°	4°18'	+34'	75°	15
16	3°11'	+28'	74°	3°28'	+29'	74°	3°45'	+30'	74°	4°01'	+31'	74°	4°18'	+32'	74°	4°35'	+33'	74°	4°51'	+34'	74°	16
17	3°39'	+28'	73°	3°57'	+29'	73°	4°15'	+30'	73°	4°32'	+31'	73°	4°50'	+32'	73°	5°08'	+33'	73°	5°25'	+33'	73°	17
18	4°07'	+28'	72°	4°26'	+29'	72°	4°45'	+30'	72°	5°03'	+31'	72°	5°22'	+32'	72°	5°40'	+33'	72°	5°58'	+33'	72°	18
19	4°36'	+28'	71°	4°55'	+29'	71°	5°15'	+30'	71°	5°34'	+31'	71°	5°53'	+32'	71°	6°13'	+32'	71°	6°32'	+33'	71°	19
20	5°04'	+28'	70°	5°24'	+29'	70°	5°45'	+30'	70°	6°05'	+31'	70°	6°25'	+32'	70°	6°45'	+32'	71°	7°05'	+33'	71°	20
21	5°32'	+28'	69°	5°53'	+29'	69°	6°14'	+30'	69°	6°36'	+31'	69°	6°57'	+31'	70°	7°18'	+32'	70°	7°38'	+33'	70°	21
22	6°00'	+28'	68°	6°22'	+29'	68°	6°44'	+30'	68°	7°06'	+31'	69°	7°28'	+31'	69°	7°50'	+32'	69°	8°11'	+33'	69°	22
23	6°28'	+28'	67°	6°51'	+29'	67°	7°14'	+30'	68°	7°37'	+30'	68°	7°59'	+31'	68°	8°22'	+32'	68°	8°45'	+33'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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°18'	-28'	93°	5°15'	-29'	93°	5°12'	-30'	93°	5°08'	-31'	93°	5°05'	-32'	93°	5°02'	-33'	93°	4°58'	-34'	93°	0
1	4°49'	-28'	94°	4°45'	-29'	94°	4°41'	-30'	94°	4°37'	-31'	94°	4°33'	-32'	94°	4°29'	-33'	94°	4°25'	-34'	94°	1
2	4°21'	-28'	95°	4°16'	-29'	95°	4°11'	-30'	95°	4°06'	-31'	95°	4°01'	-32'	95°	3°56'	-33'	95°	3°51'	-34'	95°	2
3	3°53'	-29'	95°	3°47'	-29'	96°	3°41'	-30'	96°	3°35'	-31'	96°	3°29'	-32'	96°	3°23'	-33'	96°	3°17'	-34'	96°	3
4	3°24'	-29'	96°	3°17'	-29'	96°	3°11'	-30'	96°	3°04'	-31'	97°	2°57'	-32'	97°	2°50'	-33'	97°	2°43'	-34'	97°	4
5	2°55'	-29'	97°	2°48'	-30'	97°	2°40'	-30'	97°	2°33'	-31'	97°	2°25'	-32'	97°	2°17'	-33'	97°	2°09'	-34'	98°	5
6	2°27'	-29'	98°	2°18'	-30'	98°	2°10'	-30'	98°	2°01'	-31'	98°	1°53'	-32'	98°	1°44'	-33'	98°	1°35'	-34'	98°	6
7	1°58'	-29'	99°	1°49'	-30'	99°	1°39'	-30'	99°	1°30'	-31'	99°	1°20'	-32'	99°	1°11'	-33'	99°	1°01'	-34'	99°	7
8	1°30'	-29'	100°	1°19'	-30'	100°	1°09'	-30'	100°	0°59'	-31'	100°	0°48'	-32'	100°	0°38'	-33'	100°	0°27'	-34'	100°	8
9	1°01'	-29'	101°	0°50'	-30'	101°	0°38'	-30'	101°	0°27'	-31'	101°	0°16'	-32'	101°	0°05'	-33'	101°	0°06'	+34'	79°	9
10	0°32'	-29'	102°	0°20'	-30'	102°	0°08'	-30'	102°	0°04'	+31'	78°	0°16'	+32'	78°	0°28'	+33'	78°	0°40'	+34'	78°	10
11	0°03'	-29'	103°	0°09'	+30'	77°	0°22'	+30'	77°	0°35'	+31'	78°	0°48'	+32'	78°	1°01'	+33'	78°	1°14'	+34'	78°	11
12	0°25'	+29'	77°	0°39'	+30'	77°	0°53'	+30'	77°	1°07'	+31'	77°	1°21'	+32'	77°	1°35'	+33'	77°	1°48'	+34'	77°	12
13	0°54'	+29'	76°	1°09'	+30'	76°	1°23'	+30'	76°	1°38'	+31'	76°	1°53'	+32'	76°	2°08'	+33'	76°	2°22'	+34'	76°	13
14	1°23'	+29'	75°	1°38'	+30'	75°	1°54'	+30'	75°	2°10'	+31'	75°	2°25'	+32'	75°	2°41'	+33'	75°	2°56'	+34'	75°	14
15	1°51'	+29'	74°	2°08'	+30'	74°	2°24'	+30'	74°	2°41'	+31'	74°	2°57'	+32'	74°	3°14'	+33'	74°	3°30'	+34'	74°	15
16	2°20'	+29'	73°	2°37'	+29'	73°	2°55'	+30'	73°	3°12'	+31'	73°	3°29'	+32'	73°	3°47'	+33'	73°	4°04'	+34'	73°	16
17	2°49'	+29'	72°	3°07'	+29'	72°	3°25'	+30'	72°	3°43'	+31'	72°	4°01'	+32'	72°	4°19'	+33'	73°	4°37'	+34'	73°	17
18	3°17'	+29'	71°	3°36'	+29'	71°	3°55'	+30'	71°	4°14'	+31'	72°	4°33'	+32'	72°	4°52'	+33'	72°	5°11'	+34'	72°	18
19	3°46'	+28'	70°	4°06'	+29'	71°	4°26'	+30'	71°	4°46'	+31'	71°	5°05'	+32'	71°	5°25'	+33'	71°	5°45'	+34'	71°	19
20	4°14'	+28'	70°	4°35'	+29'	70°	4°56'	+30'	70°	5°17'	+31'	70°	5°37'	+32'	70°	5°58'	+33'	70°	6°18'	+33'	70°	20
21	4°42'	+28'	69°	5°04'	+29'	69°	5°26'	+30'	69°	5°48'	+31'	69°	6°09'	+32'	69°	6°30'	+33'	69°	6°52'	+33'	69°	21
22	5°11'	+28'	68°	5°33'	+29'	68°	5°56'	+30'	68°	6°18'	+31'	68°	6°41'	+32'	68°	7°03'	+32'	68°	7°25'	+33'	68°	22
23	5°39'	+28'	67°	6°03'	+29'	67°	6°26'	+30'	67°	6°49'	+31'	67°	7°12'	+32'	67°	7°35'	+32'	67°	7°58'	+33'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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°11'	-28'	93°	6°07'	-29'	93°	6°04'	-30'	94°	6°00'	-31'	94°	5°56'	-32'	94°	5°52'	-33'	94°	5°48'	-34'	94°	0
1	5°42'	-28'	94°	5°38'	-29'	94°	5°33'	-30'	94°	5°29'	-31'	94°	5°24'	-32'	95°	5°19'	-33'	95°	5°14'	-34'	95°	1
2	5°14'	-29'	95°	5°08'	-29'	95°	5°03'	-30'	95°	4°57'	-31'	95°	4°52'	-32'	95°	4°46'	-33'	96°	4°40'	-34'	96°	2
3	4°45'	-29'	96°	4°39'	-30'	96°	4°33'	-30'	96°	4°26'	-31'	96°	4°20'	-32'	96°	4°13'	-33'	96°	4°06'	-34'	96°	3
4	4°17'	-29'	97°	4°09'	-30'	97°	4°02'	-30'	97°	3°55'	-31'	97°	3°48'	-32'	97°	3°40'	-33'	97°	3°33'	-34'	97°	4
5	3°48'	-29'	98°	3°40'	-30'	98°	3°32'	-31'	98°	3°24'	-31'	98°	3°15'	-32'	98°	3°07'	-33'	98°	2°59'	-34'	98°	5
6	3°19'	-29'	99°	3°10'	-30'	99°	3°01'	-31'	99°	2°52'	-31'	99°	2°43'	-32'	99°	2°34'	-33'	99°	2°25'	-34'	99°	6
7	2°51'	-29'	99°	2°41'	-30'	100°	2°31'	-31'	100°	2°21'	-31'	100°	2°11'	-32'	100°	2°01'	-33'	100°	1°50'	-34'	100°	7
8	2°22'	-29'	100°	2°11'	-30'	100°	2°00'	-31'	100°	1°49'	-32'	100°	1°38'	-32'	100°	1°27'	-33'	101°	1°16'	-34'	101°	8
9	1°53'	-29'	101°	1°41'	-30'	101°	1°29'	-31'	101°	1°18'	-32'	101°	1°06'	-32'	101°	0°54'	-33'	101°	0°42'	-34'	101°	9
10	1°24'	-29'	102°	1°11'	-30'	102°	0°59'	-31'	102°	0°46'	-32'	102°	0°34'	-32'	102°	0°21'	-33'	102°	0°08'	-34'	102°	10
11	0°55'	-29'	103°	0°42'	-30'	103°	0°28'	-31'	103°	0°15'	-32'	103°	0°01'	-32'	103°	0°12'	+33'	77°	0°26'	+34'	77°	11
12	0°26'	-29'	104°	0°12'	-30'	104°	0°02'	+31'	76°	0°17'	+32'	76°	0°31'	+32'	76°	0°46'	+33'	76°	1°00'	+34'	76°	12
13	0°03'	+29'	75°	0°18'	+30'	75°	0°33'	+31'	75°	0°48'	+32'	75°	1°04'	+32'	75°	1°19'	+33'	75°	1°34'	+34'	75°	13
14	0°32'	+29'	74°	0°48'	+30'	74°	1°04'	+31'	74°	1°20'	+31'	74°	1°36'	+32'	74°	1°52'	+33'	74°	2°08'	+34'	75°	14
15	1°00'	+29'	74°	1°17'	+30'	74°	1°34'	+31'	74°	1°51'	+31'	74°	2°08'	+32'	74°	2°25'	+33'	74°	2°42'	+34'	74°	15
16	1°29'	+29'	73°	1°47'	+30'	73°	2°05'	+31'	73°	2°23'	+31'	73°	2°41'	+32'	73°	2°58'	+33'	73°	3°16'	+34'	73°	16
17	1°58'	+29'	72°	2°17'	+30'	72°	2°36'	+31'	72°	2°54'	+31'	72°	3°13'	+32'	72°	3°32'	+33'	72°	3°50'	+34'	72°	17
18	2°27'	+29'	71°	2°47'	+30'	71°	3°06'	+31'	71°	3°26'	+31'	71°	3°45'	+32'	71°	4°05'	+33'	71°	4°24'	+34'	71°	18
19	2°56'	+29'	70°	3°16'	+30'	70°	3°37'	+30'	70°	3°57'	+31'	70°	4°17'	+32'	70°	4°38'	+33'	70°	4°58'	+34'	70°	19
20	3°25'	+29'	69°	3°46'	+30'	69°	4°07'	+30'	69°	4°28'	+31'	69°	4°50'	+32'	69°	5°11'	+33'	69°	5°32'	+34'	70°	20
21	3°53'	+29'	68°	4°15'	+29'	68°	4°38'	+30'	68°	5°00'	+31'	68°	5°22'	+32'	69°	5°44'	+33'	69°	6°05'	+34'	69°	21
22	4°22'	+29'	67°	4°45'	+29'	67°	5°08'	+30'	68°	5°31'	+31'	68°	5°54'	+32'	68°	6°16'	+33'	68°	6°39'	+34'	68°	22
23	4°50'	+29'	66°	5°14'	+29'	67°	5°38'	+30'	67°	6°02'	+31'	67°	6°26'	+32'	67°	6°49'	+33'	67°	7°13'	+33'	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°
	28			29			30			31			32			33			34			

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°	28			29			30			31			32			33			34			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	7°04'	-28'	94°	6°59'	-29'	94°	6°55'	-30'	94°	6°51'	-31'	94°	6°47'	-32'	94°	6°42'	-33'	94°	6°38'	-34'	94°	0
1	6°35'	-29'	95°	6°30'	-29'	95°	6°25'	-30'	95°	6°20'	-31'	95°	6°15'	-32'	95°	6°09'	-33'	95°	6°04'	-34'	95°	1
2	6°07'	-29'	96°	6°01'	-30'	96°	5°55'	-30'	96°	5°49'	-31'	96°	5°42'	-32'	96°	5°36'	-33'	96°	5°30'	-34'	96°	2
3	5°38'	-29'	96°	5°31'	-30'	97°	5°24'	-31'	97°	5°17'	-31'	97°	5°10'	-32'	97°	5°03'	-33'	97°	4°56'	-34'	97°	3
4	5°09'	-29'	97°	5°02'	-30'	97°	4°54'	-31'	97°	4°46'	-31'	98°	4°38'	-32'	98°	4°30'	-33'	98°	4°22'	-34'	98°	4
5	4°40'	-29'	98°	4°32'	-30'	98°	4°23'	-31'	98°	4°14'	-32'	98°	4°06'	-32'	98°	3°57'	-33'	99°	3°48'	-34'	99°	5
6	4°12'	-29'	99°	4°02'	-30'	99°	3°53'	-31'	99°	3°43'	-32'	99°	3°33'	-32'	99°	3°23'	-33'	99°	3°14'	-34'	99°	6
7	3°43'	-29'	100°	3°32'	-30'	100°	3°22'	-31'	100°	3°11'	-32'	100°	3°01'	-32'	100°	2°50'	-33'	100°	2°39'	-34'	100°	7
8	3°14'	-29'	101°	3°03'	-30'	101°	2°51'	-31'	101°	2°40'	-32'	101°	2°28'	-33'	101°	2°17'	-33'	101°	2°05'	-34'	101°	8
9	2°45'	-29'	102°	2°33'	-30'	102°	2°20'	-31'	102°	2°08'	-32'	102°	1°56'	-33'	102°	1°43'	-33'	102°	1°31'	-34'	102°	9
10	2°16'	-29'	103°	2°03'	-30'	103°	1°50'	-31'	103°	1°36'	-32'	103°	1°23'	-33'	103°	1°10'	-33'	103°	0°57'	-34'	103°	10
11	1°47'	-29'	103°	1°33'	-30'	103°	1°19'	-31'	104°	1°05'	-32'	104°	0°51'	-33'	104°	0°37'	-33'	104°	0°23'	-34'	104°	11
12	1°18'	-29'	104°	1°03'	-30'	104°	0°48'	-31'	104°	0°33'	-32'	104°	0°18'	-33'	104°	0°03'	-33'	104°	0°12'	+34'	76°	12
13	0°49'	-29'	105°	0°33'	-30'	105°	0°17'	-31'	105°	0°01'	-32'	105°	0°14'	+33'	75°	0°30'	+33'	75°	0°46'	+34'	75°	13
14	0°19'	-29'	106°	0°03'	-30'	106°	0°14'	+31'	74°	0°30'	+32'	74°	0°47'	+33'	74°	1°04'	+33'	74°	1°20'	+34'	74°	14
15	0°10'	+29'	73°	0°27'	+30'	73°	0°45'	+31'	73°	1°02'	+32'	73°	1°20'	+33'	73°	1°37'	+33'	73°	1°54'	+34'	73°	15
16	0°39'	+29'	72°	0°57'	+30'	72°	1°15'	+31'	72°	1°34'	+32'	72°	1°52'	+33'	72°	2°10'	+33'	72°	2°29'	+34'	72°	16
17	1°08'	+29'	71°	1°27'	+30'	71°	1°46'	+31'	71°	2°06'	+32'	71°	2°25'	+32'	71°	2°44'	+33'	71°	3°03'	+34'	72°	17
18	1°37'	+29'	70°	1°57'	+30'	70°	2°17'	+31'	70°	2°37'	+32'	71°	2°57'	+32'	71°	3°17'	+33'	71°	3°37'	+34'	71°	18
19	2°06'	+29'	70°	2°27'	+30'	70°	2°48'	+31'	70°	3°09'	+32'	70°	3°30'	+32'	70°	3°50'	+33'	70°	4°11'	+34'	70°	19
20	2°35'	+29'	69°	2°57'	+30'	69°	3°19'	+31'	69°	3°40'	+32'	69°	4°02'	+32'	69°	4°24'	+33'	69°	4°45'	+34'	69°	20
21	3°04'	+29'	68°	3°27'	+30'	68°	3°49'	+31'	68°	4°12'	+31'	68°	4°34'	+32'	68°	4°57'	+33'	68°	5°19'	+34'	68°	21
22	3°33'	+29'	67°	3°57'	+30'	67°	4°20'	+31'	67°	4°43'	+31'	67°	5°07'	+32'	67°	5°30'	+33'	67°	5°53'	+34'	67°	22
23	4°02'	+29'	66°	4°26'	+30'	66°	4°51'	+31'	66°	5°15'	+31'	66°	5°39'	+32'	66°	6°03'	+33'	66°	6°27'	+34'	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°
	28			29			30			31			32			33			34			

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°	28			29			30			31			32			33			34			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	7°56'	-28'	94°	7°52'	-29'	94°	7°47'	-30'	95°	7°42'	-31'	95°	7°37'	-32'	95°	7°32'	-33'	95°	7°27'	-34'	95°	0
1	7°28'	-29'	95°	7°22'	-30'	95°	7°17'	-30'	95°	7°11'	-31'	96°	7°05'	-32'	96°	6°59'	-33'	96°	6°53'	-34'	96°	1
2	6°59'	-29'	96°	6°53'	-30'	96°	6°46'	-31'	96°	6°40'	-31'	96°	6°33'	-32'	96°	6°26'	-33'	97°	6°19'	-34'	97°	2
3	6°31'	-29'	97°	6°23'	-30'	97°	6°16'	-31'	97°	6°08'	-32'	97°	6°01'	-32'	97°	5°53'	-33'	97°	5°45'	-34'	98°	3
4	6°02'	-29'	98°	5°54'	-30'	98°	5°45'	-31'	98°	5°37'	-32'	98°	5°28'	-32'	98°	5°20'	-33'	98°	5°11'	-34'	98°	4
5	5°33'	-29'	99°	5°24'	-30'	99°	5°15'	-31'	99°	5°05'	-32'	99°	4°56'	-33'	99°	4°46'	-33'	99°	4°37'	-34'	99°	5
6	5°04'	-29'	100°	4°54'	-30'	100°	4°44'	-31'	100°	4°34'	-32'	100°	4°23'	-33'	100°	4°13'	-33'	100°	4°03'	-34'	100°	6
7	4°35'	-29'	100°	4°24'	-30'	101°	4°13'	-31'	101°	4°02'	-32'	101°	3°51'	-33'	101°	3°40'	-33'	101°	3°28'	-34'	101°	7
8	4°06'	-29'	101°	3°54'	-30'	101°	3°42'	-31'	101°	3°30'	-32'	102°	3°18'	-33'	102°	3°06'	-34'	102°	2°54'	-34'	102°	8
9	3°37'	-29'	102°	3°24'	-30'	102°	3°11'	-31'	102°	2°58'	-32'	102°	2°46'	-33'	102°	2°33'	-34'	102°	2°20'	-34'	102°	9
10	3°07'	-29'	103°	2°54'	-30'	103°	2°40'	-31'	103°	2°27'	-32'	103°	2°13'	-33'	103°	1°59'	-34'	103°	1°45'	-34'	103°	10
11	2°38'	-29'	104°	2°24'	-30'	104°	2°09'	-31'	104°	1°55'	-32'	104°	1°40'	-33'	104°	1°25'	-34'	104°	1°11'	-34'	104°	11
12	2°09'	-29'	105°	1°54'	-30'	105°	1°38'	-31'	105°	1°23'	-32'	105°	1°07'	-33'	105°	0°52'	-34'	105°	0°36'	-34'	105°	12
13	1°40'	-29'	106°	1°23'	-30'	106°	1°07'	-31'	106°	0°51'	-32'	106°	0°35'	-33'	106°	0°18'	-34'	106°	0°02'	-34'	106°	13
14	1°10'	-29'	107°	0°53'	-30'	107°	0°36'	-31'	107°	0°19'	-32'	107°	0°02'	-33'	107°	0°15'	+34'	73°	0°32'	+34'	73°	14
15	0°41'	-29'	107°	0°23'	-30'	107°	0°05'	-31'	107°	0°13'	+32'	73°	0°31'	+33'	73°	0°49'	+34'	73°	1°07'	+34'	73°	15
16	0°12'	-29'	108°	0°07'	+30'	72°	0°26'	+31'	72°	0°45'	+32'	72°	1°04'	+33'	72°	1°23'	+34'	72°	1°41'	+34'	72°	16
17	0°18'	+29'	71°	0°37'	+30'	71°	0°57'	+31'	71°	1°17'	+32'	71°	1°36'	+33'	71°	1°56'	+34'	71°	2°16'	+34'	71°	17
18	0°47'	+29'	70°	1°08'	+30'	70°	1°28'	+31'	70°	1°49'	+32'	70°	2°09'	+33'	70°	2°30'	+34'	70°	2°50'	+34'	70°	18
19	1°16'	+29'	69°	1°38'	+30'	69°	1°59'	+31'	69°	2°21'	+32'	69°	2°42'	+33'	69°	3°03'	+33'	69°	3°24'	+34'	69°	19
20	1°46'	+29'	68°	2°08'	+30'	68°	2°30'	+31'	68°	2°52'	+32'	68°	3°15'	+33'	68°	3°37'	+33'	68°	3°59'	+34'	68°	20
21	2°15'	+29'	67°	2°38'	+30'	67°	3°01'	+31'	67°	3°24'	+32'	67°	3°47'	+33'	68°	4°10'	+33'	68°	4°33'	+34'	68°	21
22	2°44'	+29'	66°	3°08'	+30'	67°	3°32'	+31'	67°	3°56'	+32'	67°	4°20'	+33'	67°	4°44'	+33'	67°	5°07'	+34'	67°	22
23	3°14'	+29'	66°	3°38'	+30'	66°	4°03'	+31'	66°	4°28'	+32'	66°	4°52'	+32'	66°	5°17'	+33'	66°	5°41'	+34'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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°49'	-29'	95°	8°44'	-29'	95°	8°39'	-30'	95°	8°34'	-31'	95°	8°28'	-32'	95°	8°22'	-33'	95°	8°17'	-34'	96°	0
1	8°21'	-29'	96°	8°15'	-30'	96°	8°09'	-31'	96°	8°02'	-31'	96°	7°56'	-32'	96°	7°49'	-33'	96°	7°43'	-34'	96°	1
2	7°52'	-29'	97°	7°45'	-30'	97°	7°38'	-31'	97°	7°31'	-32'	97°	7°24'	-32'	97°	7°16'	-33'	97°	7°09'	-34'	97°	2
3	7°23'	-29'	97°	7°15'	-30'	98°	7°07'	-31'	98°	6°59'	-32'	98°	6°51'	-32'	98°	6°43'	-33'	98°	6°34'	-34'	98°	3
4	6°54'	-29'	98°	6°46'	-30'	98°	6°37'	-31'	99°	6°28'	-32'	99°	6°19'	-33'	99°	6°10'	-33'	99°	6°00'	-34'	99°	4
5	6°25'	-29'	99°	6°16'	-30'	99°	6°06'	-31'	99°	5°56'	-32'	99°	5°46'	-33'	100°	5°36'	-34'	100°	5°26'	-34'	100°	5
6	5°56'	-29'	100°	5°46'	-30'	100°	5°35'	-31'	100°	5°24'	-32'	100°	5°13'	-33'	100°	5°03'	-34'	101°	4°52'	-34'	101°	6
7	5°27'	-29'	101°	5°16'	-30'	101°	5°04'	-31'	101°	4°52'	-32'	101°	4°41'	-33'	101°	4°29'	-34'	101°	4°17'	-34'	101°	7
8	4°58'	-29'	102°	4°45'	-30'	102°	4°33'	-31'	102°	4°21'	-32'	102°	4°08'	-33'	102°	3°55'	-34'	102°	3°43'	-35'	102°	8
9	4°28'	-29'	103°	4°15'	-30'	103°	4°02'	-31'	103°	3°49'	-32'	103°	3°35'	-33'	103°	3°22'	-34'	103°	3°08'	-35'	103°	9
10	3°59'	-29'	104°	3°45'	-30'	104°	3°31'	-31'	104°	3°17'	-32'	104°	3°02'	-33'	104°	2°48'	-34'	104°	2°34'	-35'	104°	10
11	3°30'	-29'	104°	3°15'	-30'	104°	3°00'	-31'	105°	2°45'	-32'	105°	2°29'	-33'	105°	2°14'	-34'	105°	1°59'	-35'	105°	11
12	3°00'	-30'	105°	2°44'	-30'	105°	2°28'	-31'	105°	2°12'	-32'	105°	1°56'	-33'	105°	1°40'	-34'	105°	1°24'	-35'	106°	12
13	2°31'	-30'	106°	2°14'	-30'	106°	1°57'	-31'	106°	1°40'	-32'	106°	1°23'	-33'	106°	1°07'	-34'	106°	0°50'	-35'	106°	13
14	2°01'	-30'	107°	1°43'	-30'	107°	1°26'	-31'	107°	1°08'	-32'	107°	0°50'	-33'	107°	0°33'	-34'	107°	0°15'	-35'	107°	14
15	1°31'	-30'	108°	1°13'	-30'	108°	0°54'	-31'	108°	0°36'	-32'	108°	0°18'	-33'	108°	0°01'	+34'	72°	0°20'	+35'	72°	15
16	1°02'	-30'	109°	0°42'	-30'	109°	0°23'	-31'	109°	0°04'	-32'	109°	0°15'	+33'	71°	0°35'	+34'	71°	0°54'	+35'	71°	16
17	0°32'	-30'	110°	0°12'	-30'	110°	0°08'	+31'	70°	0°28'	+32'	70°	0°48'	+33'	70°	1°09'	+34'	70°	1°29'	+35'	70°	17
18	0°03'	-30'	111°	0°18'	+30'	69°	0°39'	+31'	69°	1°00'	+32'	70°	1°21'	+33'	70°	1°42'	+34'	70°	2°03'	+35'	70°	18
19	0°27'	+30'	69°	0°49'	+30'	69°	1°11'	+31'	69°	1°33'	+32'	69°	1°54'	+33'	69°	2°16'	+34'	69°	2°38'	+35'	69°	19
20	0°57'	+30'	68°	1°19'	+30'	68°	1°42'	+31'	68°	2°05'	+32'	68°	2°27'	+33'	68°	2°50'	+34'	68°	3°13'	+35'	68°	20
21	1°26'	+30'	67°	1°50'	+30'	67°	2°13'	+31'	67°	2°37'	+32'	67°	3°00'	+33'	67°	3°24'	+34'	67°	3°47'	+34'	67°	21
22	1°56'	+30'	66°	2°20'	+30'	66°	2°45'	+31'	66°	3°09'	+32'	66°	3°33'	+33'	66°	3°57'	+34'	66°	4°22'	+34'	66°	22
23	2°25'	+30'	65°	2°51'	+30'	65°	3°16'	+31'	65°	3°41'	+32'	65°	4°06'	+33'	65°	4°31'	+34'	65°	4°56'	+34'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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°42'	-29'	95°	9°36'	-30'	95°	9°31'	-30'	96°	9°25'	-31'	96°	9°19'	-32'	96°	9°13'	-33'	96°	9°06'	-34'	96°	0
1	9°13'	-29'	96°	9°07'	-30'	96°	9°00'	-31'	96°	8°53'	-32'	97°	8°46'	-32'	97°	8°39'	-33'	97°	8°32'	-34'	97°	1
2	8°45'	-29'	97°	8°37'	-30'	97°	8°30'	-31'	97°	8°22'	-32'	97°	8°14'	-33'	98°	8°06'	-33'	98°	7°58'	-34'	98°	2
3	8°16'	-29'	98°	8°07'	-30'	98°	7°59'	-31'	98°	7°50'	-32'	98°	7°42'	-33'	98°	7°33'	-33'	99°	7°24'	-34'	99°	3
4	7°47'	-29'	99°	7°37'	-30'	99°	7°28'	-31'	99°	7°19'	-32'	99°	7°09'	-33'	99°	6°59'	-34'	99°	6°49'	-34'	100°	4
5	7°17'	-29'	100°	7°07'	-30'	100°	6°57'	-31'	100°	6°47'	-32'	100°	6°36'	-33'	100°	6°26'	-34'	100°	6°15'	-34'	100°	5
6	6°48'	-29'	101°	6°37'	-30'	101°	6°26'	-31'	101°	6°15'	-32'	101°	6°03'	-33'	101°	5°52'	-34'	101°	5°40'	-35'	101°	6
7	6°19'	-29'	101°	6°07'	-30'	102°	5°55'	-31'	102°	5°43'	-32'	102°	5°31'	-33'	102°	5°18'	-34'	102°	5°06'	-35'	102°	7
8	5°50'	-29'	102°	5°37'	-30'	102°	5°24'	-31'	102°	5°11'	-32'	103°	4°58'	-33'	103°	4°45'	-34'	103°	4°31'	-35'	103°	8
9	5°20'	-30'	103°	5°06'	-30'	103°	4°53'	-31'	103°	4°39'	-32'	103°	4°25'	-33'	103°	4°11'	-34'	104°	3°57'	-35'	104°	9
10	4°50'	-30'	104°	4°36'	-31'	104°	4°21'	-31'	104°	4°06'	-32'	104°	3°52'	-33'	104°	3°37'	-34'	104°	3°22'	-35'	104°	10
11	4°21'	-30'	105°	4°05'	-31'	105°	3°50'	-31'	105°	3°34'	-32'	105°	3°19'	-33'	105°	3°03'	-34'	105°	2°47'	-35'	105°	11
12	3°51'	-30'	106°	3°35'	-31'	106°	3°18'	-31'	106°	3°02'	-32'	106°	2°45'	-33'	106°	2°29'	-34'	106°	2°12'	-35'	106°	12
13	3°21'	-30'	107°	3°04'	-31'	107°	2°47'	-32'	107°	2°30'	-32'	107°	2°12'	-33'	107°	1°55'	-34'	107°	1°37'	-35'	107°	13
14	2°52'	-30'	108°	2°34'	-31'	108°	2°15'	-32'	108°	1°57'	-32'	108°	1°39'	-33'	108°	1°21'	-34'	108°	1°03'	-35'	108°	14
15	2°22'	-30'	108°	2°03'	-31'	108°	1°44'	-32'	108°	1°25'	-32'	108°	1°06'	-33'	108°	0°47'	-34'	109°	0°28'	-35'	109°	15
16	1°52'	-30'	109°	1°32'	-31'	109°	1°12'	-32'	109°	0°52'	-32'	109°	0°33'	-33'	109°	0°13'	-34'	109°	0°07'	+35'	71°	16
17	1°22'	-30'	110°	1°01'	-31'	110°	0°41'	-32'	110°	0°20'	-32'	110°	0°01'	+33'	70°	0°21'	+34'	70°	0°42'	+35'	70°	17
18	0°52'	-30'	111°	0°31'	-31'	111°	0°09'	-32'	111°	0°12'	+32'	69°	0°34'	+33'	69°	0°55'	+34'	69°	1°17'	+35'	69°	18
19	0°22'	-30'	112°	0°00'	+31'	68°	0°22'	+32'	68°	0°45'	+32'	68°	1°07'	+33'	68°	1°29'	+34'	68°	1°52'	+35'	68°	19
20	0°08'	+30'	67°	0°31'	+31'	67°	0°54'	+32'	67°	1°17'	+32'	67°	1°40'	+33'	67°	2°03'	+34'	67°	2°27'	+35'	67°	20
21	0°38'	+30'	66°	1°02'	+31'	66°	1°26'	+32'	66°	1°50'	+32'	66°	2°14'	+33'	67°	2°37'	+34'	67°	3°01'	+35'	67°	21
22	1°08'	+30'	66°	1°32'	+31'	66°	1°57'	+32'	66°	2°22'	+32'	66°	2°47'	+33'	66°	3°11'	+34'	66°	3°36'	+35'	66°	22
23	1°37'	+30'	65°	2°03'	+31'	65°	2°29'	+32'	65°	2°54'	+32'	65°	3°20'	+33'	65°	3°45'	+34'	65°	4°11'	+35'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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°35'	-29'	96°	10°29'	-30'	96°	10°22'	-31'	96°	10°16'	-31'	96°	10°09'	-32'	96°	10°03'	-33'	97°	9°56'	-34'	97°	0
1	10°06'	-29'	97°	9°59'	-30'	97°	9°52'	-31'	97°	9°44'	-32'	97°	9°37'	-32'	97°	9°29'	-33'	97°	9°21'	-34'	98°	1
2	9°37'	-29'	97°	9°29'	-30'	98°	9°21'	-31'	98°	9°13'	-32'	98°	9°04'	-33'	98°	8°56'	-33'	98°	8°47'	-34'	98°	2
3	9°08'	-29'	98°	8°59'	-30'	99°	8°50'	-31'	99°	8°41'	-32'	99°	8°32'	-33'	99°	8°22'	-34'	99°	8°13'	-34'	99°	3
4	8°39'	-29'	99°	8°29'	-30'	99°	8°19'	-31'	100°	8°09'	-32'	100°	7°59'	-33'	100°	7°49'	-34'	100°	7°38'	-35'	100°	4
5	8°10'	-29'	100°	7°59'	-30'	100°	7°48'	-31'	100°	7°37'	-32'	101°	7°26'	-33'	101°	7°15'	-34'	101°	7°04'	-35'	101°	5
6	7°40'	-29'	101°	7°29'	-30'	101°	7°17'	-31'	101°	7°05'	-32'	101°	6°53'	-33'	102°	6°41'	-34'	102°	6°29'	-35'	102°	6
7	7°11'	-30'	102°	6°58'	-30'	102°	6°46'	-31'	102°	6°33'	-32'	102°	6°20'	-33'	102°	6°07'	-34'	102°	5°54'	-35'	103°	7
8	6°41'	-30'	103°	6°28'	-31'	103°	6°14'	-31'	103°	6°01'	-32'	103°	5°47'	-33'	103°	5°34'	-34'	103°	5°20'	-35'	103°	8
9	6°12'	-30'	104°	5°57'	-31'	104°	5°43'	-32'	104°	5°29'	-32'	104°	5°14'	-33'	104°	5°00'	-34'	104°	4°45'	-35'	104°	9
10	5°42'	-30'	105°	5°27'	-31'	105°	5°12'	-32'	105°	4°56'	-32'	105°	4°41'	-33'	105°	4°25'	-34'	105°	4°10'	-35'	105°	10
11	5°12'	-30'	105°	4°56'	-31'	105°	4°40'	-32'	106°	4°24'	-32'	106°	4°08'	-33'	106°	3°51'	-34'	106°	3°35'	-35'	106°	11
12	4°42'	-30'	106°	4°25'	-31'	106°	4°08'	-32'	106°	3°51'	-33'	106°	3°34'	-33'	107°	3°17'	-34'	107°	3°00'	-35'	107°	12
13	4°12'	-30'	107°	3°54'	-31'	107°	3°37'	-32'	107°	3°19'	-33'	107°	3°01'	-33'	107°	2°43'	-34'	107°	2°25'	-35'	107°	13
14	3°42'	-30'	108°	3°23'	-31'	108°	3°05'	-32'	108°	2°46'	-33'	108°	2°27'	-33'	108°	2°09'	-34'	108°	1°50'	-35'	108°	14
15	3°12'	-30'	109°	2°53'	-31'	109°	2°33'	-32'	109°	2°14'	-33'	109°	1°54'	-33'	109°	1°34'	-34'	109°	1°15'	-35'	109°	15
16	2°42'	-30'	110°	2°22'	-31'	110°	2°01'	-32'	110°	1°41'	-33'	110°	1°21'	-33'	110°	1°00'	-34'	110°	0°40'	-35'	110°	16
17	2°12'	-30'	111°	1°51'	-31'	111°	1°29'	-32'	111°	1°08'	-33'	111°	0°47'	-34'	111°	0°26'	-34'	111°	0°05'	-35'	111°	17
18	1°41'	-30'	111°	1°20'	-31'	111°	0°58'	-32'	112°	0°36'	-33'	112°	0°14'	-34'	112°	0°08'	+34'	68°	0°30'	+35'	68°	18
19	1°11'	-30'	112°	0°48'	-31'	112°	0°26'	-32'	112°	0°03'	-33'	112°	0°20'	+34'	68°	0°43'	+34'	68°	1°06'	+35'	68°	19
20	0°41'	-30'	113°	0°17'	-31'	113°	0°06'	+32'	67°	0°30'	+33'	67°	0°53'	+33'	67°	1°17'	+34'	67°	1°41'	+35'	67°	20
21	0°11'	-30'	114°	0°14'	+31'	66°	0°38'	+32'	66°	1°03'	+33'	66°	1°27'	+33'	66°	1°51'	+34'	66°	2°16'	+35'	66°	21
22	0°19'	+30'	65°	0°45'	+31'	65°	1°10'	+32'	65°	1°35'	+33'	65°	2°00'	+33'	65°	2°26'	+34'	65°	2°51'	+35'	65°	22
23	0°50'	+30'	64°	1°16'	+31'	64°	1°42'	+32'	64°	2°08'	+33'	64°	2°34'	+33'	64°	3°00'	+34'	64°	3°26'	+35'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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°27'	-29'	96°	11°21'	-30'	96°	11°14'	-31'	97°	11°07'	-32'	97°	11°00'	-32'	97°	10°52'	-33'	97°	10°45'	-34'	97°	0
1	10°59'	-29'	97°	10°51'	-30'	97°	10°43'	-31'	97°	10°35'	-32'	98°	10°27'	-33'	98°	10°19'	-33'	98°	10°11'	-34'	98°	1
2	10°30'	-29'	98°	10°21'	-30'	98°	10°13'	-31'	98°	10°04'	-32'	99°	9°55'	-33'	99°	9°46'	-34'	99°	9°36'	-34'	99°	2
3	10°00'	-29'	99°	9°51'	-30'	99°	9°42'	-31'	99°	9°32'	-32'	99°	9°22'	-33'	100°	9°12'	-34'	100°	9°02'	-35'	100°	3
4	9°31'	-29'	100°	9°21'	-30'	100°	9°11'	-31'	100°	9°00'	-32'	100°	8°49'	-33'	100°	8°38'	-34'	101°	8°27'	-35'	101°	4
5	9°02'	-30'	101°	8°51'	-30'	101°	8°39'	-31'	101°	8°28'	-32'	101°	8°16'	-33'	101°	8°05'	-34'	101°	7°53'	-35'	102°	5
6	8°32'	-30'	102°	8°20'	-31'	102°	8°08'	-31'	102°	7°56'	-32'	102°	7°43'	-33'	102°	7°31'	-34'	102°	7°18'	-35'	102°	6
7	8°03'	-30'	102°	7°50'	-31'	103°	7°37'	-32'	103°	7°23'	-32'	103°	7°10'	-33'	103°	6°57'	-34'	103°	6°43'	-35'	103°	7
8	7°33'	-30'	103°	7°19'	-31'	103°	7°05'	-32'	104°	6°51'	-32'	104°	6°37'	-33'	104°	6°22'	-34'	104°	6°08'	-35'	104°	8
9	7°03'	-30'	104°	6°48'	-31'	104°	6°33'	-32'	104°	6°18'	-33'	104°	6°03'	-33'	105°	5°48'	-34'	105°	5°33'	-35'	105°	9
10	6°33'	-30'	105°	6°17'	-31'	105°	6°02'	-32'	105°	5°46'	-33'	105°	5°30'	-33'	105°	5°14'	-34'	106°	4°58'	-35'	106°	10
11	6°03'	-30'	106°	5°47'	-31'	106°	5°30'	-32'	106°	5°13'	-33'	106°	4°57'	-34'	106°	4°40'	-34'	106°	4°23'	-35'	106°	11
12	5°33'	-30'	107°	5°16'	-31'	107°	4°58'	-32'	107°	4°41'	-33'	107°	4°23'	-34'	107°	4°05'	-34'	107°	3°48'	-35'	107°	12
13	5°03'	-30'	108°	4°44'	-31'	108°	4°26'	-32'	108°	4°08'	-33'	108°	3°49'	-34'	108°	3°31'	-34'	108°	3°12'	-35'	108°	13
14	4°32'	-30'	108°	4°13'	-31'	109°	3°54'	-32'	109°	3°35'	-33'	109°	3°16'	-34'	109°	2°56'	-35'	109°	2°37'	-35'	109°	14
15	4°02'	-30'	109°	3°42'	-31'	109°	3°22'	-32'	109°	3°02'	-33'	110°	2°42'	-34'	110°	2°22'	-35'	110°	2°02'	-35'	110°	15
16	3°32'	-30'	110°	3°11'	-31'	110°	2°50'	-32'	110°	2°29'	-33'	110°	2°08'	-34'	110°	1°47'	-35'	110°	1°26'	-35'	110°	16
17	3°01'	-30'	111°	2°40'	-31'	111°	2°18'	-32'	111°	1°56'	-33'	111°	1°35'	-34'	111°	1°13'	-35'	111°	0°51'	-35'	111°	17
18	2°31'	-31'	112°	2°08'	-31'	112°	1°46'	-32'	112°	1°23'	-33'	112°	1°01'	-34'	112°	0°38'	-35'	112°	0°16'	-35'	112°	18
19	2°00'	-31'	113°	1°37'	-31'	113°	1°14'	-32'	113°	0°50'	-33'	113°	0°27'	-34'	113°	0°04'	-35'	113°	0°20'	+35'	67°	19
20	1°30'	-31'	114°	1°06'	-31'	114°	0°41'	-32'	114°	0°17'	-33'	114°	0°07'	+34'	66°	0°31'	+35'	66°	0°55'	+35'	66°	20
21	0°59'	-31'	115°	0°34'	-31'	115°	0°09'	-32'	115°	0°16'	+33'	65°	0°41'	+34'	65°	1°06'	+35'	65°	1°30'	+35'	66°	21
22	0°28'	-31'	115°	0°03'	-31'	115°	0°23'	+32'	65°	0°49'	+33'	65°	1°14'	+34'	65°	1°40'	+35'	65°	2°06'	+35'	65°	22
23	0°02'	+31'	64°	0°29'	+31'	64°	0°55'	+32'	64°	1°22'	+33'	64°	1°48'	+34'	64°	2°15'	+35'	64°	2°41'	+35'	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°
	28			29			30			31			32			33			34			

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°	28			29			30			31			32			33			34			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	12°20'	-29'	97°	12°13'	-30'	97°	12°06'	-31'	97°	11°58'	-32'	97°	11°50'	-33'	98°	11°42'	-33'	98°	11°34'	-34'	98°	0
1	11°51'	-29'	98°	11°43'	-30'	98°	11°35'	-31'	98°	11°26'	-32'	98°	11°18'	-33'	98°	11°09'	-34'	99°	11°00'	-34'	99°	1
2	11°22'	-29'	98°	11°13'	-30'	99°	11°04'	-31'	99°	10°55'	-32'	99°	10°45'	-33'	99°	10°35'	-34'	99°	10°25'	-35'	100°	2
3	10°53'	-29'	99°	10°43'	-30'	100°	10°33'	-31'	100°	10°23'	-32'	100°	10°12'	-33'	100°	10°02'	-34'	100°	9°51'	-35'	100°	3
4	10°23'	-30'	100°	10°13'	-30'	100°	10°02'	-31'	101°	9°51'	-32'	101°	9°39'	-33'	101°	9°28'	-34'	101°	9°16'	-35'	101°	4
5	9°54'	-30'	101°	9°42'	-31'	101°	9°30'	-31'	101°	9°18'	-32'	102°	9°06'	-33'	102°	8°54'	-34'	102°	8°41'	-35'	102°	5
6	9°24'	-30'	102°	9°12'	-31'	102°	8°59'	-32'	102°	8°46'	-32'	102°	8°33'	-33'	103°	8°20'	-34'	103°	8°06'	-35'	103°	6
7	8°54'	-30'	103°	8°41'	-31'	103°	8°27'	-32'	103°	8°13'	-33'	103°	8°00'	-33'	103°	7°46'	-34'	104°	7°31'	-35'	104°	7
8	8°24'	-30'	104°	8°10'	-31'	104°	7°56'	-32'	104°	7°41'	-33'	104°	7°26'	-34'	104°	7°11'	-34'	104°	6°56'	-35'	105°	8
9	7°54'	-30'	105°	7°39'	-31'	105°	7°24'	-32'	105°	7°08'	-33'	105°	6°53'	-34'	105°	6°37'	-34'	105°	6°21'	-35'	105°	9
10	7°24'	-30'	106°	7°08'	-31'	106°	6°52'	-32'	106°	6°35'	-33'	106°	6°19'	-34'	106°	6°02'	-35'	106°	5°46'	-35'	106°	10
11	6°54'	-30'	106°	6°37'	-31'	106°	6°20'	-32'	107°	6°03'	-33'	107°	5°45'	-34'	107°	5°28'	-35'	107°	5°10'	-35'	107°	11
12	6°24'	-30'	107°	6°06'	-31'	107°	5°48'	-32'	107°	5°30'	-33'	108°	5°12'	-34'	108°	4°53'	-35'	108°	4°35'	-35'	108°	12
13	5°53'	-31'	108°	5°34'	-31'	108°	5°16'	-32'	108°	4°57'	-33'	108°	4°38'	-34'	108°	4°19'	-35'	109°	4°00'	-36'	109°	13
14	5°23'	-31'	109°	5°03'	-31'	109°	4°43'	-32'	109°	4°24'	-33'	109°	4°04'	-34'	109°	3°44'	-35'	109°	3°24'	-36'	109°	14
15	4°52'	-31'	110°	4°32'	-32'	110°	4°11'	-32'	110°	3°51'	-33'	110°	3°30'	-34'	110°	3°09'	-35'	110°	2°49'	-36'	110°	15
16	4°21'	-31'	111°	4°00'	-32'	111°	3°39'	-32'	111°	3°17'	-33'	111°	2°56'	-34'	111°	2°34'	-35'	111°	2°13'	-36'	111°	16
17	3°51'	-31'	112°	3°28'	-32'	112°	3°06'	-32'	112°	2°44'	-33'	112°	2°22'	-34'	112°	2°00'	-35'	112°	1°37'	-36'	112°	17
18	3°20'	-31'	112°	2°57'	-32'	112°	2°34'	-32'	113°	2°11'	-33'	113°	1°48'	-34'	113°	1°25'	-35'	113°	1°02'	-36'	113°	18
19	2°49'	-31'	113°	2°25'	-32'	113°	2°01'	-32'	113°	1°38'	-33'	113°	1°14'	-34'	113°	0°50'	-35'	113°	0°26'	-36'	113°	19
20	2°18'	-31'	114°	1°54'	-32'	114°	1°29'	-33'	114°	1°04'	-33'	114°	0°40'	-34'	114°	0°15'	-35'	114°	0°10'	+36'	66°	20
21	1°47'	-31'	115°	1°22'	-32'	115°	0°56'	-33'	115°	0°31'	-33'	115°	0°06'	-34'	115°	0°20'	+35'	65°	0°45'	+36'	65°	21
22	1°16'	-31'	116°	0°50'	-32'	116°	0°24'	-33'	116°	0°02'	+33'	64°	0°28'	+34'	64°	0°55'	+35'	64°	1°21'	+36'	64°	22
23	0°45'	-31'	117°	0°18'	-32'	117°	0°09'	+33'	63°	0°36'	+33'	63°	1°03'	+34'	63°	1°30'	+35'	63°	1°56'	+36'	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°
	28			29			30			31			32			33			34			

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°	28			29			30			31			32			33			34			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	13°13'	-29'	97°	13°05'	-30'	97°	12°57'	-31'	98°	12°49'	-32'	98°	12°41'	-33'	98°	12°32'	-34'	98°	12°23'	-34'	99°	0
1	12°44'	-29'	98°	12°35'	-30'	98°	12°26'	-31'	99°	12°17'	-32'	99°	12°08'	-33'	99°	11°59'	-34'	99°	11°49'	-35'	99°	1
2	12°14'	-29'	99°	12°05'	-30'	99°	11°55'	-31'	99°	11°45'	-32'	100°	11°35'	-33'	100°	11°25'	-34'	100°	11°14'	-35'	100°	2
3	11°45'	-30'	100°	11°35'	-30'	100°	11°24'	-31'	100°	11°13'	-32'	100°	11°02'	-33'	101°	10°51'	-34'	101°	10°40'	-35'	101°	3
4	11°15'	-30'	101°	11°04'	-31'	101°	10°53'	-32'	101°	10°41'	-32'	101°	10°29'	-33'	101°	10°17'	-34'	102°	10°05'	-35'	102°	4
5	10°46'	-30'	102°	10°34'	-31'	102°	10°21'	-32'	102°	10°09'	-33'	102°	9°56'	-33'	102°	9°43'	-34'	103°	9°30'	-35'	103°	5
6	10°16'	-30'	103°	10°03'	-31'	103°	9°50'	-32'	103°	9°36'	-33'	103°	9°23'	-34'	103°	9°09'	-34'	103°	8°55'	-35'	103°	6
7	9°46'	-30'	103°	9°32'	-31'	104°	9°18'	-32'	104°	9°03'	-33'	104°	8°49'	-34'	104°	8°34'	-34'	104°	8°20'	-35'	104°	7
8	9°16'	-30'	104°	9°01'	-31'	104°	8°46'	-32'	105°	8°31'	-33'	105°	8°15'	-34'	105°	8°00'	-35'	105°	7°44'	-35'	105°	8
9	8°46'	-30'	105°	8°30'	-31'	105°	8°14'	-32'	105°	7°58'	-33'	106°	7°42'	-34'	106°	7°25'	-35'	106°	7°09'	-35'	106°	9
10	8°15'	-30'	106°	7°59'	-31'	106°	7°42'	-32'	106°	7°25'	-33'	106°	7°08'	-34'	107°	6°51'	-35'	107°	6°33'	-36'	107°	10
11	7°45'	-31'	107°	7°27'	-31'	107°	7°10'	-32'	107°	6°52'	-33'	107°	6°34'	-34'	107°	6°16'	-35'	107°	5°58'	-36'	108°	11
12	7°14'	-31'	108°	6°56'	-32'	108°	6°37'	-32'	108°	6°19'	-33'	108°	6°00'	-34'	108°	5°41'	-35'	108°	5°22'	-36'	108°	12
13	6°43'	-31'	109°	6°24'	-32'	109°	6°05'	-32'	109°	5°45'	-33'	109°	5°26'	-34'	109°	5°06'	-35'	109°	4°47'	-36'	109°	13
14	6°13'	-31'	109°	5°52'	-32'	110°	5°32'	-33'	110°	5°12'	-33'	110°	4°52'	-34'	110°	4°31'	-35'	110°	4°11'	-36'	110°	14
15	5°42'	-31'	110°	5°21'	-32'	110°	5°00'	-33'	111°	4°39'	-33'	111°	4°18'	-34'	111°	3°56'	-35'	111°	3°35'	-36'	111°	15
16	5°11'	-31'	111°	4°49'	-32'	111°	4°27'	-33'	111°	4°05'	-33'	111°	3°43'	-34'	111°	3°21'	-35'	112°	2°59'	-36'	112°	16
17	4°40'	-31'	112°	4°17'	-32'	112°	3°55'	-33'	112°	3°32'	-34'	112°	3°09'	-34'	112°	2°46'	-35'	112°	2°23'	-36'	112°	17
18	4°09'	-31'	113°	3°45'	-32'	113°	3°22'	-33'	113°	2°58'	-34'	113°	2°35'	-34'	113°	2°11'	-35'	113°	1°48'	-36'	113°	18
19	3°38'	-31'	114°	3°13'	-32'	114°	2°49'	-33'	114°	2°25'	-34'	114°	2°00'	-34'	114°	1°36'	-35'	114°	1°12'	-36'	114°	19
20	3°06'	-31'	115°	2°41'	-32'	115°	2°16'	-33'	115°	1°51'	-34'	115°	1°26'	-34'	115°	1°01'	-35'	115°	0°36'	-36'	115°	20
21	2°35'	-31'	115°	2°09'	-32'	116°	1°43'	-33'	116°	1°18'	-34'	116°	0°52'	-34'	116°	0°26'	-35'	116°	0°00'	+36'	64°	21
22	2°04'	-31'	116°	1°37'	-32'	116°	1°11'	-33'	116°	0°44'	-34'	116°	0°17'	-34'	116°	0°10'	+35'	64°	0°36'	+36'	64°	22
23	1°33'	-31'	117°	1°05'	-32'	117°	0°38'	-33'	117°	0°10'	-34'	117°	0°17'	+34'	63°	0°45'	+35'	63°	1°12'	+36'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
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°05'	-29'	98°	13°57'	-30'	98°	13°49'	-31'	98°	13°40'	-32'	98°	13°31'	-33'	99°	13°22'	-34'	99°	13°13'	-35'	99°	0
1	13°36'	-29'	99°	13°27'	-30'	99°	13°18'	-31'	99°	13°08'	-32'	99°	12°58'	-33'	100°	12°48'	-34'	100°	12°38'	-35'	100°	1
2	13°07'	-30'	99°	12°57'	-30'	100°	12°46'	-31'	100°	12°36'	-32'	100°	12°25'	-33'	100°	12°14'	-34'	101°	12°03'	-35'	101°	2
3	12°37'	-30'	100°	12°26'	-31'	101°	12°15'	-32'	101°	12°04'	-32'	101°	11°52'	-33'	101°	11°40'	-34'	101°	11°28'	-35'	102°	3
4	12°07'	-30'	101°	11°56'	-31'	101°	11°44'	-32'	102°	11°31'	-33'	102°	11°19'	-33'	102°	11°06'	-34'	102°	10°53'	-35'	102°	4
5	11°38'	-30'	102°	11°25'	-31'	102°	11°12'	-32'	103°	10°59'	-33'	103°	10°46'	-34'	103°	10°32'	-34'	103°	10°18'	-35'	103°	5
6	11°08'	-30'	103°	10°54'	-31'	103°	10°40'	-32'	103°	10°26'	-33'	104°	10°12'	-34'	104°	9°58'	-35'	104°	9°43'	-35'	104°	6
7	10°37'	-30'	104°	10°23'	-31'	104°	10°08'	-32'	104°	9°53'	-33'	104°	9°38'	-34'	105°	9°23'	-35'	105°	9°08'	-35'	105°	7
8	10°07'	-30'	105°	9°52'	-31'	105°	9°36'	-32'	105°	9°20'	-33'	105°	9°05'	-34'	105°	8°48'	-35'	106°	8°32'	-36'	106°	8
9	9°37'	-31'	106°	9°20'	-31'	106°	9°04'	-32'	106°	8°47'	-33'	106°	8°31'	-34'	106°	8°14'	-35'	106°	7°57'	-36'	107°	9
10	9°06'	-31'	107°	8°49'	-32'	107°	8°32'	-32'	107°	8°14'	-33'	107°	7°57'	-34'	107°	7°39'	-35'	107°	7°21'	-36'	107°	10
11	8°35'	-31'	107°	8°17'	-32'	108°	7°59'	-33'	108°	7°41'	-33'	108°	7°22'	-34'	108°	7°04'	-35'	108°	6°45'	-36'	108°	11
12	8°04'	-31'	108°	7°46'	-32'	108°	7°27'	-33'	109°	7°07'	-33'	109°	6°48'	-34'	109°	6°29'	-35'	109°	6°09'	-36'	109°	12
13	7°33'	-31'	109°	7°14'	-32'	109°	6°54'	-33'	109°	6°34'	-34'	109°	6°14'	-34'	110°	5°54'	-35'	110°	5°34'	-36'	110°	13
14	7°02'	-31'	110°	6°42'	-32'	110°	6°21'	-33'	110°	6°00'	-34'	110°	5°40'	-34'	110°	5°19'	-35'	110°	4°58'	-36'	111°	14
15	6°31'	-31'	111°	6°10'	-32'	111°	5°48'	-33'	111°	5°27'	-34'	111°	5°05'	-35'	111°	4°43'	-35'	111°	4°22'	-36'	111°	15
16	6°00'	-31'	112°	5°38'	-32'	112°	5°15'	-33'	112°	4°53'	-34'	112°	4°31'	-35'	112°	4°08'	-35'	112°	3°45'	-36'	112°	16
17	5°29'	-31'	113°	5°06'	-32'	113°	4°43'	-33'	113°	4°19'	-34'	113°	3°56'	-35'	113°	3°33'	-35'	113°	3°09'	-36'	113°	17
18	4°57'	-31'	113°	4°33'	-32'	113°	4°10'	-33'	114°	3°45'	-34'	114°	3°21'	-35'	114°	2°57'	-35'	114°	2°33'	-36'	114°	18
19	4°26'	-32'	114°	4°01'	-32'	114°	3°36'	-33'	114°	3°12'	-34'	114°	2°47'	-35'	114°	2°22'	-35'	115°	1°57'	-36'	115°	19
20	3°54'	-32'	115°	3°29'	-32'	115°	3°03'	-33'	115°	2°38'	-34'	115°	2°12'	-35'	115°	1°46'	-35'	115°	1°21'	-36'	115°	20
21	3°23'	-32'	116°	2°57'	-32'	116°	2°30'	-33'	116°	2°04'	-34'	116°	1°37'	-35'	116°	1°11'	-35'	116°	0°44'	-36'	116°	21
22	2°51'	-32'	117°	2°24'	-32'	117°	1°57'	-33'	117°	1°30'	-34'	117°	1°03'	-35'	117°	0°35'	-35'	117°	0°08'	-36'	117°	22
23	2°20'	-32'	118°	1°52'	-32'	118°	1°24'	-33'	118°	0°56'	-34'	118°	0°28'	-35'	118°	0°00'	+35'	62°	0°28'	+36'	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°
	28			29			30			31			32			33			34			

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

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

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

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

72° 288° LHA — Latitude CONTRARY to 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

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

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

71° 289° LHA — Latitude CONTRARY to 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

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

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

70° 290° LHA — Latitude CONTRARY to 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

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

	28			29			30			31			32			33			34			
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°27'	-30'	100°	18°16'	-31'	101°	18°05'	-32'	101°	17°53'	-33'	101°	17°42'	-33'	101°	17°29'	-34'	102°	17°17'	-35'	102°	0
1	17°57'	-30'	101°	17°45'	-31'	101°	17°33'	-32'	102°	17°21'	-33'	102°	17°08'	-34'	102°	16°55'	-35'	103°	16°42'	-35'	103°	1
2	17°27'	-30'	102°	17°14'	-31'	102°	17°01'	-32'	103°	16°48'	-33'	103°	16°34'	-34'	103°	16°20'	-35'	104°	16°06'	-36'	104°	2
3	16°57'	-31'	103°	16°43'	-31'	103°	16°29'	-32'	104°	16°15'	-33'	104°	16°00'	-34'	104°	15°46'	-35'	104°	15°31'	-36'	105°	3
4	16°26'	-31'	104°	16°12'	-32'	104°	15°57'	-33'	104°	15°42'	-33'	105°	15°26'	-34'	105°	15°11'	-35'	105°	14°55'	-36'	105°	4
5	15°55'	-31'	105°	15°40'	-32'	105°	15°24'	-33'	105°	15°08'	-34'	106°	14°52'	-35'	106°	14°36'	-35'	106°	14°19'	-36'	106°	5
6	15°24'	-31'	106°	15°08'	-32'	106°	14°51'	-33'	106°	14°35'	-34'	106°	14°17'	-35'	107°	14°00'	-36'	107°	13°43'	-36'	107°	6
7	14°53'	-31'	107°	14°36'	-32'	107°	14°18'	-33'	107°	14°01'	-34'	107°	13°43'	-35'	107°	13°25'	-36'	108°	13°06'	-36'	108°	7
8	14°22'	-32'	107°	14°04'	-32'	108°	13°45'	-33'	108°	13°27'	-34'	108°	13°08'	-35'	108°	12°49'	-36'	109°	12°30'	-37'	109°	8
9	13°50'	-32'	108°	13°31'	-33'	108°	13°12'	-34'	109°	12°53'	-34'	109°	12°33'	-35'	109°	12°13'	-36'	109°	11°53'	-37'	110°	9
10	13°18'	-32'	109°	12°58'	-33'	109°	12°38'	-34'	110°	12°18'	-34'	110°	11°58'	-35'	110°	11°37'	-36'	110°	11°16'	-37'	110°	10
11	12°46'	-32'	110°	12°26'	-33'	110°	12°05'	-34'	110°	11°44'	-35'	111°	11°22'	-35'	111°	11°01'	-36'	111°	10°39'	-37'	111°	11
12	12°14'	-32'	111°	11°53'	-33'	111°	11°31'	-34'	111°	11°09'	-35'	111°	10°47'	-36'	112°	10°25'	-36'	112°	10°02'	-37'	112°	12
13	11°42'	-32'	112°	11°19'	-33'	112°	10°57'	-34'	112°	10°34'	-35'	112°	10°11'	-36'	112°	9°48'	-36'	113°	9°25'	-37'	113°	13
14	11°09'	-33'	113°	10°46'	-33'	113°	10°23'	-34'	113°	9°59'	-35'	113°	9°36'	-36'	113°	9°12'	-37'	113°	8°48'	-37'	114°	14
15	10°37'	-33'	113°	10°13'	-34'	114°	9°49'	-34'	114°	9°24'	-35'	114°	9°00'	-36'	114°	8°35'	-37'	114°	8°11'	-37'	114°	15
16	10°04'	-33'	114°	9°39'	-34'	114°	9°14'	-34'	115°	8°49'	-35'	115°	8°24'	-36'	115°	7°59'	-37'	115°	7°33'	-38'	115°	16
17	9°31'	-33'	115°	9°05'	-34'	115°	8°40'	-35'	115°	8°14'	-35'	116°	7°48'	-36'	116°	7°22'	-37'	116°	6°56'	-38'	116°	17
18	8°58'	-33'	116°	8°32'	-34'	116°	8°05'	-35'	116°	7°39'	-35'	116°	7°12'	-36'	116°	6°45'	-37'	117°	6°18'	-38'	117°	18
19	8°25'	-33'	117°	7°58'	-34'	117°	7°30'	-35'	117°	7°03'	-36'	117°	6°36'	-36'	117°	6°08'	-37'	117°	5°40'	-38'	117°	19
20	7°52'	-33'	118°	7°24'	-34'	118°	6°56'	-35'	118°	6°28'	-36'	118°	5°59'	-36'	118°	5°31'	-37'	118°	5°03'	-38'	118°	20
21	7°18'	-33'	119°	6°50'	-34'	119°	6°21'	-35'	119°	5°52'	-36'	119°	5°23'	-36'	119°	4°54'	-37'	119°	4°25'	-38'	119°	21
22	6°45'	-34'	119°	6°15'	-34'	119°	5°46'	-35'	120°	5°16'	-36'	120°	4°47'	-36'	120°	4°17'	-37'	120°	3°47'	-38'	120°	22
23	6°11'	-34'	120°	5°41'	-34'	120°	5°11'	-35'	120°	4°41'	-36'	120°	4°10'	-37'	120°	3°40'	-37'	121°	3°09'	-38'	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°
	28			29			30			31			32			33			34			

69° 291° LHA — Latitude CONTRARY to 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

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

Dec°	28			29			30			31			32			33			34			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	19°19'	-30'	101°	19°08'	-31'	101°	18°56'	-32'	101°	18°44'	-33'	102°	18°31'	-34'	102°	18°19'	-35'	102°	18°06'	-35'	103°	0
1	18°49'	-30'	102°	18°37'	-31'	102°	18°24'	-32'	102°	18°11'	-33'	103°	17°58'	-34'	103°	17°44'	-35'	103°	17°30'	-36'	104°	1
2	18°19'	-31'	103°	18°05'	-31'	103°	17°52'	-32'	103°	17°38'	-33'	104°	17°24'	-34'	104°	17°09'	-35'	104°	16°55'	-36'	104°	2
3	17°48'	-31'	103°	17°34'	-32'	104°	17°20'	-33'	104°	17°05'	-33'	104°	16°50'	-34'	105°	16°34'	-35'	105°	16°19'	-36'	105°	3
4	17°17'	-31'	104°	17°02'	-32'	105°	16°47'	-33'	105°	16°31'	-34'	105°	16°15'	-35'	106°	15°59'	-35'	106°	15°43'	-36'	106°	4
5	16°46'	-31'	105°	16°30'	-32'	106°	16°14'	-33'	106°	15°58'	-34'	106°	15°41'	-35'	106°	15°24'	-36'	107°	15°06'	-36'	107°	5
6	16°15'	-31'	106°	15°58'	-32'	106°	15°41'	-33'	107°	15°24'	-34'	107°	15°06'	-35'	107°	14°48'	-36'	107°	14°30'	-37'	108°	6
7	15°44'	-32'	107°	15°26'	-33'	107°	15°08'	-33'	108°	14°50'	-34'	108°	14°31'	-35'	108°	14°13'	-36'	108°	13°54'	-37'	109°	7
8	15°12'	-32'	108°	14°53'	-33'	108°	14°35'	-34'	108°	14°16'	-34'	109°	13°56'	-35'	109°	13°37'	-36'	109°	13°17'	-37'	109°	8
9	14°40'	-32'	109°	14°21'	-33'	109°	14°01'	-34'	109°	13°41'	-35'	110°	13°21'	-35'	110°	13°01'	-36'	110°	12°40'	-37'	110°	9
10	14°08'	-32'	110°	13°48'	-33'	110°	13°27'	-34'	110°	13°06'	-35'	110°	12°45'	-36'	111°	12°24'	-36'	111°	12°03'	-37'	111°	10
11	13°36'	-32'	111°	13°15'	-33'	111°	12°53'	-34'	111°	12°32'	-35'	111°	12°10'	-36'	111°	11°48'	-37'	112°	11°26'	-37'	112°	11
12	13°03'	-33'	111°	12°41'	-33'	112°	12°19'	-34'	112°	11°57'	-35'	112°	11°34'	-36'	112°	11°11'	-37'	112°	10°48'	-37'	113°	12
13	12°31'	-33'	112°	12°08'	-34'	112°	11°45'	-34'	113°	11°22'	-35'	113°	10°58'	-36'	113°	10°35'	-37'	113°	10°11'	-38'	113°	13
14	11°58'	-33'	113°	11°34'	-34'	113°	11°11'	-35'	114°	10°47'	-35'	114°	10°22'	-36'	114°	9°58'	-37'	114°	9°34'	-38'	114°	14
15	11°25'	-33'	114°	11°01'	-34'	114°	10°36'	-35'	114°	10°11'	-35'	115°	9°46'	-36'	115°	9°21'	-37'	115°	8°56'	-38'	115°	15
16	10°52'	-33'	115°	10°27'	-34'	115°	10°01'	-35'	115°	9°36'	-36'	115°	9°10'	-36'	115°	8°44'	-37'	116°	8°18'	-38'	116°	16
17	10°19'	-33'	116°	9°53'	-34'	116°	9°27'	-35'	116°	9°00'	-36'	116°	8°34'	-36'	116°	8°07'	-37'	116°	7°40'	-38'	117°	17
18	9°46'	-33'	117°	9°19'	-34'	117°	8°52'	-35'	117°	8°25'	-36'	117°	7°57'	-37'	117°	7°30'	-37'	117°	7°02'	-38'	117°	18
19	9°12'	-34'	117°	8°44'	-34'	118°	8°17'	-35'	118°	7°49'	-36'	118°	7°21'	-37'	118°	6°53'	-37'	118°	6°24'	-38'	118°	19
20	8°38'	-34'	118°	8°10'	-34'	118°	7°42'	-35'	118°	7°13'	-36'	119°	6°44'	-37'	119°	6°15'	-37'	119°	5°46'	-38'	119°	20
21	8°05'	-34'	119°	7°36'	-35'	119°	7°06'	-35'	119°	6°37'	-36'	119°	6°07'	-37'	119°	5°38'	-37'	120°	5°08'	-38'	120°	21
22	7°31'	-34'	120°	7°01'	-35'	120°	6°31'	-35'	120°	6°01'	-36'	120°	5°31'	-37'	120°	5°00'	-38'	120°	4°30'	-38'	120°	22
23	6°57'	-34'	121°	6°26'	-35'	121°	5°56'	-35'	121°	5°25'	-36'	121°	4°54'	-37'	121°	4°23'	-38'	121°	3°52'	-38'	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°
	28			29			30			31			32			33			34			

68° 292° LHA — Latitude CONTRARY to 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

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

Dec°	28			29			30			31			32			33			34			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	20°11'	-30'	101°	19°59'	-31'	102°	19°47'	-32'	102°	19°34'	-33'	102°	19°21'	-34'	103°	19°08'	-35'	103°	18°54'	-36'	103°	0
1	19°41'	-30'	102°	19°28'	-31'	103°	19°15'	-32'	103°	19°01'	-33'	103°	18°47'	-34'	104°	18°33'	-35'	104°	18°18'	-36'	104°	1
2	19°10'	-31'	103°	18°57'	-32'	103°	18°42'	-33'	104°	18°28'	-33'	104°	18°13'	-34'	104°	17°58'	-35'	105°	17°43'	-36'	105°	2
3	18°40'	-31'	104°	18°25'	-32'	104°	18°10'	-33'	105°	17°55'	-34'	105°	17°39'	-35'	105°	17°23'	-35'	106°	17°07'	-36'	106°	3
4	18°09'	-31'	105°	17°53'	-32'	105°	17°37'	-33'	106°	17°21'	-34'	106°	17°04'	-35'	106°	16°48'	-36'	106°	16°30'	-36'	107°	4
5	17°37'	-31'	106°	17°21'	-32'	106°	17°04'	-33'	106°	16°47'	-34'	107°	16°30'	-35'	107°	16°12'	-36'	107°	15°54'	-37'	108°	5
6	17°06'	-32'	107°	16°49'	-33'	107°	16°31'	-33'	107°	16°13'	-34'	108°	15°55'	-35'	108°	15°36'	-36'	108°	15°17'	-37'	108°	6
7	16°34'	-32'	108°	16°16'	-33'	108°	15°57'	-34'	108°	15°39'	-34'	108°	15°20'	-35'	109°	15°00'	-36'	109°	14°41'	-37'	109°	7
8	16°02'	-32'	108°	15°43'	-33'	109°	15°24'	-34'	109°	15°04'	-35'	109°	14°44'	-36'	110°	14°24'	-36'	110°	14°04'	-37'	110°	8
9	15°30'	-32'	109°	15°10'	-33'	110°	14°50'	-34'	110°	14°29'	-35'	110°	14°09'	-36'	110°	13°48'	-36'	111°	13°27'	-37'	111°	9
10	14°58'	-33'	110°	14°37'	-33'	110°	14°16'	-34'	111°	13°55'	-35'	111°	13°33'	-36'	111°	13°11'	-37'	111°	12°49'	-37'	112°	10
11	14°25'	-33'	111°	14°04'	-34'	111°	13°42'	-34'	112°	13°20'	-35'	112°	12°57'	-36'	112°	12°35'	-37'	112°	12°12'	-38'	112°	11
12	13°53'	-33'	112°	13°30'	-34'	112°	13°07'	-35'	112°	12°44'	-35'	113°	12°21'	-36'	113°	11°58'	-37'	113°	11°34'	-38'	113°	12
13	13°20'	-33'	113°	12°56'	-34'	113°	12°33'	-35'	113°	12°09'	-35'	113°	11°45'	-36'	114°	11°21'	-37'	114°	10°57'	-38'	114°	13
14	12°47'	-33'	114°	12°22'	-34'	114°	11°58'	-35'	114°	11°34'	-36'	114°	11°09'	-36'	114°	10°44'	-37'	115°	10°19'	-38'	115°	14
15	12°13'	-33'	115°	11°48'	-34'	115°	11°23'	-35'	115°	10°58'	-36'	115°	10°32'	-37'	115°	10°07'	-37'	115°	9°41'	-38'	116°	15
16	11°40'	-34'	115°	11°14'	-34'	116°	10°48'	-35'	116°	10°22'	-36'	116°	9°56'	-37'	116°	9°29'	-37'	116°	9°03'	-38'	116°	16
17	11°06'	-34'	116°	10°40'	-34'	116°	10°13'	-35'	117°	9°46'	-36'	117°	9°19'	-37'	117°	8°52'	-37'	117°	8°25'	-38'	117°	17
18	10°33'	-34'	117°	10°05'	-35'	117°	9°38'	-35'	117°	9°10'	-36'	118°	8°42'	-37'	118°	8°15'	-38'	118°	7°46'	-38'	118°	18
19	9°59'	-34'	118°	9°31'	-35'	118°	9°03'	-35'	118°	8°34'	-36'	118°	8°06'	-37'	118°	7°37'	-38'	119°	7°08'	-38'	119°	19
20	9°25'	-34'	119°	8°56'	-35'	119°	8°27'	-36'	119°	7°58'	-36'	119°	7°29'	-37'	119°	6°59'	-38'	119°	6°30'	-38'	119°	20
21	8°51'	-34'	120°	8°21'	-35'	120°	7°51'	-36'	120°	7°22'	-36'	120°	6°52'	-37'	120°	6°22'	-38'	120°	5°51'	-39'	120°	21
22	8°17'	-34'	120°	7°46'	-35'	121°	7°16'	-36'	121°	6°45'	-36'	121°	6°14'	-37'	121°	5°44'	-38'	121°	5°13'	-39'	121°	22
23	7°43'	-34'	121°	7°11'	-35'	121°	6°40'	-36'	121°	6°09'	-37'	122°	5°37'	-37'	122°	5°06'	-38'	122°	4°34'	-39'	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°
	28			29			30			31			32			33			34			

67° 293° LHA — Latitude CONTRARY to 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

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

Dec°	28			29			30			31			32			33			34			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	21°03'	-30'	102°	20°50'	-31'	102°	20°37'	-32'	103°	20°24'	-33'	103°	20°11'	-34'	103°	19°57'	-35'	104°	19°42'	-36'	104°	0
1	20°32'	-31'	103°	20°19'	-32'	103°	20°05'	-32'	103°	19°51'	-33'	104°	19°37'	-34'	104°	19°22'	-35'	104°	19°07'	-36'	105°	1
2	20°02'	-31'	104°	19°48'	-32'	104°	19°33'	-33'	104°	19°18'	-34'	105°	19°02'	-34'	105°	18°47'	-35'	105°	18°31'	-36'	106°	2
3	19°31'	-31'	105°	19°16'	-32'	105°	19°00'	-33'	105°	18°44'	-34'	106°	18°28'	-35'	106°	18°11'	-36'	106°	17°54'	-36'	107°	3
4	19°00'	-31'	105°	18°44'	-32'	106°	18°27'	-33'	106°	18°10'	-34'	106°	17°53'	-35'	107°	17°36'	-36'	107°	17°18'	-37'	107°	4
5	18°28'	-32'	106°	18°11'	-33'	107°	17°54'	-33'	107°	17°36'	-34'	107°	17°18'	-35'	108°	17°00'	-36'	108°	16°41'	-37'	108°	5
6	17°57'	-32'	107°	17°39'	-33'	108°	17°20'	-34'	108°	17°02'	-35'	108°	16°43'	-35'	108°	16°24'	-36'	109°	16°05'	-37'	109°	6
7	17°25'	-32'	108°	17°06'	-33'	108°	16°47'	-34'	109°	16°27'	-35'	109°	16°08'	-36'	109°	15°48'	-36'	110°	15°28'	-37'	110°	7
8	16°53'	-32'	109°	16°33'	-33'	109°	16°13'	-34'	110°	15°53'	-35'	110°	15°32'	-36'	110°	15°11'	-37'	110°	14°50'	-37'	111°	8
9	16°20'	-33'	110°	16°00'	-33'	110°	15°39'	-34'	110°	15°18'	-35'	111°	14°56'	-36'	111°	14°35'	-37'	111°	14°13'	-38'	111°	9
10	15°48'	-33'	111°	15°26'	-34'	111°	15°04'	-34'	111°	14°43'	-35'	112°	14°20'	-36'	112°	13°58'	-37'	112°	13°35'	-38'	112°	10
11	15°15'	-33'	112°	14°52'	-34'	112°	14°30'	-35'	112°	14°07'	-35'	112°	13°44'	-36'	113°	13°21'	-37'	113°	12°58'	-38'	113°	11
12	14°42'	-33'	113°	14°19'	-34'	113°	13°55'	-35'	113°	13°32'	-36'	113°	13°08'	-36'	113°	12°44'	-37'	114°	12°20'	-38'	114°	12
13	14°08'	-33'	113°	13°45'	-34'	114°	13°20'	-35'	114°	12°56'	-36'	114°	12°32'	-37'	114°	12°07'	-37'	114°	11°42'	-38'	115°	13
14	13°35'	-34'	114°	13°10'	-34'	114°	12°45'	-35'	115°	12°20'	-36'	115°	11°55'	-37'	115°	11°29'	-37'	115°	11°04'	-38'	115°	14
15	13°02'	-34'	115°	12°36'	-35'	115°	12°10'	-35'	115°	11°44'	-36'	116°	11°18'	-37'	116°	10°52'	-38'	116°	10°26'	-38'	116°	15
16	12°28'	-34'	116°	12°01'	-35'	116°	11°35'	-35'	116°	11°08'	-36'	116°	10°41'	-37'	117°	10°14'	-38'	117°	9°47'	-38'	117°	16
17	11°54'	-34'	117°	11°27'	-35'	117°	11°00'	-36'	117°	10°32'	-36'	117°	10°04'	-37'	117°	9°37'	-38'	118°	9°09'	-39'	118°	17
18	11°20'	-34'	118°	10°52'	-35'	118°	10°24'	-36'	118°	9°56'	-36'	118°	9°27'	-37'	118°	8°59'	-38'	118°	8°30'	-39'	119°	18
19	10°46'	-34'	118°	10°17'	-35'	119°	9°48'	-36'	119°	9°19'	-37'	119°	8°50'	-37'	119°	8°21'	-38'	119°	7°52'	-39'	119°	19
20	10°11'	-34'	119°	9°42'	-35'	119°	9°12'	-36'	120°	8°43'	-37'	120°	8°13'	-37'	120°	7°43'	-38'	120°	7°13'	-39'	120°	20
21	9°37'	-35'	120°	9°07'	-35'	120°	8°36'	-36'	120°	8°06'	-37'	121°	7°36'	-37'	121°	7°05'	-38'	121°	6°34'	-39'	121°	21
22	9°02'	-35'	121°	8°31'	-35'	121°	8°00'	-36'	121°	7°29'	-37'	121°	6°58'	-38'	121°	6°27'	-38'	122°	5°55'	-39'	122°	22
23	8°28'	-35'	122°	7°56'	-36'	122°	7°24'	-36'	122°	6°52'	-37'	122°	6°20'	-38'	122°	5°48'	-38'	122°	5°16'	-39'	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°
	28			29			30			31			32			33			34			

66° 294° LHA — Latitude CONTRARY to 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

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

Dec°	28			29			30			31			32			33			34			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	21°55'	-31'	102°	21°42'	-31'	103°	21°28'	-32'	103°	21°14'	-33'	104°	21°00'	-34'	104°	20°46'	-35'	104°	20°31'	-36'	105°	0
1	21°24'	-31'	103°	21°10'	-32'	104°	20°56'	-33'	104°	20°41'	-34'	104°	20°26'	-34'	105°	20°10'	-35'	105°	19°55'	-36'	105°	1
2	20°53'	-31'	104°	20°38'	-32'	105°	20°23'	-33'	105°	20°07'	-34'	105°	19°51'	-35'	106°	19°35'	-36'	106°	19°18'	-36'	106°	2
3	20°22'	-31'	105°	20°06'	-32'	105°	19°50'	-33'	106°	19°34'	-34'	106°	19°17'	-35'	106°	19°00'	-36'	107°	18°42'	-37'	107°	3
4	19°51'	-32'	106°	19°34'	-33'	106°	19°17'	-33'	107°	19°00'	-34'	107°	18°42'	-35'	107°	18°24'	-36'	108°	18°05'	-37'	108°	4
5	19°19'	-32'	107°	19°01'	-33'	107°	18°44'	-34'	108°	18°25'	-35'	108°	18°07'	-35'	108°	17°48'	-36'	109°	17°29'	-37'	109°	5
6	18°47'	-32'	108°	18°29'	-33'	108°	18°10'	-34'	108°	17°51'	-35'	109°	17°31'	-36'	109°	17°11'	-36'	109°	16°51'	-37'	110°	6
7	18°15'	-32'	109°	17°56'	-33'	109°	17°36'	-34'	109°	17°16'	-35'	110°	16°56'	-36'	110°	16°35'	-37'	110°	16°14'	-37'	110°	7
8	17°43'	-33'	110°	17°22'	-34'	110°	17°02'	-34'	110°	16°41'	-35'	110°	16°20'	-36'	111°	15°58'	-37'	111°	15°37'	-38'	111°	8
9	17°10'	-33'	110°	16°49'	-34'	111°	16°27'	-35'	111°	16°06'	-35'	111°	15°44'	-36'	112°	15°22'	-37'	112°	14°59'	-38'	112°	9
10	16°37'	-33'	111°	16°15'	-34'	112°	15°53'	-35'	112°	15°30'	-36'	112°	15°08'	-36'	112°	14°45'	-37'	113°	14°21'	-38'	113°	10
11	16°04'	-33'	112°	15°41'	-34'	112°	15°18'	-35'	113°	14°55'	-36'	113°	14°31'	-37'	113°	14°07'	-37'	113°	13°43'	-38'	114°	11
12	15°31'	-34'	113°	15°07'	-34'	113°	14°43'	-35'	114°	14°19'	-36'	114°	13°55'	-37'	114°	13°30'	-37'	114°	13°05'	-38'	114°	12
13	14°57'	-34'	114°	14°33'	-35'	114°	14°08'	-35'	114°	13°43'	-36'	115°	13°18'	-37'	115°	12°53'	-38'	115°	12°27'	-38'	115°	13
14	14°23'	-34'	115°	13°58'	-35'	115°	13°33'	-35'	115°	13°07'	-36'	115°	12°41'	-37'	116°	12°15'	-38'	116°	11°49'	-39'	116°	14
15	13°49'	-34'	116°	13°23'	-35'	116°	12°57'	-36'	116°	12°31'	-36'	116°	12°04'	-37'	116°	11°37'	-38'	117°	11°10'	-39'	117°	15
16	13°15'	-34'	116°	12°48'	-35'	117°	12°21'	-36'	117°	11°54'	-37'	117°	11°27'	-37'	117°	10°59'	-38'	117°	10°31'	-39'	118°	16
17	12°41'	-34'	117°	12°13'	-35'	118°	11°46'	-36'	118°	11°18'	-37'	118°	10°49'	-37'	118°	10°21'	-38'	118°	9°53'	-39'	118°	17
18	12°07'	-35'	118°	11°38'	-35'	118°	11°10'	-36'	119°	10°41'	-37'	119°	10°12'	-38'	119°	9°43'	-38'	119°	9°14'	-39'	119°	18
19	11°32'	-35'	119°	11°03'	-35'	119°	10°34'	-36'	119°	10°04'	-37'	120°	9°35'	-38'	120°	9°05'	-38'	120°	8°35'	-39'	120°	19
20	10°57'	-35'	120°	10°28'	-36'	120°	9°57'	-36'	120°	9°27'	-37'	120°	8°57'	-38'	120°	8°26'	-38'	121°	7°56'	-39'	121°	20
21	10°23'	-35'	121°	9°52'	-36'	121°	9°21'	-36'	121°	8°50'	-37'	121°	8°19'	-38'	121°	7°48'	-39'	121°	7°17'	-39'	121°	21
22	9°48'	-35'	121°	9°16'	-36'	122°	8°45'	-37'	122°	8°13'	-37'	122°	7°41'	-38'	122°	7°09'	-39'	122°	6°38'	-39'	122°	22
23	9°13'	-35'	122°	8°40'	-36'	122°	8°08'	-37'	123°	7°36'	-37'	123°	7°03'	-38'	123°	6°31'	-39'	123°	5°58'	-39'	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°
	28			29			30			31			32			33			34			

65° 295° LHA — Latitude CONTRARY to 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

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

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

64° 296° LHA — Latitude CONTRARY to 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

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

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

63° 297° LHA — Latitude CONTRARY to 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

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

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

62° 298° LHA — Latitude CONTRARY to 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

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

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

61° 299° LHA — Latitude CONTRARY to 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

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

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

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

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

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

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

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

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

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

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

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°	28			29			30			31			32			33			34			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	33°45'	-34'	111°	33°24'	-35'	111°	33°02'	-36'	112°	32°39'	-37'	113°	32°15'	-38'	113°	31°51'	-39'	114°	31°27'	-40'	114°	0
1	33°11'	-35'	112°	32°49'	-36'	112°	32°26'	-36'	113°	32°02'	-37'	114°	31°38'	-38'	114°	31°13'	-39'	115°	30°47'	-40'	115°	1
2	32°37'	-35'	113°	32°13'	-36'	113°	31°49'	-37'	114°	31°24'	-38'	114°	30°59'	-39'	115°	30°34'	-39'	116°	30°08'	-40'	116°	2
3	32°02'	-35'	114°	31°37'	-36'	114°	31°12'	-37'	115°	30°47'	-38'	115°	30°21'	-39'	116°	29°54'	-40'	116°	29°27'	-41'	117°	3
4	31°26'	-36'	115°	31°01'	-37'	115°	30°35'	-38'	116°	30°09'	-38'	116°	29°42'	-39'	117°	29°15'	-40'	117°	28°47'	-41'	118°	4
5	30°50'	-36'	116°	30°24'	-37'	116°	29°57'	-38'	117°	29°30'	-39'	117°	29°03'	-40'	118°	28°35'	-40'	118°	28°06'	-41'	119°	5
6	30°14'	-37'	117°	29°47'	-37'	117°	29°19'	-38'	118°	28°51'	-39'	118°	28°23'	-40'	119°	27°54'	-41'	119°	27°25'	-41'	119°	6
7	29°37'	-37'	117°	29°10'	-38'	118°	28°41'	-39'	118°	28°12'	-39'	119°	27°43'	-40'	119°	27°13'	-41'	120°	26°43'	-42'	120°	7
8	29°00'	-37'	118°	28°32'	-38'	119°	28°03'	-39'	119°	27°33'	-40'	120°	27°03'	-41'	120°	26°33'	-41'	121°	26°02'	-42'	121°	8
9	28°23'	-38'	119°	27°53'	-39'	120°	27°24'	-39'	120°	26°53'	-40'	121°	26°22'	-41'	121°	25°51'	-42'	121°	25°20'	-42'	122°	9
10	27°45'	-38'	120°	27°15'	-39'	121°	26°44'	-40'	121°	26°13'	-40'	121°	25°42'	-41'	122°	25°10'	-42'	122°	24°38'	-42'	123°	10
11	27°07'	-38'	121°	26°36'	-39'	121°	26°05'	-40'	122°	25°33'	-41'	122°	25°01'	-41'	123°	24°28'	-42'	123°	23°55'	-43'	123°	11
12	26°29'	-39'	122°	25°57'	-39'	122°	25°25'	-40'	123°	24°52'	-41'	123°	24°19'	-42'	123°	23°46'	-42'	124°	23°12'	-43'	124°	12
13	25°50'	-39'	123°	25°18'	-40'	123°	24°45'	-40'	124°	24°11'	-41'	124°	23°38'	-42'	124°	23°04'	-42'	125°	22°30'	-43'	125°	13
14	25°11'	-39'	124°	24°38'	-40'	124°	24°04'	-41'	124°	23°30'	-41'	125°	22°56'	-42'	125°	22°21'	-43'	125°	21°46'	-43'	126°	14
15	24°32'	-40'	124°	23°58'	-40'	125°	23°24'	-41'	125°	22°49'	-42'	125°	22°14'	-42'	126°	21°39'	-43'	126°	21°03'	-44'	126°	15
16	23°52'	-40'	125°	23°18'	-40'	126°	22°43'	-41'	126°	22°07'	-42'	126°	21°32'	-42'	127°	20°56'	-43'	127°	20°20'	-44'	127°	16
17	23°13'	-40'	126°	22°37'	-41'	126°	22°01'	-41'	127°	21°25'	-42'	127°	20°49'	-43'	127°	20°13'	-43'	128°	19°36'	-44'	128°	17
18	22°33'	-40'	127°	21°56'	-41'	127°	21°20'	-42'	127°	20°43'	-42'	128°	20°07'	-43'	128°	19°29'	-43'	128°	18°52'	-44'	129°	18
19	21°52'	-41'	128°	21°16'	-41'	128°	20°39'	-42'	128°	20°01'	-42'	129°	19°24'	-43'	129°	18°46'	-44'	129°	18°08'	-44'	129°	19
20	21°12'	-41'	128°	20°34'	-41'	129°	19°57'	-42'	129°	19°19'	-43'	129°	18°41'	-43'	130°	18°02'	-44'	130°	17°24'	-44'	130°	20
21	20°31'	-41'	129°	19°53'	-42'	130°	19°15'	-42'	130°	18°36'	-43'	130°	17°58'	-43'	130°	17°19'	-44'	131°	16°40'	-44'	131°	21
22	19°50'	-41'	130°	19°11'	-42'	130°	18°33'	-42'	131°	17°53'	-43'	131°	17°14'	-44'	131°	16°35'	-44'	131°	15°55'	-45'	131°	22
23	19°09'	-41'	131°	18°30'	-42'	131°	17°50'	-43'	131°	17°11'	-43'	132°	16°31'	-44'	132°	15°51'	-44'	132°	15°10'	-45'	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°
	28			29			30			31			32			33			34			

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

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

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°	28			29			30			31			32			33			34			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	36°13'	-35'	113°	35°49'	-36'	114°	35°25'	-37'	114°	35°00'	-38'	115°	34°34'	-39'	116°	34°08'	-40'	116°	33°42'	-41'	117°	0
1	35°38'	-36'	114°	35°13'	-37'	115°	34°48'	-37'	115°	34°22'	-38'	116°	33°56'	-39'	116°	33°29'	-40'	117°	33°01'	-41'	118°	1
2	35°02'	-36'	115°	34°36'	-37'	116°	34°10'	-38'	116°	33°44'	-39'	117°	33°16'	-40'	117°	32°49'	-40'	118°	32°20'	-41'	118°	2
3	34°26'	-37'	116°	33°59'	-37'	116°	33°32'	-38'	117°	33°05'	-39'	118°	32°37'	-40'	118°	32°08'	-41'	119°	31°39'	-42'	119°	3
4	33°49'	-37'	117°	33°22'	-38'	117°	32°54'	-39'	118°	32°26'	-40'	119°	31°57'	-40'	119°	31°27'	-41'	120°	30°57'	-42'	120°	4
5	33°12'	-37'	118°	32°44'	-38'	118°	32°15'	-39'	119°	31°46'	-40'	119°	31°16'	-41'	120°	30°46'	-41'	121°	30°15'	-42'	121°	5
6	32°35'	-38'	119°	32°06'	-39'	119°	31°36'	-39'	120°	31°06'	-40'	120°	30°36'	-41'	121°	30°05'	-42'	121°	29°33'	-43'	122°	6
7	31°57'	-38'	120°	31°27'	-39'	120°	30°57'	-40'	121°	30°26'	-41'	121°	29°55'	-41'	122°	29°23'	-42'	122°	28°51'	-43'	123°	7
8	31°19'	-39'	121°	30°48'	-39'	121°	30°17'	-40'	122°	29°45'	-41'	122°	29°13'	-42'	123°	28°41'	-42'	123°	28°08'	-43'	123°	8
9	30°40'	-39'	121°	30°09'	-40'	122°	29°37'	-40'	122°	29°04'	-41'	123°	28°32'	-42'	123°	27°58'	-43'	124°	27°25'	-43'	124°	9
10	30°01'	-39'	122°	29°29'	-40'	123°	28°56'	-41'	123°	28°23'	-42'	124°	27°50'	-42'	124°	27°16'	-43'	125°	26°42'	-44'	125°	10
11	29°22'	-40'	123°	28°49'	-40'	124°	28°15'	-41'	124°	27°42'	-42'	125°	27°07'	-42'	125°	26°33'	-43'	125°	25°58'	-44'	126°	11
12	28°42'	-40'	124°	28°08'	-41'	124°	27°34'	-41'	125°	27°00'	-42'	125°	26°25'	-43'	126°	25°50'	-43'	126°	25°14'	-44'	127°	12
13	28°02'	-40'	125°	27°28'	-41'	125°	26°53'	-42'	126°	26°18'	-42'	126°	25°42'	-43'	127°	25°06'	-44'	127°	24°30'	-44'	127°	13
14	27°22'	-41'	126°	26°47'	-41'	126°	26°11'	-42'	127°	25°35'	-43'	127°	24°59'	-43'	127°	24°23'	-44'	128°	23°46'	-44'	128°	14
15	26°41'	-41'	127°	26°06'	-42'	127°	25°29'	-42'	127°	24°53'	-43'	128°	24°16'	-43'	128°	23°39'	-44'	128°	23°01'	-45'	129°	15
16	26°01'	-41'	127°	25°24'	-42'	128°	24°47'	-42'	128°	24°10'	-43'	128°	23°32'	-44'	129°	22°55'	-44'	129°	22°17'	-45'	129°	16
17	25°19'	-41'	128°	24°42'	-42'	129°	24°05'	-43'	129°	23°27'	-43'	129°	22°49'	-44'	130°	22°10'	-44'	130°	21°32'	-45'	130°	17
18	24°38'	-42'	129°	24°00'	-42'	129°	23°22'	-43'	130°	22°44'	-43'	130°	22°05'	-44'	130°	21°26'	-45'	131°	20°47'	-45'	131°	18
19	23°56'	-42'	130°	23°18'	-43'	130°	22°39'	-43'	130°	22°00'	-44'	131°	21°21'	-44'	131°	20°41'	-45'	131°	20°02'	-45'	132°	19
20	23°14'	-42'	131°	22°35'	-43'	131°	21°56'	-43'	131°	21°16'	-44'	131°	20°37'	-44'	132°	19°56'	-45'	132°	19°16'	-46'	132°	20
21	22°32'	-42'	131°	21°53'	-43'	132°	21°13'	-44'	132°	20°32'	-44'	132°	19°52'	-45'	132°	19°11'	-45'	133°	18°31'	-46'	133°	21
22	21°50'	-43'	132°	21°10'	-43'	132°	20°29'	-44'	133°	19°48'	-44'	133°	19°07'	-45'	133°	18°26'	-45'	133°	17°45'	-46'	134°	22
23	21°07'	-43'	133°	20°27'	-43'	133°	19°45'	-44'	133°	19°04'	-44'	134°	18°23'	-45'	134°	17°41'	-45'	134°	16°59'	-46'	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°
	28			29			30			31			32			33			34			

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°	28			29			30			31			32			33			34			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	37°02'	-36'	114°	36°37'	-36'	114°	36°12'	-37'	115°	35°46'	-38'	116°	35°20'	-39'	116°	34°53'	-40'	117°	34°26'	-41'	118°	0
1	36°26'	-36'	115°	36°01'	-37'	115°	35°35'	-38'	116°	35°08'	-39'	117°	34°41'	-40'	117°	34°13'	-40'	118°	33°45'	-41'	118°	1
2	35°50'	-37'	116°	35°24'	-37'	116°	34°57'	-38'	117°	34°29'	-39'	118°	34°01'	-40'	118°	33°33'	-41'	119°	33°04'	-42'	119°	2
3	35°13'	-37'	117°	34°46'	-38'	117°	34°19'	-39'	118°	33°50'	-40'	118°	33°21'	-40'	119°	32°52'	-41'	120°	32°22'	-42'	120°	3
4	34°36'	-37'	118°	34°08'	-38'	118°	33°40'	-39'	119°	33°11'	-40'	119°	32°41'	-41'	120°	32°11'	-42'	120°	31°40'	-42'	121°	4
5	33°59'	-38'	119°	33°30'	-39'	119°	33°01'	-40'	120°	32°31'	-40'	120°	32°00'	-41'	121°	31°29'	-42'	121°	30°58'	-43'	122°	5
6	33°21'	-38'	119°	32°51'	-39'	120°	32°21'	-40'	121°	31°50'	-41'	121°	31°19'	-41'	122°	30°47'	-42'	122°	30°15'	-43'	123°	6
7	32°43'	-39'	120°	32°12'	-39'	121°	31°41'	-40'	121°	31°10'	-41'	122°	30°38'	-42'	122°	30°05'	-42'	123°	29°32'	-43'	123°	7
8	32°04'	-39'	121°	31°33'	-40'	122°	31°01'	-41'	122°	30°29'	-41'	123°	29°56'	-42'	123°	29°23'	-43'	124°	28°49'	-43'	124°	8
9	31°25'	-39'	122°	30°53'	-40'	123°	30°20'	-41'	123°	29°47'	-42'	124°	29°14'	-42'	124°	28°40'	-43'	125°	28°06'	-44'	125°	9
10	30°46'	-40'	123°	30°13'	-41'	124°	29°40'	-41'	124°	29°06'	-42'	124°	28°32'	-43'	125°	27°57'	-43'	125°	27°22'	-44'	126°	10
11	30°06'	-40'	124°	29°32'	-41'	124°	28°58'	-42'	125°	28°24'	-42'	125°	27°49'	-43'	126°	27°14'	-44'	126°	26°38'	-44'	127°	11
12	29°26'	-40'	125°	28°52'	-41'	125°	28°17'	-42'	126°	27°42'	-43'	126°	27°06'	-43'	127°	26°30'	-44'	127°	25°54'	-44'	127°	12
13	28°46'	-41'	126°	28°10'	-41'	126°	27°35'	-42'	126°	26°59'	-43'	127°	26°23'	-43'	127°	25°46'	-44'	128°	25°09'	-45'	128°	13
14	28°05'	-41'	126°	27°29'	-42'	127°	26°53'	-42'	127°	26°16'	-43'	128°	25°39'	-44'	128°	25°02'	-44'	128°	24°25'	-45'	129°	14
15	27°24'	-41'	127°	26°47'	-42'	128°	26°10'	-43'	128°	25°33'	-43'	128°	24°56'	-44'	129°	24°18'	-44'	129°	23°40'	-45'	130°	15
16	26°42'	-42'	128°	26°05'	-42'	128°	25°28'	-43'	129°	24°50'	-43'	129°	24°12'	-44'	130°	23°34'	-45'	130°	22°55'	-45'	130°	16
17	26°01'	-42'	129°	25°23'	-42'	129°	24°45'	-43'	130°	24°06'	-44'	130°	23°28'	-44'	130°	22°49'	-45'	131°	22°10'	-45'	131°	17
18	25°19'	-42'	130°	24°41'	-43'	130°	24°02'	-43'	130°	23°23'	-44'	131°	22°43'	-45'	131°	22°04'	-45'	131°	21°24'	-46'	132°	18
19	24°37'	-42'	130°	23°58'	-43'	131°	23°18'	-44'	131°	22°39'	-44'	131°	21°59'	-45'	132°	21°19'	-45'	132°	20°39'	-46'	132°	19
20	23°55'	-43'	131°	23°15'	-43'	132°	22°35'	-44'	132°	21°55'	-44'	132°	21°14'	-45'	132°	20°34'	-45'	133°	19°53'	-46'	133°	20
21	23°12'	-43'	132°	22°32'	-43'	132°	21°51'	-44'	133°	21°10'	-45'	133°	20°29'	-45'	133°	19°48'	-46'	133°	19°07'	-46'	134°	21
22	22°29'	-43'	133°	21°48'	-44'	133°	21°07'	-44'	133°	20°26'	-45'	134°	19°44'	-45'	134°	19°03'	-46'	134°	18°21'	-46'	134°	22
23	21°46'	-43'	134°	21°05'	-44'	134°	20°23'	-44'	134°	19°41'	-45'	134°	18°59'	-45'	135°	18°17'	-46'	135°	17°35'	-46'	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°
	28			29			30			31			32			33			34			

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°	28			29			30			31			32			33			34			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	37°50'	-36'	114°	37°25'	-37'	115°	36°59'	-38'	116°	36°33'	-39'	116°	36°06'	-40'	117°	35°38'	-40'	118°	35°10'	-41'	118°	0
1	37°14'	-36'	115°	36°48'	-37'	116°	36°21'	-38'	117°	35°54'	-39'	117°	35°26'	-40'	118°	34°58'	-41'	119°	34°29'	-42'	119°	1
2	36°38'	-37'	116°	36°11'	-38'	117°	35°43'	-39'	118°	35°15'	-40'	118°	34°46'	-40'	119°	34°17'	-41'	120°	33°47'	-42'	120°	2
3	36°01'	-37'	117°	35°33'	-38'	118°	35°04'	-39'	119°	34°35'	-40'	119°	34°06'	-41'	120°	33°36'	-42'	120°	33°05'	-42'	121°	3
4	35°23'	-38'	118°	34°54'	-39'	119°	34°25'	-40'	120°	33°55'	-40'	120°	33°25'	-41'	121°	32°54'	-42'	121°	32°23'	-43'	122°	4
5	34°45'	-38'	119°	34°16'	-39'	120°	33°46'	-40'	120°	33°15'	-41'	121°	32°44'	-41'	122°	32°12'	-42'	122°	31°40'	-43'	123°	5
6	34°07'	-39'	120°	33°37'	-40'	121°	33°06'	-40'	121°	32°34'	-41'	122°	32°02'	-42'	122°	31°30'	-43'	123°	30°57'	-43'	123°	6
7	33°28'	-39'	121°	32°57'	-40'	122°	32°25'	-41'	122°	31°53'	-41'	123°	31°20'	-42'	123°	30°47'	-43'	124°	30°14'	-44'	124°	7
8	32°49'	-39'	122°	32°17'	-40'	123°	31°45'	-41'	123°	31°12'	-42'	124°	30°38'	-42'	124°	30°04'	-43'	125°	29°30'	-44'	125°	8
9	32°10'	-40'	123°	31°37'	-41'	123°	31°04'	-41'	124°	30°30'	-42'	124°	29°56'	-43'	125°	29°21'	-43'	125°	28°46'	-44'	126°	9
10	31°30'	-40'	124°	30°56'	-41'	124°	30°22'	-42'	125°	29°48'	-42'	125°	29°13'	-43'	126°	28°38'	-44'	126°	28°02'	-44'	127°	10
11	30°50'	-41'	125°	30°15'	-41'	125°	29°41'	-42'	126°	29°06'	-43'	126°	28°30'	-43'	127°	27°54'	-44'	127°	27°18'	-45'	127°	11
12	30°09'	-41'	126°	29°34'	-42'	126°	28°59'	-42'	126°	28°23'	-43'	127°	27°47'	-44'	127°	27°10'	-44'	128°	26°33'	-45'	128°	12
13	29°28'	-41'	126°	28°53'	-42'	127°	28°16'	-43'	127°	27°40'	-43'	128°	27°03'	-44'	128°	26°26'	-44'	128°	25°48'	-45'	129°	13
14	28°47'	-41'	127°	28°11'	-42'	128°	27°34'	-43'	128°	26°57'	-43'	128°	26°19'	-44'	129°	25°41'	-45'	129°	25°03'	-45'	130°	14
15	28°06'	-42'	128°	27°29'	-42'	128°	26°51'	-43'	129°	26°13'	-44'	129°	25°35'	-44'	130°	24°57'	-45'	130°	24°18'	-45'	130°	15
16	27°24'	-42'	129°	26°46'	-43'	129°	26°08'	-43'	130°	25°30'	-44'	130°	24°51'	-45'	130°	24°12'	-45'	131°	23°33'	-46'	131°	16
17	26°42'	-42'	130°	26°03'	-43'	130°	25°25'	-44'	130°	24°46'	-44'	131°	24°06'	-45'	131°	23°27'	-45'	131°	22°47'	-46'	132°	17
18	26°00'	-43'	130°	25°20'	-43'	131°	24°41'	-44'	131°	24°02'	-44'	131°	23°22'	-45'	132°	22°42'	-45'	132°	22°01'	-46'	132°	18
19	25°17'	-43'	131°	24°37'	-43'	132°	23°57'	-44'	132°	23°17'	-45'	132°	22°37'	-45'	133°	21°56'	-46'	133°	21°15'	-46'	133°	19
20	24°34'	-43'	132°	23°54'	-44'	132°	23°13'	-44'	133°	22°33'	-45'	133°	21°52'	-45'	133°	21°10'	-46'	134°	20°29'	-46'	134°	20
21	23°51'	-43'	133°	23°10'	-44'	133°	22°29'	-44'	133°	21°48'	-45'	134°	21°06'	-45'	134°	20°25'	-46'	134°	19°43'	-46'	134°	21
22	23°08'	-43'	134°	22°26'	-44'	134°	21°45'	-45'	134°	21°03'	-45'	134°	20°21'	-46'	135°	19°39'	-46'	135°	18°56'	-47'	135°	22
23	22°24'	-44'	134°	21°42'	-44'	135°	21°00'	-45'	135°	20°18'	-45'	135°	19°35'	-46'	135°	18°52'	-46'	136°	18°09'	-47'	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°
	28			29			30			31			32			33			34			

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°	28			29			30			31			32			33			34			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	38°38'	-36'	115°	38°12'	-37'	116°	37°46'	-38'	117°	37°19'	-39'	117°	36°51'	-40'	118°	36°22'	-41'	119°	35°53'	-42'	119°	0
1	38°02'	-37'	116°	37°35'	-38'	117°	37°07'	-39'	118°	36°39'	-40'	118°	36°11'	-40'	119°	35°42'	-41'	119°	35°12'	-42'	120°	1
2	37°25'	-37'	117°	36°57'	-38'	118°	36°29'	-39'	118°	36°00'	-40'	119°	35°30'	-41'	120°	35°00'	-42'	120°	34°30'	-42'	121°	2
3	36°48'	-38'	118°	36°19'	-39'	119°	35°50'	-40'	119°	35°20'	-40'	120°	34°50'	-41'	121°	34°19'	-42'	121°	33°47'	-43'	122°	3
4	36°10'	-38'	119°	35°40'	-39'	120°	35°10'	-40'	120°	34°40'	-41'	121°	34°08'	-42'	122°	33°37'	-42'	122°	33°05'	-43'	123°	4
5	35°31'	-39'	120°	35°01'	-40'	121°	34°30'	-40'	121°	33°59'	-41'	122°	33°27'	-42'	122°	32°55'	-43'	123°	32°22'	-43'	123°	5
6	34°53'	-39'	121°	34°22'	-40'	122°	33°50'	-41'	122°	33°18'	-41'	123°	32°45'	-42'	123°	32°12'	-43'	124°	31°38'	-44'	124°	6
7	34°14'	-40'	122°	33°42'	-40'	122°	33°09'	-41'	123°	32°36'	-42'	124°	32°03'	-43'	124°	31°29'	-43'	125°	30°55'	-44'	125°	7
8	33°34'	-40'	123°	33°01'	-41'	123°	32°28'	-41'	124°	31°54'	-42'	124°	31°20'	-43'	125°	30°46'	-44'	125°	30°11'	-44'	126°	8
9	32°54'	-40'	124°	32°21'	-41'	124°	31°47'	-42'	125°	31°12'	-42'	125°	30°37'	-43'	126°	30°02'	-44'	126°	29°26'	-45'	127°	9
10	32°14'	-41'	125°	31°40'	-41'	125°	31°05'	-42'	126°	30°30'	-43'	126°	29°54'	-43'	127°	29°18'	-44'	127°	28°42'	-45'	127°	10
11	31°33'	-41'	125°	30°58'	-42'	126°	30°23'	-42'	126°	29°47'	-43'	127°	29°11'	-44'	127°	28°34'	-44'	128°	27°57'	-45'	128°	11
12	30°52'	-41'	126°	30°16'	-42'	127°	29°40'	-43'	127°	29°04'	-43'	128°	28°27'	-44'	128°	27°50'	-45'	129°	27°12'	-45'	129°	12
13	30°11'	-42'	127°	29°34'	-42'	128°	28°58'	-43'	128°	28°20'	-44'	128°	27°43'	-44'	129°	27°05'	-45'	129°	26°27'	-45'	130°	13
14	29°29'	-42'	128°	28°52'	-43'	128°	28°15'	-43'	129°	27°37'	-44'	129°	26°59'	-45'	130°	26°20'	-45'	130°	25°41'	-46'	130°	14
15	28°47'	-42'	129°	28°09'	-43'	129°	27°31'	-44'	130°	26°53'	-44'	130°	26°14'	-45'	130°	25°35'	-45'	131°	24°56'	-46'	131°	15
16	28°05'	-43'	130°	27°27'	-43'	130°	26°48'	-44'	130°	26°09'	-44'	131°	25°29'	-45'	131°	24°50'	-46'	132°	24°10'	-46'	132°	16
17	27°22'	-43'	130°	26°43'	-43'	131°	26°04'	-44'	131°	25°24'	-45'	132°	24°44'	-45'	132°	24°04'	-46'	132°	23°24'	-46'	133°	17
18	26°40'	-43'	131°	26°00'	-44'	132°	25°20'	-44'	132°	24°40'	-45'	132°	23°59'	-45'	133°	23°19'	-46'	133°	22°38'	-46'	133°	18
19	25°57'	-43'	132°	25°16'	-44'	132°	24°36'	-44'	133°	23°55'	-45'	133°	23°14'	-46'	133°	22°33'	-46'	134°	21°51'	-47'	134°	19
20	25°13'	-44'	133°	24°32'	-44'	133°	23°51'	-45'	133°	23°10'	-45'	134°	22°28'	-46'	134°	21°47'	-46'	134°	21°05'	-47'	135°	20
21	24°30'	-44'	133°	23°48'	-44'	134°	23°07'	-45'	134°	22°25'	-45'	134°	21°43'	-46'	135°	21°00'	-46'	135°	20°18'	-47'	135°	21
22	23°46'	-44'	134°	23°04'	-45'	135°	22°22'	-45'	135°	21°39'	-46'	135°	20°57'	-46'	135°	20°14'	-47'	136°	19°31'	-47'	136°	22
23	23°02'	-44'	135°	22°19'	-45'	135°	21°37'	-45'	136°	20°54'	-46'	136°	20°11'	-46'	136°	19°27'	-47'	136°	18°44'	-47'	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°
	28			29			30			31			32			33			34			

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Dec°	28			29			30			31			32			33			34			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	48°29'	-43'	127°	47°53'	-44'	128°	47°16'	-44'	129°	46°38'	-45'	129°	45°59'	-46'	130°	45°20'	-47'	131°	44°40'	-47'	132°	0
1	47°46'	-43'	128°	47°09'	-44'	129°	46°31'	-45'	130°	45°52'	-46'	130°	45°13'	-46'	131°	44°33'	-47'	132°	43°53'	-48'	133°	1
2	47°03'	-44'	129°	46°25'	-45'	130°	45°46'	-45'	131°	45°07'	-46'	131°	44°27'	-47'	132°	43°46'	-47'	133°	43°05'	-48'	134°	2
3	46°19'	-44'	130°	45°40'	-45'	131°	45°01'	-46'	132°	44°21'	-47'	132°	43°40'	-47'	133°	42°59'	-48'	134°	42°17'	-48'	134°	3
4	45°35'	-45'	131°	44°55'	-46'	132°	44°15'	-46'	132°	43°34'	-47'	133°	42°53'	-48'	134°	42°11'	-48'	134°	41°29'	-49'	135°	4
5	44°50'	-45'	132°	44°09'	-46'	133°	43°29'	-47'	133°	42°47'	-47'	134°	42°05'	-48'	135°	41°23'	-49'	135°	40°40'	-49'	136°	5
6	44°05'	-46'	133°	43°23'	-46'	134°	42°42'	-47'	134°	42°00'	-48'	135°	41°17'	-48'	135°	40°34'	-49'	136°	39°51'	-49'	137°	6
7	43°19'	-46'	134°	42°37'	-47'	134°	41°55'	-47'	135°	41°12'	-48'	136°	40°29'	-49'	136°	39°46'	-49'	137°	39°02'	-50'	137°	7
8	42°33'	-47'	135°	41°50'	-47'	135°	41°07'	-48'	136°	40°24'	-48'	136°	39°41'	-49'	137°	38°56'	-49'	138°	38°12'	-50'	138°	8
9	41°46'	-47'	135°	41°03'	-47'	136°	40°20'	-48'	137°	39°36'	-49'	137°	38°52'	-49'	138°	38°07'	-50'	138°	37°22'	-50'	139°	9
10	40°59'	-47'	136°	40°16'	-48'	137°	39°32'	-48'	137°	38°47'	-49'	138°	38°03'	-49'	138°	37°17'	-50'	139°	36°32'	-50'	139°	10
11	40°12'	-48'	137°	39°28'	-48'	138°	38°43'	-49'	138°	37°58'	-49'	139°	37°13'	-50'	139°	36°28'	-50'	140°	35°42'	-51'	140°	11
12	39°24'	-48'	138°	38°40'	-48'	138°	37°55'	-49'	139°	37°09'	-49'	139°	36°23'	-50'	140°	35°37'	-50'	140°	34°51'	-51'	141°	12
13	38°36'	-48'	139°	37°51'	-49'	139°	37°06'	-49'	140°	36°20'	-50'	140°	35°34'	-50'	141°	34°47'	-51'	141°	34°00'	-51'	141°	13
14	37°48'	-48'	139°	37°03'	-49'	140°	36°16'	-49'	140°	35°30'	-50'	141°	34°43'	-50'	141°	33°56'	-51'	142°	33°09'	-51'	142°	14
15	37°00'	-49'	140°	36°14'	-49'	141°	35°27'	-50'	141°	34°40'	-50'	142°	33°53'	-51'	142°	33°06'	-51'	142°	32°18'	-51'	143°	15
16	36°11'	-49'	141°	35°24'	-49'	141°	34°37'	-50'	142°	33°50'	-50'	142°	33°03'	-51'	143°	32°15'	-51'	143°	31°27'	-52'	143°	16
17	35°22'	-49'	142°	34°35'	-50'	142°	33°47'	-50'	142°	33°00'	-51'	143°	32°12'	-51'	143°	31°24'	-51'	144°	30°35'	-52'	144°	17
18	34°33'	-49'	142°	33°45'	-50'	143°	32°57'	-50'	143°	32°09'	-51'	143°	31°21'	-51'	144°	30°32'	-51'	144°	29°44'	-52'	145°	18
19	33°43'	-50'	143°	32°55'	-50'	143°	32°07'	-51'	144°	31°18'	-51'	144°	30°30'	-51'	144°	29°41'	-52'	145°	28°52'	-52'	145°	19
20	32°54'	-50'	144°	32°05'	-50'	144°	31°16'	-51'	144°	30°28'	-51'	145°	29°38'	-51'	145°	28°49'	-52'	145°	28°00'	-52'	146°	20
21	32°04'	-50'	144°	31°15'	-51'	145°	30°26'	-51'	145°	29°36'	-51'	145°	28°47'	-52'	146°	27°57'	-52'	146°	27°08'	-52'	146°	21
22	31°13'	-50'	145°	30°24'	-51'	145°	29°35'	-51'	146°	28°45'	-51'	146°	27°55'	-52'	146°	27°06'	-52'	147°	26°15'	-52'	147°	22
23	30°23'	-50'	146°	29°34'	-51'	146°	28°44'	-51'	146°	27°54'	-52'	147°	27°04'	-52'	147°	26°13'	-52'	147°	25°23'	-52'	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°
	28			29			30			31			32			33			34			

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

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

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

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

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

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

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°	28			29			30			31			32			33			34			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	51°13'	-45'	131°	50°33'	-46'	132°	49°53'	-47'	133°	49°11'	-48'	134°	48°29'	-48'	135°	47°46'	-49'	136°	47°03'	-49'	136°	0
1	50°28'	-46'	132°	49°47'	-47'	133°	49°06'	-47'	134°	48°24'	-48'	135°	47°41'	-49'	136°	46°58'	-49'	137°	46°14'	-50'	137°	1
2	49°42'	-46'	133°	49°01'	-47'	134°	48°19'	-48'	135°	47°36'	-48'	136°	46°52'	-49'	137°	46°08'	-50'	137°	45°24'	-50'	138°	2
3	48°56'	-47'	134°	48°14'	-47'	135°	47°31'	-48'	136°	46°47'	-49'	137°	46°03'	-49'	137°	45°19'	-50'	138°	44°34'	-50'	139°	3
4	48°09'	-47'	135°	47°26'	-48'	136°	46°43'	-49'	137°	45°59'	-49'	138°	45°14'	-50'	138°	44°29'	-50'	139°	43°44'	-51'	140°	4
5	47°22'	-48'	136°	46°38'	-48'	137°	45°54'	-49'	138°	45°10'	-49'	138°	44°24'	-50'	139°	43°39'	-50'	140°	42°53'	-51'	140°	5
6	46°34'	-48'	137°	45°50'	-49'	138°	45°05'	-49'	139°	44°20'	-50'	139°	43°34'	-50'	140°	42°48'	-51'	140°	42°02'	-51'	141°	6
7	45°46'	-48'	138°	45°01'	-49'	139°	44°16'	-50'	139°	43°30'	-50'	140°	42°44'	-51'	141°	41°58'	-51'	141°	41°11'	-51'	142°	7
8	44°58'	-49'	139°	44°12'	-49'	140°	43°27'	-50'	140°	42°40'	-50'	141°	41°54'	-51'	141°	41°07'	-51'	142°	40°19'	-52'	142°	8
9	44°09'	-49'	140°	43°23'	-50'	140°	42°37'	-50'	141°	41°50'	-51'	142°	41°03'	-51'	142°	40°15'	-52'	143°	39°27'	-52'	143°	9
10	43°20'	-49'	141°	42°33'	-50'	141°	41°47'	-50'	142°	40°59'	-51'	142°	40°12'	-51'	143°	39°24'	-52'	143°	38°36'	-52'	144°	10
11	42°30'	-50'	141°	41°43'	-50'	142°	40°56'	-51'	142°	40°08'	-51'	143°	39°20'	-52'	143°	38°32'	-52'	144°	37°43'	-52'	144°	11
12	41°41'	-50'	142°	40°53'	-51'	143°	40°05'	-51'	143°	39°17'	-51'	144°	38°29'	-52'	144°	37°40'	-52'	145°	36°51'	-53'	145°	12
13	40°51'	-50'	143°	40°03'	-51'	143°	39°14'	-51'	144°	38°26'	-52'	144°	37°37'	-52'	145°	36°48'	-52'	145°	35°59'	-53'	146°	13
14	40°00'	-51'	144°	39°12'	-51'	144°	38°23'	-51'	144°	37°34'	-52'	145°	36°45'	-52'	145°	35°56'	-53'	146°	35°06'	-53'	146°	14
15	39°10'	-51'	144°	38°21'	-51'	145°	37°32'	-52'	145°	36°43'	-52'	146°	35°53'	-52'	146°	35°03'	-53'	146°	34°13'	-53'	147°	15
16	38°19'	-51'	145°	37°30'	-51'	145°	36°40'	-52'	146°	35°51'	-52'	146°	35°01'	-53'	147°	34°10'	-53'	147°	33°20'	-53'	147°	16
17	37°28'	-51'	146°	36°38'	-52'	146°	35°48'	-52'	146°	34°58'	-52'	147°	34°08'	-53'	147°	33°18'	-53'	148°	32°27'	-53'	148°	17
18	36°37'	-51'	146°	35°47'	-52'	147°	34°56'	-52'	147°	34°06'	-53'	147°	33°15'	-53'	148°	32°25'	-53'	148°	31°34'	-53'	148°	18
19	35°45'	-52'	147°	34°55'	-52'	147°	34°04'	-52'	148°	33°13'	-53'	148°	32°23'	-53'	148°	31°31'	-53'	149°	30°40'	-54'	149°	19
20	34°53'	-52'	147°	34°03'	-52'	148°	33°12'	-53'	148°	32°21'	-53'	149°	31°30'	-53'	149°	30°38'	-53'	149°	29°47'	-54'	149°	20
21	34°02'	-52'	148°	33°11'	-52'	148°	32°19'	-53'	149°	31°28'	-53'	149°	30°36'	-53'	149°	29°45'	-54'	150°	28°53'	-54'	150°	21
22	33°10'	-52'	149°	32°18'	-53'	149°	31°27'	-53'	149°	30°35'	-53'	150°	29°43'	-53'	150°	28°51'	-54'	150°	27°59'	-54'	150°	22
23	32°17'	-52'	149°	31°26'	-53'	150°	30°34'	-53'	150°	29°42'	-53'	150°	28°50'	-54'	150°	27°57'	-54'	151°	27°05'	-54'	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°
	28			29			30			31			32			33			34			

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°	28			29			30			31			32			33			34			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	51°53'	-46'	133°	51°12'	-47'	134°	50°30'	-47'	134°	49°48'	-48'	135°	49°05'	-49'	136°	48°21'	-49'	137°	47°37'	-50'	138°	0
1	51°07'	-46'	134°	50°25'	-47'	135°	49°43'	-48'	135°	49°00'	-49'	136°	48°16'	-49'	137°	47°32'	-50'	138°	46°47'	-50'	138°	1
2	50°20'	-47'	135°	49°38'	-48'	136°	48°55'	-48'	136°	48°11'	-49'	137°	47°27'	-50'	138°	46°42'	-50'	139°	45°57'	-51'	139°	2
3	49°33'	-47'	136°	48°50'	-48'	136°	48°07'	-49'	137°	47°22'	-49'	138°	46°37'	-50'	139°	45°52'	-50'	139°	45°06'	-51'	140°	3
4	48°46'	-48'	137°	48°02'	-48'	137°	47°18'	-49'	138°	46°33'	-50'	139°	45°48'	-50'	139°	45°02'	-51'	140°	44°15'	-51'	141°	4
5	47°58'	-48'	138°	47°14'	-49'	138°	46°29'	-49'	139°	45°43'	-50'	140°	44°57'	-50'	140°	44°11'	-51'	141°	43°24'	-51'	142°	5
6	47°10'	-49'	138°	46°25'	-49'	139°	45°39'	-50'	140°	44°53'	-50'	140°	44°07'	-51'	141°	43°20'	-51'	142°	42°33'	-52'	142°	6
7	46°21'	-49'	139°	45°36'	-50'	140°	44°50'	-50'	141°	44°03'	-51'	141°	43°16'	-51'	142°	42°29'	-52'	142°	41°41'	-52'	143°	7
8	45°32'	-49'	140°	44°46'	-50'	141°	43°59'	-50'	141°	43°12'	-51'	142°	42°25'	-51'	142°	41°37'	-52'	143°	40°49'	-52'	144°	8
9	44°43'	-50'	141°	43°56'	-50'	141°	43°09'	-51'	142°	42°22'	-51'	143°	41°34'	-52'	143°	40°45'	-52'	144°	39°57'	-52'	144°	9
10	43°53'	-50'	142°	43°06'	-50'	142°	42°18'	-51'	143°	41°30'	-51'	143°	40°42'	-52'	144°	39°53'	-52'	144°	39°05'	-53'	145°	10
11	43°03'	-50'	142°	42°15'	-51'	143°	41°27'	-51'	144°	40°39'	-52'	144°	39°50'	-52'	145°	39°01'	-52'	145°	38°12'	-53'	145°	11
12	42°13'	-51'	143°	41°25'	-51'	144°	40°36'	-51'	144°	39°47'	-52'	145°	38°58'	-52'	145°	38°09'	-53'	146°	37°19'	-53'	146°	12
13	41°22'	-51'	144°	40°34'	-51'	144°	39°45'	-52'	145°	38°56'	-52'	145°	38°06'	-52'	146°	37°16'	-53'	146°	36°26'	-53'	147°	13
14	40°31'	-51'	145°	39°42'	-52'	145°	38°53'	-52'	146°	38°03'	-52'	146°	37°14'	-53'	146°	36°24'	-53'	147°	35°33'	-53'	147°	14
15	39°40'	-51'	145°	38°51'	-52'	146°	38°01'	-52'	146°	37°11'	-52'	147°	36°21'	-53'	147°	35°31'	-53'	147°	34°40'	-53'	148°	15
16	38°49'	-52'	146°	37°59'	-52'	146°	37°09'	-52'	147°	36°19'	-53'	147°	35°28'	-53'	148°	34°37'	-53'	148°	33°46'	-54'	148°	16
17	37°57'	-52'	147°	37°07'	-52'	147°	36°17'	-52'	147°	35°26'	-53'	148°	34°35'	-53'	148°	33°44'	-53'	149°	32°53'	-54'	149°	17
18	37°06'	-52'	147°	36°15'	-52'	148°	35°24'	-53'	148°	34°33'	-53'	148°	33°42'	-53'	149°	32°51'	-54'	149°	31°59'	-54'	149°	18
19	36°14'	-52'	148°	35°23'	-52'	148°	34°32'	-53'	149°	33°40'	-53'	149°	32°49'	-53'	149°	31°57'	-54'	150°	31°05'	-54'	150°	19
20	35°22'	-52'	148°	34°30'	-53'	149°	33°39'	-53'	149°	32°47'	-53'	150°	31°55'	-54'	150°	31°04'	-54'	150°	30°11'	-54'	150°	20
21	34°29'	-53'	149°	33°38'	-53'	149°	32°46'	-53'	150°	31°54'	-53'	150°	31°02'	-54'	150°	30°10'	-54'	151°	29°17'	-54'	151°	21
22	33°37'	-53'	150°	32°45'	-53'	150°	31°53'	-53'	150°	31°01'	-54'	151°	30°08'	-54'	151°	29°16'	-54'	151°	28°23'	-54'	151°	22
23	32°44'	-53'	150°	31°52'	-53'	151°	31°00'	-53'	151°	30°07'	-54'	151°	29°14'	-54'	151°	28°22'	-54'	152°	27°29'	-54'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	52°31'	-47'	134°	51°49'	-47'	135°	51°07'	-48'	136°	50°23'	-49'	137°	49°40'	-49'	137°	48°55'	-50'	138°	48°10'	-50'	139°	0
1	51°45'	-47'	135°	51°02'	-48'	136°	50°19'	-48'	137°	49°35'	-49'	137°	48°50'	-50'	138°	48°05'	-50'	139°	47°20'	-51'	140°	1
2	50°58'	-48'	136°	50°14'	-48'	137°	49°30'	-49'	138°	48°46'	-49'	138°	48°01'	-50'	139°	47°15'	-51'	140°	46°29'	-51'	140°	2
3	50°10'	-48'	137°	49°26'	-49'	138°	48°41'	-49'	138°	47°56'	-50'	139°	47°11'	-50'	140°	46°24'	-51'	141°	45°38'	-51'	141°	3
4	49°22'	-48'	138°	48°37'	-49'	139°	47°52'	-50'	139°	47°06'	-50'	140°	46°20'	-51'	141°	45°34'	-51'	141°	44°46'	-52'	142°	4
5	48°34'	-49'	139°	47°48'	-49'	139°	47°02'	-50'	140°	46°16'	-51'	141°	45°29'	-51'	141°	44°42'	-51'	142°	43°55'	-52'	143°	5
6	47°45'	-49'	140°	46°59'	-50'	140°	46°12'	-50'	141°	45°26'	-51'	142°	44°38'	-51'	142°	43°51'	-52'	143°	43°03'	-52'	143°	6
7	46°55'	-50'	140°	46°09'	-50'	141°	45°22'	-51'	142°	44°35'	-51'	142°	43°47'	-52'	143°	42°59'	-52'	144°	42°11'	-52'	144°	7
8	46°06'	-50'	141°	45°19'	-50'	142°	44°31'	-51'	142°	43°44'	-51'	143°	42°56'	-52'	144°	42°07'	-52'	144°	41°18'	-53'	145°	8
9	45°16'	-50'	142°	44°28'	-51'	143°	43°41'	-51'	143°	42°52'	-52'	144°	42°04'	-52'	144°	41°15'	-52'	145°	40°26'	-53'	145°	9
10	44°26'	-51'	143°	43°38'	-51'	143°	42°49'	-51'	144°	42°01'	-52'	144°	41°12'	-52'	145°	40°22'	-53'	145°	39°33'	-53'	146°	10
11	43°35'	-51'	144°	42°47'	-51'	144°	41°58'	-52'	145°	41°09'	-52'	145°	40°19'	-52'	146°	39°30'	-53'	146°	38°40'	-53'	147°	11
12	42°44'	-51'	144°	41°55'	-52'	145°	41°06'	-52'	145°	40°17'	-52'	146°	39°27'	-53'	146°	38°37'	-53'	147°	37°47'	-53'	147°	12
13	41°53'	-51'	145°	41°04'	-52'	145°	40°14'	-52'	146°	39°24'	-53'	146°	38°34'	-53'	147°	37°44'	-53'	147°	36°53'	-54'	148°	13
14	41°02'	-52'	146°	40°12'	-52'	146°	39°22'	-52'	147°	38°32'	-53'	147°	37°41'	-53'	147°	36°51'	-53'	148°	36°00'	-54'	148°	14
15	40°10'	-52'	146°	39°20'	-52'	147°	38°30'	-53'	147°	37°39'	-53'	148°	36°48'	-53'	148°	35°57'	-54'	148°	35°06'	-54'	149°	15
16	39°18'	-52'	147°	38°28'	-52'	147°	37°37'	-53'	148°	36°46'	-53'	148°	35°55'	-53'	149°	35°04'	-54'	149°	34°12'	-54'	149°	16
17	38°26'	-52'	148°	37°35'	-53'	148°	36°44'	-53'	148°	35°53'	-53'	149°	35°02'	-54'	149°	34°10'	-54'	150°	33°18'	-54'	150°	17
18	37°34'	-52'	148°	36°43'	-53'	149°	35°51'	-53'	149°	35°00'	-53'	149°	34°08'	-54'	150°	33°16'	-54'	150°	32°24'	-54'	150°	18
19	36°41'	-53'	149°	35°50'	-53'	149°	34°58'	-53'	150°	34°07'	-54'	150°	33°14'	-54'	150°	32°22'	-54'	151°	31°30'	-54'	151°	19
20	35°49'	-53'	149°	34°57'	-53'	150°	34°05'	-53'	150°	33°13'	-54'	151°	32°21'	-54'	151°	31°28'	-54'	151°	30°36'	-54'	151°	20
21	34°56'	-53'	150°	34°04'	-53'	150°	33°12'	-54'	151°	32°19'	-54'	151°	31°27'	-54'	151°	30°34'	-54'	152°	29°41'	-55'	152°	21
22	34°03'	-53'	151°	33°11'	-53'	151°	32°18'	-54'	151°	31°25'	-54'	152°	30°33'	-54'	152°	29°40'	-54'	152°	28°47'	-55'	152°	22
23	33°10'	-53'	151°	32°17'	-54'	151°	31°25'	-54'	152°	30°32'	-54'	152°	29°38'	-54'	152°	28°45'	-55'	153°	27°52'	-55'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	53°09'	-47'	135°	52°26'	-48'	136°	51°43'	-49'	137°	50°58'	-49'	138°	50°14'	-50'	139°	49°28'	-50'	139°	48°43'	-51'	140°	0
1	52°22'	-48'	136°	51°38'	-48'	137°	50°54'	-49'	138°	50°09'	-50'	139°	49°24'	-50'	140°	48°38'	-51'	140°	47°52'	-51'	141°	1
2	51°34'	-48'	137°	50°50'	-49'	138°	50°05'	-49'	139°	49°19'	-50'	140°	48°34'	-51'	140°	47°47'	-51'	141°	47°00'	-52'	142°	2
3	50°46'	-49'	138°	50°01'	-49'	139°	49°15'	-50'	140°	48°29'	-50'	140°	47°43'	-51'	141°	46°56'	-51'	142°	46°09'	-52'	142°	3
4	49°57'	-49'	139°	49°12'	-50'	140°	48°26'	-50'	141°	47°39'	-51'	141°	46°52'	-51'	142°	46°05'	-52'	143°	45°17'	-52'	143°	4
5	49°08'	-49'	140°	48°22'	-50'	141°	47°35'	-51'	141°	46°48'	-51'	142°	46°01'	-52'	143°	45°13'	-52'	143°	44°24'	-52'	144°	5
6	48°19'	-50'	141°	47°32'	-50'	142°	46°45'	-51'	142°	45°57'	-51'	143°	45°09'	-52'	143°	44°21'	-52'	144°	43°32'	-53'	145°	6
7	47°29'	-50'	142°	46°42'	-51'	142°	45°54'	-51'	143°	45°06'	-52'	144°	44°17'	-52'	144°	43°29'	-52'	145°	42°39'	-53'	145°	7
8	46°39'	-51'	142°	45°51'	-51'	143°	45°03'	-51'	144°	44°14'	-52'	144°	43°25'	-52'	145°	42°36'	-53'	145°	41°47'	-53'	146°	8
9	45°48'	-51'	143°	45°00'	-51'	144°	44°11'	-52'	144°	43°22'	-52'	145°	42°33'	-53'	145°	41°43'	-53'	146°	40°54'	-53'	146°	9
10	44°57'	-51'	144°	44°09'	-52'	145°	43°20'	-52'	145°	42°30'	-52'	146°	41°40'	-53'	146°	40°50'	-53'	147°	40°00'	-53'	147°	10
11	44°06'	-51'	145°	43°17'	-52'	145°	42°28'	-52'	146°	41°38'	-53'	146°	40°48'	-53'	147°	39°57'	-53'	147°	39°07'	-54'	148°	11
12	43°15'	-52'	145°	42°25'	-52'	146°	41°35'	-52'	146°	40°45'	-53'	147°	39°55'	-53'	147°	39°04'	-53'	148°	38°13'	-54'	148°	12
13	42°23'	-52'	146°	41°33'	-52'	147°	40°43'	-53'	147°	39°52'	-53'	148°	39°02'	-53'	148°	38°11'	-54'	148°	37°19'	-54'	149°	13
14	41°31'	-52'	147°	40°41'	-52'	147°	39°50'	-53'	148°	38°59'	-53'	148°	38°08'	-53'	149°	37°17'	-54'	149°	36°25'	-54'	149°	14
15	40°39'	-52'	147°	39°48'	-53'	148°	38°57'	-53'	148°	38°06'	-53'	149°	37°15'	-54'	149°	36°23'	-54'	150°	35°31'	-54'	150°	15
16	39°47'	-53'	148°	38°56'	-53'	149°	38°04'	-53'	149°	37°13'	-54'	149°	36°21'	-54'	150°	35°29'	-54'	150°	34°37'	-54'	150°	16
17	38°54'	-53'	149°	38°03'	-53'	149°	37°11'	-53'	150°	36°19'	-54'	150°	35°27'	-54'	150°	34°35'	-54'	151°	33°43'	-54'	151°	17
18	38°01'	-53'	149°	37°10'	-53'	150°	36°18'	-54'	150°	35°26'	-54'	150°	34°33'	-54'	151°	33°41'	-54'	151°	32°48'	-55'	151°	18
19	37°08'	-53'	150°	36°16'	-53'	150°	35°24'	-54'	151°	34°32'	-54'	151°	33°39'	-54'	151°	32°47'	-54'	152°	31°54'	-55'	152°	19
20	36°15'	-53'	150°	35°23'	-54'	151°	34°31'	-54'	151°	33°38'	-54'	152°	32°45'	-54'	152°	31°52'	-55'	152°	30°59'	-55'	152°	20
21	35°22'	-53'	151°	34°29'	-54'	151°	33°37'	-54'	152°	32°44'	-54'	152°	31°51'	-54'	152°	30°58'	-55'	153°	30°04'	-55'	153°	21
22	34°29'	-54'	152°	33°36'	-54'	152°	32°43'	-54'	152°	31°50'	-54'	153°	30°56'	-55'	153°	30°03'	-55'	153°	29°09'	-55'	153°	22
23	33°35'	-54'	152°	32°42'	-54'	152°	31°49'	-54'	153°	30°55'	-54'	153°	30°02'	-55'	153°	29°08'	-55'	154°	28°14'	-55'	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°
	28			29			30			31			32			33			34			

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

Dec°	28			29			30			31			32			33			34			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	53°46'	-48'	137°	53°02'	-49'	137°	52°18'	-49'	138°	51°33'	-50'	139°	50°47'	-50'	140°	50°01'	-51'	141°	49°14'	-52'	141°	0
1	52°58'	-48'	138°	52°13'	-49'	138°	51°28'	-50'	139°	50°43'	-50'	140°	49°56'	-51'	141°	49°10'	-51'	142°	48°22'	-52'	142°	1
2	52°10'	-49'	138°	51°24'	-49'	139°	50°39'	-50'	140°	49°52'	-51'	141°	49°06'	-51'	142°	48°18'	-52'	142°	47°31'	-52'	143°	2
3	51°21'	-49'	139°	50°35'	-50'	140°	49°49'	-50'	141°	49°02'	-51'	142°	48°14'	-51'	142°	47°27'	-52'	143°	46°38'	-52'	144°	3
4	50°31'	-50'	140°	49°45'	-50'	141°	48°58'	-51'	142°	48°11'	-51'	143°	47°23'	-52'	143°	46°35'	-52'	144°	45°46'	-53'	144°	4
5	49°42'	-50'	141°	48°55'	-51'	142°	48°07'	-51'	143°	47°19'	-52'	143°	46°31'	-52'	144°	45°42'	-52'	145°	44°53'	-53'	145°	5
6	48°52'	-50'	142°	48°04'	-51'	143°	47°16'	-51'	143°	46°28'	-52'	144°	45°39'	-52'	145°	44°50'	-53'	145°	44°01'	-53'	146°	6
7	48°01'	-51'	143°	47°13'	-51'	144°	46°25'	-52'	144°	45°36'	-52'	145°	44°47'	-53'	145°	43°57'	-53'	146°	43°07'	-53'	146°	7
8	47°10'	-51'	144°	46°22'	-52'	144°	45°33'	-52'	145°	44°44'	-52'	145°	43°54'	-53'	146°	43°04'	-53'	147°	42°14'	-54'	147°	8
9	46°19'	-51'	144°	45°30'	-52'	145°	44°41'	-52'	146°	43°51'	-53'	146°	43°01'	-53'	147°	42°11'	-53'	147°	41°21'	-54'	148°	9
10	45°28'	-52'	145°	44°39'	-52'	146°	43°49'	-52'	146°	42°59'	-53'	147°	42°08'	-53'	147°	41°18'	-54'	148°	40°27'	-54'	148°	10
11	44°36'	-52'	146°	43°46'	-52'	146°	42°56'	-53'	147°	42°06'	-53'	147°	41°15'	-53'	148°	40°24'	-54'	148°	39°33'	-54'	149°	11
12	43°44'	-52'	147°	42°54'	-53'	147°	42°04'	-53'	148°	41°13'	-53'	148°	40°22'	-54'	149°	39°30'	-54'	149°	38°39'	-54'	149°	12
13	42°52'	-52'	147°	42°02'	-53'	148°	41°11'	-53'	148°	40°20'	-53'	149°	39°28'	-54'	149°	38°37'	-54'	150°	37°45'	-54'	150°	13
14	42°00'	-53'	148°	41°09'	-53'	148°	40°18'	-53'	149°	39°26'	-54'	149°	38°34'	-54'	150°	37°43'	-54'	150°	36°50'	-54'	150°	14
15	41°07'	-53'	149°	40°16'	-53'	149°	39°24'	-53'	149°	38°32'	-54'	150°	37°40'	-54'	150°	36°48'	-54'	151°	35°56'	-55'	151°	15
16	40°14'	-53'	149°	39°23'	-53'	150°	38°31'	-54'	150°	37°39'	-54'	150°	36°46'	-54'	151°	35°54'	-54'	151°	35°01'	-55'	151°	16
17	39°21'	-53'	150°	38°29'	-54'	150°	37°37'	-54'	151°	36°45'	-54'	151°	35°52'	-54'	151°	34°59'	-55'	152°	34°07'	-55'	152°	17
18	38°28'	-53'	150°	37°36'	-54'	151°	36°43'	-54'	151°	35°51'	-54'	151°	34°58'	-54'	152°	34°05'	-55'	152°	33°12'	-55'	152°	18
19	37°35'	-54'	151°	36°42'	-54'	151°	35°49'	-54'	152°	34°56'	-54'	152°	34°03'	-55'	152°	33°10'	-55'	153°	32°17'	-55'	153°	19
20	36°41'	-54'	152°	35°48'	-54'	152°	34°55'	-54'	152°	34°02'	-54'	153°	33°09'	-55'	153°	32°15'	-55'	153°	31°22'	-55'	153°	20
21	35°47'	-54'	152°	34°54'	-54'	152°	34°01'	-54'	153°	33°08'	-55'	153°	32°14'	-55'	153°	31°20'	-55'	154°	30°27'	-55'	154°	21
22	34°53'	-54'	153°	34°00'	-54'	153°	33°07'	-54'	153°	32°13'	-55'	154°	31°19'	-55'	154°	30°25'	-55'	154°	29°31'	-55'	154°	22
23	33°59'	-54'	153°	33°06'	-54'	153°	32°12'	-55'	154°	31°18'	-55'	154°	30°24'	-55'	154°	29°30'	-55'	155°	28°36'	-55'	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°
	28			29			30			31			32			33			34			

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

Dec°	28			29			30			31			32			33			34			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	54°22'	-49'	138°	53°37'	-49'	139°	52°52'	-50'	140°	52°06'	-50'	141°	51°19'	-51'	141°	50°32'	-52'	142°	49°44'	-52'	143°	0
1	53°33'	-49'	139°	52°48'	-50'	140°	52°02'	-50'	141°	51°15'	-51'	141°	50°28'	-51'	142°	49°40'	-52'	143°	48°52'	-52'	144°	1
2	52°44'	-50'	140°	51°58'	-50'	141°	51°11'	-51'	141°	50°24'	-51'	142°	49°37'	-52'	143°	48°49'	-52'	144°	48°00'	-53'	144°	2
3	51°55'	-50'	141°	51°08'	-51'	142°	50°21'	-51'	142°	49°33'	-52'	143°	48°45'	-52'	144°	47°56'	-52'	144°	47°07'	-53'	145°	3
4	51°05'	-50'	142°	50°18'	-51'	142°	49°30'	-51'	143°	48°42'	-52'	144°	47°53'	-52'	144°	47°04'	-53'	145°	46°15'	-53'	146°	4
5	50°14'	-51'	143°	49°27'	-51'	143°	48°38'	-52'	144°	47°50'	-52'	145°	47°01'	-53'	145°	46°11'	-53'	146°	45°21'	-53'	146°	5
6	49°24'	-51'	143°	48°35'	-52'	144°	47°47'	-52'	145°	46°58'	-52'	145°	46°08'	-53'	146°	45°18'	-53'	146°	44°28'	-54'	147°	6
7	48°33'	-51'	144°	47°44'	-52'	145°	46°55'	-52'	145°	46°05'	-53'	146°	45°15'	-53'	147°	44°25'	-53'	147°	43°34'	-54'	148°	7
8	47°41'	-52'	145°	46°52'	-52'	146°	46°02'	-53'	146°	45°12'	-53'	147°	44°22'	-53'	147°	43°32'	-54'	148°	42°41'	-54'	148°	8
9	46°50'	-52'	146°	46°00'	-52'	146°	45°10'	-53'	147°	44°20'	-53'	147°	43°29'	-53'	148°	42°38'	-54'	148°	41°47'	-54'	149°	9
10	45°58'	-52'	146°	45°08'	-53'	147°	44°17'	-53'	147°	43°26'	-53'	148°	42°35'	-54'	148°	41°44'	-54'	149°	40°53'	-54'	149°	10
11	45°06'	-52'	147°	44°15'	-53'	148°	43°24'	-53'	148°	42°33'	-54'	149°	41°42'	-54'	149°	40°50'	-54'	150°	39°58'	-54'	150°	11
12	44°13'	-53'	148°	43°22'	-53'	148°	42°31'	-53'	149°	41°40'	-54'	149°	40°48'	-54'	150°	39°56'	-54'	150°	39°04'	-55'	151°	12
13	43°20'	-53'	148°	42°29'	-53'	149°	41°38'	-54'	149°	40°46'	-54'	150°	39°54'	-54'	150°	39°02'	-54'	151°	38°09'	-55'	151°	13
14	42°27'	-53'	149°	41°36'	-53'	150°	40°44'	-54'	150°	39°52'	-54'	150°	39°00'	-54'	151°	38°07'	-55'	151°	37°15'	-55'	152°	14
15	41°34'	-53'	150°	40°42'	-54'	150°	39°50'	-54'	151°	38°58'	-54'	151°	38°05'	-54'	151°	37°13'	-55'	152°	36°20'	-55'	152°	15
16	40°41'	-54'	150°	39°49'	-54'	151°	38°56'	-54'	151°	38°04'	-54'	152°	37°11'	-55'	152°	36°18'	-55'	152°	35°25'	-55'	153°	16
17	39°47'	-54'	151°	38°55'	-54'	151°	38°02'	-54'	152°	37°09'	-55'	152°	36°16'	-55'	152°	35°23'	-55'	153°	34°30'	-55'	153°	17
18	38°54'	-54'	151°	38°01'	-54'	152°	37°08'	-54'	152°	36°15'	-55'	153°	35°21'	-55'	153°	34°28'	-55'	153°	33°34'	-55'	154°	18
19	38°00'	-54'	152°	37°07'	-54'	152°	36°14'	-55'	153°	35°20'	-55'	153°	34°27'	-55'	153°	33°33'	-55'	154°	32°39'	-55'	154°	19
20	37°06'	-54'	153°	36°13'	-54'	153°	35°19'	-55'	153°	34°25'	-55'	154°	33°32'	-55'	154°	32°38'	-55'	154°	31°44'	-56'	154°	20
21	36°12'	-54'	153°	35°18'	-55'	153°	34°24'	-55'	154°	33°30'	-55'	154°	32°36'	-55'	154°	31°42'	-55'	155°	30°48'	-56'	155°	21
22	35°17'	-54'	154°	34°24'	-55'	154°	33°30'	-55'	154°	32°35'	-55'	155°	31°41'	-55'	155°	30°47'	-56'	155°	29°52'	-56'	155°	22
23	34°23'	-55'	154°	33°29'	-55'	154°	32°35'	-55'	155°	31°40'	-55'	155°	30°46'	-55'	155°	29°51'	-56'	155°	28°57'	-56'	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°
	28			29			30			31			32			33			34			

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

Dec°	28			29			30			31			32			33			34			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	54°57'	-49'	139°	54°11'	-50'	140°	53°25'	-51'	141°	52°38'	-51'	142°	51°50'	-52'	143°	51°02'	-52'	143°	50°14'	-53'	144°	0
1	54°08'	-50'	140°	53°21'	-50'	141°	52°34'	-51'	142°	51°47'	-51'	143°	50°59'	-52'	143°	50°10'	-52'	144°	49°21'	-53'	145°	1
2	53°18'	-50'	141°	52°31'	-51'	142°	51°43'	-51'	143°	50°55'	-52'	144°	50°07'	-52'	144°	49°18'	-53'	145°	48°29'	-53'	146°	2
3	52°28'	-51'	142°	51°40'	-51'	143°	50°52'	-52'	144°	50°04'	-52'	144°	49°15'	-53'	145°	48°25'	-53'	146°	47°35'	-53'	146°	3
4	51°37'	-51'	143°	50°49'	-51'	144°	50°00'	-52'	144°	49°11'	-52'	145°	48°22'	-53'	146°	47°32'	-53'	146°	46°42'	-54'	147°	4
5	50°46'	-51'	144°	49°58'	-52'	145°	49°09'	-52'	145°	48°19'	-53'	146°	47°29'	-53'	146°	46°39'	-53'	147°	45°48'	-54'	148°	5
6	49°55'	-52'	145°	49°06'	-52'	145°	48°16'	-53'	146°	47°26'	-53'	147°	46°36'	-53'	147°	45°46'	-54'	148°	44°55'	-54'	148°	6
7	49°03'	-52'	145°	48°14'	-52'	146°	47°24'	-53'	147°	46°33'	-53'	147°	45°43'	-54'	148°	44°52'	-54'	148°	44°01'	-54'	149°	7
8	48°11'	-52'	146°	47°21'	-53'	147°	46°31'	-53'	147°	45°40'	-53'	148°	44°49'	-54'	148°	43°58'	-54'	149°	43°06'	-54'	149°	8
9	47°19'	-53'	147°	46°29'	-53'	148°	45°38'	-53'	148°	44°47'	-54'	149°	43°56'	-54'	149°	43°04'	-54'	150°	42°12'	-55'	150°	9
10	46°27'	-53'	148°	45°36'	-53'	148°	44°45'	-53'	149°	43°53'	-54'	149°	43°02'	-54'	150°	42°10'	-54'	150°	41°17'	-55'	151°	10
11	45°34'	-53'	148°	44°43'	-53'	149°	43°51'	-54'	149°	42°59'	-54'	150°	42°07'	-54'	150°	41°15'	-55'	151°	40°23'	-55'	151°	11
12	44°41'	-53'	149°	43°49'	-54'	149°	42°57'	-54'	150°	42°05'	-54'	150°	41°13'	-54'	151°	40°21'	-55'	151°	39°28'	-55'	152°	12
13	43°48'	-53'	150°	42°56'	-54'	150°	42°04'	-54'	151°	41°11'	-54'	151°	40°19'	-55'	151°	39°26'	-55'	152°	38°33'	-55'	152°	13
14	42°54'	-54'	150°	42°02'	-54'	151°	41°10'	-54'	151°	40°17'	-55'	152°	39°24'	-55'	152°	38°31'	-55'	152°	37°38'	-55'	153°	14
15	42°01'	-54'	151°	41°08'	-54'	151°	40°15'	-54'	152°	39°22'	-55'	152°	38°29'	-55'	152°	37°36'	-55'	153°	36°43'	-55'	153°	15
16	41°07'	-54'	151°	40°14'	-54'	152°	39°21'	-55'	152°	38°28'	-55'	153°	37°34'	-55'	153°	36°41'	-55'	153°	35°47'	-55'	154°	16
17	40°13'	-54'	152°	39°20'	-54'	152°	38°26'	-55'	153°	37°33'	-55'	153°	36°39'	-55'	153°	35°46'	-55'	154°	34°52'	-56'	154°	17
18	39°19'	-54'	153°	38°25'	-55'	153°	37°32'	-55'	153°	36°38'	-55'	154°	35°44'	-55'	154°	34°50'	-55'	154°	33°56'	-56'	155°	18
19	38°24'	-54'	153°	37°31'	-55'	153°	36°37'	-55'	154°	35°43'	-55'	154°	34°49'	-55'	154°	33°55'	-56'	155°	33°00'	-56'	155°	19
20	37°30'	-55'	154°	36°36'	-55'	154°	35°42'	-55'	154°	34°48'	-55'	155°	33°54'	-55'	155°	32°59'	-56'	155°	32°05'	-56'	155°	20
21	36°35'	-55'	154°	35°41'	-55'	154°	34°47'	-55'	155°	33°53'	-55'	155°	32°58'	-56'	155°	32°03'	-56'	156°	31°09'	-56'	156°	21
22	35°40'	-55'	155°	34°46'	-55'	155°	33°52'	-55'	155°	32°57'	-55'	156°	32°02'	-56'	156°	31°08'	-56'	156°	30°13'	-56'	156°	22
23	34°46'	-55'	155°	33°51'	-55'	155°	32°56'	-55'	156°	32°02'	-56'	156°	31°07'	-56'	156°	30°12'	-56'	156°	29°17'	-56'	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°
	28			29			30			31			32			33			34			

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

Dec°	28			29			30			31			32			33			34			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	55°31'	-50'	141°	54°44'	-51'	142°	53°57'	-51'	142°	53°09'	-52'	143°	52°21'	-52'	144°	51°32'	-53'	145°	50°43'	-53'	146°	0
1	54°41'	-50'	142°	53°54'	-51'	143°	53°06'	-52'	143°	52°17'	-52'	144°	51°29'	-53'	145°	50°39'	-53'	146°	49°50'	-53'	146°	1
2	53°51'	-51'	143°	53°03'	-51'	143°	52°14'	-52'	144°	51°25'	-52'	145°	50°36'	-53'	146°	49°46'	-53'	146°	48°56'	-54'	147°	2
3	53°00'	-51'	144°	52°11'	-52'	144°	51°22'	-52'	145°	50°33'	-53'	146°	49°43'	-53'	146°	48°53'	-53'	147°	48°03'	-54'	148°	3
4	52°09'	-52'	144°	51°20'	-52'	145°	50°30'	-53'	146°	49°40'	-53'	146°	48°50'	-53'	147°	48°00'	-54'	148°	47°09'	-54'	148°	4
5	51°17'	-52'	145°	50°28'	-52'	146°	49°38'	-53'	147°	48°47'	-53'	147°	47°57'	-54'	148°	47°06'	-54'	148°	46°15'	-54'	149°	5
6	50°25'	-52'	146°	49°35'	-53'	147°	48°45'	-53'	147°	47°54'	-53'	148°	47°03'	-54'	148°	46°12'	-54'	149°	45°20'	-54'	150°	6
7	49°33'	-53'	147°	48°42'	-53'	147°	47°52'	-53'	148°	47°01'	-54'	149°	46°09'	-54'	149°	45°18'	-54'	150°	44°26'	-55'	150°	7
8	48°40'	-53'	147°	47°50'	-53'	148°	46°58'	-54'	149°	46°07'	-54'	149°	45°15'	-54'	150°	44°23'	-55'	150°	43°31'	-55'	151°	8
9	47°48'	-53'	148°	46°56'	-53'	149°	46°05'	-54'	149°	45°13'	-54'	150°	44°21'	-54'	150°	43°29'	-55'	151°	42°36'	-55'	151°	9
10	46°54'	-53'	149°	46°03'	-54'	149°	45°11'	-54'	150°	44°19'	-54'	150°	43°27'	-55'	151°	42°34'	-55'	151°	41°41'	-55'	152°	10
11	46°01'	-54'	150°	45°09'	-54'	150°	44°17'	-54'	151°	43°25'	-54'	151°	42°32'	-55'	151°	41°39'	-55'	152°	40°46'	-55'	152°	11
12	45°08'	-54'	150°	44°15'	-54'	151°	43°23'	-54'	151°	42°30'	-55'	152°	41°37'	-55'	152°	40°44'	-55'	152°	39°51'	-55'	153°	12
13	44°14'	-54'	151°	43°21'	-54'	151°	42°29'	-55'	152°	41°36'	-55'	152°	40°43'	-55'	153°	39°49'	-55'	153°	38°56'	-56'	153°	13
14	43°20'	-54'	151°	42°27'	-54'	152°	41°34'	-55'	152°	40°41'	-55'	153°	39°48'	-55'	153°	38°54'	-55'	153°	38°00'	-56'	154°	14
15	42°26'	-54'	152°	41°33'	-55'	152°	40°39'	-55'	153°	39°46'	-55'	153°	38°52'	-55'	154°	37°59'	-56'	154°	37°05'	-56'	154°	15
16	41°32'	-54'	153°	40°38'	-55'	153°	39°45'	-55'	153°	38°51'	-55'	154°	37°57'	-55'	154°	37°03'	-56'	154°	36°09'	-56'	155°	16
17	40°37'	-55'	153°	39°44'	-55'	154°	38°50'	-55'	154°	37°56'	-55'	154°	37°02'	-56'	155°	36°07'	-56'	155°	35°13'	-56'	155°	17
18	39°43'	-55'	154°	38°49'	-55'	154°	37°55'	-55'	154°	37°00'	-55'	155°	36°06'	-56'	155°	35°12'	-56'	155°	34°17'	-56'	156°	18
19	38°48'	-55'	154°	37°54'	-55'	155°	36°59'	-55'	155°	36°05'	-56'	155°	35°10'	-56'	156°	34°16'	-56'	156°	33°21'	-56'	156°	19
20	37°53'	-55'	155°	36°59'	-55'	155°	36°04'	-55'	155°	35°09'	-56'	156°	34°15'	-56'	156°	33°20'	-56'	156°	32°25'	-56'	156°	20
21	36°58'	-55'	155°	36°03'	-55'	156°	35°09'	-56'	156°	34°14'	-56'	156°	33°19'	-56'	156°	32°24'	-56'	157°	31°29'	-56'	157°	21
22	36°03'	-55'	156°	35°08'	-55'	156°	34°13'	-56'	156°	33°18'	-56'	157°	32°23'	-56'	157°	31°28'	-56'	157°	30°32'	-56'	157°	22
23	35°07'	-55'	156°	34°12'	-56'	156°	33°17'	-56'	157°	32°22'	-56'	157°	31°27'	-56'	157°	30°32'	-56'	157°	29°36'	-56'	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°
	28			29			30			31			32			33			34			

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

Dec°	28			29			30			31			32			33			34			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	56°04'	-51'	142°	55°16'	-51'	143°	54°28'	-52'	144°	53°39'	-52'	145°	52°50'	-53'	146°	52°00'	-53'	146°	51°10'	-54'	147°	0
1	55°13'	-51'	143°	54°25'	-52'	144°	53°36'	-52'	145°	52°47'	-53'	146°	51°57'	-53'	146°	51°07'	-54'	147°	50°17'	-54'	148°	1
2	54°22'	-51'	144°	53°33'	-52'	145°	52°44'	-52'	146°	51°54'	-53'	146°	51°04'	-53'	147°	50°14'	-54'	148°	49°23'	-54'	148°	2
3	53°31'	-52'	145°	52°41'	-52'	146°	51°52'	-53'	146°	51°01'	-53'	147°	50°11'	-54'	148°	49°20'	-54'	148°	48°29'	-54'	149°	3
4	52°39'	-52'	146°	51°49'	-53'	146°	50°59'	-53'	147°	50°08'	-53'	148°	49°17'	-54'	148°	48°26'	-54'	149°	47°34'	-55'	150°	4
5	51°47'	-53'	147°	50°56'	-53'	147°	50°06'	-53'	148°	49°15'	-54'	149°	48°23'	-54'	149°	47°32'	-54'	150°	46°40'	-55'	150°	5
6	50°54'	-53'	147°	50°03'	-53'	148°	49°12'	-54'	149°	48°21'	-54'	149°	47°29'	-54'	150°	46°37'	-55'	150°	45°45'	-55'	151°	6
7	50°01'	-53'	148°	49°10'	-53'	149°	48°19'	-54'	149°	47°27'	-54'	150°	46°35'	-54'	150°	45°43'	-55'	151°	44°50'	-55'	151°	7
8	49°08'	-53'	149°	48°17'	-54'	149°	47°25'	-54'	150°	46°33'	-54'	150°	45°41'	-55'	151°	44°48'	-55'	151°	43°55'	-55'	152°	8
9	48°15'	-54'	150°	47°23'	-54'	150°	46°31'	-54'	151°	45°39'	-55'	151°	44°46'	-55'	152°	43°53'	-55'	152°	43°00'	-55'	152°	9
10	47°21'	-54'	150°	46°29'	-54'	151°	45°37'	-54'	151°	44°44'	-55'	152°	43°51'	-55'	152°	42°58'	-55'	153°	42°04'	-56'	153°	10
11	46°28'	-54'	151°	45°35'	-54'	151°	44°42'	-55'	152°	43°49'	-55'	152°	42°56'	-55'	153°	42°03'	-55'	153°	41°09'	-56'	154°	11
12	45°33'	-54'	151°	44°41'	-55'	152°	43°48'	-55'	152°	42°54'	-55'	153°	42°01'	-55'	153°	41°07'	-56'	154°	40°13'	-56'	154°	12
13	44°39'	-54'	152°	43°46'	-55'	153°	42°53'	-55'	153°	41°59'	-55'	153°	41°06'	-55'	154°	40°12'	-56'	154°	39°18'	-56'	154°	13
14	43°45'	-55'	153°	42°51'	-55'	153°	41°58'	-55'	153°	41°04'	-55'	154°	40°10'	-56'	154°	39°16'	-56'	155°	38°22'	-56'	155°	14
15	42°50'	-55'	153°	41°57'	-55'	154°	41°03'	-55'	154°	40°09'	-55'	154°	39°15'	-56'	155°	38°20'	-56'	155°	37°26'	-56'	155°	15
16	41°55'	-55'	154°	41°02'	-55'	154°	40°07'	-55'	155°	39°13'	-56'	155°	38°19'	-56'	155°	37°24'	-56'	156°	36°30'	-56'	156°	16
17	41°01'	-55'	154°	40°06'	-55'	155°	39°12'	-56'	155°	38°18'	-56'	155°	37°23'	-56'	156°	36°28'	-56'	156°	35°33'	-56'	156°	17
18	40°06'	-55'	155°	39°11'	-55'	155°	38°17'	-56'	156°	37°22'	-56'	156°	36°27'	-56'	156°	35°32'	-56'	156°	34°37'	-56'	157°	18
19	39°10'	-55'	155°	38°16'	-56'	156°	37°21'	-56'	156°	36°26'	-56'	156°	35°31'	-56'	157°	34°36'	-56'	157°	33°41'	-56'	157°	19
20	38°15'	-55'	156°	37°20'	-56'	156°	36°25'	-56'	156°	35°30'	-56'	157°	34°35'	-56'	157°	33°40'	-56'	157°	32°44'	-57'	158°	20
21	37°20'	-56'	156°	36°25'	-56'	157°	35°29'	-56'	157°	34°34'	-56'	157°	33°39'	-56'	157°	32°43'	-56'	158°	31°48'	-57'	158°	21
22	36°24'	-56'	157°	35°29'	-56'	157°	34°33'	-56'	157°	33°38'	-56'	158°	32°43'	-56'	158°	31°47'	-57'	158°	30°51'	-57'	158°	22
23	35°28'	-56'	157°	34°33'	-56'	158°	33°37'	-56'	158°	32°42'	-56'	158°	31°46'	-56'	158°	30°50'	-57'	158°	29°55'	-57'	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°
	28			29			30			31			32			33			34			

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

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

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

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°	28			29			30			31			32			33			34			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	57°36'	-53'	147°	56°46'	-53'	148°	55°55'	-54'	149°	55°03'	-54'	149°	54°12'	-54'	150°	53°19'	-55'	151°	52°27'	-55'	151°	0
1	56°43'	-53'	148°	55°52'	-54'	149°	55°01'	-54'	149°	54°09'	-54'	150°	53°17'	-55'	151°	52°25'	-55'	151°	51°32'	-55'	152°	1
2	55°50'	-53'	149°	54°59'	-54'	149°	54°07'	-54'	150°	53°15'	-55'	151°	52°22'	-55'	151°	51°30'	-55'	152°	50°36'	-56'	153°	2
3	54°57'	-54'	149°	54°05'	-54'	150°	53°13'	-54'	151°	52°20'	-55'	151°	51°27'	-55'	152°	50°34'	-55'	153°	49°41'	-56'	153°	3
4	54°03'	-54'	150°	53°11'	-54'	151°	52°18'	-55'	152°	51°25'	-55'	152°	50°32'	-55'	153°	49°39'	-56'	153°	48°45'	-56'	154°	4
5	53°09'	-54'	151°	52°17'	-55'	152°	51°24'	-55'	152°	50°30'	-55'	153°	49°37'	-56'	153°	48°43'	-56'	154°	47°49'	-56'	154°	5
6	52°15'	-55'	152°	51°22'	-55'	152°	50°29'	-55'	153°	49°35'	-55'	153°	48°41'	-56'	154°	47°47'	-56'	154°	46°53'	-56'	155°	6
7	51°20'	-55'	152°	50°27'	-55'	153°	49°34'	-55'	153°	48°40'	-56'	154°	47°46'	-56'	154°	46°52'	-56'	155°	45°57'	-56'	155°	7
8	50°26'	-55'	153°	49°32'	-55'	154°	48°38'	-56'	154°	47°44'	-56'	155°	46°50'	-56'	155°	45°55'	-56'	155°	45°01'	-56'	156°	8
9	49°31'	-55'	154°	48°37'	-55'	154°	47°43'	-56'	155°	46°48'	-56'	155°	45°54'	-56'	155°	44°59'	-56'	156°	44°04'	-57'	156°	9
10	48°36'	-55'	154°	47°41'	-56'	155°	46°47'	-56'	155°	45°53'	-56'	156°	44°58'	-56'	156°	44°03'	-56'	156°	43°08'	-57'	157°	10
11	47°40'	-55'	155°	46°46'	-56'	155°	45°51'	-56'	156°	44°56'	-56'	156°	44°02'	-56'	156°	43°06'	-57'	157°	42°11'	-57'	157°	11
12	46°45'	-56'	155°	45°50'	-56'	156°	44°55'	-56'	156°	44°00'	-56'	157°	43°05'	-56'	157°	42°10'	-57'	157°	41°14'	-57'	158°	12
13	45°49'	-56'	156°	44°54'	-56'	156°	43°59'	-56'	157°	43°04'	-56'	157°	42°09'	-57'	157°	41°13'	-57'	158°	40°18'	-57'	158°	13
14	44°53'	-56'	156°	43°58'	-56'	157°	43°03'	-56'	157°	42°08'	-57'	158°	41°12'	-57'	158°	40°16'	-57'	158°	39°21'	-57'	158°	14
15	43°57'	-56'	157°	43°02'	-56'	157°	42°07'	-56'	158°	41°11'	-57'	158°	40°15'	-57'	158°	39°20'	-57'	159°	38°24'	-57'	159°	15
16	43°01'	-56'	157°	42°06'	-56'	158°	41°10'	-57'	158°	40°14'	-57'	158°	39°19'	-57'	159°	38°23'	-57'	159°	37°27'	-57'	159°	16
17	42°05'	-56'	158°	41°09'	-56'	158°	40°14'	-57'	159°	39°18'	-57'	159°	38°22'	-57'	159°	37°26'	-57'	159°	36°29'	-57'	160°	17
18	41°09'	-56'	158°	40°13'	-57'	159°	39°17'	-57'	159°	38°21'	-57'	159°	37°25'	-57'	160°	36°28'	-57'	160°	35°32'	-57'	160°	18
19	40°12'	-57'	159°	39°16'	-57'	159°	38°20'	-57'	159°	37°24'	-57'	160°	36°28'	-57'	160°	35°31'	-57'	160°	34°35'	-57'	160°	19
20	39°16'	-57'	159°	38°20'	-57'	159°	37°23'	-57'	160°	36°27'	-57'	160°	35°31'	-57'	160°	34°34'	-57'	161°	33°37'	-57'	161°	20
21	38°19'	-57'	160°	37°23'	-57'	160°	36°26'	-57'	160°	35°30'	-57'	160°	34°33'	-57'	161°	33°37'	-57'	161°	32°40'	-57'	161°	21
22	37°22'	-57'	160°	36°26'	-57'	160°	35°29'	-57'	161°	34°33'	-57'	161°	33°36'	-57'	161°	32°39'	-57'	161°	31°43'	-58'	161°	22
23	36°26'	-57'	160°	35°29'	-57'	161°	34°32'	-57'	161°	33°36'	-57'	161°	32°39'	-57'	161°	31°42'	-57'	162°	30°45'	-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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	58°05'	-53'	149°	57°13'	-54'	149°	56°21'	-54'	150°	55°29'	-55'	151°	54°36'	-55'	152°	53°43'	-55'	152°	52°50'	-56'	153°	0
1	57°11'	-54'	149°	56°19'	-54'	150°	55°27'	-55'	151°	54°34'	-55'	152°	53°41'	-55'	152°	52°48'	-56'	153°	51°55'	-56'	153°	1
2	56°17'	-54'	150°	55°25'	-54'	151°	54°32'	-55'	152°	53°39'	-55'	152°	52°46'	-55'	153°	51°53'	-56'	153°	50°59'	-56'	154°	2
3	55°23'	-54'	151°	54°31'	-55'	152°	53°38'	-55'	152°	52°44'	-55'	153°	51°51'	-56'	154°	50°57'	-56'	154°	50°03'	-56'	155°	3
4	54°29'	-55'	152°	53°36'	-55'	152°	52°43'	-55'	153°	51°49'	-56'	154°	50°55'	-56'	154°	50°01'	-56'	155°	49°07'	-56'	155°	4
5	53°34'	-55'	152°	52°41'	-55'	153°	51°47'	-55'	154°	50°53'	-56'	154°	49°59'	-56'	155°	49°05'	-56'	155°	48°10'	-56'	156°	5
6	52°39'	-55'	153°	51°46'	-55'	154°	50°52'	-56'	154°	49°58'	-56'	155°	49°03'	-56'	155°	48°09'	-56'	156°	47°14'	-57'	156°	6
7	51°44'	-55'	154°	50°50'	-56'	154°	49°56'	-56'	155°	49°02'	-56'	155°	48°07'	-56'	156°	47°12'	-56'	156°	46°17'	-57'	157°	7
8	50°49'	-55'	154°	49°55'	-56'	155°	49°00'	-56'	155°	48°06'	-56'	156°	47°11'	-56'	156°	46°16'	-57'	157°	45°21'	-57'	157°	8
9	49°54'	-56'	155°	48°59'	-56'	155°	48°04'	-56'	156°	47°10'	-56'	156°	46°14'	-57'	157°	45°19'	-57'	157°	44°24'	-57'	158°	9
10	48°58'	-56'	156°	48°03'	-56'	156°	47°08'	-56'	156°	46°13'	-56'	157°	45°18'	-57'	157°	44°23'	-57'	158°	43°27'	-57'	158°	10
11	48°02'	-56'	156°	47°07'	-56'	157°	46°12'	-56'	157°	45°17'	-57'	157°	44°21'	-57'	158°	43°26'	-57'	158°	42°30'	-57'	158°	11
12	47°06'	-56'	157°	46°11'	-56'	157°	45°16'	-57'	157°	44°20'	-57'	158°	43°25'	-57'	158°	42°29'	-57'	159°	41°33'	-57'	159°	12
13	46°10'	-56'	157°	45°15'	-56'	158°	44°19'	-57'	158°	43°24'	-57'	158°	42°28'	-57'	159°	41°32'	-57'	159°	40°36'	-57'	159°	13
14	45°14'	-56'	158°	44°18'	-57'	158°	43°23'	-57'	158°	42°27'	-57'	159°	41°31'	-57'	159°	40°35'	-57'	159°	39°38'	-57'	160°	14
15	44°18'	-56'	158°	43°22'	-57'	159°	42°26'	-57'	159°	41°30'	-57'	159°	40°34'	-57'	159°	39°37'	-57'	160°	38°41'	-57'	160°	15
16	43°21'	-57'	159°	42°25'	-57'	159°	41°29'	-57'	159°	40°33'	-57'	160°	39°37'	-57'	160°	38°40'	-57'	160°	37°44'	-57'	160°	16
17	42°24'	-57'	159°	41°28'	-57'	159°	40°32'	-57'	160°	39°36'	-57'	160°	38°39'	-57'	160°	37°43'	-57'	161°	36°46'	-58'	161°	17
18	41°28'	-57'	160°	40°31'	-57'	160°	39°35'	-57'	160°	38°39'	-57'	160°	37°42'	-57'	161°	36°45'	-57'	161°	35°49'	-58'	161°	18
19	40°31'	-57'	160°	39°35'	-57'	160°	38°38'	-57'	161°	37°41'	-57'	161°	36°45'	-57'	161°	35°48'	-58'	161°	34°51'	-58'	161°	19
20	39°34'	-57'	160°	38°38'	-57'	161°	37°41'	-57'	161°	36°44'	-57'	161°	35°47'	-57'	161°	34°50'	-58'	162°	33°53'	-58'	162°	20
21	38°37'	-57'	161°	37°40'	-57'	161°	36°44'	-57'	161°	35°47'	-57'	162°	34°50'	-58'	162°	33°53'	-58'	162°	32°56'	-58'	162°	21
22	37°40'	-57'	161°	36°43'	-57'	161°	35°46'	-57'	162°	34°49'	-57'	162°	33°52'	-58'	162°	32°55'	-58'	162°	31°58'	-58'	162°	22
23	36°43'	-57'	162°	35°46'	-57'	162°	34°49'	-57'	162°	33°52'	-58'	162°	32°55'	-58'	162°	31°57'	-58'	163°	31°00'	-58'	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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	58°31'	-54'	150°	57°39'	-55'	151°	56°46'	-55'	152°	55°53'	-55'	153°	55°00'	-56'	153°	54°06'	-56'	154°	53°12'	-56'	154°	0
1	57°37'	-54'	151°	56°45'	-55'	152°	55°52'	-55'	153°	54°58'	-55'	153°	54°04'	-56'	154°	53°10'	-56'	154°	52°16'	-56'	155°	1
2	56°43'	-55'	152°	55°50'	-55'	153°	54°56'	-55'	153°	54°03'	-56'	154°	53°09'	-56'	154°	52°14'	-56'	155°	51°20'	-56'	156°	2
3	55°48'	-55'	153°	54°55'	-55'	153°	54°01'	-56'	154°	53°07'	-56'	154°	52°13'	-56'	155°	51°18'	-56'	156°	50°24'	-57'	156°	3
4	54°53'	-55'	153°	54°00'	-55'	154°	53°06'	-56'	155°	52°11'	-56'	155°	51°17'	-56'	156°	50°22'	-56'	156°	49°27'	-57'	157°	4
5	53°58'	-55'	154°	53°04'	-56'	155°	52°10'	-56'	155°	51°15'	-56'	156°	50°20'	-56'	156°	49°25'	-57'	157°	48°30'	-57'	157°	5
6	53°03'	-56'	155°	52°08'	-56'	155°	51°14'	-56'	156°	50°19'	-56'	156°	49°24'	-57'	157°	48°29'	-57'	157°	47°33'	-57'	158°	6
7	52°07'	-56'	155°	51°13'	-56'	156°	50°18'	-56'	156°	49°23'	-56'	157°	48°27'	-57'	157°	47°32'	-57'	158°	46°36'	-57'	158°	7
8	51°11'	-56'	156°	50°17'	-56'	156°	49°21'	-56'	157°	48°26'	-57'	157°	47°31'	-57'	158°	46°35'	-57'	158°	45°39'	-57'	158°	8
9	50°15'	-56'	156°	49°20'	-56'	157°	48°25'	-57'	157°	47°30'	-57'	158°	46°34'	-57'	158°	45°38'	-57'	159°	44°42'	-57'	159°	9
10	49°19'	-56'	157°	48°24'	-56'	157°	47°29'	-57'	158°	46°33'	-57'	158°	45°37'	-57'	159°	44°41'	-57'	159°	43°45'	-57'	159°	10
11	48°23'	-56'	158°	47°28'	-57'	158°	46°32'	-57'	158°	45°36'	-57'	159°	44°40'	-57'	159°	43°44'	-57'	159°	42°48'	-57'	160°	11
12	47°27'	-57'	158°	46°31'	-57'	158°	45°35'	-57'	159°	44°39'	-57'	159°	43°43'	-57'	159°	42°47'	-57'	160°	41°50'	-57'	160°	12
13	46°30'	-57'	159°	45°34'	-57'	159°	44°38'	-57'	159°	43°42'	-57'	160°	42°46'	-57'	160°	41°49'	-57'	160°	40°53'	-58'	161°	13
14	45°33'	-57'	159°	44°37'	-57'	159°	43°41'	-57'	160°	42°45'	-57'	160°	41°48'	-57'	160°	40°52'	-58'	161°	39°55'	-58'	161°	14
15	44°37'	-57'	159°	43°40'	-57'	160°	42°44'	-57'	160°	41°48'	-57'	160°	40°51'	-57'	161°	39°54'	-58'	161°	38°58'	-58'	161°	15
16	43°40'	-57'	160°	42°43'	-57'	160°	41°47'	-57'	161°	40°50'	-57'	161°	39°54'	-58'	161°	38°57'	-58'	161°	38°00'	-58'	162°	16
17	42°43'	-57'	160°	41°46'	-57'	161°	40°50'	-57'	161°	39°53'	-57'	161°	38°56'	-58'	161°	37°59'	-58'	162°	37°02'	-58'	162°	17
18	41°46'	-57'	161°	40°49'	-57'	161°	39°52'	-57'	161°	38°55'	-58'	162°	37°58'	-58'	162°	37°01'	-58'	162°	36°04'	-58'	162°	18
19	40°49'	-57'	161°	39°52'	-57'	161°	38°55'	-57'	162°	37°58'	-58'	162°	37°01'	-58'	162°	36°04'	-58'	162°	35°06'	-58'	163°	19
20	39°51'	-57'	162°	38°54'	-57'	162°	37°57'	-58'	162°	37°00'	-58'	162°	36°03'	-58'	162°	35°06'	-58'	163°	34°08'	-58'	163°	20
21	38°54'	-57'	162°	37°57'	-58'	162°	37°00'	-58'	162°	36°03'	-58'	163°	35°05'	-58'	163°	34°08'	-58'	163°	33°11'	-58'	163°	21
22	37°57'	-57'	162°	36°59'	-58'	163°	36°02'	-58'	163°	35°05'	-58'	163°	34°07'	-58'	163°	33°10'	-58'	163°	32°13'	-58'	164°	22
23	36°59'	-58'	163°	36°02'	-58'	163°	35°05'	-58'	163°	34°07'	-58'	163°	33°10'	-58'	163°	32°12'	-58'	164°	31°14'	-58'	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°
	28			29			30			31			32			33			34			

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°	28			29			30			31			32			33			34			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	58°57'	-55'	152°	58°04'	-55'	153°	57°10'	-55'	153°	56°16'	-56'	154°	55°22'	-56'	155°	54°28'	-56'	155°	53°33'	-57'	156°	0
1	58°02'	-55'	153°	57°09'	-55'	154°	56°15'	-56'	154°	55°21'	-56'	155°	54°26'	-56'	155°	53°32'	-56'	156°	52°37'	-57'	157°	1
2	57°07'	-55'	154°	56°13'	-56'	154°	55°19'	-56'	155°	54°25'	-56'	155°	53°30'	-56'	156°	52°35'	-57'	157°	51°40'	-57'	157°	2
3	56°12'	-56'	154°	55°18'	-56'	155°	54°23'	-56'	155°	53°29'	-56'	156°	52°34'	-57'	157°	51°38'	-57'	157°	50°43'	-57'	158°	3
4	55°16'	-56'	155°	54°22'	-56'	156°	53°27'	-56'	156°	52°32'	-56'	157°	51°37'	-57'	157°	50°42'	-57'	158°	49°46'	-57'	158°	4
5	54°21'	-56'	156°	53°26'	-56'	156°	52°31'	-56'	157°	51°36'	-57'	157°	50°40'	-57'	158°	49°45'	-57'	158°	48°49'	-57'	159°	5
6	53°25'	-56'	156°	52°30'	-56'	157°	51°35'	-57'	157°	50°39'	-57'	158°	49°44'	-57'	158°	48°48'	-57'	159°	47°52'	-57'	159°	6
7	52°29'	-56'	157°	51°33'	-56'	157°	50°38'	-57'	158°	49°42'	-57'	158°	48°47'	-57'	159°	47°51'	-57'	159°	46°55'	-57'	159°	7
8	51°32'	-56'	157°	50°37'	-57'	158°	49°41'	-57'	158°	48°45'	-57'	159°	47°50'	-57'	159°	46°53'	-57'	159°	45°57'	-57'	160°	8
9	50°36'	-57'	158°	49°40'	-57'	158°	48°44'	-57'	159°	47°48'	-57'	159°	46°52'	-57'	160°	45°56'	-57'	160°	45°00'	-58'	160°	9
10	49°39'	-57'	158°	48°44'	-57'	159°	47°48'	-57'	159°	46°51'	-57'	160°	45°55'	-57'	160°	44°59'	-58'	160°	44°02'	-58'	161°	10
11	48°43'	-57'	159°	47°47'	-57'	159°	46°50'	-57'	160°	45°54'	-57'	160°	44°58'	-57'	160°	44°01'	-58'	161°	43°04'	-58'	161°	11
12	47°46'	-57'	159°	46°50'	-57'	160°	45°53'	-57'	160°	44°57'	-57'	160°	44°00'	-58'	161°	43°03'	-58'	161°	42°07'	-58'	161°	12
13	46°49'	-57'	160°	45°53'	-57'	160°	44°56'	-57'	161°	43°59'	-57'	161°	43°03'	-58'	161°	42°06'	-58'	161°	41°09'	-58'	162°	13
14	45°52'	-57'	160°	44°55'	-57'	161°	43°59'	-57'	161°	43°02'	-58'	161°	42°05'	-58'	162°	41°08'	-58'	162°	40°11'	-58'	162°	14
15	44°55'	-57'	161°	43°58'	-57'	161°	43°01'	-58'	161°	42°04'	-58'	162°	41°07'	-58'	162°	40°10'	-58'	162°	39°13'	-58'	162°	15
16	43°57'	-57'	161°	43°01'	-57'	161°	42°04'	-58'	162°	41°07'	-58'	162°	40°10'	-58'	162°	39°12'	-58'	163°	38°15'	-58'	163°	16
17	43°00'	-57'	162°	42°03'	-58'	162°	41°06'	-58'	162°	40°09'	-58'	162°	39°12'	-58'	163°	38°14'	-58'	163°	37°17'	-58'	163°	17
18	42°03'	-58'	162°	41°06'	-58'	162°	40°08'	-58'	162°	39°11'	-58'	163°	38°14'	-58'	163°	37°16'	-58'	163°	36°19'	-58'	163°	18
19	41°05'	-58'	162°	40°08'	-58'	163°	39°11'	-58'	163°	38°13'	-58'	163°	37°16'	-58'	163°	36°18'	-58'	164°	35°21'	-58'	164°	19
20	40°08'	-58'	163°	39°10'	-58'	163°	38°13'	-58'	163°	37°15'	-58'	163°	36°18'	-58'	164°	35°20'	-58'	164°	34°23'	-58'	164°	20
21	39°10'	-58'	163°	38°13'	-58'	163°	37°15'	-58'	164°	36°17'	-58'	164°	35°20'	-58'	164°	34°22'	-58'	164°	33°24'	-58'	164°	21
22	38°12'	-58'	163°	37°15'	-58'	164°	36°17'	-58'	164°	35°19'	-58'	164°	34°22'	-58'	164°	33°24'	-58'	164°	32°26'	-58'	165°	22
23	37°14'	-58'	164°	36°17'	-58'	164°	35°19'	-58'	164°	34°21'	-58'	164°	33°24'	-58'	165°	32°26'	-58'	165°	31°28'	-58'	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°
	28			29			30			31			32			33			34			

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°	28			29			30			31			32			33			34			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	59°21'	-55'	154°	58°27'	-56'	155°	57°33'	-56'	155°	56°38'	-56'	156°	55°43'	-57'	156°	54°48'	-57'	157°	53°53'	-57'	158°	0
1	58°26'	-56'	155°	57°31'	-56'	155°	56°37'	-56'	156°	55°42'	-56'	156°	54°47'	-57'	157°	53°51'	-57'	158°	52°56'	-57'	158°	1
2	57°30'	-56'	155°	56°35'	-56'	156°	55°41'	-56'	157°	54°45'	-57'	157°	53°50'	-57'	158°	52°54'	-57'	158°	51°59'	-57'	159°	2
3	56°34'	-56'	156°	55°39'	-56'	157°	54°44'	-57'	157°	53°49'	-57'	158°	52°53'	-57'	158°	51°57'	-57'	159°	51°01'	-57'	159°	3
4	55°38'	-56'	157°	54°43'	-56'	157°	53°48'	-57'	158°	52°52'	-57'	158°	51°56'	-57'	159°	51°00'	-57'	159°	50°04'	-57'	160°	4
5	54°42'	-56'	157°	53°47'	-57'	158°	52°51'	-57'	158°	51°55'	-57'	159°	50°59'	-57'	159°	50°03'	-57'	160°	49°07'	-58'	160°	5
6	53°46'	-57'	158°	52°50'	-57'	158°	51°54'	-57'	159°	50°58'	-57'	159°	50°02'	-57'	160°	49°06'	-58'	160°	48°09'	-58'	160°	6
7	52°49'	-57'	158°	51°53'	-57'	159°	50°57'	-57'	159°	50°01'	-57'	160°	49°05'	-57'	160°	48°08'	-58'	160°	47°11'	-58'	161°	7
8	51°52'	-57'	159°	50°56'	-57'	159°	50°00'	-57'	160°	49°04'	-57'	160°	48°07'	-58'	161°	47°10'	-58'	161°	46°14'	-58'	161°	8
9	50°55'	-57'	159°	49°59'	-57'	160°	49°03'	-57'	160°	48°06'	-57'	161°	47°10'	-58'	161°	46°13'	-58'	161°	45°16'	-58'	162°	9
10	49°58'	-57'	160°	49°02'	-57'	160°	48°05'	-57'	161°	47°09'	-58'	161°	46°12'	-58'	161°	45°15'	-58'	162°	44°18'	-58'	162°	10
11	49°01'	-57'	160°	48°05'	-57'	161°	47°08'	-58'	161°	46°11'	-58'	161°	45°14'	-58'	162°	44°17'	-58'	162°	43°20'	-58'	162°	11
12	48°04'	-57'	161°	47°07'	-57'	161°	46°10'	-58'	161°	45°13'	-58'	162°	44°16'	-58'	162°	43°19'	-58'	162°	42°22'	-58'	163°	12
13	47°07'	-57'	161°	46°10'	-58'	162°	45°13'	-58'	162°	44°16'	-58'	162°	43°19'	-58'	162°	42°21'	-58'	163°	41°24'	-58'	163°	13
14	46°09'	-58'	162°	45°12'	-58'	162°	44°15'	-58'	162°	43°18'	-58'	163°	42°21'	-58'	163°	41°23'	-58'	163°	40°26'	-58'	163°	14
15	45°12'	-58'	162°	44°15'	-58'	162°	43°17'	-58'	163°	42°20'	-58'	163°	41°23'	-58'	163°	40°25'	-58'	163°	39°28'	-58'	164°	15
16	44°14'	-58'	162°	43°17'	-58'	163°	42°19'	-58'	163°	41°22'	-58'	163°	40°25'	-58'	164°	39°27'	-58'	164°	38°29'	-58'	164°	16
17	43°16'	-58'	163°	42°19'	-58'	163°	41°22'	-58'	163°	40°24'	-58'	164°	39°26'	-58'	164°	38°29'	-58'	164°	37°31'	-58'	164°	17
18	42°19'	-58'	163°	41°21'	-58'	163°	40°24'	-58'	164°	39°26'	-58'	164°	38°28'	-58'	164°	37°31'	-58'	164°	36°33'	-58'	165°	18
19	41°21'	-58'	164°	40°23'	-58'	164°	39°26'	-58'	164°	38°28'	-58'	164°	37°30'	-58'	164°	36°32'	-58'	165°	35°34'	-58'	165°	19
20	40°23'	-58'	164°	39°25'	-58'	164°	38°27'	-58'	164°	37°30'	-58'	165°	36°32'	-58'	165°	35°34'	-58'	165°	34°36'	-58'	165°	20
21	39°25'	-58'	164°	38°27'	-58'	164°	37°29'	-58'	165°	36°31'	-58'	165°	35°33'	-58'	165°	34°35'	-58'	165°	33°37'	-58'	165°	21
22	38°27'	-58'	165°	37°29'	-58'	165°	36°31'	-58'	165°	35°33'	-58'	165°	34°35'	-58'	165°	33°37'	-58'	165°	32°39'	-59'	166°	22
23	37°29'	-58'	165°	36°31'	-58'	165°	35°33'	-58'	165°	34°35'	-58'	165°	33°37'	-58'	166°	32°39'	-58'	166°	31°40'	-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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	59°44'	-56'	156°	58°49'	-56'	156°	57°54'	-57'	157°	56°59'	-57'	158°	56°03'	-57'	158°	55°07'	-57'	159°	54°11'	-57'	159°	0
1	58°48'	-56'	156°	57°53'	-56'	157°	56°57'	-57'	158°	56°02'	-57'	158°	55°06'	-57'	159°	54°10'	-57'	159°	53°14'	-58'	160°	1
2	57°52'	-56'	157°	56°56'	-57'	158°	56°01'	-57'	158°	55°05'	-57'	159°	54°09'	-57'	159°	53°13'	-57'	160°	52°16'	-58'	160°	2
3	56°55'	-57'	158°	56°00'	-57'	158°	55°04'	-57'	159°	54°08'	-57'	159°	53°12'	-57'	160°	52°15'	-58'	160°	51°19'	-58'	161°	3
4	55°59'	-57'	158°	55°03'	-57'	159°	54°07'	-57'	159°	53°10'	-57'	160°	52°14'	-58'	160°	51°18'	-58'	161°	50°21'	-58'	161°	4
5	55°02'	-57'	159°	54°06'	-57'	159°	53°10'	-57'	160°	52°13'	-57'	160°	51°17'	-58'	161°	50°20'	-58'	161°	49°23'	-58'	161°	5
6	54°05'	-57'	159°	53°09'	-57'	160°	52°12'	-57'	160°	51°16'	-58'	161°	50°19'	-58'	161°	49°22'	-58'	161°	48°25'	-58'	162°	6
7	53°08'	-57'	160°	52°11'	-57'	160°	51°15'	-58'	161°	50°18'	-58'	161°	49°21'	-58'	162°	48°24'	-58'	162°	47°27'	-58'	162°	7
8	52°11'	-57'	160°	51°14'	-57'	161°	50°17'	-58'	161°	49°20'	-58'	162°	48°23'	-58'	162°	47°26'	-58'	162°	46°29'	-58'	163°	8
9	51°13'	-57'	161°	50°17'	-58'	161°	49°20'	-58'	162°	48°23'	-58'	162°	47°26'	-58'	162°	46°28'	-58'	163°	45°31'	-58'	163°	9
10	50°16'	-58'	161°	49°19'	-58'	162°	48°22'	-58'	162°	47°25'	-58'	162°	46°28'	-58'	163°	45°30'	-58'	163°	44°33'	-58'	163°	10
11	49°18'	-58'	162°	48°21'	-58'	162°	47°24'	-58'	162°	46°27'	-58'	163°	45°30'	-58'	163°	44°32'	-58'	163°	43°35'	-58'	164°	11
12	48°21'	-58'	162°	47°24'	-58'	163°	46°26'	-58'	163°	45°29'	-58'	163°	44°31'	-58'	163°	43°34'	-58'	164°	42°36'	-58'	164°	12
13	47°23'	-58'	163°	46°26'	-58'	163°	45°28'	-58'	163°	44°31'	-58'	163°	43°33'	-58'	164°	42°36'	-58'	164°	41°38'	-58'	164°	13
14	46°25'	-58'	163°	45°28'	-58'	163°	44°30'	-58'	164°	43°33'	-58'	164°	42°35'	-58'	164°	41°37'	-58'	164°	40°40'	-58'	165°	14
15	45°27'	-58'	163°	44°30'	-58'	164°	43°32'	-58'	164°	42°35'	-58'	164°	41°37'	-58'	164°	40°39'	-58'	165°	39°41'	-58'	165°	15
16	44°29'	-58'	164°	43°32'	-58'	164°	42°34'	-58'	164°	41°36'	-58'	164°	40°38'	-58'	165°	39°41'	-58'	165°	38°43'	-59'	165°	16
17	43°31'	-58'	164°	42°34'	-58'	164°	41°36'	-58'	165°	40°38'	-58'	165°	39°40'	-58'	165°	38°42'	-59'	165°	37°44'	-59'	165°	17
18	42°33'	-58'	164°	41°36'	-58'	165°	40°38'	-58'	165°	39°40'	-58'	165°	38°42'	-58'	165°	37°44'	-59'	166°	36°45'	-59'	166°	18
19	41°35'	-58'	165°	40°37'	-58'	165°	39°39'	-58'	165°	38°41'	-58'	165°	37°43'	-59'	166°	36°45'	-59'	166°	35°47'	-59'	166°	19
20	40°37'	-58'	165°	39°39'	-58'	165°	38°41'	-58'	166°	37°43'	-58'	166°	36°45'	-59'	166°	35°46'	-59'	166°	34°48'	-59'	166°	20
21	39°39'	-58'	165°	38°41'	-58'	166°	37°43'	-58'	166°	36°44'	-59'	166°	35°46'	-59'	166°	34°48'	-59'	166°	33°50'	-59'	166°	21
22	38°40'	-58'	166°	37°42'	-58'	166°	36°44'	-58'	166°	35°46'	-59'	166°	34°48'	-59'	166°	33°49'	-59'	167°	32°51'	-59'	167°	22
23	37°42'	-58'	166°	36°44'	-58'	166°	35°46'	-59'	166°	34°47'	-59'	167°	33°49'	-59'	167°	32°51'	-59'	167°	31°52'	-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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	60°05'	-57'	158°	59°09'	-57'	158°	58°13'	-57'	159°	57°17'	-57'	159°	56°21'	-57'	160°	55°25'	-58'	160°	54°28'	-58'	161°	0
1	59°08'	-57'	158°	58°12'	-57'	159°	57°16'	-57'	159°	56°20'	-57'	160°	55°24'	-58'	160°	54°27'	-58'	161°	53°30'	-58'	161°	1
2	58°11'	-57'	159°	57°15'	-57'	159°	56°19'	-57'	160°	55°23'	-58'	160°	54°26'	-58'	161°	53°29'	-58'	161°	52°32'	-58'	162°	2
3	57°15'	-57'	159°	56°18'	-57'	160°	55°22'	-57'	160°	54°25'	-58'	161°	53°28'	-58'	161°	52°32'	-58'	162°	51°35'	-58'	162°	3
4	56°17'	-57'	160°	55°21'	-57'	160°	54°24'	-58'	161°	53°28'	-58'	161°	52°31'	-58'	162°	51°34'	-58'	162°	50°36'	-58'	163°	4
5	55°20'	-57'	160°	54°24'	-58'	161°	53°27'	-58'	161°	52°30'	-58'	162°	51°33'	-58'	162°	50°36'	-58'	163°	49°38'	-58'	163°	5
6	54°23'	-57'	161°	53°26'	-58'	161°	52°29'	-58'	162°	51°32'	-58'	162°	50°35'	-58'	163°	49°38'	-58'	163°	48°40'	-58'	163°	6
7	53°25'	-58'	161°	52°28'	-58'	162°	51°31'	-58'	162°	50°34'	-58'	163°	49°37'	-58'	163°	48°39'	-58'	163°	47°42'	-58'	164°	7
8	52°28'	-58'	162°	51°31'	-58'	162°	50°33'	-58'	163°	49°36'	-58'	163°	48°39'	-58'	163°	47°41'	-58'	164°	46°43'	-58'	164°	8
9	51°30'	-58'	162°	50°33'	-58'	163°	49°35'	-58'	163°	48°38'	-58'	163°	47°40'	-58'	164°	46°43'	-58'	164°	45°45'	-58'	164°	9
10	50°32'	-58'	163°	49°35'	-58'	163°	48°37'	-58'	163°	47°40'	-58'	164°	46°42'	-58'	164°	45°44'	-58'	164°	44°47'	-59'	165°	10
11	49°34'	-58'	163°	48°37'	-58'	164°	47°39'	-58'	164°	46°42'	-58'	164°	45°44'	-58'	164°	44°46'	-58'	165°	43°48'	-59'	165°	11
12	48°36'	-58'	164°	47°39'	-58'	164°	46°41'	-58'	164°	45°43'	-58'	164°	44°45'	-58'	165°	43°47'	-59'	165°	42°49'	-59'	165°	12
13	47°38'	-58'	164°	46°41'	-58'	164°	45°43'	-58'	165°	44°45'	-58'	165°	43°47'	-58'	165°	42°49'	-59'	165°	41°51'	-59'	166°	13
14	46°40'	-58'	164°	45°42'	-58'	165°	44°44'	-58'	165°	43°46'	-58'	165°	42°48'	-59'	165°	41°50'	-59'	166°	40°52'	-59'	166°	14
15	45°42'	-58'	165°	44°44'	-58'	165°	43°46'	-58'	165°	42°48'	-59'	165°	41°50'	-59'	166°	40°52'	-59'	166°	39°54'	-59'	166°	15
16	44°44'	-58'	165°	43°46'	-58'	165°	42°48'	-58'	166°	41°50'	-59'	166°	40°51'	-59'	166°	39°53'	-59'	166°	38°55'	-59'	166°	16
17	43°45'	-58'	165°	42°47'	-58'	166°	41°49'	-59'	166°	40°51'	-59'	166°	39°53'	-59'	166°	38°54'	-59'	166°	37°56'	-59'	167°	17
18	42°47'	-58'	166°	41°49'	-58'	166°	40°51'	-59'	166°	39°52'	-59'	166°	38°54'	-59'	167°	37°56'	-59'	167°	36°57'	-59'	167°	18
19	41°49'	-58'	166°	40°50'	-59'	166°	39°52'	-59'	166°	38°54'	-59'	167°	37°55'	-59'	167°	36°57'	-59'	167°	35°58'	-59'	167°	19
20	40°50'	-59'	166°	39°52'	-59'	166°	38°53'	-59'	167°	37°55'	-59'	167°	36°57'	-59'	167°	35°58'	-59'	167°	35°00'	-59'	167°	20
21	39°52'	-59'	167°	38°53'	-59'	167°	37°55'	-59'	167°	36°56'	-59'	167°	35°58'	-59'	167°	34°59'	-59'	167°	34°01'	-59'	168°	21
22	38°53'	-59'	167°	37°55'	-59'	167°	36°56'	-59'	167°	35°58'	-59'	167°	34°59'	-59'	168°	34°00'	-59'	168°	33°02'	-59'	168°	22
23	37°54'	-59'	167°	36°56'	-59'	167°	35°57'	-59'	167°	34°59'	-59'	168°	34°00'	-59'	168°	33°02'	-59'	168°	32°03'	-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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	60°24'	-57'	159°	59°28'	-57'	160°	58°32'	-58'	161°	57°35'	-58'	161°	56°38'	-58'	162°	55°41'	-58'	162°	54°44'	-58'	162°	0
1	59°27'	-57'	160°	58°31'	-57'	161°	57°34'	-58'	161°	56°37'	-58'	162°	55°40'	-58'	162°	54°43'	-58'	163°	53°46'	-58'	163°	1
2	58°30'	-57'	161°	57°33'	-58'	161°	56°36'	-58'	162°	55°39'	-58'	162°	54°42'	-58'	163°	53°45'	-58'	163°	52°47'	-58'	163°	2
3	57°32'	-58'	161°	56°36'	-58'	162°	55°39'	-58'	162°	54°41'	-58'	163°	53°44'	-58'	163°	52°47'	-58'	163°	51°49'	-58'	164°	3
4	56°35'	-58'	162°	55°38'	-58'	162°	54°41'	-58'	163°	53°43'	-58'	163°	52°46'	-58'	163°	51°48'	-58'	164°	50°51'	-58'	164°	4
5	55°37'	-58'	162°	54°40'	-58'	163°	53°43'	-58'	163°	52°45'	-58'	163°	51°48'	-58'	164°	50°50'	-58'	164°	49°52'	-59'	164°	5
6	54°39'	-58'	163°	53°42'	-58'	163°	52°45'	-58'	163°	51°47'	-58'	164°	50°49'	-58'	164°	49°52'	-58'	164°	48°54'	-59'	165°	6
7	53°41'	-58'	163°	52°44'	-58'	163°	51°46'	-58'	164°	50°49'	-58'	164°	49°51'	-58'	164°	48°53'	-59'	165°	47°55'	-59'	165°	7
8	52°43'	-58'	164°	51°46'	-58'	164°	50°48'	-58'	164°	49°50'	-58'	165°	48°53'	-59'	165°	47°55'	-59'	165°	46°57'	-59'	165°	8
9	51°45'	-58'	164°	50°48'	-58'	164°	49°50'	-58'	165°	48°52'	-58'	165°	47°54'	-59'	165°	46°56'	-59'	165°	45°58'	-59'	166°	9
10	50°47'	-58'	164°	49°49'	-58'	165°	48°52'	-58'	165°	47°54'	-59'	165°	46°55'	-59'	165°	45°57'	-59'	166°	44°59'	-59'	166°	10
11	49°49'	-58'	165°	48°51'	-58'	165°	47°53'	-59'	165°	46°55'	-59'	166°	45°57'	-59'	166°	44°59'	-59'	166°	44°00'	-59'	166°	11
12	48°51'	-58'	165°	47°53'	-58'	165°	46°55'	-59'	166°	45°56'	-59'	166°	44°58'	-59'	166°	44°00'	-59'	166°	43°02'	-59'	167°	12
13	47°52'	-58'	165°	46°54'	-59'	166°	45°56'	-59'	166°	44°58'	-59'	166°	43°59'	-59'	166°	43°01'	-59'	167°	42°03'	-59'	167°	13
14	46°54'	-58'	166°	45°56'	-59'	166°	44°57'	-59'	166°	43°59'	-59'	166°	43°01'	-59'	167°	42°02'	-59'	167°	41°04'	-59'	167°	14
15	45°55'	-59'	166°	44°57'	-59'	166°	43°59'	-59'	167°	43°00'	-59'	167°	42°02'	-59'	167°	41°03'	-59'	167°	40°05'	-59'	167°	15
16	44°57'	-59'	166°	43°58'	-59'	167°	43°00'	-59'	167°	42°02'	-59'	167°	41°03'	-59'	167°	40°05'	-59'	167°	39°06'	-59'	168°	16
17	43°58'	-59'	167°	43°00'	-59'	167°	42°01'	-59'	167°	41°03'	-59'	167°	40°04'	-59'	167°	39°06'	-59'	168°	38°07'	-59'	168°	17
18	43°00'	-59'	167°	42°01'	-59'	167°	41°03'	-59'	167°	40°04'	-59'	168°	39°05'	-59'	168°	38°07'	-59'	168°	37°08'	-59'	168°	18
19	42°01'	-59'	167°	41°02'	-59'	167°	40°04'	-59'	168°	39°05'	-59'	168°	38°06'	-59'	168°	37°08'	-59'	168°	36°09'	-59'	168°	19
20	41°02'	-59'	168°	40°04'	-59'	168°	39°05'	-59'	168°	38°06'	-59'	168°	37°07'	-59'	168°	36°09'	-59'	168°	35°10'	-59'	168°	20
21	40°03'	-59'	168°	39°05'	-59'	168°	38°06'	-59'	168°	37°07'	-59'	168°	36°09'	-59'	168°	35°10'	-59'	169°	34°11'	-59'	169°	21
22	39°05'	-59'	168°	38°06'	-59'	168°	37°07'	-59'	168°	36°08'	-59'	169°	35°10'	-59'	169°	34°11'	-59'	169°	33°12'	-59'	169°	22
23	38°06'	-59'	168°	37°07'	-59'	168°	36°08'	-59'	169°	35°09'	-59'	169°	34°10'	-59'	169°	33°12'	-59'	169°	32°13'	-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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	60°42'	-58'	161°	59°45'	-58'	162°	58°48'	-58'	162°	57°51'	-58'	163°	56°53'	-58'	163°	55°56'	-58'	164°	54°58'	-58'	164°	0
1	59°44'	-58'	162°	58°47'	-58'	162°	57°50'	-58'	163°	56°53'	-58'	163°	55°55'	-58'	164°	54°57'	-58'	164°	54°00'	-59'	165°	1
2	58°47'	-58'	162°	57°49'	-58'	163°	56°52'	-58'	163°	55°54'	-58'	164°	54°57'	-58'	164°	53°59'	-59'	165°	53°01'	-59'	165°	2
3	57°49'	-58'	163°	56°51'	-58'	163°	55°54'	-58'	164°	54°56'	-58'	164°	53°58'	-58'	165°	53°00'	-59'	165°	52°02'	-59'	165°	3
4	56°51'	-58'	163°	55°53'	-58'	164°	54°56'	-58'	164°	53°58'	-58'	165°	53°00'	-59'	165°	52°02'	-59'	165°	51°04'	-59'	166°	4
5	55°53'	-58'	164°	54°55'	-58'	164°	53°57'	-58'	165°	52°59'	-59'	165°	52°01'	-59'	165°	51°03'	-59'	166°	50°05'	-59'	166°	5
6	54°54'	-58'	164°	53°57'	-58'	165°	52°59'	-58'	165°	52°01'	-59'	165°	51°03'	-59'	166°	50°04'	-59'	166°	49°06'	-59'	166°	6
7	53°56'	-58'	165°	52°58'	-58'	165°	52°00'	-59'	165°	51°02'	-59'	166°	50°04'	-59'	166°	49°06'	-59'	166°	48°07'	-59'	167°	7
8	52°58'	-58'	165°	52°00'	-59'	165°	51°02'	-59'	166°	50°03'	-59'	166°	49°05'	-59'	166°	48°07'	-59'	167°	47°08'	-59'	167°	8
9	51°59'	-59'	165°	51°01'	-59'	166°	50°03'	-59'	166°	49°05'	-59'	166°	48°06'	-59'	167°	47°08'	-59'	167°	46°10'	-59'	167°	9
10	51°01'	-59'	166°	50°03'	-59'	166°	49°04'	-59'	166°	48°06'	-59'	167°	47°08'	-59'	167°	46°09'	-59'	167°	45°11'	-59'	167°	10
11	50°02'	-59'	166°	49°04'	-59'	166°	48°06'	-59'	167°	47°07'	-59'	167°	46°09'	-59'	167°	45°10'	-59'	167°	44°12'	-59'	168°	11
12	49°04'	-59'	166°	48°05'	-59'	167°	47°07'	-59'	167°	46°08'	-59'	167°	45°10'	-59'	167°	44°11'	-59'	168°	43°13'	-59'	168°	12
13	48°05'	-59'	167°	47°07'	-59'	167°	46°08'	-59'	167°	45°09'	-59'	168°	44°11'	-59'	168°	43°12'	-59'	168°	42°14'	-59'	168°	13
14	47°06'	-59'	167°	46°08'	-59'	167°	45°09'	-59'	168°	44°11'	-59'	168°	43°12'	-59'	168°	42°13'	-59'	168°	41°14'	-59'	168°	14
15	46°07'	-59'	167°	45°09'	-59'	168°	44°10'	-59'	168°	43°12'	-59'	168°	42°13'	-59'	168°	41°14'	-59'	168°	40°15'	-59'	169°	15
16	45°09'	-59'	168°	44°10'	-59'	168°	43°11'	-59'	168°	42°13'	-59'	168°	41°14'	-59'	168°	40°15'	-59'	169°	39°16'	-59'	169°	16
17	44°10'	-59'	168°	43°11'	-59'	168°	42°12'	-59'	168°	41°14'	-59'	169°	40°15'	-59'	169°	39°16'	-59'	169°	38°17'	-59'	169°	17
18	43°11'	-59'	168°	42°12'	-59'	168°	41°13'	-59'	169°	40°15'	-59'	169°	39°16'	-59'	169°	38°17'	-59'	169°	37°18'	-59'	169°	18
19	42°12'	-59'	168°	41°13'	-59'	169°	40°14'	-59'	169°	39°15'	-59'	169°	38°17'	-59'	169°	37°18'	-59'	169°	36°19'	-59'	169°	19
20	41°13'	-59'	169°	40°14'	-59'	169°	39°15'	-59'	169°	38°16'	-59'	169°	37°17'	-59'	169°	36°18'	-59'	169°	35°19'	-59'	170°	20
21	40°14'	-59'	169°	39°15'	-59'	169°	38°16'	-59'	169°	37°17'	-59'	169°	36°18'	-59'	170°	35°19'	-59'	170°	34°20'	-59'	170°	21
22	39°15'	-59'	169°	38°16'	-59'	169°	37°17'	-59'	169°	36°18'	-59'	170°	35°19'	-59'	170°	34°20'	-59'	170°	33°21'	-59'	170°	22
23	38°16'	-59'	169°	37°17'	-59'	170°	36°18'	-59'	170°	35°19'	-59'	170°	34°20'	-59'	170°	33°21'	-59'	170°	32°22'	-59'	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°
	28			29			30			31			32			33			34			

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

Dec°	28 Hc°	d'	Z°	29 Hc°	d'	Z°	30 Hc°	d'	Z°	31 Hc°	d'	Z°	32 Hc°	d'	Z°	33 Hc°	d'	Z°	34 Hc°	d'	Z°	Dec°
0	60°58'	-58'	163°	60°01'	-58'	164°	59°03'	-58'	164°	58°05'	-58'	165°	57°07'	-59'	165°	56°09'	-59'	166°	55°11'	-59'	166°	0
1	60°00'	-58'	164°	59°02'	-58'	164°	58°04'	-58'	165°	57°07'	-59'	165°	56°09'	-59'	166°	55°10'	-59'	166°	54°12'	-59'	166°	1
2	59°02'	-58'	164°	58°04'	-58'	165°	57°06'	-59'	165°	56°08'	-59'	166°	55°10'	-59'	166°	54°12'	-59'	166°	53°13'	-59'	167°	2
3	58°03'	-58'	165°	57°06'	-59'	165°	56°07'	-59'	166°	55°09'	-59'	166°	54°11'	-59'	166°	53°13'	-59'	167°	52°14'	-59'	167°	3
4	57°05'	-58'	165°	56°07'	-59'	166°	55°09'	-59'	166°	54°11'	-59'	166°	53°12'	-59'	167°	52°14'	-59'	167°	51°15'	-59'	167°	4
5	56°07'	-59'	166°	55°08'	-59'	166°	54°10'	-59'	166°	53°12'	-59'	167°	52°13'	-59'	167°	51°15'	-59'	167°	50°16'	-59'	167°	5
6	55°08'	-59'	166°	54°10'	-59'	166°	53°11'	-59'	167°	52°13'	-59'	167°	51°15'	-59'	167°	50°16'	-59'	167°	49°17'	-59'	168°	6
7	54°09'	-59'	166°	53°11'	-59'	167°	52°13'	-59'	167°	51°14'	-59'	167°	50°16'	-59'	168°	49°17'	-59'	168°	48°18'	-59'	168°	7
8	53°11'	-59'	167°	52°12'	-59'	167°	51°14'	-59'	167°	50°15'	-59'	168°	49°17'	-59'	168°	48°18'	-59'	168°	47°19'	-59'	168°	8
9	52°12'	-59'	167°	51°13'	-59'	167°	50°15'	-59'	168°	49°16'	-59'	168°	48°18'	-59'	168°	47°19'	-59'	168°	46°20'	-59'	169°	9
10	51°13'	-59'	167°	50°15'	-59'	168°	49°16'	-59'	168°	48°17'	-59'	168°	47°19'	-59'	168°	46°20'	-59'	169°	45°21'	-59'	169°	10
11	50°14'	-59'	168°	49°16'	-59'	168°	48°17'	-59'	168°	47°18'	-59'	168°	46°19'	-59'	169°	45°21'	-59'	169°	44°22'	-59'	169°	11
12	49°15'	-59'	168°	48°17'	-59'	168°	47°18'	-59'	168°	46°19'	-59'	169°	45°20'	-59'	169°	44°21'	-59'	169°	43°22'	-59'	169°	12
13	48°16'	-59'	168°	47°18'	-59'	168°	46°19'	-59'	169°	45°20'	-59'	169°	44°21'	-59'	169°	43°22'	-59'	169°	42°23'	-59'	169°	13
14	47°17'	-59'	169°	46°19'	-59'	169°	45°20'	-59'	169°	44°21'	-59'	169°	43°22'	-59'	169°	42°23'	-59'	169°	41°24'	-59'	170°	14
15	46°18'	-59'	169°	45°20'	-59'	169°	44°21'	-59'	169°	43°22'	-59'	169°	42°23'	-59'	170°	41°24'	-59'	170°	40°25'	-59'	170°	15
16	45°19'	-59'	169°	44°20'	-59'	169°	43°21'	-59'	169°	42°22'	-59'	170°	41°23'	-59'	170°	40°24'	-59'	170°	39°25'	-59'	170°	16
17	44°20'	-59'	169°	43°21'	-59'	169°	42°22'	-59'	170°	41°23'	-59'	170°	40°24'	-59'	170°	39°25'	-59'	170°	38°26'	-59'	170°	17
18	43°21'	-59'	170°	42°22'	-59'	170°	41°23'	-59'	170°	40°24'	-59'	170°	39°25'	-59'	170°	38°26'	-59'	170°	37°27'	-59'	170°	18
19	42°22'	-59'	170°	41°23'	-59'	170°	40°24'	-59'	170°	39°25'	-59'	170°	38°26'	-59'	170°	37°26'	-59'	170°	36°27'	-59'	171°	19
20	41°23'	-59'	170°	40°24'	-59'	170°	39°25'	-59'	170°	38°25'	-59'	170°	37°26'	-59'	171°	36°27'	-59'	171°	35°28'	-59'	171°	20
21	40°24'	-59'	170°	39°24'	-59'	170°	38°25'	-59'	170°	37°26'	-59'	171°	36°27'	-59'	171°	35°28'	-59'	171°	34°28'	-59'	171°	21
22	39°24'	-59'	170°	38°25'	-59'	171°	37°26'	-59'	171°	36°27'	-59'	171°	35°28'	-59'	171°	34°28'	-59'	171°	33°29'	-59'	171°	22
23	38°25'	-59'	171°	37°26'	-59'	171°	36°27'	-59'	171°	35°27'	-59'	171°	34°28'	-59'	171°	33°29'	-59'	171°	32°30'	-59'	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°
	28			29			30			31			32			33			34			

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

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

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

Dec°	28			29			30			31			32			33			34			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	61°25'	-59'	167°	60°26'	-59'	168°	59°28'	-59'	168°	58°29'	-59'	168°	57°30'	-59'	169°	56°31'	-59'	169°	55°32'	-59'	169°	0
1	60°26'	-59'	168°	59°27'	-59'	168°	58°29'	-59'	168°	57°30'	-59'	169°	56°31'	-59'	169°	55°32'	-59'	169°	54°33'	-59'	170°	1
2	59°27'	-59'	168°	58°28'	-59'	168°	57°29'	-59'	169°	56°31'	-59'	169°	55°32'	-59'	169°	54°33'	-59'	170°	53°34'	-59'	170°	2
3	58°28'	-59'	168°	57°29'	-59'	169°	56°30'	-59'	169°	55°31'	-59'	169°	54°32'	-59'	170°	53°33'	-59'	170°	52°34'	-59'	170°	3
4	57°29'	-59'	169°	56°30'	-59'	169°	55°31'	-59'	169°	54°32'	-59'	170°	53°33'	-59'	170°	52°34'	-59'	170°	51°35'	-59'	170°	4
5	56°30'	-59'	169°	55°31'	-59'	169°	54°32'	-59'	170°	53°33'	-59'	170°	52°34'	-59'	170°	51°35'	-59'	170°	50°35'	-59'	171°	5
6	55°31'	-59'	169°	54°32'	-59'	170°	53°33'	-59'	170°	52°33'	-59'	170°	51°34'	-59'	170°	50°35'	-59'	171°	49°36'	-59'	171°	6
7	54°31'	-59'	170°	53°32'	-59'	170°	52°33'	-59'	170°	51°34'	-59'	170°	50°35'	-59'	171°	49°36'	-59'	171°	48°36'	-59'	171°	7
8	53°32'	-59'	170°	52°33'	-59'	170°	51°34'	-59'	170°	50°35'	-59'	171°	49°35'	-59'	171°	48°36'	-59'	171°	47°37'	-60'	171°	8
9	52°33'	-59'	170°	51°34'	-59'	170°	50°35'	-59'	171°	49°35'	-59'	171°	48°36'	-59'	171°	47°37'	-59'	171°	46°37'	-60'	171°	9
10	51°34'	-59'	170°	50°34'	-59'	171°	49°35'	-59'	171°	48°36'	-59'	171°	47°37'	-59'	171°	46°37'	-60'	171°	45°38'	-60'	172°	10
11	50°34'	-59'	171°	49°35'	-59'	171°	48°36'	-59'	171°	47°36'	-59'	171°	46°37'	-60'	171°	45°38'	-60'	172°	44°38'	-60'	172°	11
12	49°35'	-59'	171°	48°36'	-59'	171°	47°36'	-59'	171°	46°37'	-59'	171°	45°38'	-60'	172°	44°38'	-60'	172°	43°39'	-60'	172°	12
13	48°35'	-59'	171°	47°36'	-59'	171°	46°37'	-59'	171°	45°37'	-60'	172°	44°38'	-60'	172°	43°39'	-60'	172°	42°39'	-60'	172°	13
14	47°36'	-59'	171°	46°37'	-59'	172°	45°37'	-60'	172°	44°38'	-60'	172°	43°39'	-60'	172°	42°39'	-60'	172°	41°40'	-60'	172°	14
15	46°37'	-59'	172°	45°37'	-59'	172°	44°38'	-60'	172°	43°38'	-60'	172°	42°39'	-60'	172°	41°40'	-60'	172°	40°40'	-60'	172°	15
16	45°37'	-59'	172°	44°38'	-60'	172°	43°38'	-60'	172°	42°39'	-60'	172°	41°39'	-60'	172°	40°40'	-60'	172°	39°40'	-60'	172°	16
17	44°38'	-60'	172°	43°38'	-60'	172°	42°39'	-60'	172°	41°39'	-60'	172°	40°40'	-60'	172°	39°40'	-60'	173°	38°41'	-60'	173°	17
18	43°38'	-60'	172°	42°39'	-60'	172°	41°39'	-60'	172°	40°40'	-60'	172°	39°40'	-60'	173°	38°41'	-60'	173°	37°41'	-60'	173°	18
19	42°39'	-60'	172°	41°39'	-60'	172°	40°40'	-60'	173°	39°40'	-60'	173°	38°41'	-60'	173°	37°41'	-60'	173°	36°42'	-60'	173°	19
20	41°39'	-60'	172°	40°40'	-60'	173°	39°40'	-60'	173°	38°41'	-60'	173°	37°41'	-60'	173°	36°41'	-60'	173°	35°42'	-60'	173°	20
21	40°39'	-60'	173°	39°40'	-60'	173°	38°40'	-60'	173°	37°41'	-60'	173°	36°41'	-60'	173°	35°42'	-60'	173°	34°42'	-60'	173°	21
22	39°40'	-60'	173°	38°40'	-60'	173°	37°41'	-60'	173°	36°41'	-60'	173°	35°42'	-60'	173°	34°42'	-60'	173°	33°43'	-60'	173°	22
23	38°40'	-60'	173°	37°41'	-60'	173°	36°41'	-60'	173°	35°42'	-60'	173°	34°42'	-60'	173°	33°42'	-60'	173°	32°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°
	28			29			30			31			32			33			34			

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

Dec°	28			29			30			31			32			33			34			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	61°36'	-59'	169°	60°37'	-59'	170°	59°37'	-59'	170°	58°38'	-59'	170°	57°39'	-59'	171°	56°40'	-59'	171°	55°41'	-60'	171°	0
1	60°36'	-59'	170°	59°37'	-59'	170°	58°38'	-59'	170°	57°39'	-59'	171°	56°40'	-59'	171°	55°40'	-60'	171°	54°41'	-60'	171°	1
2	59°37'	-59'	170°	58°38'	-59'	170°	57°39'	-59'	171°	56°40'	-59'	171°	55°40'	-59'	171°	54°41'	-60'	171°	53°42'	-60'	172°	2
3	58°38'	-59'	170°	57°39'	-59'	171°	56°39'	-59'	171°	55°40'	-59'	171°	54°41'	-60'	171°	53°41'	-60'	172°	52°42'	-60'	172°	3
4	57°38'	-59'	171°	56°39'	-59'	171°	55°40'	-59'	171°	54°41'	-60'	171°	53°41'	-60'	172°	52°42'	-60'	172°	51°42'	-60'	172°	4
5	56°39'	-59'	171°	55°40'	-59'	171°	54°40'	-59'	171°	53°41'	-60'	172°	52°42'	-60'	172°	51°42'	-60'	172°	50°43'	-60'	172°	5
6	55°40'	-59'	171°	54°40'	-59'	171°	53°41'	-60'	172°	52°42'	-60'	172°	51°42'	-60'	172°	50°43'	-60'	172°	49°43'	-60'	172°	6
7	54°40'	-59'	171°	53°41'	-60'	172°	52°41'	-60'	172°	51°42'	-60'	172°	50°43'	-60'	172°	49°43'	-60'	172°	48°44'	-60'	172°	7
8	53°41'	-60'	172°	52°41'	-60'	172°	51°42'	-60'	172°	50°42'	-60'	172°	49°43'	-60'	172°	48°43'	-60'	172°	47°44'	-60'	173°	8
9	52°41'	-60'	172°	51°42'	-60'	172°	50°42'	-60'	172°	49°43'	-60'	172°	48°43'	-60'	173°	47°44'	-60'	173°	46°44'	-60'	173°	9
10	51°42'	-60'	172°	50°42'	-60'	172°	49°43'	-60'	172°	48°43'	-60'	173°	47°44'	-60'	173°	46°44'	-60'	173°	45°45'	-60'	173°	10
11	50°42'	-60'	172°	49°43'	-60'	172°	48°43'	-60'	173°	47°44'	-60'	173°	46°44'	-60'	173°	45°45'	-60'	173°	44°45'	-60'	173°	11
12	49°42'	-60'	172°	48°43'	-60'	173°	47°43'	-60'	173°	46°44'	-60'	173°	45°44'	-60'	173°	44°45'	-60'	173°	43°45'	-60'	173°	12
13	48°43'	-60'	173°	47°43'	-60'	173°	46°44'	-60'	173°	45°44'	-60'	173°	44°45'	-60'	173°	43°45'	-60'	173°	42°46'	-60'	173°	13
14	47°43'	-60'	173°	46°44'	-60'	173°	45°44'	-60'	173°	44°45'	-60'	173°	43°45'	-60'	173°	42°45'	-60'	173°	41°46'	-60'	173°	14
15	46°44'	-60'	173°	45°44'	-60'	173°	44°45'	-60'	173°	43°45'	-60'	173°	42°45'	-60'	173°	41°46'	-60'	174°	40°46'	-60'	174°	15
16	45°44'	-60'	173°	44°44'	-60'	173°	43°45'	-60'	173°	42°45'	-60'	173°	41°46'	-60'	174°	40°46'	-60'	174°	39°46'	-60'	174°	16
17	44°44'	-60'	173°	43°45'	-60'	173°	42°45'	-60'	173°	41°46'	-60'	174°	40°46'	-60'	174°	39°46'	-60'	174°	38°47'	-60'	174°	17
18	43°45'	-60'	173°	42°45'	-60'	174°	41°46'	-60'	174°	40°46'	-60'	174°	39°46'	-60'	174°	38°47'	-60'	174°	37°47'	-60'	174°	18
19	42°45'	-60'	174°	41°45'	-60'	174°	40°46'	-60'	174°	39°46'	-60'	174°	38°47'	-60'	174°	37°47'	-60'	174°	36°47'	-60'	174°	19
20	41°45'	-60'	174°	40°46'	-60'	174°	39°46'	-60'	174°	38°46'	-60'	174°	37°47'	-60'	174°	36°47'	-60'	174°	35°47'	-60'	174°	20
21	40°46'	-60'	174°	39°46'	-60'	174°	38°46'	-60'	174°	37°47'	-60'	174°	36°47'	-60'	174°	35°47'	-60'	174°	34°48'	-60'	174°	21
22	39°46'	-60'	174°	38°46'	-60'	174°	37°47'	-60'	174°	36°47'	-60'	174°	35°47'	-60'	174°	34°48'	-60'	174°	33°48'	-60'	174°	22
23	38°46'	-60'	174°	37°47'	-60'	174°	36°47'	-60'	174°	35°47'	-60'	174°	34°48'	-60'	174°	33°48'	-60'	174°	32°48'	-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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	61°44'	-60'	172°	60°45'	-60'	172°	59°46'	-60'	172°	58°46'	-60'	172°	57°47'	-60'	172°	56°47'	-60'	173°	55°48'	-60'	173°	0
1	60°45'	-60'	172°	59°45'	-60'	172°	58°46'	-60'	172°	57°46'	-60'	172°	56°47'	-60'	173°	55°47'	-60'	173°	54°48'	-60'	173°	1
2	59°45'	-60'	172°	58°46'	-60'	172°	57°46'	-60'	172°	56°47'	-60'	173°	55°47'	-60'	173°	54°48'	-60'	173°	53°48'	-60'	173°	2
3	58°46'	-60'	172°	57°46'	-60'	172°	56°47'	-60'	173°	55°47'	-60'	173°	54°48'	-60'	173°	53°48'	-60'	173°	52°49'	-60'	173°	3
4	57°46'	-60'	173°	56°47'	-60'	173°	55°47'	-60'	173°	54°48'	-60'	173°	53°48'	-60'	173°	52°48'	-60'	173°	51°49'	-60'	174°	4
5	56°47'	-60'	173°	55°47'	-60'	173°	54°47'	-60'	173°	53°48'	-60'	173°	52°48'	-60'	173°	51°49'	-60'	174°	50°49'	-60'	174°	5
6	55°47'	-60'	173°	54°47'	-60'	173°	53°48'	-60'	173°	52°48'	-60'	173°	51°49'	-60'	174°	50°49'	-60'	174°	49°49'	-60'	174°	6
7	54°47'	-60'	173°	53°48'	-60'	173°	52°48'	-60'	173°	51°48'	-60'	174°	50°49'	-60'	174°	49°49'	-60'	174°	48°50'	-60'	174°	7
8	53°48'	-60'	173°	52°48'	-60'	173°	51°48'	-60'	174°	50°49'	-60'	174°	49°49'	-60'	174°	48°49'	-60'	174°	47°50'	-60'	174°	8
9	52°48'	-60'	173°	51°48'	-60'	174°	50°49'	-60'	174°	49°49'	-60'	174°	48°49'	-60'	174°	47°50'	-60'	174°	46°50'	-60'	174°	9
10	51°48'	-60'	174°	50°49'	-60'	174°	49°49'	-60'	174°	48°49'	-60'	174°	47°50'	-60'	174°	46°50'	-60'	174°	45°50'	-60'	174°	10
11	50°48'	-60'	174°	49°49'	-60'	174°	48°49'	-60'	174°	47°49'	-60'	174°	46°50'	-60'	174°	45°50'	-60'	174°	44°50'	-60'	174°	11
12	49°49'	-60'	174°	48°49'	-60'	174°	47°49'	-60'	174°	46°50'	-60'	174°	45°50'	-60'	174°	44°50'	-60'	174°	43°51'	-60'	175°	12
13	48°49'	-60'	174°	47°49'	-60'	174°	46°50'	-60'	174°	45°50'	-60'	174°	44°50'	-60'	174°	43°50'	-60'	175°	42°51'	-60'	175°	13
14	47°49'	-60'	174°	46°50'	-60'	174°	45°50'	-60'	174°	44°50'	-60'	175°	43°50'	-60'	175°	42°51'	-60'	175°	41°51'	-60'	175°	14
15	46°50'	-60'	174°	45°50'	-60'	174°	44°50'	-60'	175°	43°50'	-60'	175°	42°51'	-60'	175°	41°51'	-60'	175°	40°51'	-60'	175°	15
16	45°50'	-60'	174°	44°50'	-60'	175°	43°50'	-60'	175°	42°51'	-60'	175°	41°51'	-60'	175°	40°51'	-60'	175°	39°51'	-60'	175°	16
17	44°50'	-60'	175°	43°50'	-60'	175°	42°51'	-60'	175°	41°51'	-60'	175°	40°51'	-60'	175°	39°51'	-60'	175°	38°51'	-60'	175°	17
18	43°50'	-60'	175°	42°50'	-60'	175°	41°51'	-60'	175°	40°51'	-60'	175°	39°51'	-60'	175°	38°51'	-60'	175°	37°52'	-60'	175°	18
19	42°50'	-60'	175°	41°51'	-60'	175°	40°51'	-60'	175°	39°51'	-60'	175°	38°51'	-60'	175°	37°52'	-60'	175°	36°52'	-60'	175°	19
20	41°51'	-60'	175°	40°51'	-60'	175°	39°51'	-60'	175°	38°51'	-60'	175°	37°52'	-60'	175°	36°52'	-60'	175°	35°52'	-60'	175°	20
21	40°51'	-60'	175°	39°51'	-60'	175°	38°51'	-60'	175°	37°52'	-60'	175°	36°52'	-60'	175°	35°52'	-60'	175°	34°52'	-60'	175°	21
22	39°51'	-60'	175°	38°51'	-60'	175°	37°51'	-60'	175°	36°52'	-60'	175°	35°52'	-60'	175°	34°52'	-60'	175°	33°52'	-60'	176°	22
23	38°51'	-60'	175°	37°51'	-60'	175°	36°52'	-60'	175°	35°52'	-60'	175°	34°52'	-60'	176°	33°52'	-60'	176°	32°52'	-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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	61°51'	-60'	174°	60°52'	-60'	174°	59°52'	-60'	174°	58°52'	-60'	174°	57°52'	-60'	174°	56°53'	-60'	175°	55°53'	-60'	175°	0
1	60°51'	-60'	174°	59°52'	-60'	174°	58°52'	-60'	174°	57°52'	-60'	174°	56°53'	-60'	175°	55°53'	-60'	175°	54°53'	-60'	175°	1
2	59°52'	-60'	174°	58°52'	-60'	174°	57°52'	-60'	174°	56°53'	-60'	175°	55°53'	-60'	175°	54°53'	-60'	175°	53°53'	-60'	175°	2
3	58°52'	-60'	174°	57°52'	-60'	174°	56°53'	-60'	175°	55°53'	-60'	175°	54°53'	-60'	175°	53°53'	-60'	175°	52°54'	-60'	175°	3
4	57°52'	-60'	174°	56°52'	-60'	175°	55°53'	-60'	175°	54°53'	-60'	175°	53°53'	-60'	175°	52°53'	-60'	175°	51°54'	-60'	175°	4
5	56°52'	-60'	175°	55°53'	-60'	175°	54°53'	-60'	175°	53°53'	-60'	175°	52°53'	-60'	175°	51°54'	-60'	175°	50°54'	-60'	175°	5
6	55°53'	-60'	175°	54°53'	-60'	175°	53°53'	-60'	175°	52°53'	-60'	175°	51°54'	-60'	175°	50°54'	-60'	175°	49°54'	-60'	175°	6
7	54°53'	-60'	175°	53°53'	-60'	175°	52°53'	-60'	175°	51°53'	-60'	175°	50°54'	-60'	175°	49°54'	-60'	175°	48°54'	-60'	175°	7
8	53°53'	-60'	175°	52°53'	-60'	175°	51°53'	-60'	175°	50°54'	-60'	175°	49°54'	-60'	175°	48°54'	-60'	175°	47°54'	-60'	176°	8
9	52°53'	-60'	175°	51°53'	-60'	175°	50°54'	-60'	175°	49°54'	-60'	175°	48°54'	-60'	175°	47°54'	-60'	176°	46°54'	-60'	176°	9
10	51°53'	-60'	175°	50°54'	-60'	175°	49°54'	-60'	175°	48°54'	-60'	176°	47°54'	-60'	176°	46°54'	-60'	176°	45°54'	-60'	176°	10
11	50°54'	-60'	175°	49°54'	-60'	175°	48°54'	-60'	176°	47°54'	-60'	176°	46°54'	-60'	176°	45°54'	-60'	176°	44°55'	-60'	176°	11
12	49°54'	-60'	175°	48°54'	-60'	176°	47°54'	-60'	176°	46°54'	-60'	176°	45°54'	-60'	176°	44°55'	-60'	176°	43°55'	-60'	176°	12
13	48°54'	-60'	176°	47°54'	-60'	176°	46°54'	-60'	176°	45°54'	-60'	176°	44°54'	-60'	176°	43°55'	-60'	176°	42°55'	-60'	176°	13
14	47°54'	-60'	176°	46°54'	-60'	176°	45°54'	-60'	176°	44°54'	-60'	176°	43°55'	-60'	176°	42°55'	-60'	176°	41°55'	-60'	176°	14
15	46°54'	-60'	176°	45°54'	-60'	176°	44°54'	-60'	176°	43°55'	-60'	176°	42°55'	-60'	176°	41°55'	-60'	176°	40°55'	-60'	176°	15
16	45°54'	-60'	176°	44°54'	-60'	176°	43°55'	-60'	176°	42°55'	-60'	176°	41°55'	-60'	176°	40°55'	-60'	176°	39°55'	-60'	176°	16
17	44°54'	-60'	176°	43°55'	-60'	176°	42°55'	-60'	176°	41°55'	-60'	176°	40°55'	-60'	176°	39°55'	-60'	176°	38°55'	-60'	176°	17
18	43°55'	-60'	176°	42°55'	-60'	176°	41°55'	-60'	176°	40°55'	-60'	176°	39°55'	-60'	176°	38°55'	-60'	176°	37°55'	-60'	176°	18
19	42°55'	-60'	176°	41°55'	-60'	176°	40°55'	-60'	176°	39°55'	-60'	176°	38°55'	-60'	176°	37°55'	-60'	176°	36°55'	-60'	176°	19
20	41°55'	-60'	176°	40°55'	-60'	176°	39°55'	-60'	176°	38°55'	-60'	176°	37°55'	-60'	176°	36°55'	-60'	176°	35°55'	-60'	177°	20
21	40°55'	-60'	176°	39°55'	-60'	176°	38°55'	-60'	176°	37°55'	-60'	176°	36°55'	-60'	176°	35°55'	-60'	177°	34°56'	-60'	177°	21
22	39°55'	-60'	176°	38°55'	-60'	176°	37°55'	-60'	176°	36°55'	-60'	177°	35°55'	-60'	177°	34°56'	-60'	177°	33°56'	-60'	177°	22
23	38°55'	-60'	176°	37°55'	-60'	176°	36°55'	-60'	177°	35°55'	-60'	177°	34°56'	-60'	177°	33°56'	-60'	177°	32°56'	-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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	61°56'	-60'	176°	60°56'	-60'	176°	59°56'	-60'	176°	58°57'	-60'	176°	57°57'	-60'	176°	56°57'	-60'	176°	55°57'	-60'	176°	0
1	60°56'	-60'	176°	59°56'	-60'	176°	58°56'	-60'	176°	57°57'	-60'	176°	56°57'	-60'	176°	55°57'	-60'	176°	54°57'	-60'	177°	1
2	59°56'	-60'	176°	58°56'	-60'	176°	57°57'	-60'	176°	56°57'	-60'	176°	55°57'	-60'	176°	54°57'	-60'	177°	53°57'	-60'	177°	2
3	58°56'	-60'	176°	57°57'	-60'	176°	56°57'	-60'	176°	55°57'	-60'	176°	54°57'	-60'	177°	53°57'	-60'	177°	52°57'	-60'	177°	3
4	57°57'	-60'	176°	56°57'	-60'	176°	55°57'	-60'	176°	54°57'	-60'	177°	53°57'	-60'	177°	52°57'	-60'	177°	51°57'	-60'	177°	4
5	56°57'	-60'	176°	55°57'	-60'	176°	54°57'	-60'	177°	53°57'	-60'	177°	52°57'	-60'	177°	51°57'	-60'	177°	50°57'	-60'	177°	5
6	55°57'	-60'	176°	54°57'	-60'	177°	53°57'	-60'	177°	52°57'	-60'	177°	51°57'	-60'	177°	50°57'	-60'	177°	49°57'	-60'	177°	6
7	54°57'	-60'	177°	53°57'	-60'	177°	52°57'	-60'	177°	51°57'	-60'	177°	50°57'	-60'	177°	49°57'	-60'	177°	48°57'	-60'	177°	7
8	53°57'	-60'	177°	52°57'	-60'	177°	51°57'	-60'	177°	50°57'	-60'	177°	49°57'	-60'	177°	48°57'	-60'	177°	47°57'	-60'	177°	8
9	52°57'	-60'	177°	51°57'	-60'	177°	50°57'	-60'	177°	49°57'	-60'	177°	48°57'	-60'	177°	47°57'	-60'	177°	46°57'	-60'	177°	9
10	51°57'	-60'	177°	50°57'	-60'	177°	49°57'	-60'	177°	48°57'	-60'	177°	47°57'	-60'	177°	46°57'	-60'	177°	45°58'	-60'	177°	10
11	50°57'	-60'	177°	49°57'	-60'	177°	48°57'	-60'	177°	47°57'	-60'	177°	46°57'	-60'	177°	45°58'	-60'	177°	44°58'	-60'	177°	11
12	49°57'	-60'	177°	48°57'	-60'	177°	47°57'	-60'	177°	46°57'	-60'	177°	45°58'	-60'	177°	44°58'	-60'	177°	43°58'	-60'	177°	12
13	48°57'	-60'	177°	47°57'	-60'	177°	46°57'	-60'	177°	45°57'	-60'	177°	44°58'	-60'	177°	43°58'	-60'	177°	42°58'	-60'	177°	13
14	47°57'	-60'	177°	46°57'	-60'	177°	45°57'	-60'	177°	44°58'	-60'	177°	43°58'	-60'	177°	42°58'	-60'	177°	41°58'	-60'	177°	14
15	46°57'	-60'	177°	45°57'	-60'	177°	44°58'	-60'	177°	43°58'	-60'	177°	42°58'	-60'	177°	41°58'	-60'	177°	40°58'	-60'	177°	15
16	45°57'	-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°	16
17	44°58'	-60'	177°	43°58'	-60'	177°	42°58'	-60'	177°	41°58'	-60'	177°	40°58'	-60'	177°	39°58'	-60'	178°	38°58'	-60'	178°	17
18	43°58'	-60'	177°	42°58'	-60'	177°	41°58'	-60'	177°	40°58'	-60'	177°	39°58'	-60'	178°	38°58'	-60'	178°	37°58'	-60'	178°	18
19	42°58'	-60'	177°	41°58'	-60'	177°	40°58'	-60'	177°	39°58'	-60'	178°	38°58'	-60'	178°	37°58'	-60'	178°	36°58'	-60'	178°	19
20	41°58'	-60'	177°	40°58'	-60'	178°	39°58'	-60'	178°	38°58'	-60'	178°	37°58'	-60'	178°	36°58'	-60'	178°	35°58'	-60'	178°	20
21	40°58'	-60'	178°	39°58'	-60'	178°	38°58'	-60'	178°	37°58'	-60'	178°	36°58'	-60'	178°	35°58'	-60'	178°	34°58'	-60'	178°	21
22	39°58'	-60'	178°	38°58'	-60'	178°	37°58'	-60'	178°	36°58'	-60'	178°	35°58'	-60'	178°	34°58'	-60'	178°	33°58'	-60'	178°	22
23	38°58'	-60'	178°	37°58'	-60'	178°	36°58'	-60'	178°	35°58'	-60'	178°	34°58'	-60'	178°	33°58'	-60'	178°	32°58'	-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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	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°	0
1	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°	1
2	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°	2
3	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°	3
4	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°	4
5	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°	5
6	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°	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	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°	8
9	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°	9
10	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°	10
11	50°59'	-60'	178°	49°59'	-60'	178°	48°59'	-60'	179°	47°59'	-60'	179°	46°59'	-60'	179°	45°59'	-60'	179°	44°59'	-60'	179°	11
12	49°59'	-60'	178°	48°59'	-60'	179°	47°59'	-60'	179°	46°59'	-60'	179°	45°59'	-60'	179°	44°59'	-60'	179°	43°59'	-60'	179°	12
13	48°59'	-60'	179°	47°59'	-60'	179°	46°59'	-60'	179°	45°59'	-60'	179°	44°59'	-60'	179°	43°59'	-60'	179°	42°59'	-60'	179°	13
14	47°59'	-60'	179°	46°59'	-60'	179°	45°59'	-60'	179°	44°59'	-60'	179°	43°59'	-60'	179°	42°59'	-60'	179°	41°59'	-60'	179°	14
15	46°59'	-60'	179°	45°59'	-60'	179°	44°59'	-60'	179°	43°59'	-60'	179°	42°59'	-60'	179°	41°59'	-60'	179°	40°59'	-60'	179°	15
16	45°59'	-60'	179°	44°59'	-60'	179°	43°59'	-60'	179°	42°59'	-60'	179°	41°59'	-60'	179°	40°59'	-60'	179°	39°59'	-60'	179°	16
17	44°59'	-60'	179°	43°59'	-60'	179°	42°59'	-60'	179°	41°59'	-60'	179°	40°59'	-60'	179°	39°59'	-60'	179°	38°59'	-60'	179°	17
18	43°59'	-60'	179°	42°59'	-60'	179°	41°59'	-60'	179°	40°59'	-60'	179°	39°59'	-60'	179°	38°59'	-60'	179°	37°59'	-60'	179°	18
19	42°59'	-60'	179°	41°59'	-60'	179°	40°59'	-60'	179°	39°59'	-60'	179°	38°59'	-60'	179°	37°59'	-60'	179°	36°59'	-60'	179°	19
20	41°59'	-60'	179°	40°59'	-60'	179°	39°59'	-60'	179°	38°59'	-60'	179°	37°59'	-60'	179°	36°59'	-60'	179°	35°59'	-60'	179°	20
21	40°59'	-60'	179°	39°59'	-60'	179°	38°59'	-60'	179°	37°59'	-60'	179°	36°59'	-60'	179°	35°59'	-60'	179°	35°00'	-60'	179°	21
22	39°59'	-60'	179°	38°59'	-60'	179°	37°59'	-60'	179°	36°59'	-60'	179°	35°59'	-60'	179°	35°00'	-60'	179°	34°00'	-60'	179°	22
23	38°59'	-60'	179°	37°59'	-60'	179°	36°59'	-60'	179°	35°59'	-60'	179°	35°00'	-60'	179°	34°00'	-60'	179°	33°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°
	28			29			30			31			32			33			34			

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

	28			29			30			31			32			33			34			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
0	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°	0
1	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°	1
2	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°	2
3	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°	3
4	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°	4
5	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°	5
6	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°	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	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°	8
9	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°	9
10	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°	10
11	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°	11
12	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°	12
13	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°	13
14	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°	14
15	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°	15
16	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°	16
17	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°	17
18	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°	18
19	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°	19
20	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°	20
21	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°	21
22	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°	22
23	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°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	28			29			30			31			32			33			34			

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**
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