

# Sight Reduction Tables

Latitude 28° to 34°

## **Introduction.**

The purpose and scope of these tables is to enable a navigator to establish his or her position at sea, or on land, using the Marc Saint Hilaire, or Intercept, method.

The author produced these tables with the objective of reducing the size of the printed tables to just what is required for his cruising latitude.

The tables cover 7 degrees of Latitude and Declination is limited to between 23°N and 23°S. Tables are provided for GHA and Declination interpolation and Sextant corrections. The Excel spreadsheet, from which this PDF file was generated, allows the navigator to enter the 'middle latitude' of his cruising ground. The tables are then produced using this middle latitude + and - 3°.

The tables have been designed primarily for establishing a Line of Position (LOP) from the altitude of the SUN. Two such LOPs, ideally either side of noon, giving a Sun-run-Sun calculated position.

## **LHA and Declination = SAME**

For LHAs between 0° 360° to 90° 270°, the LHA is printed above and below the relevant table. The tabulated data is in normal text.

Where the LHA is > 90° and < 270°, the LHA is printed below the table while any tabulated Hc on the table is positive.

## **LHA and Declination = CONTRARY**

For LHAs between 90° 270° and 0° 360° the LHA is printed above the table and the tabulated data is in **bold** text. The last contrary value of Hc in the relevant column is also underlined. Below that value the figures are for SAME.

When all the Hc° values are bold, indicating that there are no more SAME Hc° values, the LHA and text displayed at the bottom of the table changes accordingly.

## **NOTE**

There are neither blank entries nor negative values for Hc° in these tables.

## **Accuracy and Precision**

The tables were compiled using Microsoft Excel running under Microsoft Windows XP operating system.

Calculations were carried out to the full 15 decimal places, not precision as displayed.

These tables have been compared to the US National Imagery and Mapping Agency Sight Reduction Tables for Marine Navigation Pub229 with the following results.

No difference for Hc° has been identified by the author.

The difference in d' is occasionally 0.1'.

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

2° 358° LHA			Latitude SAME as Declination							2° 358° 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°56.1'	+59.9'	175.7°	60°56.2'	+59.9'	175.9°	59°56.4'	+59.9'	176.0°	58°56.5'	+59.9'	176.1°	57°56.7'	+59.9'	176.2°	56°56.8'	+59.9'	176.3°	55°56.9'	+59.9'	176.4°	0
1	62°55.9'	+59.9'	175.6°	61°56.1'	+59.9'	175.7°	60°56.3'	+59.9'	175.9°	59°56.4'	+59.9'	176.0°	58°56.6'	+59.9'	176.1°	57°56.7'	+59.9'	176.2°	56°56.8'	+59.9'	176.3°	1
2	63°55.8'	+59.8'	175.4°	62°56.0'	+59.9'	175.6°	61°56.1'	+59.9'	175.7°	60°56.3'	+59.9'	175.9°	59°56.5'	+59.9'	176.0°	58°56.6'	+59.9'	176.1°	57°56.7'	+59.9'	176.2°	2
3	64°55.6'	+59.8'	175.3°	63°55.8'	+59.8'	175.5°	62°56.0'	+59.9'	175.6°	61°56.2'	+59.9'	175.8°	60°56.3'	+59.9'	175.9°	59°56.5'	+59.9'	176.0°	58°56.6'	+59.9'	176.1°	3
4	65°55.5'	+59.8'	175.1°	64°55.7'	+59.8'	175.3°	63°55.9'	+59.9'	175.5°	62°56.1'	+59.9'	175.6°	61°56.2'	+59.9'	175.8°	60°56.4'	+59.9'	175.9°	59°56.5'	+59.9'	176.0°	4
5	66°55.3'	+63.5'	174.9°	65°55.5'	+63.3'	175.1°	64°55.7'	+63.2'	175.3°	63°55.9'	+63.0'	175.5°	62°56.1'	+62.9'	175.6°	61°56.3'	+62.8'	175.8°	60°56.4'	+62.7'	175.9°	5
6	67°58.8'	+59.9'	177.4°	66°58.8'	+60.0'	177.5°	65°58.9'	+60.0'	177.6°	64°59.0'	+60.0'	177.7°	63°59.0'	+60.0'	177.7°	62°59.0'	+60.0'	177.8°	61°59.1'	+60.0'	177.9°	6
7	68°58.7'	+59.9'	177.2°	67°58.8'	+59.9'	177.4°	66°58.9'	+60.0'	177.5°	65°58.9'	+60.0'	177.6°	64°59.0'	+60.0'	177.7°	63°59.0'	+60.0'	177.8°	62°59.1'	+60.0'	177.8°	7
8	69°58.7'	+59.9'	177.1°	68°58.7'	+59.9'	177.2°	67°58.8'	+59.9'	177.4°	66°58.8'	+60.0'	177.5°	65°58.9'	+60.0'	177.6°	64°59.0'	+60.0'	177.7°	63°59.0'	+60.0'	177.8°	8
9	70°58.6'	+59.9'	177.0°	69°58.7'	+59.9'	177.1°	68°58.8'	+59.9'	177.3°	67°58.8'	+60.0'	177.4°	66°58.9'	+60.0'	177.5°	65°58.9'	+60.0'	177.6°	64°59.0'	+60.0'	177.7°	9
10	71°58.5'	+59.9'	176.8°	70°58.6'	+59.9'	177.0°	69°58.7'	+59.9'	177.1°	68°58.8'	+59.9'	177.3°	67°58.8'	+60.0'	177.4°	66°58.9'	+60.0'	177.5°	65°59.0'	+60.0'	177.6°	10
11	72°58.5'	+59.9'	176.7°	71°58.6'	+59.9'	176.8°	70°58.6'	+59.9'	177.0°	69°58.7'	+59.9'	177.1°	68°58.8'	+59.9'	177.3°	67°58.9'	+60.0'	177.4°	66°58.9'	+60.0'	177.5°	11
12	73°58.4'	+59.9'	176.5°	72°58.5'	+59.9'	176.7°	71°58.6'	+59.9'	176.8°	70°58.7'	+59.9'	177.0°	69°58.7'	+59.9'	177.2°	68°58.8'	+59.9'	177.3°	67°58.9'	+60.0'	177.4°	12
13	74°58.3'	+59.9'	176.3°	73°58.4'	+59.9'	176.5°	72°58.5'	+59.9'	176.7°	71°58.6'	+59.9'	176.9°	70°58.7'	+59.9'	177.0°	69°58.8'	+59.9'	177.2°	68°58.8'	+59.9'	177.3°	13
14	75°58.2'	+59.9'	176.0°	74°58.3'	+59.9'	176.3°	73°58.4'	+59.9'	176.5°	72°58.5'	+59.9'	176.7°	71°58.6'	+59.9'	176.9°	70°58.7'	+59.9'	177.0°	69°58.8'	+59.9'	177.2°	14
15	76°58.0'	+59.8'	175.7°	75°58.2'	+59.9'	176.0°	74°58.3'	+59.9'	176.3°	73°58.4'	+59.9'	176.5°	72°58.5'	+59.9'	176.7°	71°58.6'	+59.9'	176.9°	70°58.7'	+59.9'	177.0°	15
16	77°57.9'	+59.8'	175.4°	76°58.1'	+59.9'	175.8°	75°58.2'	+59.9'	176.0°	74°58.3'	+59.9'	176.3°	73°58.5'	+59.9'	176.5°	72°58.6'	+59.9'	176.7°	71°58.7'	+59.9'	176.9°	16
17	78°57.7'	+59.8'	175.0°	77°57.9'	+59.8'	175.4°	76°58.1'	+59.9'	175.8°	75°58.2'	+59.9'	176.1°	74°58.4'	+59.9'	176.3°	73°58.5'	+59.9'	176.5°	72°58.6'	+59.9'	176.7°	17
18	79°57.5'	+59.7'	174.6°	78°57.7'	+59.8'	175.0°	77°57.9'	+59.8'	175.5°	76°58.1'	+59.9'	175.8°	75°58.3'	+59.9'	176.1°	74°58.4'	+59.9'	176.3°	73°58.5'	+59.9'	176.6°	18
19	80°57.2'	+59.7'	174.0°	79°57.5'	+59.7'	174.6°	78°57.8'	+59.8'	175.1°	77°58.0'	+59.8'	175.5°	76°58.2'	+59.9'	175.8°	75°58.3'	+59.9'	176.1°	74°58.4'	+59.9'	176.4°	19
20	81°56.9'	+59.6'	173.3°	80°57.3'	+59.7'	174.0°	79°57.6'	+59.8'	174.6°	78°57.8'	+59.8'	175.1°	77°58.0'	+59.8'	175.5°	76°58.2'	+59.9'	175.8°	75°58.3'	+59.9'	176.1°	20
21	82°56.5'	+59.5'	172.4°	81°57.0'	+59.6'	173.3°	80°57.3'	+59.7'	174.1°	79°57.6'	+59.8'	174.7°	78°57.8'	+59.8'	175.1°	77°58.0'	+59.8'	175.5°	76°58.2'	+59.9'	175.9°	21
22	83°56.0'	+59.5'	171.2°	82°56.6'	+59.5'	172.5°	81°57.0'	+59.6'	173.4°	80°57.4'	+59.8'	174.1°	79°57.7'	+59.8'	174.7°	78°57.9'	+59.8'	175.2°	77°58.1'	+59.8'	175.6°	22
23	84°55.2'	+58.9'	169.6°	83°56.0'	+59.3'	171.3°	82°56.6'	+59.5'	172.5°	81°57.1'	+59.6'	173.4°	80°57.4'	+59.7'	174.2°	79°57.7'	+59.8'	174.7°	78°57.9'	+59.8'	175.2°	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												
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°51.2'	+59.7'	173.6°	60°51.5'	+59.7'	173.8°	59°51.9'	+59.7'	174.0°	58°52.2'	+59.8'	174.2°	57°52.5'	+59.8'	174.4°	56°52.8'	+59.8'	174.5°	55°53.0'	+59.8'	174.6°	0
1	62°50.9'	+59.7'	173.4°	61°51.2'	+59.7'	173.6°	60°51.6'	+59.7'	173.8°	59°51.9'	+59.8'	174.0°	58°52.3'	+59.8'	174.2°	57°52.6'	+59.8'	174.4°	56°52.8'	+59.8'	174.5°	1
2	63°50.5'	+59.7'	173.2°	62°51.0'	+59.7'	173.4°	61°51.3'	+59.7'	173.6°	60°51.7'	+59.7'	173.8°	59°52.0'	+59.8'	174.0°	58°52.3'	+59.8'	174.2°	57°52.6'	+59.8'	174.4°	2
3	64°50.2'	+59.6'	172.9°	63°50.6'	+59.7'	173.2°	62°51.0'	+59.7'	173.4°	61°51.4'	+59.7'	173.6°	60°51.8'	+59.7'	173.8°	59°52.1'	+59.8'	174.0°	58°52.4'	+59.8'	174.2°	3
4	65°49.8'	+59.6'	172.7°	64°50.3'	+59.6'	172.9°	63°50.7'	+59.7'	173.2°	62°51.1'	+59.7'	173.4°	61°51.5'	+59.7'	173.6°	60°51.9'	+59.7'	173.8°	59°52.2'	+59.8'	174.0°	4
5	66°49.4'	+59.6'	172.4°	65°49.9'	+59.6'	172.7°	64°50.4'	+59.6'	173.0°	63°50.8'	+59.7'	173.2°	62°51.3'	+59.7'	173.4°	61°51.6'	+59.7'	173.7°	60°52.0'	+59.8'	173.9°	5
6	67°49.0'	+59.5'	172.1°	66°49.5'	+59.6'	172.4°	65°50.1'	+59.6'	172.7°	64°50.5'	+59.7'	173.0°	63°51.0'	+59.7'	173.2°	62°51.4'	+59.7'	173.4°	61°51.7'	+59.7'	173.7°	6
7	68°48.5'	+59.5'	171.7°	67°49.1'	+59.5'	172.1°	66°49.7'	+59.6'	172.4°	65°50.2'	+59.6'	172.7°	64°50.6'	+59.7'	173.0°	63°51.1'	+59.7'	173.2°	62°51.5'	+59.7'	173.5°	7
8	69°48.0'	+59.4'	171.4°	68°48.7'	+59.5'	171.8°	67°49.3'	+59.5'	172.1°	66°49.8'	+59.6'	172.4°	65°50.3'	+59.6'	172.7°	64°50.8'	+59.7'	173.0°	63°51.2'	+59.7'	173.2°	8
9	70°47.4'	+59.4'	171.0°	69°48.2'	+59.4'	171.4°	68°48.8'	+59.5'	171.8°	67°49.4'	+59.6'	172.1°	66°49.9'	+59.6'	172.5°	65°50.4'	+59.6'	172.7°	64°50.9'	+59.7'	173.0°	9
10	71°46.8'	+59.3'	170.5°	70°47.6'	+59.4'	171.0°	69°48.3'	+59.5'	171.4°	68°48.9'	+59.5'	171.8°	67°49.5'	+59.6'	172.2°	66°50.1'	+59.6'	172.5°	65°50.6'	+59.6'	172.8°	10
11	72°46.1'	+59.2'	170.0°	71°47.0'	+59.3'	170.5°	70°47.8'	+59.4'	171.0°	69°48.5'	+59.5'	171.4°	68°49.1'	+59.5'	171.8°	67°49.7'	+59.6'	172.2°	66°50.2'	+59.6'	172.5°	11
12	73°45.3'	+59.1'	169.5°	72°46.3'	+59.2'	170.0°	71°47.2'	+59.3'	170.6°	70°47.9'	+59.4'	171.0°	69°48.6'	+59.5'	171.5°	68°49.3'	+59.5'	171.9°	67°49.8'	+59.6'	172.2°	12
13	74°44.5'	+59.0'	168.8°	73°45.5'	+59.1'	169.5°	72°46.5'	+59.3'	170.1°	71°47.3'	+59.3'	170.6°	70°48.1'	+59.4'	171.1°	69°48.8'	+59.5'	171.5°	68°49.4'	+59.5'	171.9°	13
14	75°43.5'	+58.9'	168.1°	74°44.7'	+59.0'	168.9°	73°45.7'	+59.2'	169.5°	72°46.7'	+59.3'	170.1°	71°47.5'	+59.4'	170.6°	70°48.3'	+59.4'	171.1°	69°49.0'	+59.5'	171.5°	14
15	76°42.3'	+58.7'	167.3°	75°43.7'	+58.9'	168.2°	74°44.9'	+59.0'	168.9°	73°45.9'	+59.2'	169.6°	72°46.9'	+59.3'	170.2°	71°47.7'	+59.4'	170.7°	70°48.5'	+59.4'	171.2°	15
16	77°41.0'	+58.5'	166.4°	76°42.6'	+58.7'	167.4°	75°43.9'	+58.9'	168.2°	74°45.1'	+59.1'	169.0°	73°46.2'	+59.2'	169.6°	72°47.1'	+59.3'	170.2°	71°47.9'	+59.4'	170.7°	16
17	78°39.5'	+58.2'	165.3°	77°41.3'	+58.5'	166.4°	76°42.8'	+58.7'	167.4°	75°44.2'	+58.9'	168.3°	74°45.4'	+59.1'	169.0°	73°46.4'	+59.2'	169.7°	72°47.3'	+59.3'	170.3°	17
18	79°37.6'	+57.8'	164.0°	78°39.8'	+58.2'	165.3°	77°41.6'	+58.5'	166.5°	76°43.1'	+58.8'	167.5°	75°44.4'	+58.9'	168.3°	74°45.6'	+59.1'	169.1°	73°46.6'	+59.2'	169.7°	18
19	80°35.4'	+57.3'	162.4°	79°38.0'	+57.8'	164.0°	78°40.1'	+58.2'	165.4°	77°41.9'	+58.5'	166.6°	76°43.4'	+58.8'	167.6°	75°44.7'	+59.0'	168.4°	74°45.8'	+59.1'	169.1°	19
20	81°32.7'	+56.6'	160.5°	80°35.8'	+57.3'	162.5°	79°38.3'	+57.9'	164.1°	78°40.4'	+58.3'	165.5°	77°42.2'	+58.6'	166.6°	76°43.7'	+58.8'	167.6°	75°45.0'	+59.0'	168.5°	20
21	82°29.3'	+55.6'	158.1°	81°33.1'	+56.6'	160.6°	80°36.2'	+57.4'	162.6°	79°38.7'	+57.9'	164.2°	78°40.7'	+58.3'	165.6°	77°42.5'	+58.6'	166.7°	76°44.0'	+58.8'	167.7°	21

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°44.3'	+59.5'	171.5°	60°45.0'	+59.5'	171.8°	59°45.5'	+59.6'	172.0°	58°46.1'	+59.6'	172.3°	57°46.6'	+59.6'	172.5°	56°47.1'	+59.6'	172.7°	55°47.6'	+59.7'	172.9°	0
1	62°43.8'	+59.4'	171.2°	61°44.5'	+59.5'	171.5°	60°45.1'	+59.5'	171.8°	59°45.7'	+59.6'	172.0°	58°46.3'	+59.6'	172.3°	57°46.8'	+59.6'	172.5°	56°47.3'	+59.7'	172.7°	1
2	63°43.2'	+59.4'	170.9°	62°44.0'	+59.4'	171.2°	61°44.6'	+59.5'	171.5°	60°45.3'	+59.5'	171.8°	59°45.9'	+59.6'	172.0°	58°46.4'	+59.6'	172.3°	57°46.9'	+59.6'	172.5°	2
3	64°42.6'	+59.3'	170.6°	63°43.4'	+59.4'	170.9°	62°44.1'	+59.5'	171.3°	61°44.8'	+59.5'	171.5°	60°45.4'	+59.5'	171.8°	59°46.0'	+59.6'	172.0°	58°46.6'	+59.6'	172.3°	3
4	65°42.0'	+59.3'	170.3°	64°42.8'	+59.4'	170.6°	63°43.6'	+59.4'	171.0°	62°44.3'	+59.5'	171.3°	61°45.0'	+59.5'	171.5°	60°45.6'	+59.6'	171.8°	59°46.2'	+59.6'	172.1°	4
5	66°41.3'	+59.2'	169.9°	65°42.2'	+59.3'	170.3°	64°43.0'	+59.4'	170.6°	63°43.8'	+59.4'	171.0°	62°44.5'	+59.5'	171.3°	61°45.2'	+59.5'	171.6°	60°45.8'	+59.6'	171.8°	5
6	67°40.5'	+59.2'	169.5°	66°41.5'	+59.3'	169.9°	65°42.4'	+59.3'	170.3°	64°43.2'	+59.4'	170.7°	63°44.0'	+59.4'	171.0°	62°44.7'	+59.5'	171.3°	61°45.4'	+59.5'	171.6°	6
7	68°39.7'	+59.1'	169.0°	67°40.7'	+59.2'	169.5°	66°41.7'	+59.3'	169.9°	65°42.6'	+59.3'	170.3°	64°43.4'	+59.4'	170.7°	63°44.2'	+59.5'	171.0°	62°44.9'	+59.5'	171.3°	7
8	69°38.8'	+59.0'	168.5°	68°39.9'	+59.1'	169.1°	67°41.0'	+59.2'	169.5°	66°41.9'	+59.3'	169.9°	65°42.8'	+59.4'	170.3°	64°43.6'	+59.4'	170.7°	63°44.4'	+59.5'	171.0°	8
9	70°37.8'	+58.9'	168.0°	69°39.0'	+59.0'	168.6°	68°40.2'	+59.1'	169.1°	67°41.2'	+59.2'	169.5°	66°42.2'	+59.3'	170.0°	65°43.0'	+59.4'	170.4°	64°43.9'	+59.4'	170.7°	9
10	71°36.7'	+58.8'	167.4°	70°38.0'	+58.9'	168.0°	69°39.3'	+59.0'	168.6°	68°40.4'	+59.1'	169.1°	67°41.5'	+59.2'	169.6°	66°42.4'	+59.3'	170.0°	65°43.3'	+59.4'	170.4°	10
11	72°35.5'	+58.6'	166.8°	71°37.0'	+58.8'	167.5°	70°38.3'	+58.9'	168.1°	69°39.6'	+59.1'	168.6°	68°40.7'	+59.2'	169.1°	67°41.7'	+59.3'	169.6°	66°42.7'	+59.3'	170.0°	11
12	73°34.1'	+58.5'	166.0°	72°35.8'	+58.7'	166.8°	71°37.3'	+58.8'	167.5°	70°38.6'	+59.0'	168.1°	69°39.9'	+59.1'	168.7°	68°41.0'	+59.2'	169.2°	67°42.0'	+59.3'	169.6°	12
13	74°32.6'	+58.3'	165.2°	73°34.4'	+58.5'	166.1°	72°36.1'	+58.7'	166.9°	71°37.6'	+58.9'	167.5°	70°38.9'	+59.0'	168.2°	69°40.1'	+59.1'	168.7°	68°41.3'	+59.2'	169.2°	13
14	75°30.8'	+58.0'	164.3°	74°32.9'	+58.3'	165.3°	73°34.8'	+58.5'	166.1°	72°36.4'	+58.7'	166.9°	71°37.9'	+58.9'	167.6°	70°39.3'	+59.0'	168.2°	69°40.5'	+59.1'	168.8°	14
15	76°28.9'	+57.7'	163.2°	75°31.2'	+58.1'	164.4°	74°33.3'	+58.3'	165.3°	73°35.2'	+58.6'	166.2°	72°36.8'	+58.7'	167.0°	71°38.3'	+58.9'	167.6°	70°39.6'	+59.0'	168.3°	15
16	77°26.6'	+57.3'	162.0°	76°29.3'	+57.8'	163.3°	75°31.7'	+58.1'	164.4°	74°33.7'	+58.4'	165.4°	73°35.5'	+58.6'	166.3°	72°37.2'	+58.8'	167.0°	71°38.6'	+58.9'	167.7°	16
17	78°23.9'	+56.9'	160.6°	77°27.1'	+57.4'	162.1°	76°29.7'	+57.8'	163.4°	75°32.1'	+58.1'	164.5°	74°34.1'	+58.4'	165.5°	73°35.9'	+58.6'	166.3°	72°37.5'	+58.8'	167.1°	17
18	79°20.8'	+56.2'	159.0°	78°24.4'	+56.9'	160.7°	77°27.5'	+57.4'	162.2°	76°30.2'	+57.8'	163.5°	75°32.5'	+58.2'	164.6°	74°34.5'	+58.4'	165.6°	73°36.3'	+58.6'	166.4°	18
19	80°17.0'	+55.4'	157.0°	79°21.4'	+56.3'	159.1°	78°25.0'	+57.0'	160.8°	77°28.1'	+57.5'	162.3°	76°30.7'	+57.9'	163.6°	75°33.0'	+58.2'	164.7°	74°35.0'	+58.5'	165.6°	19
20	81°12.4'	+54.3'	154.6°	80°17.6'	+55.5'	157.1°	79°21.9'	+56.4'	159.2°	78°25.5'	+57.0'	160.9°	77°28.6'	+57.5'	162.4°	76°31.2'	+57.9'	163.7°	75°33.4'	+58.2'	164.8°	20
21	82°06.7'	+52.8'	151.7°	81°13.1'	+54.4'	154.7°	80°18.3'	+55.6'	157.2°	79°22.6'	+56.4'	159.3°	78°26.1'	+56.1'	161.0°	77°29.1'	+57.6'	162.5°	76°31.7'	+58.0'	163.8°	21
22	82°59.5'	+50.6'	148.0°	82°07.5'	+52.9'	151.8°	81°13.9'	+54.5'	154.9°	80°19.0'	+55.7'	157.4°	79°23.2'	+55.6'	159.4°	78°26.7'	+57.1'	161.2°	77°29.7'	+57.6'	162.6°	22
23	83°50.0'	+47.3'	143.3°	83°00.4'	+50.7'	148.2°	82°08.4'	+53.0'	152.0°	81°14.7'	+54.6'	155.1°	80°19.7'	+55.7'	157.5°	79°23.8'	+56.6'	159.6°	78°27.3'	+57.2'	161.3°	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°35.6'	+59.2'	169.4°	60°36.5'	+59.2'	169.8°	59°37.5'	+59.3'	170.1°	58°38.3'	+59.4'	170.4°	57°39.2'	+59.4'	170.6°	56°39.9'	+59.5'	170.9°	55°40.7'	+59.5'	171.1°	0
1	62°34.7'	+59.1'	169.1°	61°35.8'	+59.2'	169.4°	60°36.8'	+59.3'	169.8°	59°37.7'	+59.3'	170.1°	58°38.6'	+59.4'	170.4°	57°39.4'	+59.4'	170.6°	56°40.2'	+59.5'	170.9°	1
2	63°33.9'	+59.1'	168.7°	62°35.0'	+59.1'	169.1°	61°36.0'	+59.2'	169.4°	60°37.0'	+59.3'	169.8°	59°37.9'	+59.3'	170.1°	58°38.8'	+59.4'	170.4°	57°39.6'	+59.4'	170.6°	2
3	64°32.9'	+59.0'	168.3°	63°34.1'	+59.1'	168.7°	62°35.3'	+59.2'	169.1°	61°36.3'	+59.2'	169.5°	60°37.3'	+59.3'	169.8°	59°38.2'	+59.4'	170.1°	58°39.1'	+59.4'	170.4°	3
4	65°31.9'	+58.9'	167.9°	64°33.2'	+59.0'	168.3°	63°34.4'	+59.1'	168.7°	62°35.5'	+59.2'	169.1°	61°36.6'	+59.2'	169.5°	60°37.6'	+59.3'	169.8°	59°38.5'	+59.4'	170.1°	4
5	66°30.8'	+58.8'	167.4°	65°32.2'	+58.9'	167.9°	64°33.5'	+59.0'	168.3°	63°34.7'	+59.1'	168.7°	62°35.8'	+59.2'	169.1°	61°36.9'	+59.3'	169.5°	60°37.8'	+59.3'	169.8°	5
6	67°29.7'	+58.7'	166.9°	66°31.2'	+58.8'	167.4°	65°32.5'	+59.0'	167.9°	64°33.8'	+59.1'	168.4°	63°35.0'	+59.1'	168.8°	62°36.1'	+59.2'	169.1°	61°37.2'	+59.3'	169.5°	6
7	68°28.4'	+58.6'	166.4°	67°30.0'	+58.7'	166.9°	66°31.5'	+58.9'	167.5°	65°32.9'	+59.0'	167.9°	64°34.2'	+59.1'	168.4°	63°35.3'	+59.2'	168.8°	62°36.4'	+59.2'	169.2°	7
8	69°27.0'	+58.5'	165.8°	68°28.8'	+58.6'	166.4°	67°30.4'	+58.8'	167.0°	66°31.9'	+58.9'	167.5°	65°33.2'	+59.0'	168.0°	64°34.5'	+59.1'	168.4°	63°35.7'	+59.2'	168.8°	8
9	70°25.5'	+58.3'	165.1°	69°27.4'	+58.5'	165.8°	68°29.1'	+58.7'	166.4°	67°30.7'	+58.8'	167.0°	66°32.2'	+58.9'	167.5°	65°33.6'	+59.0'	168.0°	64°34.9'	+59.1'	168.4°	9
10	71°23.8'	+58.1'	164.4°	70°25.9'	+58.3'	165.2°	69°27.8'	+58.5'	165.8°	68°29.5'	+58.7'	166.5°	67°31.1'	+58.8'	167.0°	66°32.6'	+58.9'	167.5°	65°34.0'	+59.0'	168.0°	10
11	72°21.9'	+57.9'	163.6°	71°24.2'	+58.2'	164.4°	70°26.3'	+58.4'	165.2°	69°28.2'	+58.6'	165.9°	68°30.0'	+58.7'	166.5°	67°31.5'	+58.8'	167.1°	66°33.0'	+59.0'	167.6°	11
12	73°19.8'	+57.7'	162.7°	72°22.4'	+58.0'	163.6°	71°24.7'	+58.2'	164.5°	70°26.8'	+58.4'	165.2°	69°28.7'	+58.6'	165.9°	68°30.4'	+58.7'	166.5°	67°32.0'	+58.9'	167.1°	12
13	74°17.5'	+57.4'	161.7°	73°20.4'	+57.7'	162.8°	72°22.9'	+58.0'	163.7°	71°25.2'	+58.2'	164.5°	70°27.3'	+58.4'	165.3°	69°29.1'	+58.6'	166.0°	68°30.8'	+58.8'	166.6°	13
14	75°14.9'	+57.0'	160.6°	74°18.1'	+57.4'	161.8°	73°20.9'	+57.8'	162.8°	72°23.4'	+58.0'	163.8°	71°25.7'	+58.3'	164.6°	70°27.7'	+58.5'	165.4°	69°29.6'	+58.6'	166.0°	14
15	76°11.9'	+56.6'	159.3°	75°15.5'	+57.1'	160.7°	74°18.6'	+57.5'	161.9°	73°21.5'	+57.8'	162.9°	72°24.0'	+58.1'	163.8°	71°26.2'	+58.3'	164.7°	70°28.2'	+58.5'	165.4°	15
16	77°08.4'	+56.0'	157.9°	76°12.5'	+56.6'	159.4°	75°16.1'	+57.1'	160.8°	74°19.3'	+57.5'	161.9°	73°22.0'	+57.8'	163.0°	72°24.5'	+58.1'	163.9°	71°26.8'	+58.3'	164.7°	16
17	78°04.4'	+55.3'	156.2°	77°09.1'	+56.1'	158.0°	76°13.2'	+56.7'	159.5°	75°16.8'	+57.2'	160.9°	74°19.9'	+57.6'	162.0°	73°22.6'	+57.9'	163.1°	72°25.1'	+58.2'	164.0°	17
18	78°59.7'	+54.4'	154.3°	78°05.2'	+55.4'	156.3°	77°09.9'	+56.1'	158.1°	76°13.9'	+56.7'	159.6°	75°17.4'	+57.2'	160.9°	74°20.5'	+57.6'	162.1°	73°23.3'	+57.9'	163.1°	18
19	79°54.2'	+53.3'	152.0°	79°00.6'	+54.5'	154.4°	78°06.0'	+55.5'	156.4°	77°10.7'	+56.2'	158.2°	76°14.7'	+56.8'	159.7°	75°18.1'	+57.3'	161.0°	74°21.2'	+57.7'	162.2°	19
20	80°47.5'	+51.8'	149.2°	79°55.1'	+53.4'	152.1°	79°01.5'	+54.6'	154.5°	78°06.9'	+55.6'	156.6°	77°11.5'	+56.3'	158.3°	76°15.4'						

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

6° 354° LHA				Latitude SAME as 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°24.9'	+58.8'	167.4°	60°26.3'	+58.9'	167.8°	59°27.6'	+59.0'	168.1°	58°28.9'	+59.1'	168.5°	57°30.1'	+59.2'	168.8°	56°31.2'	+59.2'	169.1°	55°32.2'	+59.3'	169.4°	0
1	62°23.8'	+58.8'	167.0°	61°25.3'	+58.9'	167.4°	60°26.7'	+58.9'	167.8°	59°28.0'	+59.0'	168.1°	58°29.2'	+59.1'	168.5°	57°30.4'	+59.2'	168.8°	56°31.5'	+59.2'	169.1°	1
2	63°22.5'	+58.7'	166.5°	62°24.1'	+58.8'	167.0°	61°25.6'	+58.9'	167.4°	60°27.0'	+59.0'	167.8°	59°28.3'	+59.1'	168.1°	58°29.6'	+59.1'	168.5°	57°30.8'	+59.2'	168.8°	2
3	64°21.2'	+58.6'	166.0°	63°22.9'	+58.7'	166.5°	62°24.5'	+58.8'	167.0°	61°26.0'	+58.9'	167.4°	60°27.4'	+59.0'	167.8°	59°28.7'	+59.1'	168.1°	58°29.9'	+59.1'	168.5°	3
4	65°19.7'	+58.5'	165.5°	64°21.6'	+58.6'	166.1°	63°23.3'	+58.7'	166.5°	62°24.9'	+58.8'	167.0°	61°26.4'	+58.9'	167.4°	60°27.8'	+59.0'	167.8°	59°29.1'	+59.1'	168.1°	4
5	66°18.2'	+58.3'	165.0°	65°20.2'	+58.5'	165.5°	64°22.0'	+58.6'	166.1°	63°23.7'	+58.7'	166.6°	62°25.3'	+58.9'	167.0°	61°26.8'	+58.9'	167.4°	60°28.2'	+59.0'	167.8°	5
6	67°16.5'	+58.2'	164.4°	66°18.7'	+58.4'	165.0°	65°20.6'	+58.5'	165.6°	64°22.5'	+58.6'	166.1°	63°24.2'	+58.8'	166.6°	62°25.7'	+58.9'	167.0°	61°27.2'	+59.0'	167.4°	6
7	68°14.7'	+58.0'	163.7°	67°17.0'	+58.2'	164.4°	66°19.1'	+58.4'	165.0°	65°21.1'	+58.5'	165.6°	64°22.9'	+58.7'	166.1°	63°24.6'	+58.8'	166.6°	62°26.2'	+58.9'	167.0°	7
8	69°12.7'	+57.8'	163.0°	68°15.2'	+58.1'	163.8°	67°17.5'	+58.3'	164.4°	66°19.6'	+58.4'	165.1°	65°21.6'	+58.6'	165.6°	64°23.4'	+58.7'	166.1°	63°25.1'	+58.8'	166.6°	8
9	70°10.6'	+57.6'	162.3°	69°13.3'	+57.9'	163.1°	68°15.8'	+58.1'	163.8°	67°18.1'	+58.3'	164.5°	66°20.2'	+58.5'	165.1°	65°22.1'	+58.6'	165.7°	64°23.9'	+58.7'	166.2°	9
10	71°08.2'	+57.4'	161.4°	70°11.2'	+57.7'	162.3°	69°13.9'	+57.9'	163.1°	68°16.4'	+58.1'	163.9°	67°18.6'	+58.3'	164.5°	66°20.7'	+58.5'	165.1°	65°22.7'	+58.6'	165.7°	10
11	72°05.6'	+57.1'	160.5°	71°08.8'	+57.4'	161.5°	70°11.8'	+57.7'	162.4°	69°14.5'	+58.0'	163.2°	68°17.0'	+58.2'	163.9°	67°19.2'	+58.4'	164.6°	66°21.3'	+58.5'	165.2°	11
12	73°02.7'	+56.7'	159.5°	72°06.3'	+57.1'	160.6°	71°09.5'	+57.5'	161.5°	70°12.5'	+57.8'	162.4°	69°15.1'	+58.0'	163.2°	68°17.6'	+58.2'	164.0°	67°19.8'	+58.4'	164.6°	12
13	73°59.4'	+56.3'	158.3°	73°03.4'	+56.8'	159.5°	72°07.0'	+57.2'	160.6°	71°10.2'	+57.5'	161.6°	70°13.1'	+57.8'	162.5°	69°15.8'	+58.0'	163.3°	68°18.2'	+58.3'	164.0°	13
14	74°55.7'	+55.8'	157.0°	74°00.2'	+56.4'	158.4°	73°04.2'	+56.9'	159.6°	72°07.7'	+57.2'	160.7°	71°10.9'	+57.6'	161.7°	70°13.8'	+57.8'	162.6°	69°16.5'	+58.1'	163.3°	14
15	75°51.5'	+55.2'	155.6°	74°56.6'	+55.9'	157.1°	74°01.0'	+56.5'	158.5°	73°05.0'	+56.9'	159.7°	72°08.5'	+57.3'	160.8°	71°11.7'	+57.6'	161.7°	70°14.5'	+57.9'	162.6°	15
16	76°46.8'	+54.5'	153.9°	75°52.5'	+55.3'	155.7°	74°57.5'	+56.0'	157.2°	74°01.9'	+56.5'	158.6°	73°05.8'	+57.0'	159.8°	72°09.3'	+57.4'	160.9°	71°12.4'	+57.7'	161.8°	16
17	77°41.3'	+53.6'	152.0°	76°47.8'	+54.6'	154.0°	75°53.5'	+55.4'	155.8°	74°58.4'	+56.1'	157.3°	74°02.8'	+56.6'	158.7°	73°06.6'	+57.0'	159.9°	72°10.1'	+57.4'	160.9°	17
18	78°34.9'	+52.5'	149.9°	77°42.4'	+53.7'	152.2°	76°48.9'	+54.7'	154.2°	75°54.5'	+55.5'	155.9°	74°59.4'	+56.1'	157.4°	74°03.7'	+56.7'	158.8°	73°07.5'	+57.1'	160.0°	18
19	79°27.4'	+51.0'	147.3°	78°36.1'	+52.6'	150.0°	77°43.5'	+53.8'	152.3°	76°49.9'	+54.8'	154.3°	75°55.5'	+55.6'	156.0°	75°00.3'	+56.2'	157.5°	74°04.6'	+56.7'	158.9°	19
20	80°18.4'	+49.2'	144.3°	79°28.7'	+51.2'	147.5°	78°37.4'	+52.7'	150.1°	77°44.7'	+53.9'	152.4°	76°51.1'	+54.9'	154.4°	75°56.6'	+55.7'	156.1°	75°01.4'	+56.3'	157.7°	20
21	81°07.6'	+46.8'	140.8°	80°19.9'	+49.3'	144.5°	79°30.1'	+51.3'	147.6°	78°38.7'	+52.8'	150.3°	77°46.0'	+54.0'	152.6°	76°52.2'	+55.0'	154.6°	75°57.7'	+55.8'	156.3°	21
22	81°54.3'	+43.6'	136.5°	81°09.2'	+46.9'	140.9°	80°21.4'	+49.5'	144.7°	79°31.5'	+51.5'	147.8°	78°40.0'	+53.0'	150.5°	77°47.2'	+54.2'	152.7°	76°53.4'	+55.1'	154.7°	22
23	82°37.9'	+39.4'	131.4°	81°56.1'	+43.8'	136.7°	81°10.9'	+47.1'	141.1°	80°23.0'	+49.7'	144.8°	79°33.0'	+51.6'	148.0°	78°41.4'	+53.1'	150.6°	77°48.5'	+54.3'	152.9°	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										
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°12.4'	+58.4'	165.3°	60°14.3'	+58.6'	165.8°	59°16.1'	+58.7'	166.2°	58°17.8'	+58.8'	166.6°	57°19.4'	+58.9'	167.0°	56°20.9'	+58.9'	167.3°	55°22.3'	+59.0'	167.6°	0
1	62°10.9'	+58.3'	164.9°	61°12.9'	+58.5'	165.3°	60°14.8'	+58.6'	165.8°	59°16.6'	+58.7'	166.2°	58°18.2'	+58.8'	166.6°	57°19.8'	+58.9'	167.0°	56°21.3'	+59.0'	167.3°	1
2	63°09.2'	+58.2'	164.4°	62°11.3'	+58.4'	164.9°	61°13.4'	+58.5'	165.3°	60°15.2'	+58.6'	165.8°	59°17.0'	+58.7'	166.2°	58°18.7'	+58.8'	166.6°	57°20.3'	+58.9'	167.0°	2
3	64°07.4'	+58.1'	163.8°	63°09.7'	+58.2'	164.4°	62°11.8'	+58.4'	164.9°	61°13.9'	+58.5'	165.4°	60°15.8'	+58.6'	165.8°	59°17.5'	+58.7'	166.2°	58°19.2'	+58.8'	166.6°	3
4	65°05.5'	+57.9'	163.2°	64°07.9'	+58.1'	163.8°	63°10.2'	+58.3'	164.4°	62°12.4'	+58.4'	164.9°	61°14.4'	+58.6'	165.4°	60°16.3'	+58.7'	165.8°	59°18.1'	+58.8'	166.2°	4
5	66°03.4'	+57.8'	162.6°	65°06.1'	+58.0'	163.2°	64°08.5'	+58.2'	163.8°	63°10.8'	+58.3'	164.4°	62°12.9'	+58.5'	164.9°	61°15.0'	+58.6'	165.4°	60°16.8'	+58.7'	165.8°	5
6	67°01.2'	+57.6'	161.9°	66°04.0'	+57.8'	162.6°	65°06.7'	+58.0'	163.3°	64°09.1'	+58.2'	163.9°	63°11.4'	+58.3'	164.4°	62°13.5'	+58.5'	164.9°	61°15.5'	+58.6'	165.4°	6
7	67°58.8'	+57.4'	161.2°	67°01.8'	+57.6'	161.9°	66°04.7'	+57.8'	162.6°	65°07.3'	+58.0'	163.3°	64°09.7'	+58.2'	163.9°	63°12.0'	+58.4'	164.4°	62°14.2'	+58.5'	164.9°	7
8	68°56.1'	+57.1'	160.4°	67°59.5'	+57.4'	161.2°	67°02.5'	+57.7'	162.0°	66°05.4'	+57.9'	162.7°	65°08.0'	+58.1'	163.3°	64°10.4'	+58.3'	163.9°	63°12.7'	+58.4'	164.5°	8
9	69°53.2'	+56.8'	159.5°	68°56.9'	+57.2'	160.4°	68°00.2'	+57.5'	161.3°	67°03.2'	+57.7'	162.0°	66°06.1'	+57.9'	162.7°	65°08.7'	+58.1'	163.4°	64°11.1'	+58.3'	164.0°	9
10	70°50.1'	+56.5'	158.6°	69°54.0'	+56.9'	159.6°	68°57.7'	+57.2'	160.5°	68°01.0'	+57.5'	161.3°	67°04.0'	+57.8'	162.1°	66°06.8'	+58.0'	162.8°	65°09.4'	+58.2'	163.4°	10
11	71°46.6'	+56.1'	157.5°	70°50.9'	+56.6'	158.6°	69°54.9'	+57.0'	159.6°	68°58.5'	+57.3'	160.5°	68°01.8'	+57.6'	161.4°	67°04.8'	+57.8'	162.1°	66°07.6'	+58.0'	162.8°	11
12	72°42.7'	+55.7'	156.4°	71°47.5'	+56.2'	157.6°	70°51.8'	+56.6'	158.7°	69°55.7'	+57.0'	159.7°	68°59.3'	+57.3'	160.6°	68°02.6'	+57.6'	161.4°	67°05.6'	+57.9'	162.2°	12
13	73°38.4'	+55.2'	155.1°	72°43.7'	+55.8'	156.4°	71°48.5'	+56.3'	157.6°	70°52.8'	+56.7'	158.7°	69°56.7'	+57.1'	159.7°	69°00.2'	+57.4'	160.6°	68°03.4'	+57.7'	161.5°	13
14	74°33.6'	+54.6'	153.6°	73°39.5'	+55.3'	155.1°	72°44.7'	+55.8'	156.5°	71°49.5'	+56.3'	157.7°	70°53.7'	+56.8'	158.8°	69°57.6'	+57.1'	159.8°	69°01.1'	+57.4'	160.7°	14
15	75°28.2'	+53.8'	152.0°	74°34.7'	+54.6'	153.7°	73°40.6'	+55.3'	155.2°	72°45.8'	+55.9'	156.6°	71°50.5'	+56.4'	157.8°	70°54.7'	+56.8'	158.9°	69°58.6'	+57.2'	159.9°	15
16	76°22.0'	+52.9'	150.2°	75°29.4'	+53.9'	152.1°	74°35.9'	+54.7'	153.8°	73°41.7'	+55.4'	155.3°	72°46.9'	+56.0'	156.7°	71°51.6'	+56.5'	157.9°	70°55.8'	+56.9'	159.0°	16
17	77°14.9'	+51.8'	148.1°	76°23.3'	+53.0'	150.3°	75°30.7'	+54.0'	152.2°	74°37.2'	+54.8'	153.9°	73°42.9'	+55.5'	155.4°	72°48.1'	+56.1'	156.8°	71°52.7'	+56.6'	158.0°	17
18	78°06.7'	+50.4'	145.8°	77°16.3'	+51.9'	148.3°	76°24.7'	+53.1'	150.4°	75°32.0'	+54.1'	152.4°	74°38.4'	+54.9'	154.0°	73°44.1'	+55.6'	155.6°	72°49.2'	+56.2'	156.9°	18
19	78°57.1'	+48.7'	143.0°	78°08.2'	+50.6'	145.9°	77°17.8'	+52.1'	148.4°	76°26.1'	+53.3'	150.6°	75°33.4'	+54.2'	152.5°	74°39.8'	+55.0'	154.2°	73°45.4'	+55.7'	155.7°	19
20	79°45.8'	+46.6'	139.9°	78°58.8'	+48.9'	143.2°	78°09.9'	+50.7'	146.1°	77°19.4'	+52.2'	148.5°	76°27.6'	+53.4'	150.7°	75°34.8'	+54.3'	152.6°	74°41.1'	+55.1'	154.3°	20
21	80°32.4'	+43.9'	136.2°	79°47.7'	+46.8'	140.0°	79°00.6'	+49.1'	143.4°	78°11.6'	+50.9'	146.2°	77°21.0'	+52.3'	148.7°	76°29.1'	+53.5'	150.9°	75°36.2'	+54.5'	152.8°	21

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

8° 352° LHA				Latitude SAME as Declination								8° 352° 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	60°58.1'	+58.0'	163.3°	60°00.6'	+58.1'	163.8°	59°02.9'	+58.3'	164.3°	58°05.0'	+58.4'	164.7°	57°07.1'	+58.5'	165.1°	56°09.1'	+58.6'	165.5°	55°10.9'	+58.7'	165.9°	0
1	61°56.1'	+57.8'	162.8°	60°58.7'	+58.0'	163.3°	60°01.2'	+58.2'	163.8°	59°03.5'	+58.3'	164.3°	58°05.6'	+58.4'	164.7°	57°07.7'	+58.6'	165.1°	56°09.6'	+58.7'	165.5°	1
2	62°54.0'	+57.7'	162.2°	61°56.7'	+57.9'	162.8°	60°59.3'	+58.1'	163.3°	60°01.8'	+58.2'	163.8°	59°04.1'	+58.3'	164.3°	58°06.3'	+58.5'	164.7°	57°08.3'	+58.6'	165.1°	2
3	63°51.7'	+57.5'	161.6°	62°54.6'	+57.7'	162.2°	61°57.4'	+57.9'	162.8°	61°00.0'	+58.1'	163.3°	60°02.4'	+58.2'	163.8°	59°04.7'	+58.4'	164.3°	58°06.9'	+58.5'	164.7°	3
4	64°49.2'	+57.3'	161.0°	63°52.4'	+57.6'	161.6°	62°55.3'	+57.8'	162.2°	61°58.1'	+58.0'	162.8°	61°00.7'	+58.1'	163.4°	60°03.1'	+58.3'	163.9°	59°05.4'	+58.4'	164.3°	4
5	65°46.5'	+57.1'	160.3°	64°49.9'	+57.4'	161.0°	63°53.1'	+57.6'	161.6°	62°56.0'	+57.8'	162.3°	61°58.8'	+58.0'	162.8°	61°01.4'	+58.2'	163.4°	60°03.8'	+58.3'	163.9°	5
6	66°43.7'	+56.9'	159.5°	65°47.3'	+57.2'	160.3°	64°50.7'	+57.4'	161.0°	63°53.9'	+57.7'	161.7°	62°56.8'	+57.9'	162.3°	61°59.6'	+58.1'	162.9°	61°02.2'	+58.2'	163.4°	6
7	67°40.6'	+56.6'	158.7°	66°44.5'	+57.0'	159.5°	65°48.2'	+57.2'	160.3°	64°51.5'	+57.5'	161.0°	63°54.7'	+57.7'	161.7°	62°57.6'	+57.9'	162.3°	62°00.4'	+58.1'	162.9°	7
8	68°37.2'	+56.3'	157.8°	67°41.5'	+56.7'	158.7°	66°45.4'	+57.0'	159.6°	65°49.0'	+57.3'	160.3°	64°52.4'	+57.5'	161.1°	63°55.5'	+57.8'	161.7°	62°58.5'	+58.0'	162.3°	8
9	69°33.5'	+56.0'	156.8°	68°38.2'	+56.4'	157.8°	67°42.4'	+56.8'	158.8°	66°46.3'	+57.1'	159.6°	65°50.0'	+57.4'	160.4°	64°53.3'	+57.6'	161.1°	63°56.4'	+57.8'	161.8°	9
10	70°29.5'	+55.6'	155.8°	69°34.6'	+56.1'	156.9°	68°39.2'	+56.5'	157.9°	67°43.4'	+56.8'	158.8°	66°47.3'	+57.1'	159.7°	65°50.9'	+57.4'	160.4°	64°54.3'	+57.7'	161.1°	10
11	71°25.1'	+55.1'	154.6°	70°30.6'	+55.7'	155.8°	69°35.6'	+56.1'	156.9°	68°40.2'	+56.5'	157.9°	67°44.4'	+56.9'	158.9°	66°48.3'	+57.2'	159.7°	65°51.9'	+57.5'	160.5°	11
12	72°20.2'	+54.6'	153.3°	71°26.3'	+55.2'	154.7°	70°31.8'	+55.7'	155.9°	69°36.8'	+56.2'	157.0°	68°41.3'	+56.6'	158.0°	67°45.5'	+56.9'	158.9°	66°49.4'	+57.3'	159.8°	12
13	73°14.8'	+53.9'	151.9°	72°21.5'	+54.7'	153.4°	71°27.5'	+55.3'	154.8°	70°33.0'	+55.8'	156.0°	69°37.9'	+56.3'	157.1°	68°42.5'	+56.7'	158.1°	67°46.6'	+57.0'	159.0°	13
14	74°08.7'	+53.2'	150.4°	73°16.1'	+54.0'	152.0°	72°22.8'	+54.8'	153.5°	71°28.8'	+55.4'	154.8°	70°34.2'	+55.9'	156.0°	69°39.1'	+56.4'	157.1°	68°43.6'	+56.7'	158.1°	14
15	75°01.9'	+52.3'	148.6°	74°10.2'	+53.3'	150.5°	73°17.6'	+54.1'	152.1°	72°24.2'	+54.9'	153.6°	71°30.1'	+55.5'	154.9°	70°35.5'	+56.0'	156.1°	69°40.4'	+56.4'	157.2°	15
16	75°54.2'	+51.2'	146.7°	75°03.5'	+52.4'	148.7°	74°11.7'	+53.4'	150.6°	73°19.0'	+54.3'	152.2°	72°25.6'	+55.0'	153.7°	71°31.5'	+55.6'	155.0°	70°36.8'	+56.1'	156.2°	16
17	76°45.5'	+50.0'	144.5°	75°55.9'	+51.4'	146.8°	75°05.1'	+52.6'	148.9°	74°13.3'	+53.5'	150.7°	73°20.5'	+54.4'	152.3°	72°27.0'	+55.1'	153.8°	71°32.9'	+55.7'	155.1°	17
18	77°35.4'	+48.4'	142.0°	76°47.3'	+50.1'	144.6°	75°57.7'	+51.5'	146.9°	75°06.8'	+52.7'	149.0°	74°14.9'	+53.7'	150.8°	73°22.1'	+54.5'	152.5°	72°28.5'	+55.2'	153.9°	18
19	78°23.8'	+46.5'	139.1°	77°37.4'	+48.6'	142.1°	76°49.2'	+50.3'	144.8°	75°59.5'	+51.7'	147.1°	75°08.6'	+52.8'	149.1°	74°16.6'	+53.8'	151.0°	73°23.7'	+54.6'	152.6°	19
20	79°10.3'	+44.1'	135.9°	78°26.0'	+46.7'	139.3°	77°39.5'	+48.7'	142.3°	76°51.2'	+50.4'	144.9°	76°01.4'	+51.8'	147.2°	75°10.3'	+53.0'	149.3°	74°18.3'	+53.9'	151.1°	20
21	79°54.4'	+41.2'	132.1°	79°12.6'	+44.3'	136.0°	78°28.2'	+46.9'	139.5°	77°41.6'	+48.9'	142.4°	76°53.2'	+50.6'	145.1°	76°03.3'	+52.0'	147.4°	75°12.2'	+53.1'	149.4°	21
22	80°35.6'	+37.6'	127.9°	79°57.0'	+41.5'	132.3°	79°15.1'	+44.5'	136.2°	78°30.5'	+47.1'	139.6°	77°43.8'	+49.1'	142.6°	76°55.3'	+50.8'	145.2°	76°05.3'	+52.1'	147.5°	22
23	81°13.3'	+33.2'	122.9°	80°38.4'	+37.9'	128.0°	79°59.6'	+41.7'	132.5°	79°17.6'	+44.8'	136.4°	78°32.9'	+47.3'	139.8°	77°46.0'	+49.3'	142.8°	76°57.4'	+50.9'	145.4°	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										
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	60°42.1'	+57.5'	161.4°	59°45.1'	+57.7'	161.9°	58°48.0'	+57.9'	162.4°	57°50.7'	+58.0'	162.9°	56°53.3'	+58.2'	163.4°	55°55.7'	+58.3'	163.8°	54°58.1'	+58.4'	164.2°	0
1	61°39.5'	+57.3'	160.8°	60°42.8'	+57.5'	161.4°	59°45.8'	+57.7'	161.9°	58°48.7'	+57.9'	162.4°	57°51.5'	+58.1'	162.9°	56°54.0'	+58.2'	163.4°	55°56.5'	+58.3'	163.8°	1
2	62°36.9'	+57.1'	160.1°	61°40.3'	+57.4'	160.8°	60°43.6'	+57.6'	161.4°	59°46.6'	+57.8'	161.9°	58°49.5'	+57.9'	162.4°	57°52.2'	+58.1'	162.9°	56°54.8'	+58.2'	163.4°	2
3	63°34.0'	+56.9'	159.5°	62°37.7'	+57.2'	160.1°	61°41.1'	+57.4'	160.8°	60°44.4'	+57.6'	161.4°	59°47.4'	+57.8'	161.9°	58°50.3'	+58.0'	162.4°	57°53.0'	+58.1'	162.9°	3
4	64°30.9'	+56.7'	158.7°	63°34.9'	+57.0'	159.5°	62°38.6'	+57.2'	160.1°	61°42.0'	+57.5'	160.8°	60°45.3'	+57.7'	161.4°	59°48.3'	+57.9'	161.9°	58°51.2'	+58.0'	162.4°	4
5	65°27.6'	+56.5'	158.0°	64°31.9'	+56.8'	158.8°	63°35.8'	+57.0'	159.5°	62°39.5'	+57.3'	160.2°	61°42.9'	+57.5'	160.8°	60°46.2'	+57.7'	161.4°	59°49.2'	+57.9'	161.9°	5
6	66°24.1'	+56.2'	157.1°	65°28.6'	+56.5'	158.0°	64°32.8'	+56.8'	158.8°	63°36.8'	+57.1'	159.5°	62°40.5'	+57.4'	160.2°	61°43.9'	+57.6'	160.8°	60°49.1'	+57.8'	161.4°	6
7	67°20.3'	+55.8'	156.2°	66°25.1'	+56.2'	157.2°	65°29.7'	+56.6'	158.0°	64°33.9'	+56.9'	158.8°	63°37.8'	+57.2'	159.5°	62°41.5'	+57.4'	160.2°	61°44.9'	+57.6'	160.9°	7
8	68°16.1'	+55.5'	155.3°	67°21.4'	+55.9'	156.3°	66°26.3'	+56.3'	157.2°	65°30.8'	+56.6'	158.1°	64°35.0'	+57.0'	158.8°	63°38.9'	+57.2'	159.6°	62°42.5'	+57.5'	160.3°	8
9	69°11.6'	+55.1'	154.2°	68°17.3'	+55.6'	155.3°	67°22.6'	+56.0'	156.3°	66°27.4'	+56.4'	157.2°	65°31.9'	+56.7'	158.1°	64°36.1'	+57.0'	158.9°	63°40.0'	+57.3'	159.6°	9
10	70°06.6'	+54.6'	153.1°	69°12.9'	+55.1'	154.3°	68°18.6'	+55.6'	155.4°	67°23.8'	+56.1'	156.4°	65°32.8'	+56.4'	157.3°	64°36.1'	+56.8'	158.1°	63°41.1'	+57.1'	158.9°	10
11	71°01.2'	+54.0'	151.8°	70°08.0'	+54.7'	153.1°	69°14.2'	+55.2'	154.3°	68°19.9'	+55.7'	155.4°	65°33.9'	+56.1'	156.4°	64°37.2'	+56.5'	157.4°	63°42.1'	+56.9'	158.2°	11
12	71°55.3'	+53.4'	150.5°	71°02.7'	+54.1'	151.9°	70°09.4'	+54.8'	153.2°	69°15.6'	+55.3'	154.4°	65°34.9'	+56.2'	156.5°	64°38.3'	+56.6'	157.4°	63°43.1'	+57.1'	158.9°	12
13	72°48.6'	+52.7'	149.0°	71°56.8'	+53.5'	150.5°	71°04.2'	+54.2'	152.0°	70°10.9'	+54.9'	153.3°	65°35.9'	+56.3'	157.5°	64°39.4'	+56.7'	157.4°	63°44.1'	+57.1'	158.9°	13
14	73°41.3'	+51.8'	147.3°	72°50.3'	+52.8'	149.0°	71°58.4'	+53.6'	150.6°	71°05.8'	+54.3'	152.1°	65°36.9'	+56.4'	157.5°	64°40.5'	+56.8'	157.4°	63°45.1'	+57.1'	158.9°	14
15	74°33.1'	+50.8'	145.4°	73°43.1'	+51.9'	147.4°	72°52.1'	+52.9'	149.1°	72°00.1'	+53.7'	150.7°	65°37.9'	+56.5'	157.5°	64°41.6'	+56.9'	157.4°	63°46.1'	+57.1'	158.9°	15
16	75°23.8'	+49.6'	143.4°	74°35.0'	+50.9'	145.6°	73°45.0'	+52.1'	147.5°	72°53.9'	+53.0'	149.2°	65°38.9'	+56.6'	157.5°	64°42.7'	+57.0'	157.4°	63°47.1'	+57.1'	158.9°	16
17	76°13.4'	+48.1'	141.1°	75°25.9'	+49.7'	143.5°	74°37.0'	+51.1'	145.7°	73°46.9'	+52.2'	147.6°	65°39.9'	+56.7'	157.5°	64°43.8'	+56.9'	157.4°	63°48.1'	+57.1'	158.9°	17
18	77°01.5'	+46.4'	138.5°	76°15.6'	+48.3'	141.2°	75°28.1'	+49.9'	143.6°	74°39.1'	+51.2'	145.8°	65°40.9'	+56.8'	157.5°	64°44.9'	+57.0'	157.4°	63°49.1'	+57.1'	158.9°	18
19	77°47.9'	+44.3'	135.6°	77°03.9'	+46.6'	138.6°	76°18.0'	+48.5'	141.4°	75°30.3'	+50.0'	143.8°	65°41.9'	+56.9'	157.5°	64°46.0'	+57.0'	157.4°	63°50.1'	+57.1'	158.9°	19
20	78°32.2'	+41.8'	132.3°	77°50.5'	+44.5'	135.7°	77°06.4'	+46.8'	138.8°	76°20.3'	+48.7'	141.5°	65°42.9'	+57.0'	157.5°	64°47.1'	+57.0'	157.4°	63°51.1'	+57.1'	158.9°	20
21	79°14.0'	+38.8'	128.6°	78°35.0'	+42.0'	132.5°	77°53.2'	+44.7'	135.9°	77°09.0'	+47.0'	139.0°	65°43.9'	+57.1'	157.5°	64°48.2'	+57.0'</					

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

10° 350° LHA

Latitude SAME as Declination

10° 350° 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	60°24.3'	+56.9'	159.4°	59°28.0'	+57.2'	160.0°	58°31.5'	+57.4'	160.6°	57°34.8'	+57.6'	161.1°	56°38.0'	+57.8'	161.6°	55°41.0'	+57.9'	162.1°	54°43.8'	+58.1'	162.5°	0
1	61°21.2'	+56.7'	158.8°	60°25.2'	+57.0'	159.4°	59°28.9'	+57.2'	160.0°	58°32.4'	+57.4'	160.6°	57°35.7'	+57.6'	161.1°	56°38.9'	+57.8'	161.6°	55°41.9'	+58.0'	162.1°	1
2	62°18.0'	+56.5'	158.1°	61°22.2'	+56.8'	158.8°	60°26.1'	+57.1'	159.4°	59°29.8'	+57.3'	160.0°	58°33.4'	+57.5'	160.6°	57°36.7'	+57.7'	161.1°	56°39.8'	+57.8'	161.6°	2
3	63°14.5'	+56.3'	157.3°	62°19.0'	+56.6'	158.1°	61°23.2'	+56.9'	158.8°	60°27.1'	+57.1'	159.4°	59°30.8'	+57.3'	160.0°	58°34.4'	+57.5'	160.6°	57°37.7'	+57.7'	161.1°	3
4	64°10.8'	+56.0'	156.6°	63°15.6'	+56.4'	157.4°	62°20.0'	+56.7'	158.1°	61°24.2'	+56.9'	158.8°	60°28.2'	+57.2'	159.4°	59°31.9'	+57.4'	160.0°	58°35.4'	+57.6'	160.6°	4
5	65°06.8'	+55.7'	155.7°	64°11.9'	+56.1'	156.6°	63°16.7'	+56.4'	157.4°	62°21.2'	+56.7'	158.1°	61°25.4'	+57.0'	158.8°	60°29.3'	+57.2'	159.4°	59°33.0'	+57.5'	160.0°	5
6	66°02.5'	+55.4'	154.8°	65°08.0'	+55.8'	155.8°	64°13.1'	+56.2'	156.6°	63°17.9'	+56.5'	157.4°	62°22.3'	+56.8'	158.1°	61°26.5'	+57.1'	158.8°	60°30.5'	+57.3'	159.5°	6
7	66°57.9'	+55.0'	153.9°	66°03.8'	+55.5'	154.9°	65°09.3'	+55.9'	155.8°	64°14.4'	+56.2'	156.6°	63°19.1'	+56.6'	157.4°	62°23.6'	+56.9'	158.2°	61°27.8'	+57.1'	158.9°	7
8	67°52.9'	+54.6'	152.8°	66°59.3'	+55.1'	153.9°	66°05.2'	+55.5'	154.9°	65°10.6'	+56.0'	155.8°	64°15.7'	+56.3'	156.7°	63°20.4'	+56.6'	157.5°	62°24.9'	+56.9'	158.2°	8
9	68°47.5'	+54.1'	151.7°	67°54.4'	+54.7'	152.9°	67°00.7'	+55.2'	153.9°	66°06.6'	+55.6'	154.9°	65°12.0'	+56.0'	155.9°	64°17.1'	+56.4'	156.7°	63°21.8'	+56.7'	157.5°	9
10	69°41.6'	+53.5'	150.5°	68°49.0'	+54.2'	151.8°	67°55.9'	+54.8'	152.9°	67°02.2'	+55.3'	154.0°	66°08.1'	+55.7'	155.0°	65°13.5'	+56.1'	155.9°	64°18.5'	+56.5'	156.8°	10
11	70°35.1'	+52.9'	149.1°	69°43.2'	+53.6'	150.5°	68°50.7'	+54.3'	151.8°	67°57.5'	+54.9'	153.0°	67°03.8'	+55.4'	154.1°	66°09.6'	+55.8'	155.1°	65°15.0'	+56.2'	156.0°	11
12	71°28.0'	+52.2'	147.7°	70°36.9'	+53.0'	149.2°	69°45.0'	+53.8'	150.6°	68°52.4'	+54.4'	151.9°	67°59.1'	+55.0'	153.1°	67°05.4'	+55.5'	154.1°	66°11.2'	+55.9'	155.1°	12
13	72°20.2'	+51.3'	146.1°	71°29.9'	+52.3'	147.8°	70°38.7'	+53.1'	149.3°	69°46.8'	+53.9'	150.7°	68°54.1'	+54.5'	152.0°	68°00.9'	+55.1'	153.1°	67°07.1'	+55.6'	154.2°	13
14	73°11.5'	+50.4'	144.4°	72°22.2'	+51.5'	146.2°	71°31.9'	+52.4'	147.9°	70°40.6'	+53.3'	149.4°	69°48.6'	+54.0'	150.8°	68°55.9'	+54.6'	152.0°	68°02.6'	+55.2'	153.2°	14
15	74°01.9'	+49.2'	142.4°	73°13.7'	+50.5'	144.5°	72°24.3'	+51.6'	146.3°	71°33.9'	+52.6'	148.0°	70°42.6'	+53.4'	149.5°	69°50.6'	+54.1'	150.9°	68°57.8'	+54.7'	152.1°	15
16	74°51.1'	+47.9'	140.3°	74°04.2'	+49.4'	142.5°	73°15.9'	+50.7'	144.6°	72°26.5'	+51.8'	146.4°	71°36.0'	+52.7'	148.1°	70°44.7'	+53.5'	149.6°	69°52.6'	+54.2'	151.0°	16
17	75°39.0'	+46.3'	137.9°	74°53.6'	+48.1'	140.4°	74°06.6'	+49.6'	142.7°	73°18.2'	+50.8'	144.7°	72°28.7'	+51.9'	146.5°	71°38.2'	+52.9'	148.2°	70°46.8'	+53.7'	149.7°	17
18	76°25.3'	+44.5'	135.3°	75°41.6'	+46.5'	138.1°	74°56.1'	+48.2'	140.5°	74°09.1'	+49.7'	142.8°	73°20.6'	+51.0'	144.8°	72°31.0'	+52.1'	146.7°	71°40.4'	+53.0'	148.3°	18
19	77°09.8'	+42.3'	132.4°	76°28.2'	+44.7'	135.4°	75°44.4'	+46.7'	138.2°	74°58.8'	+48.4'	140.7°	74°11.6'	+49.9'	142.9°	73°23.1'	+51.2'	145.0°	72°33.4'	+52.2'	146.8°	19
20	77°52.0'	+39.7'	129.1°	77°12.8'	+42.5'	132.5°	76°31.1'	+44.9'	135.6°	75°47.2'	+46.9'	138.3°	75°01.5'	+48.6'	140.8°	74°14.3'	+50.1'	143.1°	73°25.7'	+51.3'	145.1°	20
21	78°31.7'	+36.6'	125.4°	77°55.3'	+39.9'	129.2°	77°16.0'	+42.7'	132.7°	76°34.1'	+45.1'	135.7°	75°50.2'	+47.1'	138.5°	75°04.4'	+48.8'	141.0°	74°17.0'	+50.3'	143.2°	21
22	79°08.3'	+33.0'	121.3°	78°35.2'	+36.8'	125.5°	77°58.7'	+40.2'	129.4°	77°19.2'	+43.0'	132.8°	76°37.3'	+45.3'	135.9°	75°53.2'	+47.3'	138.7°	75°07.3'	+49.0'	141.2°	22
23	79°41.3'	+28.8'	116.8°	79°12.1'	+33.2'	121.4°	78°38.9'	+37.1'	125.7°	78°02.2'	+40.4'	129.5°	77°22.6'	+43.2'	133.0°	76°40.5'	+45.6'	136.1°	75°56.3'	+47.6'	138.9°	23

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

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	60°04.8'	+56.4'	157.5°	59°09.3'	+56.6'	158.2°	58°13.4'	+56.9'	158.8°	57°17.4'	+57.1'	159.3°	56°21.2'	+57.3'	159.9°	55°24.8'	+57.5'	160.4°	54°28.2'	+57.7'	160.8°	0
1	61°01.2'	+56.1'	156.8°	60°05.9'	+56.4'	157.5°	59°10.3'	+56.7'	158.1°	58°14.5'	+56.9'	158.7°	57°18.5'	+57.2'	159.3°	56°22.3'	+57.4'	159.8°	55°25.8'	+57.6'	160.4°	1
2	61°57.3'	+55.9'	156.1°	61°02.3'	+56.2'	156.8°	60°07.0'	+56.5'	157.5°	59°11.5'	+56.8'	158.1°	58°15.7'	+57.0'	158.7°	57°19.6'	+57.2'	159.3°	56°23.4'	+57.4'	159.8°	2
3	62°53.2'	+55.6'	155.3°	61°58.5'	+56.0'	156.1°	61°03.5'	+56.3'	156.8°	60°08.2'	+56.6'	157.5°	59°12.7'	+56.8'	158.1°	58°16.9'	+57.1'	158.8°	57°20.8'	+57.3'	159.3°	3
4	63°48.8'	+55.3'	154.4°	62°54.5'	+55.7'	155.3°	61°59.8'	+56.0'	156.1°	61°04.8'	+56.4'	156.8°	60°09.5'	+56.6'	157.5°	59°13.9'	+56.9'	158.2°	58°18.1'	+57.1'	158.8°	4
5	64°44.1'	+54.9'	153.6°	63°50.2'	+55.4'	154.5°	62°55.8'	+55.8'	155.3°	62°01.2'	+56.1'	156.1°	61°06.1'	+56.4'	156.8°	60°10.8'	+56.7'	157.5°	59°15.3'	+57.0'	158.2°	5
6	65°39.1'	+54.6'	152.6°	64°45.6'	+55.0'	153.6°	63°51.6'	+55.5'	154.5°	62°57.3'	+55.8'	155.3°	62°02.6'	+56.2'	156.1°	61°07.5'	+56.5'	156.9°	60°12.2'	+56.8'	157.5°	6
7	66°33.6'	+54.1'	151.6°	65°40.6'	+54.7'	152.6°	64°47.1'	+55.1'	153.6°	63°53.1'	+55.6'	154.5°	62°58.8'	+55.9'	155.4°	62°04.1'	+56.3'	156.2°	61°09.0'	+56.6'	156.9°	7
8	67°27.7'	+53.6'	150.5°	66°35.2'	+54.2'	151.6°	65°42.2'	+54.8'	152.7°	64°48.7'	+55.2'	153.6°	63°54.7'	+55.6'	154.6°	63°00.3'	+56.0'	155.4°	62°05.6'	+56.4'	156.2°	8
9	68°21.4'	+53.1'	149.3°	67°29.5'	+53.7'	150.5°	66°37.0'	+54.3'	151.7°	65°43.9'	+54.9'	152.7°	64°50.3'	+55.3'	153.7°	63°56.3'	+55.7'	154.6°	63°01.9'	+56.1'	155.4°	9
10	69°14.5'	+52.5'	148.0°	68°23.2'	+53.2'	149.3°	67°31.3'	+53.9'	150.6°	66°38.7'	+54.4'	151.7°	65°45.6'	+55.0'	152.8°	64°52.1'	+55.4'	153.7°	63°58.0'	+55.8'	154.6°	10
11	70°06.9'	+51.8'	146.6°	69°16.4'	+52.6'	148.0°	68°25.2'	+53.3'	149.4°	67°33.2'	+54.0'	150.6°	66°40.6'	+54.5'	151.8°	65°47.5'	+55.1'	152.8°	64°53.9'	+55.5'	153.8°	11
12	70°58.7'	+50.9'	145.1°	70°09.0'	+51.9'	146.7°	69°18.5'	+52.7'	148.1°	68°27.2'	+53.4'	149.5°	67°35.2'	+54.1'	150.7°	66°42.5'	+54.7'	151.8°	65°49.4'	+55.2'	152.9°	12
13	71°49.6'	+50.0'	143.4°	71°00.9'	+51.1'	145.1°	70°11.2'	+52.0'	146.7°	69°20.6'	+52.8'	148.2°	68°29.2'	+53.6'	149.5°	67°37.2'	+54.2'	150.8°	66°44.5'	+54.8'	151.9°	13
14	72°39.6'	+48.9'	141.6°	71°52.0'	+50.2'	143.5°	71°03.2'	+51.2'	145.2°	70°13.5'	+52.2'	146.8°	69°22.8'	+53.0'	148.3°	68°31.4'	+53.7'	149.6°	67°39.3'	+54.3'	150.9°	14
15	73°28.6'	+47.7'	139.6°	72°42.2'	+49.1'	141.7°	71°54.5'	+50.3'	143.6°	71°05.6'	+51.4'	145.3°	70°15.8'	+52.3'	146.9°	69°25.1'	+53.1'	148.4°	68°33.6'	+53.8'	149.7°	15
16	74°16.2'	+46.3'	137.4°	73°31.3'	+47.9'	139.7°	72°44.8'	+49.3'	141.8°	71°57.0'	+50.5'	143.7°	71°08.1'	+51.5'	145.4°	70°18.2'	+52.5'	147.0°	69°27.5'	+53.3'	148.5°	16
17	75°02.5'	+44.6'	135.0°	74°19.1'	+46.4'	137.5°	73°34.1'	+48.1'	139.8°	72°47.5'	+49.5'	141.9°	71°59.7'	+50.7'	143.8°	71°10.7'	+51.7'	145.6°	70°20.7'	+52.6'	147.1°	17
18	75°47.1'	+42.6'	132.4°	75°05.6'	+44.8'	135.1°	74°22.1'	+46.7'	137.7°	73°37.0'	+48.3'	140.0°	72°50.3'	+49.6'	142.0°	72°02.4'	+50.8'	143.9°	71°13.3'	+51.9'	145.7°	18
19	76°29.7'	+40.4'	129.4°	75°50.4'	+42.9'	132.5°	75°08.8'	+45.0'	135.3°	74°25.2'	+46.9'	137.8°	73°40.0'	+48.5'	140.1°	72°53.2'	+49.8'	142.2°	72°05.2'	+51.0'	144.1°	19
20	77°10.1'	+37.7'	126.2°	76°33.2'	+40.6'	129.5°	75°53.8'	+43.1'	132.6°	75°12.1'	+45.2'	135.4°	74°28.4'	+47.1'	137.9°	73°43.0'	+48.7'	140.2°	72°56.2'	+50.0'	142.3°	20
21	77°47.8'	+34.6'	122.6°	77°13.8'	+38.0'	126.3°	76°36.9'	+40.8'	129.7°	75°57.3'	+43.3'	132.8°	75°15.5'	+45.5'	135.6°	74°31.7'	+47.3'	138.1°	73°46.2'	+48.9'	140.4°	21



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°43.8'	+55.8'	155.6°	58°48.9'	+56.1'	156.3°	57°53.9'	+56.4'	157.0°	56°58.5'	+56.6'	157.6°	56°02.9'	+56.9'	158.1°	55°07.2'	+57.1'	158.7°	54°11.2'	+57.3'	159.2°	0
1	60°39.5'	+55.5'	154.9°	59°45.0'	+55.8'	155.6°	58°50.2'	+56.1'	156.3°	57°55.1'	+56.4'	157.0°	56°59.8'	+56.7'	157.6°	56°04.2'	+56.9'	158.1°	55°08.4'	+57.1'	158.7°	1
2	61°35.0'	+55.2'	154.1°	60°40.9'	+55.6'	154.9°	59°46.4'	+55.9'	155.6°	58°51.6'	+56.2'	156.3°	57°56.5'	+56.5'	157.0°	57°01.1'	+56.8'	157.6°	56°05.6'	+57.0'	158.1°	2
3	62°30.2'	+54.9'	153.3°	61°36.4'	+55.3'	154.1°	60°42.3'	+55.7'	154.9°	59°47.8'	+56.0'	155.6°	58°53.0'	+56.3'	156.3°	57°57.9'	+56.6'	157.0°	57°02.6'	+56.8'	157.6°	3
4	63°25.1'	+54.5'	152.4°	62°31.7'	+55.0'	153.3°	61°37.9'	+55.4'	154.1°	60°43.8'	+55.7'	154.9°	59°49.3'	+56.1'	155.6°	58°54.5'	+56.4'	156.3°	57°59.4'	+56.6'	157.0°	4
5	64°19.6'	+54.1'	151.4°	63°26.7'	+54.6'	152.4°	62°33.3'	+55.1'	153.3°	61°39.5'	+55.5'	154.1°	60°45.3'	+55.8'	154.9°	59°50.8'	+56.2'	155.6°	58°56.0'	+56.5'	156.3°	5
6	65°13.8'	+53.7'	150.4°	64°21.3'	+54.2'	151.5°	63°28.4'	+54.7'	152.4°	62°35.0'	+55.2'	153.3°	61°41.2'	+55.6'	154.2°	60°47.0'	+55.9'	154.9°	59°52.5'	+56.2'	155.7°	6
7	66°07.5'	+53.2'	149.3°	65°15.6'	+53.8'	150.5°	64°23.1'	+54.4'	151.5°	63°30.2'	+54.8'	152.4°	62°36.7'	+55.3'	153.3°	61°42.9'	+55.7'	154.2°	60°48.7'	+56.0'	155.0°	7
8	67°00.7'	+52.7'	148.2°	66°09.4'	+53.3'	149.4°	65°17.5'	+53.9'	150.5°	64°25.0'	+54.5'	151.5°	63°32.0'	+54.9'	152.5°	62°38.6'	+55.4'	153.4°	61°44.7'	+55.7'	154.2°	8
9	67°53.4'	+52.1'	146.9°	67°02.7'	+52.8'	148.2°	66°11.4'	+53.5'	149.4°	65°19.4'	+54.0'	150.5°	64°26.9'	+54.6'	151.6°	63°33.9'	+55.0'	152.5°	62°40.5'	+55.5'	153.4°	9
10	68°45.4'	+51.4'	145.6°	67°55.5'	+52.2'	147.0°	67°04.9'	+52.9'	148.3°	66°13.5'	+53.6'	149.5°	65°21.5'	+54.2'	150.6°	64°29.0'	+54.7'	151.6°	63°35.9'	+55.1'	152.6°	10
11	69°36.8'	+50.6'	144.1°	68°47.7'	+51.5'	145.6°	67°57.8'	+52.3'	147.0°	67°07.1'	+53.1'	148.3°	66°15.7'	+53.7'	149.5°	65°23.6'	+54.3'	150.6°	64°31.1'	+54.8'	151.7°	11
12	70°27.4'	+49.7'	142.6°	69°39.2'	+50.7'	144.2°	68°50.1'	+51.7'	145.7°	68°00.1'	+52.5'	147.1°	67°09.4'	+53.2'	148.4°	66°17.9'	+53.8'	149.6°	65°25.9'	+54.4'	150.7°	12
13	71°17.1'	+48.7'	140.8°	70°30.0'	+49.9'	142.6°	69°41.8'	+50.9'	144.3°	68°52.6'	+51.8'	145.8°	68°02.6'	+52.6'	147.2°	67°11.8'	+53.3'	148.5°	66°20.3'	+54.0'	149.7°	13
14	72°05.8'	+47.5'	139.0°	71°19.8'	+48.9'	140.9°	70°32.7'	+50.0'	142.7°	69°44.4'	+51.1'	144.4°	68°55.2'	+52.0'	145.9°	68°05.1'	+52.8'	147.3°	67°14.2'	+53.5'	148.6°	14
15	72°53.3'	+46.2'	137.0°	72°08.7'	+47.7'	139.1°	71°22.7'	+49.0'	141.0°	70°35.4'	+50.2'	142.8°	69°47.1'	+51.2'	144.5°	68°57.8'	+52.1'	146.0°	68°07.7'	+52.9'	147.4°	15
16	73°39.5'	+44.7'	134.7°	72°56.4'	+46.4'	137.1°	72°11.7'	+47.9'	139.2°	71°25.6'	+49.2'	141.1°	70°38.3'	+50.4'	142.9°	69°49.9'	+51.4'	144.6°	69°00.6'	+52.3'	146.1°	16
17	74°24.2'	+42.9'	132.3°	73°42.8'	+44.9'	134.8°	72°59.6'	+46.6'	137.2°	72°14.9'	+48.1'	139.3°	71°28.7'	+49.4'	141.3°	70°41.3'	+50.5'	143.0°	69°52.9'	+51.5'	144.7°	17
18	75°07.1'	+40.9'	129.7°	74°27.7'	+43.1'	132.4°	73°46.2'	+45.1'	135.0°	73°03.0'	+46.8'	137.3°	72°18.1'	+48.3'	139.4°	71°31.9'	+49.6'	141.4°	70°44.4'	+50.7'	143.2°	18
19	75°48.0'	+38.6'	126.7°	75°10.8'	+41.1'	129.8°	74°31.3'	+43.4'	132.6°	73°49.8'	+45.3'	135.1°	73°06.4'	+47.0'	137.4°	72°21.5'	+48.5'	139.6°	71°35.1'	+49.8'	141.5°	19
20	76°26.6'	+35.9'	123.5°	75°52.0'	+38.8'	126.9°	75°14.7'	+41.4'	129.9°	74°35.1'	+43.6'	132.7°	73°53.4'	+45.6'	135.2°	73°10.0'	+47.2'	137.6°	72°24.9'	+48.7'	139.7°	20
21	77°02.5'	+32.9'	120.1°	76°30.8'	+36.2'	123.7°	75°56.1'	+39.1'	127.0°	75°18.7'	+41.6'	130.0°	74°39.0'	+43.9'	132.8°	73°57.2'	+45.8'	135.4°	73°13.6'	+47.5'	137.7°	21
22	77°35.4'	+29.4'	116.2°	77°07.0'	+33.1'	120.2°	76°35.2'	+36.4'	123.8°	76°00.4'	+39.4'	127.1°	75°22.9'	+41.9'	130.2°	74°43.0'	+44.1'	133.0°	74°01.1'	+46.0'	135.6°	22
23	78°04.8'	+25.5'	112.1°	77°40.1'	+29.7'	116.3°	77°11.6'	+33.4'	120.3°	76°39.7'	+36.7'	123.9°	76°04.8'	+39.6'	127.3°	75°27.1'	+42.2'	130.4°	74°47.1'	+44.4'	133.2°	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°21.1'	+55.1'	153.8°	58°27.1'	+55.5'	154.5°	57°32.8'	+55.8'	155.2°	56°38.2'	+56.1'	155.9°	55°43.3'	+56.4'	156.5°	54°48.2'	+56.6'	157.0°	53°52.8'	+56.8'	157.6°	0
1	60°16.3'	+54.8'	153.0°	59°22.6'	+55.2'	153.8°	58°28.6'	+55.6'	154.5°	57°34.3'	+55.9'	155.2°	56°39.7'	+56.2'	155.8°	55°44.8'	+56.4'	156.4°	54°49.7'	+56.7'	157.0°	1
2	61°11.1'	+54.5'	152.2°	60°17.8'	+54.9'	153.0°	59°24.2'	+55.3'	153.8°	58°30.2'	+55.6'	154.5°	57°35.8'	+56.0'	155.2°	56°41.2'	+56.3'	155.8°	55°46.4'	+56.5'	156.4°	2
3	62°05.6'	+54.1'	151.3°	61°12.7'	+54.6'	152.2°	60°19.5'	+55.0'	153.0°	59°25.8'	+55.4'	153.8°	58°31.8'	+55.7'	154.5°	57°37.5'	+56.0'	155.2°	56°42.9'	+56.3'	155.8°	3
4	62°59.7'	+53.8'	150.4°	62°07.3'	+54.2'	151.3°	61°14.5'	+54.7'	152.2°	60°21.2'	+55.1'	153.0°	59°27.5'	+55.5'	153.8°	58°33.5'	+55.8'	154.5°	57°39.2'	+56.1'	155.2°	4
5	63°53.5'	+53.3'	149.4°	63°01.6'	+53.9'	150.4°	62°09.2'	+54.4'	151.3°	61°16.3'	+54.8'	152.2°	60°23.0'	+55.2'	153.0°	59°29.4'	+55.6'	153.8°	58°35.4'	+55.9'	154.5°	5
6	64°46.8'	+52.8'	148.3°	63°55.4'	+53.4'	149.4°	63°03.5'	+54.0'	150.4°	62°11.1'	+54.5'	151.4°	61°18.2'	+54.9'	152.2°	60°24.9'	+55.3'	153.1°	59°31.3'	+55.7'	153.8°	6
7	65°39.6'	+52.3'	147.2°	64°48.9'	+53.0'	148.4°	63°57.5'	+53.6'	149.4°	63°05.6'	+54.1'	150.4°	62°13.1'	+54.6'	151.4°	61°20.2'	+55.0'	152.3°	60°26.9'	+55.4'	153.1°	7
8	66°31.9'	+51.7'	146.0°	65°41.8'	+52.4'	147.2°	64°51.0'	+53.1'	148.4°	63°59.7'	+53.7'	149.5°	63°07.7'	+54.2'	150.5°	62°15.3'	+54.7'	151.4°	61°22.3'	+55.1'	152.3°	8
9	67°23.6'	+51.0'	144.7°	66°34.2'	+51.8'	146.0°	65°44.1'	+52.6'	147.3°	64°53.3'	+53.2'	148.4°	64°01.9'	+53.8'	149.5°	63°09.9'	+54.3'	150.5°	62°17.5'	+54.8'	151.5°	9
10	68°14.6'	+50.3'	143.3°	67°26.1'	+51.2'	144.7°	66°36.7'	+52.0'	146.1°	65°46.5'	+52.7'	147.3°	64°55.7'	+53.3'	148.5°	64°04.3'	+53.9'	149.6°	63°12.3'	+54.4'	150.6°	10
11	69°04.9'	+49.4'	141.8°	68°17.3'	+50.4'	143.4°	67°28.7'	+51.3'	144.8°	66°39.2'	+52.1'	146.1°	65°49.0'	+52.8'	147.4°	64°58.2'	+53.5'	148.5°	64°06.7'	+54.0'	149.6°	11
12	69°54.3'	+48.5'	140.2°	69°07.7'	+49.6'	141.9°	68°20.0'	+50.6'	143.4°	67°31.3'	+51.5'	144.9°	66°41.9'	+52.3'	146.2°	65°51.7'	+53.0'	147.4°	65°00.8'	+53.6'	148.6°	12
13	70°42.8'	+47.4'	138.4°	69°57.3'	+48.6'	140.2°	69°10.6'	+49.8'	141.9°	68°22.8'	+50.8'	143.5°	67°34.1'	+51.6'	144.9°	66°44.6'	+52.4'	146.3°	65°54.4'	+53.1'	147.5°	13
14	71°30.2'	+46.1'	136.5°	70°45.9'	+47.6'	138.5°	70°00.3'	+48.8'	140.3°	69°13.6'	+49.9'	142.0°	68°25.8'	+50.9'	143.6°	67°37.0'	+51.8'	145.0°	66°47.5'	+52.6'	146.4°	14
15	72°16.3'	+44.8'	134.5°	71°33.5'	+46.4'	136.6°	70°49.1'	+47.8'	138.6°	70°03.5'	+49.0'	140.4°	69°16.7'	+50.1'	142.1°	68°28.8'	+51.1'	143.7°	67°40.1'	+52.0'	145.1°	15
16	73°01.1'	+43.2'	132.2°	72°19.8'	+45.0'	134.6°	71°36.9'	+46.6'	136.7°	70°52.5'	+48.0'	138.7°	70°06.8'	+49.2'	140.5°	69°19.9'	+50.3'	142.2°	68°32.0'	+51.3'	143.8°	16
17	73°44.2'	+41.4'	129.8°	73°04.8'	+43.4'	132.3°	72°23.5'	+45.2'	134.7°	71°40.5'	+46.8'	136.8°	70°56.0'	+48.2'	138.8°	70°10.2'	+49.4'	140.6°	69°23.3'	+50.5'	142.3°	17
18	74°25.6'	+39.3'	127.2°	73°48.2'	+41.6'	129.9°	73°08.7'	+43.6'	132.5°	72°27.3'	+45.4'	134.8°	71°44.2'	+47.0'	136.9°	70°59.6'	+48.4'	138.9°	70°13.8'	+49.6'	140.8°	18
19	75°04.9'	+37.0'	124.3°	74°29.8'	+39.5'	127.3°	73°52.3'	+41.8'	130.0°	73°12.7'	+43.9'	132.6°	72°31.2'	+45.6'	134.9°	71°48.0'	+47.2'	137.1°	71°03.3'	+48.6'	139.1°	19
20	75°41.8'	+34.3'	121.2°	75°09.3'	+37.2'	124.4°	74°34.1'	+39.8'	127.4°	73°56.5'	+42.1'	130.2°	73°16.8'	+44.1'	132.7°	72°						

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

14° 346° LHA

Latitude SAME as 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°57.0'	+54.5'	152.0°	58°03.8'	+54.9'	152.8°	57°10.3'	+55.2'	153.5°	56°16.5'	+55.5'	154.2°	55°22.3'	+55.9'	154.8°	54°27.9'	+56.1'	155.4°	53°33.2'	+56.4'	156.0°	0
1	59°51.5'	+54.1'	151.2°	58°58.7'	+54.6'	152.0°	58°05.5'	+54.9'	152.8°	57°12.0'	+55.3'	153.5°	56°18.2'	+55.6'	154.2°	55°24.0'	+55.9'	154.8°	54°29.6'	+56.2'	155.4°	1
2	60°45.6'	+53.8'	150.3°	59°53.3'	+54.2'	151.2°	59°00.5'	+54.7'	152.0°	58°07.3'	+55.0'	152.8°	57°13.8'	+55.4'	153.5°	56°20.0'	+55.7'	154.1°	55°25.8'	+56.0'	154.8°	2
3	61°39.4'	+53.4'	149.4°	60°47.5'	+53.9'	150.3°	59°55.1'	+54.3'	151.2°	59°02.4'	+54.8'	152.0°	58°09.2'	+55.1'	152.8°	57°15.7'	+55.5'	153.5°	56°21.9'	+55.8'	154.1°	3
4	62°32.8'	+52.9'	148.4°	61°41.4'	+53.5'	149.4°	60°49.5'	+54.0'	150.3°	59°57.1'	+54.5'	151.2°	59°04.3'	+54.9'	152.0°	58°11.2'	+55.2'	152.8°	57°17.7'	+55.6'	153.5°	4
5	63°25.7'	+52.5'	147.4°	62°34.9'	+53.1'	148.4°	61°43.5'	+53.6'	149.4°	60°51.6'	+54.1'	150.3°	59°59.2'	+54.6'	151.2°	59°06.4'	+55.0'	152.0°	58°13.3'	+55.4'	152.8°	5
6	64°18.2'	+51.9'	146.3°	63°27.9'	+52.6'	147.4°	62°37.1'	+53.2'	148.5°	61°45.7'	+53.7'	149.4°	60°53.8'	+54.2'	150.4°	60°01.4'	+54.7'	151.2°	59°08.6'	+55.1'	152.0°	6
7	65°10.1'	+51.4'	145.1°	64°20.5'	+52.1'	146.3°	63°30.3'	+52.7'	147.4°	62°39.4'	+53.3'	148.5°	61°48.0'	+53.9'	149.5°	60°56.1'	+54.3'	150.4°	60°03.7'	+54.8'	151.2°	7
8	66°01.5'	+50.7'	143.9°	65°12.6'	+51.5'	145.2°	64°23.0'	+52.2'	146.4°	63°32.8'	+52.9'	147.5°	62°41.9'	+53.5'	148.5°	61°50.4'	+54.0'	149.5°	60°58.5'	+54.5'	150.4°	8
9	66°52.2'	+50.0'	142.5°	66°04.1'	+50.9'	143.9°	65°15.2'	+51.6'	145.2°	64°25.6'	+52.4'	146.4°	63°35.3'	+53.0'	147.5°	62°44.4'	+53.6'	148.6°	61°53.0'	+54.1'	149.5°	9
10	67°42.2'	+49.2'	141.1°	66°55.0'	+50.1'	142.6°	66°06.9'	+51.0'	144.0°	65°18.0'	+51.8'	145.2°	64°28.3'	+52.5'	146.4°	63°38.0'	+53.1'	147.6°	62°47.1'	+53.7'	148.6°	10
11	68°31.3'	+48.3'	139.6°	67°45.1'	+49.3'	141.2°	66°57.9'	+50.3'	142.6°	66°09.8'	+51.2'	144.0°	65°20.8'	+52.0'	145.3°	64°31.2'	+52.7'	146.5°	63°40.8'	+53.3'	147.6°	11
12	69°19.6'	+47.2'	137.9°	68°34.5'	+48.4'	139.6°	67°48.2'	+49.5'	141.2°	67°01.0'	+50.5'	142.7°	66°12.8'	+51.3'	144.1°	65°23.8'	+52.1'	145.4°	64°34.1'	+52.8'	146.6°	12
13	70°06.8'	+46.1'	136.1°	69°22.9'	+47.4'	138.0°	68°37.7'	+48.6'	139.7°	67°51.4'	+49.7'	141.3°	67°04.1'	+50.7'	142.8°	66°15.9'	+51.5'	144.2°	65°26.9'	+52.3'	145.4°	13
14	70°52.9'	+44.8'	134.2°	70°10.3'	+46.3'	136.2°	69°26.4'	+47.6'	138.1°	68°41.1'	+48.8'	139.8°	67°54.8'	+49.9'	141.4°	67°07.4'	+50.8'	142.9°	66°19.2'	+51.7'	144.2°	14
15	71°37.7'	+43.4'	132.1°	70°56.7'	+45.0'	134.3°	70°14.0'	+46.5'	136.3°	69°30.0'	+47.8'	138.1°	68°44.7'	+49.0'	139.9°	67°58.3'	+50.1'	141.5°	67°10.8'	+51.0'	142.9°	15
16	72°21.1'	+41.7'	129.9°	71°41.7'	+43.6'	132.2°	71°00.5'	+45.3'	134.4°	70°17.8'	+46.7'	136.4°	69°33.7'	+48.0'	138.2°	68°48.3'	+49.2'	140.0°	68°01.8'	+50.3'	141.6°	16
17	73°02.8'	+39.9'	127.5°	72°25.3'	+42.0'	130.0°	71°45.8'	+43.8'	132.3°	71°04.5'	+45.5'	134.5°	70°21.7'	+47.0'	136.5°	69°37.5'	+48.3'	138.4°	68°52.1'	+49.4'	140.1°	17
18	73°42.7'	+37.8'	124.9°	73°07.2'	+40.1'	127.6°	72°29.6'	+42.2'	130.1°	71°50.0'	+44.1'	132.4°	71°08.7'	+45.7'	134.6°	70°25.8'	+47.2'	136.6°	69°41.5'	+48.5'	138.5°	18
19	74°20.5'	+35.5'	122.1°	73°47.4'	+38.1'	125.0°	73°11.8'	+40.4'	127.7°	72°34.1'	+42.5'	130.2°	71°54.4'	+44.3'	132.6°	71°13.0'	+46.0'	134.7°	70°30.0'	+47.4'	136.7°	19
20	74°56.0'	+32.8'	119.0°	74°25.4'	+35.7'	122.2°	73°52.2'	+38.3'	125.1°	73°16.5'	+40.7'	127.8°	72°38.7'	+42.7'	130.3°	71°58.9'	+44.6'	132.7°	71°17.4'	+46.2'	134.9°	20
21	75°28.8'	+29.9'	115.7°	75°01.2'	+33.1'	119.1°	74°30.5'	+36.0'	122.3°	73°57.2'	+38.6'	125.2°	73°21.4'	+40.9'	127.9°	72°43.5'	+43.0'	130.5°	72°03.6'	+44.8'	132.8°	21
22	75°58.7'	+26.6'	112.2°	75°34.3'	+30.2'	115.8°	75°06.5'	+33.4'	119.2°	74°35.8'	+36.3'	122.4°	74°02.4'	+38.9'	125.3°	73°26.5'	+41.2'	128.1°	72°48.4'	+43.3'	130.6°	22
23	76°25.3'	+23.0'	108.5°	76°04.4'	+26.9'	112.3°	75°39.9'	+30.4'	115.9°	75°12.1'	+33.7'	119.3°	74°41.3'	+36.6'	122.5°	74°07.7'	+39.2'	125.5°	73°31.7'	+41.5'	128.2°	23
Dec°	28			29			30			31			32			33			34			Dec°

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

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°31.5'	+53.8'	150.3°	57°39.1'	+54.2'	151.1°	56°46.4'	+54.6'	151.8°	55°53.4'	+55.0'	152.5°	55°00.0'	+55.3'	153.2°	54°06.3'	+55.6'	153.8°	53°12.3'	+55.9'	154.4°	0
1	59°25.2'	+53.4'	149.4°	58°33.4'	+53.9'	150.3°	57°41.1'	+54.3'	151.0°	56°48.4'	+54.7'	151.8°	55°55.3'	+55.1'	152.5°	55°01.9'	+55.4'	153.2°	54°08.3'	+55.7'	153.8°	1
2	60°18.7'	+53.0'	148.5°	59°27.2'	+53.5'	149.4°	58°35.4'	+54.0'	150.2°	57°43.1'	+54.4'	151.0°	56°50.4'	+54.8'	151.8°	55°57.4'	+55.2'	152.5°	55°04.0'	+55.5'	153.1°	2
3	61°11.7'	+52.6'	147.6°	60°20.8'	+53.2'	148.5°	59°29.4'	+53.7'	149.4°	58°37.5'	+54.1'	150.2°	57°45.2'	+54.5'	151.0°	56°52.5'	+54.9'	151.8°	55°59.5'	+55.3'	152.5°	3
4	62°04.3'	+52.1'	146.5°	61°13.9'	+52.7'	147.6°	60°23.0'	+53.3'	148.5°	59°31.6'	+53.8'	149.4°	58°39.8'	+54.2'	150.2°	57°47.5'	+54.7'	151.0°	56°54.8'	+55.0'	151.8°	4
5	62°56.4'	+51.6'	145.5°	62°06.7'	+52.3'	146.5°	61°16.3'	+52.9'	147.6°	60°25.4'	+53.4'	148.5°	59°34.0'	+53.9'	149.4°	58°42.1'	+54.4'	150.2°	57°49.8'	+54.8'	151.0°	5
6	63°48.0'	+51.0'	144.3°	62°58.9'	+51.8'	145.5°	62°09.2'	+52.4'	146.6°	61°18.8'	+53.0'	147.6°	60°27.9'	+53.5'	148.5°	59°36.5'	+54.0'	149.4°	58°44.6'	+54.5'	150.3°	6
7	64°39.1'	+50.4'	143.1°	63°50.7'	+51.2'	144.4°	63°01.6'	+51.9'	145.5°	62°11.8'	+52.5'	146.6°	61°21.4'	+53.1'	147.6°	60°30.5'	+53.7'	148.5°	59°39.1'	+54.2'	149.4°	7
8	65°29.5'	+49.7'	141.8°	64°41.9'	+50.6'	143.2°	63°53.5'	+51.3'	144.4°	63°04.4'	+52.1'	145.5°	62°14.6'	+52.7'	146.6°	61°24.2'	+53.3'	147.6°	60°33.2'	+53.8'	148.6°	8
9	66°19.2'	+48.9'	140.5°	65°32.5'	+49.9'	141.9°	64°44.8'	+50.7'	143.2°	63°56.4'	+51.5'	144.4°	63°07.3'	+52.2'	145.6°	62°17.5'	+52.8'	146.6°	61°27.0'	+53.4'	147.7°	9
10	67°08.1'	+48.1'	139.0°	66°22.3'	+49.1'	140.5°	65°35.6'	+50.1'	141.9°	64°47.9'	+50.9'	143.2°	63°59.5'	+51.7'	144.5°	63°10.3'	+52.4'	145.6°	62°20.5'	+53.0'	146.7°	10
11	67°56.2'	+47.1'	137.4°	67°11.5'	+48.3'	139.1°	66°25.6'	+49.3'	140.6°	65°38.8'	+50.2'	142.0°	64°51.1'	+51.1'	143.3°	64°02.7'	+51.8'	144.5°	63°13.4'	+52.5'	145.7°	11
12	68°43.3'	+46.1'	135.8°	67°59.7'	+47.3'	137.5°	67°14.9'	+48.5'	139.1°	66°29.0'	+49.5'	140.6°	65°42.2'	+50.4'	142.0°	64°54.5'	+51.2'	143.3°	64°06.0'	+52.0'	144.6°	12
13	69°29.4'	+44.9'	134.0°	68°47.0'	+46.3'	135.8°	68°03.4'	+47.5'	137.6°	67°18.5'	+48.7'	139.2°	66°32.6'	+49.7'	140.7°	65°45.7'	+50.6'	142.1°	64°58.0'	+51.4'	143.4°	13
14	70°14.3'	+43.5'	132.0°	69°33.3'	+45.1'	134.0°	68°50.9'	+46.5'	135.9°	68°07.2'	+47.7'	137.6°	67°22.3'	+48.9'	139.3°	66°36.3'	+49.9'	140.8°	65°49.4'	+50.8'	142.2°	14
15	70°57.8'	+42.0'	130.0°	70°18.4'	+43.8'	132.1°	69°37.4'	+45.3'	134.1°	68°54.9'	+46.7'	136.0°	68°11.1'	+47.9'	137.7°	67°26.2'	+49.1'	139.3°	66°40.1'	+50.1'	140.9°	15
16	71°39.8'	+40.4'	127.7°	71°02.2'	+42.3'	130.0°	70°22.7'	+44.0'	132.2°	69°41.6'	+45.5'	134.2°	68°59.1'	+46.9'	136.1°	68°15.2'	+48.2'	137.8°	67°30.2'	+49.3'	139.4°	16
17	72°20.2'	+38.5'	125.3°	71°44.4'	+40.6'	127.8°	71°06.7'	+42.5'	130.1°	70°27.2'	+44.2'	132.3°	69°46.0'	+45.8'	134.3°	69°03.4'	+47.1'	136.2°	68°19.5'	+48.4'	137.9°	17
18	72°58.7'	+36.4'	122.8°	72°25.1'	+38.8'	125.4°	71°49.2'	+40.9'	127.5°	71°11.4'	+42.8'	130.2°	70°31.8'	+44.5'	132.4°	69°50.5'	+46.0'	134.4°	69°07.8'	+47.4'	136.3°	18
19	73°35.1'	+34.1'	120.0°	73°03.8'	+36.7'	122.9°	72°30.1'	+39.0'	125.9°	71°54.2'	+41.1'	128.0°	71°16.3'	+43.0'	130.3°	70°36.5'	+44.7'	132.5°	69°55.2'	+46.3'	134.5°	19
20	74°09.2'	+31.5'	117.0°	73°40.5'	+34.4'	120.1°	73°09.1'	+37.0'	122.9°	72°35.3'	+39.3'	125.6°	71°59.3'	+41.4'	128.1°	71°21.3'	+43.3'	130.5°	70°41.5'	+45.0'	132.6°	20
21	74°40.7'	+28.6'	113.9°	74°14.9'	+31.8'	117.1°	73°46.1'	+34.6'	120.2°	73°14.6'	+37.2'	123.1°	72°40									

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

16° 344° LHA

Latitude SAME as Declination

16° 344° 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°04.5'	+53.1'	148.6°	57°13.1'	+53.6'	149.4°	56°21.2'	+54.0'	150.2°	55°29.0'	+54.4'	150.9°	54°36.4'	+54.8'	151.6°	53°43.5'	+55.1'	152.2°	52°50.2'	+55.4'	152.9°	0
1	58°57.6'	+52.7'	147.7°	58°06.6'	+53.2'	148.6°	57°15.2'	+53.7'	149.4°	56°23.4'	+54.1'	150.1°	55°31.2'	+54.5'	150.9°	54°38.6'	+54.9'	151.6°	53°45.7'	+55.2'	152.2°	1
2	59°50.3'	+52.3'	146.8°	58°59.9'	+52.8'	147.7°	58°08.9'	+53.3'	148.5°	57°17.5'	+53.8'	149.4°	56°25.7'	+54.2'	150.1°	55°33.5'	+54.6'	150.9°	54°40.9'	+55.0'	151.5°	2
3	60°42.6'	+51.8'	145.8°	59°52.7'	+52.4'	146.7°	59°02.2'	+53.0'	147.7°	58°11.3'	+53.5'	148.5°	57°19.9'	+53.9'	149.3°	56°28.1'	+54.4'	150.1°	55°35.9'	+54.7'	150.8°	3
4	61°34.4'	+51.3'	144.7°	60°45.1'	+52.0'	145.8°	59°55.2'	+52.5'	146.7°	59°04.8'	+53.1'	147.6°	58°13.8'	+53.6'	148.5°	57°22.5'	+54.1'	149.3°	56°30.6'	+54.5'	150.1°	4
5	62°25.7'	+50.8'	143.6°	61°37.0'	+51.5'	144.7°	60°47.8'	+52.1'	145.8°	59°57.9'	+52.7'	146.7°	59°07.4'	+53.2'	147.7°	58°16.5'	+53.7'	148.5°	57°25.1'	+54.2'	149.3°	5
6	63°16.4'	+50.1'	142.4°	62°28.5'	+50.9'	143.6°	61°39.9'	+51.6'	144.7°	60°50.6'	+52.2'	145.8°	60°00.7'	+52.8'	146.7°	59°10.2'	+53.4'	147.7°	58°19.3'	+53.9'	148.5°	6
7	64°06.6'	+49.5'	141.2°	63°19.4'	+50.3'	142.5°	62°31.5'	+51.1'	143.6°	61°42.8'	+51.8'	144.7°	60°53.5'	+52.4'	145.8°	60°03.6'	+53.0'	146.8°	59°13.1'	+53.5'	147.7°	7
8	64°56.1'	+48.7'	139.9°	64°09.7'	+49.6'	141.2°	63°22.5'	+50.5'	142.5°	62°34.6'	+51.2'	143.7°	61°45.9'	+51.9'	144.8°	60°56.6'	+52.5'	145.8°	60°06.7'	+53.1'	146.8°	8
9	65°44.8'	+47.9'	138.5°	64°59.4'	+48.9'	139.9°	64°13.0'	+49.8'	141.3°	63°25.8'	+50.6'	142.5°	62°37.8'	+51.4'	143.7°	61°49.1'	+52.1'	144.8°	60°59.8'	+52.7'	145.8°	9
10	66°32.7'	+47.0'	137.0°	65°48.3'	+48.1'	138.5°	65°02.8'	+49.1'	140.0°	64°16.4'	+50.0'	141.3°	63°29.2'	+50.8'	142.5°	62°41.2'	+51.6'	143.7°	61°52.5'	+52.2'	144.8°	10
11	67°19.7'	+46.0'	135.4°	66°36.4'	+47.2'	137.0°	65°51.9'	+48.3'	138.6°	65°06.4'	+49.3'	140.0°	64°20.0'	+50.2'	141.3°	63°32.8'	+51.0'	142.6°	62°44.7'	+51.7'	143.8°	11
12	68°05.7'	+44.9'	133.7°	67°23.6'	+46.2'	135.5°	66°40.2'	+47.4'	137.1°	65°55.7'	+48.5'	138.6°	65°10.2'	+49.5'	140.1°	64°23.8'	+50.4'	141.4°	63°36.5'	+51.2'	142.7°	12
13	68°50.6'	+43.7'	131.9°	68°09.8'	+45.1'	133.8°	67°27.6'	+46.4'	135.5°	66°44.2'	+47.6'	137.2°	65°59.7'	+48.7'	138.7°	65°14.1'	+49.7'	140.1°	64°27.6'	+50.6'	141.5°	13
14	69°34.3'	+42.3'	130.0°	68°54.9'	+43.9'	132.0°	68°14.1'	+45.4'	133.8°	67°31.9'	+46.7'	135.6°	66°48.4'	+47.8'	137.2°	66°03.8'	+48.9'	138.8°	65°18.2'	+49.9'	140.2°	14
15	70°16.6'	+40.8'	127.9°	69°38.8'	+42.5'	130.0°	68°59.4'	+44.1'	132.0°	68°18.5'	+45.6'	133.9°	67°36.2'	+46.9'	135.7°	66°52.7'	+48.1'	137.3°	66°08.1'	+49.1'	138.8°	15
16	70°57.4'	+39.1'	125.7°	70°21.4'	+41.0'	128.0°	69°43.6'	+42.8'	130.1°	69°04.1'	+44.4'	132.1°	68°23.1'	+45.8'	134.0°	67°40.8'	+47.1'	135.8°	66°57.2'	+48.3'	137.4°	16
17	71°36.5'	+37.2'	123.3°	71°02.4'	+39.4'	125.8°	70°26.4'	+41.3'	128.1°	69°48.5'	+43.0'	130.2°	69°08.9'	+44.6'	132.2°	68°27.9'	+46.1'	134.1°	67°45.5'	+47.3'	135.9°	17
18	72°13.7'	+35.1'	120.8°	71°41.8'	+37.5'	123.4°	71°07.7'	+39.6'	125.9°	70°31.5'	+41.6'	128.2°	69°53.6'	+43.3'	130.3°	69°14.0'	+44.9'	132.3°	68°32.8'	+46.3'	134.2°	18
19	72°48.8'	+32.8'	118.1°	72°19.3'	+35.4'	120.9°	71°47.3'	+37.8'	123.5°	71°13.1'	+39.9'	126.0°	70°36.9'	+41.8'	128.3°	69°58.8'	+43.6'	130.4°	69°19.1'	+45.1'	132.4°	19
20	73°21.6'	+30.3'	115.2°	72°54.7'	+33.1'	118.2°	72°25.0'	+35.7'	121.0°	71°53.0'	+38.1'	123.6°	71°18.7'	+40.2'	126.1°	70°42.4'	+42.1'	128.4°	70°04.3'	+43.8'	130.5°	20
21	73°52.0'	+27.5'	112.2°	73°27.8'	+30.6'	115.3°	73°00.7'	+33.4'	118.3°	72°31.0'	+36.0'	121.1°	71°58.9'	+38.3'	123.7°	71°24.5'	+40.5'	126.2°	70°48.1'	+42.4'	128.5°	21
22	74°19.5'	+24.5'	108.9°	73°58.4'	+27.8'	112.2°	73°34.2'	+30.9'	115.4°	73°07.0'	+33.7'	118.4°	72°37.2'	+36.3'	121.2°	72°05.0'	+38.6'	123.8°	71°30.5'	+40.8'	126.3°	22
23	74°44.0'	+21.2'	105.5°	74°26.2'	+24.8'	109.0°	74°05.0'	+28.1'	112.3°	73°40.7'	+31.2'	115.5°	73°13.5'	+34.0'	118.5°	72°43.6'	+36.6'	121.3°	72°11.3'	+38.9'	124.0°	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

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°36.3'	+52.4'	146.9°	56°45.7'	+52.9'	147.8°	55°54.8'	+53.4'	148.6°	55°03.4'	+53.8'	149.3°	54°11.6'	+54.2'	150.0°	53°19.4'	+54.6'	150.7°	52°26.9'	+54.9'	151.3°	0
1	58°28.6'	+52.0'	146.0°	57°38.6'	+52.5'	146.9°	56°48.1'	+53.0'	147.7°	55°57.2'	+53.5'	148.5°	55°05.8'	+53.9'	149.3°	54°14.0'	+54.3'	150.0°	53°21.9'	+54.7'	150.7°	1
2	59°20.6'	+51.5'	145.0°	58°31.1'	+52.1'	146.0°	57°41.1'	+52.7'	146.9°	56°50.7'	+53.2'	147.7°	55°59.7'	+53.6'	148.5°	55°08.4'	+54.1'	149.3°	54°16.6'	+54.5'	150.0°	2
3	60°12.1'	+51.0'	144.0°	59°23.2'	+51.7'	145.0°	58°33.8'	+52.2'	146.0°	57°43.8'	+52.8'	146.8°	56°53.3'	+53.3'	147.7°	56°02.4'	+53.8'	148.5°	55°11.1'	+54.2'	149.2°	3
4	61°03.1'	+50.5'	142.9°	60°14.9'	+51.2'	144.0°	59°26.0'	+51.8'	145.0°	58°36.6'	+52.4'	145.9°	57°46.6'	+52.9'	146.8°	56°56.2'	+53.4'	147.7°	56°05.2'	+53.9'	148.5°	4
5	61°53.6'	+49.9'	141.8°	61°06.1'	+50.6'	142.9°	60°17.9'	+51.3'	144.0°	59°29.0'	+52.0'	145.0°	58°39.6'	+52.5'	145.9°	57°49.6'	+53.1'	146.8°	56°59.1'	+53.6'	147.7°	5
6	62°43.5'	+49.2'	140.6°	61°56.7'	+50.1'	141.8°	61°09.2'	+50.8'	142.9°	60°21.0'	+51.5'	144.0°	59°32.1'	+52.1'	145.0°	58°42.7'	+52.7'	146.0°	57°52.7'	+53.2'	146.8°	6
7	63°32.7'	+48.5'	139.4°	62°46.8'	+49.4'	140.6°	62°00.0'	+50.2'	141.8°	61°12.5'	+51.0'	142.9°	60°24.2'	+51.7'	144.0°	59°35.4'	+52.3'	145.0°	58°45.9'	+52.8'	146.0°	7
8	64°21.3'	+47.8'	138.0°	63°36.2'	+48.7'	139.4°	62°50.2'	+49.6'	140.6°	62°03.4'	+50.4'	141.8°	61°15.9'	+51.1'	143.0°	60°27.6'	+51.8'	144.0°	59°38.8'	+52.4'	145.0°	8
9	65°09.0'	+46.9'	136.6°	64°24.9'	+48.0'	138.0°	63°39.8'	+48.9'	139.4°	62°53.8'	+49.8'	140.7°	62°07.0'	+50.6'	141.9°	61°19.5'	+51.3'	143.0°	60°31.2'	+52.0'	144.1°	9
10	65°55.9'	+46.0'	135.1°	65°12.9'	+47.1'	136.6°	64°28.7'	+48.2'	138.1°	63°43.6'	+49.1'	139.4°	62°57.6'	+50.0'	140.7°	62°10.8'	+50.8'	141.9°	61°23.2'	+51.5'	143.0°	10
11	66°41.9'	+44.9'	133.5°	66°00.0'	+46.2'	135.1°	65°16.9'	+47.3'	136.7°	64°32.7'	+48.4'	138.1°	63°47.6'	+49.3'	139.5°	63°01.6'	+50.2'	140.7°	62°14.7'	+51.0'	142.0°	11
12	67°26.8'	+43.8'	131.8°	66°46.1'	+45.2'	133.5°	66°04.2'	+46.4'	135.2°	65°21.1'	+47.5'	136.7°	64°36.9'	+48.6'	138.2°	63°51.7'	+49.5'	139.5°	63°05.6'	+50.4'	140.8°	12
13	68°10.6'	+42.5'	130.0°	67°31.3'	+44.0'	131.8°	66°50.6'	+45.4'	133.6°	66°08.6'	+46.6'	135.2°	65°25.5'	+47.8'	136.8°	64°41.2'	+48.8'	138.2°	63°56.0'	+49.7'	139.6°	13
14	68°53.1'	+41.1'	128.0°	68°15.3'	+42.8'	130.0°	67°36.0'	+44.3'	131.9°	66°55.2'	+45.6'	133.6°	66°13.2'	+46.9'	135.3°	65°30.0'	+48.0'	136.8°	64°45.7'	+49.0'	138.3°	14
15	69°34.2'	+39.6'	126.0°	68°58.1'	+41.4'	128.1°	68°20.2'	+43.0'	130.1°	67°40.9'	+44.5'	132.0°	67°00.1'	+45.9'	133.7°	66°18.0'	+47.1'	135.4°	65°34.7'	+48.2'	136.9°	15
16	70°13.8'	+37.9'	123.8°	69°39.5'	+39.9'	126.1°	69°03.3'	+41.6'	128.2°	68°25.4'	+43.3'	130.2°	67°45.9'	+44.8'	132.0°	67°05.1'	+46.1'	133.8°	66°22.9'	+47.3'	135.5°	16
17	70°51.7'	+36.0'	121.5°	70°19.3'	+38.2'	123.9°	69°44.9'	+40.1'	126.1°	69°08.6'	+41.9'	128.2°	68°30.7'	+43.5'	130.2°	67°51.2'	+45.0'	132.1°	67°10.2'	+46.3'	133.9°	17
18	71°27.7'	+34.0'	119.0°	70°57.5'	+36.3'	121.5°	70°25.0'	+38.4'	123.9°	69°50.6'	+40.4'	126.2°	69°14.2'	+42.2'	128.3°	68°36.2'	+43.8'	130.3°	67°56.6'	+45.3'	132.2°	18
19	72°01.7'	+31.7'	116.4°	71°33.8'	+34.2'	119.1°	71°03.5'	+36.6'	121.6°	70°31.0'	+38.7'	124.0°	69°56.4'	+40.7'	126.3°	69°20.0'	+42.5'	128.4°	68°41.8'	+44.1'	130.5°	19
20	72°33.4'	+29.2'	113.6°	72°08.0'	+32.0'	116.4°	71°40.1'	+34.5'	119.1°	71°09.7'	+36.9'	121.7°	70°37.1'	+39.0'	124.1°	70°						

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

18° 342° LHA

Latitude SAME as 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°06.7'	+51.7'	145.3°	56°17.1'	+52.2'	146.2°	55°27.0'	+52.7'	147.0°	54°36.5'	+53.2'	147.8°	53°45.6'	+53.6'	148.5°	52°54.2'	+54.0'	149.2°	52°02.5'	+54.4'	149.8°	0
1	57°58.4'	+51.2'	144.4°	57°09.3'	+51.8'	145.3°	56°19.8'	+52.4'	146.1°	55°29.7'	+52.9'	146.9°	54°39.2'	+53.3'	147.7°	53°48.3'	+53.8'	148.5°	52°56.9'	+54.2'	149.1°	1
2	58°49.6'	+50.7'	143.4°	58°01.2'	+51.4'	144.3°	57°12.1'	+52.0'	145.2°	56°22.6'	+52.5'	146.1°	55°32.5'	+53.0'	146.9°	54°42.0'	+53.5'	147.7°	53°51.1'	+53.9'	148.4°	2
3	59°40.3'	+50.2'	142.3°	58°52.5'	+50.9'	143.3°	58°04.1'	+51.5'	144.3°	57°15.1'	+52.1'	145.2°	56°25.5'	+52.7'	146.1°	55°35.5'	+53.2'	146.9°	54°45.0'	+53.6'	147.7°	3
4	60°30.6'	+49.6'	141.2°	59°43.4'	+50.4'	142.3°	58°55.6'	+51.1'	143.3°	58°07.2'	+51.7'	144.3°	57°18.2'	+52.3'	145.2°	56°28.7'	+52.8'	146.1°	55°38.6'	+53.3'	146.9°	4
5	61°20.2'	+49.0'	140.1°	60°33.8'	+49.8'	141.2°	59°46.7'	+50.6'	142.3°	58°58.9'	+51.2'	143.3°	58°10.5'	+51.9'	144.3°	57°21.5'	+52.4'	145.2°	56°31.9'	+53.0'	146.1°	5
6	62°09.2'	+48.4'	138.9°	61°23.6'	+49.2'	140.1°	60°37.2'	+50.0'	141.2°	59°50.1'	+50.7'	142.3°	59°02.3'	+51.4'	143.3°	58°13.9'	+52.0'	144.3°	57°24.9'	+52.6'	145.2°	6
7	62°57.6'	+47.6'	137.6°	62°12.8'	+48.5'	138.9°	61°27.2'	+49.4'	140.1°	60°40.8'	+50.2'	141.2°	59°53.7'	+50.9'	142.3°	59°05.9'	+51.6'	143.3°	58°17.5'	+52.2'	144.3°	7
8	63°45.2'	+46.8'	136.2°	63°01.4'	+47.8'	137.6°	62°16.6'	+48.7'	138.9°	61°31.0'	+49.6'	140.1°	60°44.6'	+50.4'	141.2°	59°57.5'	+51.1'	142.3°	59°09.7'	+51.7'	143.3°	8
9	64°32.0'	+45.9'	134.8°	63°49.2'	+47.0'	136.2°	63°05.4'	+48.0'	137.6°	62°20.6'	+48.9'	138.9°	61°35.0'	+49.8'	140.1°	60°48.6'	+50.6'	141.3°	60°01.4'	+51.3'	142.3°	9
10	65°17.9'	+44.9'	133.3°	64°36.2'	+46.1'	134.8°	63°53.4'	+47.2'	136.3°	63°09.6'	+48.2'	137.6°	62°24.8'	+49.1'	138.9°	61°39.1'	+50.0'	140.1°	60°52.7'	+50.7'	141.3°	10
11	66°02.9'	+43.9'	131.7°	65°22.3'	+45.2'	133.3°	64°40.6'	+46.4'	134.8°	63°57.8'	+47.4'	136.3°	63°13.9'	+48.4'	137.7°	62°29.1'	+49.3'	139.0°	61°43.4'	+50.2'	140.2°	11
12	66°46.7'	+42.7'	129.9°	66°07.5'	+44.1'	131.7°	65°27.0'	+45.4'	133.3°	64°45.2'	+46.6'	134.9°	64°02.3'	+47.7'	136.3°	63°18.4'	+48.6'	137.7°	62°33.6'	+49.6'	139.0°	12
13	67°29.5'	+41.4'	128.1°	66°51.6'	+43.0'	130.0°	66°12.4'	+44.4'	131.7°	65°31.8'	+45.6'	133.4°	64°50.0'	+46.8'	134.9°	64°07.1'	+47.9'	136.4°	63°23.2'	+48.9'	137.8°	13
14	68°10.9'	+40.0'	126.2°	67°34.6'	+41.7'	128.2°	66°56.7'	+43.2'	130.0°	66°17.4'	+44.6'	131.8°	65°36.8'	+45.9'	133.4°	64°55.0'	+47.1'	135.0°	64°12.0'	+48.1'	136.5°	14
15	68°50.9'	+38.5'	124.2°	68°16.3'	+40.3'	126.3°	67°40.0'	+41.9'	128.2°	67°02.1'	+43.5'	130.1°	66°22.7'	+44.9'	131.8°	65°42.0'	+46.1'	133.5°	65°00.1'	+47.3'	135.1°	15
16	69°29.4'	+36.8'	122.0°	68°56.6'	+38.7'	124.2°	68°21.9'	+40.6'	126.3°	67°45.5'	+42.2'	128.3°	67°07.6'	+43.7'	130.2°	66°28.2'	+45.1'	131.9°	65°47.4'	+46.4'	133.6°	16
17	70°06.1'	+34.9'	119.7°	69°35.3'	+37.0'	122.1°	69°02.5'	+39.0'	124.3°	68°27.7'	+40.8'	126.4°	67°51.3'	+42.5'	128.4°	67°13.3'	+44.0'	130.2°	66°33.8'	+45.4'	132.0°	17
18	70°41.0'	+32.9'	117.3°	70°12.4'	+35.2'	119.8°	69°41.5'	+37.3'	122.1°	69°08.6'	+39.3'	124.4°	68°33.8'	+41.1'	126.5°	67°57.3'	+42.8'	128.5°	67°19.2'	+44.3'	130.3°	18
19	71°13.9'	+30.7'	114.8°	70°47.5'	+33.2'	117.4°	70°18.8'	+35.5'	119.8°	69°47.9'	+37.6'	122.2°	69°14.9'	+39.6'	124.4°	68°40.0'	+41.4'	126.6°	68°03.5'	+43.0'	128.6°	19
20	71°44.6'	+28.2'	112.0°	71°20.7'	+31.0'	114.8°	70°54.3'	+33.5'	117.4°	70°25.5'	+35.8'	119.9°	69°54.5'	+37.9'	122.3°	69°21.4'	+39.9'	124.5°	68°46.5'	+41.7'	126.7°	20
21	72°12.8'	+25.6'	109.2°	71°51.7'	+28.5'	112.1°	71°27.8'	+31.3'	114.8°	71°01.3'	+33.8'	117.5°	70°32.4'	+36.1'	120.0°	70°01.3'	+38.2'	122.4°	69°28.2'	+40.2'	124.7°	21
22	72°38.5'	+22.8'	106.2°	72°20.2'	+25.9'	109.2°	71°59.0'	+28.8'	112.1°	71°35.1'	+31.6'	114.9°	71°08.5'	+34.1'	117.6°	70°39.6'	+36.4'	120.1°	70°08.4'	+38.6'	122.5°	22
23	73°01.3'	+19.8'	103.1°	72°46.1'	+23.1'	106.2°	72°27.9'	+26.2'	109.3°	72°06.6'	+29.1'	112.2°	71°42.6'	+31.9'	115.0°	71°16.0'	+34.4'	117.7°	70°47.0'	+36.7'	120.2°	23
Dec°	28			29			30			31			32			33			34			Dec°

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

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°36.0'	+50.9'	143.7°	55°47.3'	+51.5'	144.6°	54°58.1'	+52.1'	145.4°	54°08.5'	+52.6'	146.2°	53°18.4'	+53.1'	147.0°	52°27.9'	+53.5'	147.7°	51°37.0'	+53.9'	148.4°	0
1	57°26.9'	+50.5'	142.8°	56°38.9'	+51.1'	143.7°	55°50.2'	+51.7'	144.6°	55°01.1'	+52.2'	145.4°	54°11.5'	+52.7'	146.2°	53°21.4'	+53.2'	146.9°	52°30.9'	+53.6'	147.7°	1
2	58°17.4'	+50.0'	141.8°	57°30.0'	+50.6'	142.7°	56°41.9'	+51.3'	143.7°	55°53.3'	+51.8'	144.5°	55°04.2'	+52.4'	145.4°	54°14.6'	+52.9'	146.2°	53°24.5'	+53.3'	146.9°	2
3	59°07.4'	+49.4'	140.7°	58°20.6'	+50.1'	141.7°	57°33.2'	+50.8'	142.7°	56°45.2'	+51.4'	143.6°	55°56.6'	+52.0'	144.5°	55°07.5'	+52.5'	145.3°	54°17.9'	+53.0'	146.1°	3
4	59°56.8'	+48.8'	139.6°	59°10.7'	+49.6'	140.7°	58°24.0'	+50.3'	141.7°	57°36.6'	+51.0'	142.7°	56°48.6'	+51.6'	143.6°	56°00.0'	+52.2'	144.5°	55°10.9'	+52.7'	145.3°	4
5	60°45.6'	+48.2'	138.4°	60°00.3'	+49.0'	139.6°	59°14.3'	+49.8'	140.6°	58°27.6'	+50.5'	141.7°	57°40.2'	+51.2'	142.7°	56°52.2'	+51.8'	143.6°	56°03.6'	+52.3'	144.5°	5
6	61°33.8'	+47.5'	137.2°	60°49.4'	+48.4'	138.4°	60°04.1'	+49.2'	139.5°	59°18.1'	+50.0'	140.6°	58°31.3'	+50.7'	141.7°	57°44.0'	+51.3'	142.7°	56°55.9'	+51.9'	143.6°	6
7	62°21.3'	+46.7'	135.9°	61°37.7'	+47.7'	137.2°	60°53.3'	+48.6'	138.4°	60°08.1'	+49.4'	139.5°	59°22.0'	+50.2'	140.6°	58°35.3'	+50.9'	141.7°	57°47.9'	+51.5'	142.7°	7
8	63°08.0'	+45.9'	134.5°	62°25.4'	+46.9'	135.9°	61°41.9'	+47.9'	137.2°	60°57.4'	+48.8'	138.4°	60°12.2'	+49.6'	139.5°	59°26.2'	+50.4'	140.7°	58°39.4'	+51.1'	141.7°	8
9	63°53.8'	+45.0'	133.0°	63°12.3'	+46.1'	134.5°	62°29.8'	+47.1'	135.9°	61°46.2'	+48.1'	137.2°	61°01.8'	+49.0'	138.4°	60°16.5'	+49.8'	139.6°	59°30.5'	+50.5'	140.7°	9
10	64°38.8'	+44.0'	131.5°	63°58.4'	+45.2'	133.1°	63°16.9'	+46.3'	134.5°	62°34.3'	+47.4'	135.9°	61°50.8'	+48.3'	137.2°	61°06.3'	+49.2'	138.4°	60°21.0'	+50.0'	139.6°	10
11	65°22.7'	+42.9'	129.9°	64°43.6'	+44.2'	131.5°	64°03.2'	+45.4'	133.1°	63°21.7'	+46.5'	134.5°	62°39.1'	+47.6'	135.9°	61°55.5'	+48.5'	137.2°	61°11.0'	+49.4'	138.5°	11
12	66°05.6'	+41.7'	128.2°	65°27.8'	+43.1'	129.9°	64°48.6'	+44.4'	131.6°	64°08.2'	+45.7'	133.1°	63°26.7'	+46.8'	134.6°	62°44.0'	+47.8'	136.0°	62°00.4'	+48.8'	137.3°	12
13	66°47.3'	+40.4'	126.4°	66°10.9'	+41.9'	128.2°	65°33.1'	+43.4'	130.0°	64°53.9'	+44.7'	131.6°	64°13.4'	+45.9'	133.2°	63°31.8'	+47.0'	134.6°	62°49.2'	+48.0'	136.0°	13
14	67°27.7'	+39.0'	124.5°	66°52.9'	+40.6'	126.4°	66°16.4'	+42.2'	128.3°	65°38.6'	+43.6'	130.0°	64°59.3'	+44.9'	131.7°	64°18.8'	+46.2'	133.2°	63°37.2'	+47.3'	134.7°	14
15	68°06.6'	+37.4'	122.5°	67°33.5'	+39.2'	124.5°	66°58.6'	+40.9'	126.5°	66°22.2'	+42.5'	128.3°	65°44.3'	+43.9'	130.1°	65°05.0'	+45.2'	131.7°	64°24.5'	+46.4'	133.3°	15
16	68°44.0'	+35.7'	120.4°	68°12.7'	+37.7'	122.5°	67°39.6'	+39.5'	124.6°	67°04.7'	+41.2'	126.5°	66°28.2'	+42.7'	128.4°	65°50.2'	+44.2'	130.1°	65°10.9'	+45.5'	131.8°	16
17	69°19.8'	+33.9'	118.1°	68°50.4'	+36.0'	120.4°	68°19.1'	+38.0'	122.6°	67°45.9'	+39.8'	124.6°	67°10.9'	+41.5'	126.6°	66°34.4'	+43.0'	128.5°	65°56.3'	+44.4'	130.2°	17
18	69°53.6'	+31.9'	115.7°	69°26.4'	+34.2'	118.2°	68°57.1'	+36.3'	120.4°	68°25.7'	+38.3'	122.6°	67°52.4'	+40.1'	124.7°	67°17.4'	+41.8'	126.7°	66°40.8'	+43.3'	128.5°	18
19	70°25.5'	+29.7'	113.2°	70°00.6'	+32.2'	115.8°	69°33.4'	+34.5'	118.2°	69°04.0'	+36.6'	120.5°	68°32.5'	+38.6'	122.7°	67°59.2'	+40.4'	124.8°	67°24.1'	+42.1'	126.8°	19
20	70°55.2'	+27.4'	110.6°	70°32.8'	+30.0'	113.3°	70°07.8'	+32.5'	115.8°	69°40.6'	+34.8'	118.3°	69°11.1'	+36.9'	120.6°	68°39.6'	+38.9'	122.8°	68°06.1'	+40.7'	124.9°	20
21	71°22.6'	+24.8'	107.9°	71°02.8'	+27.7'	110.6°	70°40.3'	+30.3'	113.3°	70°15.3'	+32.8'	115.9°	69°48									

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°04.1'	+50.2'	142.2°	55°16.4'	+50.8'	143.1°	54°28.1'	+51.4'	143.9°	53°39.4'	+52.0'	144.8°	52°50.1'	+52.5'	145.5°	52°00.5'	+52.9'	146.2°	51°10.4'	+53.4'	146.9°	0
1	56°54.3'	+49.7'	141.2°	56°07.2'	+50.4'	142.2°	55°19.5'	+51.0'	143.1°	54°31.3'	+51.6'	143.9°	53°42.6'	+52.1'	144.7°	52°53.4'	+52.6'	145.5°	52°03.7'	+53.1'	146.2°	1
2	57°44.0'	+49.2'	140.2°	56°57.6'	+49.9'	141.2°	56°10.6'	+50.6'	142.1°	55°22.9'	+51.2'	143.0°	54°34.7'	+51.8'	143.9°	53°46.0'	+52.3'	144.7°	52°56.8'	+52.8'	145.4°	2
3	58°33.2'	+48.6'	139.1°	57°47.5'	+49.4'	140.1°	57°01.1'	+50.1'	141.1°	56°14.1'	+50.8'	142.1°	55°26.5'	+51.4'	143.0°	54°38.3'	+51.9'	143.8°	53°49.6'	+52.5'	144.6°	3
4	59°21.9'	+48.0'	138.0°	58°36.9'	+48.8'	139.1°	57°51.2'	+49.6'	140.1°	57°04.9'	+50.3'	141.1°	56°17.8'	+50.9'	142.1°	55°30.2'	+51.5'	143.0°	54°42.1'	+52.1'	143.8°	4
5	60°09.9'	+47.3'	136.8°	59°25.7'	+48.2'	137.9°	58°40.8'	+49.0'	139.0°	57°55.1'	+49.8'	140.1°	57°08.8'	+50.5'	141.1°	56°21.8'	+51.1'	142.0°	55°34.2'	+51.7'	142.9°	5
6	60°57.2'	+46.6'	135.5°	60°14.0'	+47.5'	136.8°	59°29.8'	+48.4'	137.9°	58°44.9'	+49.2'	139.0°	57°59.2'	+50.0'	140.1°	57°12.9'	+50.7'	141.1°	56°25.9'	+51.3'	142.1°	6
7	61°43.8'	+45.8'	134.2°	61°01.5'	+46.8'	135.5°	60°18.2'	+47.8'	136.7°	59°34.1'	+48.6'	137.9°	58°49.2'	+49.4'	139.0°	58°03.5'	+50.2'	140.1°	57°17.2'	+50.8'	141.1°	7
8	62°29.6'	+45.0'	132.8°	61°48.3'	+46.0'	134.2°	61°06.0'	+47.0'	135.5°	60°22.7'	+48.0'	136.7°	59°38.6'	+48.8'	137.9°	58°53.7'	+49.6'	139.0°	58°08.0'	+50.4'	140.1°	8
9	63°14.6'	+44.0'	131.4°	62°34.4'	+45.2'	132.8°	61°53.0'	+46.3'	134.2°	61°10.7'	+47.3'	135.5°	60°27.5'	+48.2'	136.8°	59°43.3'	+49.0'	137.9°	58°58.4'	+49.8'	139.1°	9
10	63°58.6'	+43.0'	129.9°	63°19.5'	+44.3'	131.4°	62°39.3'	+45.4'	132.8°	61°58.0'	+46.5'	134.2°	61°15.6'	+47.5'	135.5°	60°32.4'	+48.4'	136.8°	59°48.2'	+49.3'	138.0°	10
11	64°41.6'	+41.9'	128.2°	64°03.8'	+43.3'	129.9°	63°24.7'	+44.5'	131.4°	62°44.5'	+45.7'	132.9°	62°03.1'	+46.7'	134.2°	61°20.8'	+47.7'	135.6°	60°37.5'	+48.6'	136.8°	11
12	65°23.5'	+40.7'	126.5°	64°47.1'	+42.2'	128.3°	64°09.2'	+43.5'	129.9°	63°30.2'	+44.8'	131.4°	62°49.9'	+45.9'	132.9°	62°08.5'	+47.0'	134.3°	61°26.1'	+48.0'	135.6°	12
13	66°04.2'	+39.4'	124.8°	65°29.2'	+41.0'	126.6°	64°52.8'	+42.4'	128.3°	64°14.9'	+43.8'	129.9°	63°35.8'	+45.0'	131.5°	62°55.5'	+46.2'	132.9°	62°14.1'	+47.2'	134.3°	13
14	66°43.6'	+38.0'	122.9°	66°10.2'	+39.7'	124.8°	65°35.2'	+41.2'	126.6°	64°58.7'	+42.7'	128.3°	64°20.8'	+44.0'	130.0°	63°41.7'	+45.3'	131.5°	63°01.3'	+46.4'	133.0°	14
15	67°21.6'	+36.4'	120.9°	66°49.8'	+38.2'	122.9°	66°16.4'	+39.9'	124.8°	65°41.4'	+41.5'	126.6°	65°04.9'	+43.0'	128.4°	64°26.9'	+44.3'	130.0°	63°47.7'	+45.5'	131.6°	15
16	67°58.0'	+34.7'	118.8°	67°28.1'	+36.7'	120.9°	66°56.4'	+38.5'	122.9°	66°22.9'	+40.2'	124.9°	65°47.8'	+41.8'	126.7°	65°11.3'	+43.3'	128.4°	64°33.3'	+44.6'	130.1°	16
17	68°32.7'	+32.9'	116.6°	68°04.8'	+35.0'	118.8°	67°34.9'	+37.0'	120.9°	67°03.1'	+38.8'	123.0°	66°29.6'	+40.5'	124.9°	65°54.5'	+42.1'	126.7°	65°17.9'	+43.5'	128.5°	17
18	69°05.6'	+31.0'	114.3°	68°39.8'	+33.2'	116.6°	68°11.9'	+35.3'	118.9°	67°42.0'	+37.3'	121.0°	67°10.2'	+39.1'	123.0°	66°36.6'	+40.8'	125.0°	66°01.4'	+42.4'	126.8°	18
19	69°36.6'	+28.8'	111.8°	69°13.1'	+31.3'	114.3°	68°47.3'	+33.5'	116.7°	68°19.3'	+35.7'	118.9°	67°49.3'	+37.6'	121.1°	67°17.4'	+39.4'	123.1°	66°43.8'	+41.1'	125.1°	19
20	70°05.4'	+26.6'	109.3°	69°44.3'	+29.1'	111.9°	69°20.8'	+31.6'	114.3°	68°54.9'	+33.8'	116.7°	68°26.9'	+36.0'	119.0°	67°56.9'	+37.9'	121.1°	67°24.9'	+39.8'	123.2°	20
21	70°32.0'	+24.1'	106.6°	70°13.5'	+26.9'	109.3°	69°52.4'	+29.5'	111.9°	69°28.8'	+31.9'	114.4°	69°02.9'	+34.2'	116.8°	68°34.8'	+36.3'	119.0°	68°04.7'	+38.3'	121.2°	21
22	70°56.1'	+21.5'	103.9°	70°40.3'	+24.4'	106.6°	70°21.8'	+27.2'	109.3°	70°00.7'	+29.8'	111.9°	69°37.0'	+32.2'	114.4°	69°11.1'	+34.5'	116.8°	68°42.9'	+36.6'	119.1°	22
23	71°17.7'	+18.8'	101.0°	71°04.8'	+21.8'	103.8°	70°49.0'	+24.7'	106.6°	70°30.4'	+27.5'	109.4°	70°09.3'	+30.1'	112.0°	69°45.6'	+32.5'	114.5°	69°19.6'	+34.8'	116.9°	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°31.1'	+49.5'	140.7°	54°44.3'	+50.2'	141.6°	53°57.0'	+50.8'	142.5°	53°09.2'	+51.3'	143.3°	52°20.8'	+51.9'	144.1°	51°32.0'	+52.4'	144.8°	50°42.7'	+52.8'	145.5°	0
1	56°20.6'	+49.0'	139.7°	55°34.5'	+49.7'	140.7°	54°47.8'	+50.3'	141.6°	54°00.5'	+50.9'	142.4°	53°12.7'	+51.5'	143.3°	52°24.4'	+52.0'	144.0°	51°35.6'	+52.5'	144.8°	1
2	57°09.6'	+48.4'	138.7°	56°24.2'	+49.2'	139.7°	55°38.1'	+49.9'	140.6°	54°51.4'	+50.5'	141.5°	54°04.2'	+51.1'	142.4°	53°16.4'	+51.7'	143.2°	52°28.1'	+52.2'	144.0°	2
3	57°58.0'	+47.8'	137.6°	57°13.4'	+48.6'	138.6°	56°28.0'	+49.4'	139.6°	55°42.0'	+50.1'	140.6°	54°55.3'	+50.7'	141.5°	54°08.1'	+51.3'	142.4°	53°20.3'	+51.9'	143.2°	3
4	58°45.9'	+47.2'	136.4°	58°02.0'	+48.1'	137.5°	57°17.4'	+48.8'	138.6°	56°32.0'	+49.6'	139.6°	55°46.0'	+50.3'	140.5°	54°59.4'	+50.9'	141.5°	54°12.2'	+51.5'	142.3°	4
5	59°33.1'	+46.5'	135.2°	58°50.1'	+47.4'	136.4°	58°06.2'	+48.3'	137.5°	57°21.6'	+49.0'	138.6°	56°36.3'	+49.8'	139.6°	55°50.3'	+50.5'	140.5°	55°03.7'	+51.1'	141.4°	5
6	60°19.6'	+45.8'	134.0°	59°37.5'	+46.7'	135.2°	58°54.5'	+47.6'	136.4°	58°10.7'	+48.5'	137.5°	57°26.1'	+49.3'	138.5°	56°40.7'	+50.0'	139.5°	55°54.8'	+50.7'	140.5°	6
7	61°05.3'	+44.9'	132.6°	60°24.2'	+46.0'	133.9°	59°42.1'	+47.0'	135.2°	58°59.1'	+47.9'	136.3°	58°15.3'	+48.7'	137.5°	57°30.7'	+49.5'	138.5°	56°45.4'	+50.2'	139.5°	7
8	61°50.3'	+44.1'	131.2°	61°10.2'	+45.2'	132.6°	60°29.1'	+46.2'	133.9°	59°47.0'	+47.2'	135.2°	59°04.0'	+48.1'	136.3°	58°20.2'	+48.9'	137.5°	57°35.6'	+49.7'	138.5°	8
9	62°34.4'	+43.1'	129.8°	61°55.4'	+44.3'	131.2°	61°15.3'	+45.4'	132.6°	60°34.2'	+46.5'	133.9°	59°52.1'	+47.4'	135.2°	59°09.1'	+48.3'	136.3°	58°25.3'	+49.1'	137.5°	9
10	63°17.5'	+42.1'	128.3°	62°39.7'	+43.4'	129.8°	62°00.7'	+44.6'	131.2°	61°20.6'	+45.7'	132.6°	60°39.5'	+46.7'	133.9°	59°57.4'	+47.7'	135.2°	59°14.4'	+48.5'	136.4°	10
11	63°59.6'	+41.0'	126.7°	63°23.1'	+42.3'	128.3°	62°45.3'	+43.6'	129.8°	62°06.3'	+44.8'	131.2°	61°26.2'	+45.9'	132.6°	60°45.1'	+46.9'	133.9°	60°02.9'	+47.9'	135.2°	11
12	64°40.5'	+39.8'	125.0°	64°05.4'	+41.2'	126.7°	63°28.9'	+42.6'	128.3°	62°51.1'	+43.9'	129.8°	62°12.1'	+45.1'	131.3°	61°32.0'	+46.2'	132.7°	60°50.8'	+47.2'	134.0°	12
13	65°20.3'	+38.4'	123.2°	64°46.6'	+40.0'	125.0°	64°11.5'	+41.5'	126.7°	63°35.0'	+42.9'	128.3°	62°57.2'	+44.2'	129.8°	62°18.2'	+45.3'	131.3°	61°38.0'	+46.4'	132.7°	13
14	65°58.7'	+37.0'	121.3°	65°26.7'	+38.7'	123.2°	64°53.0'	+40.3'	125.0°	64°17.9'	+41.8'	126.7°	63°41.4'	+43.2'	128.3°	63°03.5'	+44.4'	129.9°	62°24.4'	+45.6'	131.3°	14
15	66°35.7'	+35.5'	119.4°	66°05.4'	+37.3'	121.3°	65°33.3'	+39.0'	123.2°	64°59.7'	+40.6'	125.0°	64°24.5'	+42.1'	126.7°	63°47.9'	+43.4'	128.4°	63°10.1'	+44.7'	129.9°	15
16	67°11.2'	+33.8'	117.3°	66°42.7'	+35.8'	119.4°	66°12.4'	+37.6'	121.4°	65°40.3'	+39.3'	123.3°	65°06.6'	+40.9'	125.1°	64°31.4'	+42.4'	126.8°	63°54.8'	+43.7'	128.4°	16
17	67°45.0'	+32.0'	115.2°	67°18.5'	+34.1'	117.3°	66°50.0'	+36.1'	119.4°	66°19.6'	+37.9'	121.4°	65°47.5'	+39.6'	123.3°	65°13.8'	+41.2'	125.1°	64°38.5'	+42.7'	126.9°	17
18	68°17.1'	+30.1'	112.9°	67°52.6'	+32.3'	115.2°	67°26.1'	+34.4'	117.4°	66°57.5'	+36.4'	119.4°	66°27.1'	+38.2'	121.4°	65°55.0'	+39.9'	123.4°	65°21.2'	+41.5'	125.2°	18
19	68°47.2'	+28.1'	110.5°	68°25.0'	+30.4'	112.9°	68°00.5'	+32.7'	115.2°	67°33.9'	+34.8'	117.4°	67°05.4'	+36.7'	119.5°	66°34.9'	+38.5'	121.5°	66°02.7'	+40.2'	123.4°	19
20	69°15.2'	+25.8'	108.1°	68°55.4'	+28.4'	110.5°	68°33.2'	+30.7'	112.9°	68°08.7'	+33.0'	115.2°	67°42.1'	+35.1'	117.4°	67°						

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°57.0'	+48.8'	139.3°	54°11.2'	+49.5'	140.2°	53°24.8'	+50.1'	141.1°	52°37.9'	+50.7'	141.9°	51°50.4'	+51.3'	142.7°	51°02.5'	+51.8'	143.4°	50°14.1'	+52.3'	144.2°	0
1	55°45.8'	+48.3'	138.3°	55°00.7'	+49.0'	139.2°	54°15.0'	+49.7'	140.1°	53°28.6'	+50.3'	141.0°	52°41.7'	+50.9'	141.8°	51°54.3'	+51.5'	142.6°	51°06.4'	+52.0'	143.4°	1
2	56°34.1'	+47.7'	137.2°	55°49.7'	+48.5'	138.2°	55°04.6'	+49.2'	139.2°	54°18.9'	+49.9'	140.1°	53°32.6'	+50.5'	140.9°	52°45.8'	+51.1'	141.8°	51°58.4'	+51.6'	142.6°	2
3	57°21.8'	+47.1'	136.1°	56°38.2'	+47.9'	137.1°	55°53.8'	+48.7'	138.1°	55°08.8'	+49.4'	139.1°	54°23.1'	+50.1'	140.0°	53°36.8'	+50.7'	140.9°	52°50.0'	+51.3'	141.7°	3
4	58°08.8'	+46.4'	134.9°	57°26.1'	+47.3'	136.0°	56°42.5'	+48.1'	137.1°	55°58.2'	+48.9'	138.1°	55°13.2'	+49.6'	139.1°	54°27.5'	+50.3'	140.0°	53°41.3'	+50.9'	140.9°	4
5	58°55.3'	+45.7'	133.7°	58°13.4'	+46.6'	134.9°	57°30.6'	+47.5'	136.0°	56°47.1'	+48.3'	137.1°	56°02.8'	+49.1'	138.1°	55°17.8'	+49.8'	139.0°	54°32.2'	+50.5'	140.0°	5
6	59°41.0'	+44.9'	132.4°	59°00.0'	+45.9'	133.7°	58°18.1'	+46.9'	134.8°	57°35.4'	+47.7'	136.0°	56°51.9'	+48.5'	137.0°	56°07.6'	+49.3'	138.1°	55°22.6'	+50.0'	139.0°	6
7	60°25.9'	+44.1'	131.1°	59°45.9'	+45.2'	132.4°	59°05.0'	+46.2'	133.6°	58°23.1'	+47.1'	134.8°	57°40.4'	+48.0'	135.9°	56°56.9'	+48.8'	137.0°	56°12.6'	+49.5'	138.0°	7
8	61°10.0'	+43.2'	129.7°	60°31.1'	+44.4'	131.1°	59°51.2'	+45.4'	132.4°	59°10.2'	+46.4'	133.6°	58°28.4'	+47.3'	134.8°	57°45.7'	+48.2'	135.9°	57°02.2'	+49.0'	137.0°	8
9	61°53.2'	+42.2'	128.3°	61°15.5'	+43.5'	129.7°	60°36.6'	+44.6'	131.1°	59°56.6'	+45.7'	132.4°	59°15.7'	+46.7'	133.6°	58°33.9'	+47.6'	134.8°	57°51.2'	+48.4'	135.9°	9
10	62°35.4'	+41.2'	126.7°	61°58.9'	+42.5'	128.2°	61°21.2'	+43.7'	129.7°	60°42.3'	+44.9'	131.1°	60°02.4'	+45.9'	132.4°	59°21.4'	+46.9'	133.6°	58°39.6'	+47.8'	134.8°	10
11	63°16.6'	+40.1'	125.1°	62°41.4'	+41.5'	126.7°	62°04.9'	+42.8'	128.2°	61°27.2'	+44.0'	129.7°	60°48.3'	+45.1'	131.1°	60°08.3'	+46.2'	132.4°	59°27.4'	+47.2'	133.6°	11
12	63°56.7'	+38.9'	123.5°	63°22.9'	+40.4'	125.1°	62°47.7'	+41.7'	126.7°	62°11.2'	+43.1'	128.3°	61°33.4'	+44.3'	129.7°	60°54.5'	+45.4'	131.1°	60°14.6'	+46.4'	132.4°	12
13	64°35.6'	+37.5'	121.7°	64°03.2'	+39.1'	123.5°	63°29.4'	+40.6'	125.1°	62°54.2'	+42.0'	126.7°	62°17.7'	+43.3'	128.3°	61°39.9'	+44.5'	129.7°	61°01.0'	+45.7'	131.1°	13
14	65°13.1'	+36.1'	119.9°	64°42.4'	+37.8'	121.7°	64°10.1'	+39.4'	123.5°	63°36.2'	+40.9'	125.2°	63°01.0'	+42.3'	126.8°	62°24.4'	+43.6'	128.3°	61°46.7'	+44.8'	129.8°	14
15	65°49.2'	+34.6'	117.9°	65°20.2'	+36.4'	119.9°	64°49.5'	+38.1'	121.7°	64°17.2'	+39.7'	123.5°	63°43.3'	+41.2'	125.2°	63°08.1'	+42.6'	126.8°	62°31.5'	+43.9'	128.3°	15
16	66°23.9'	+33.0'	115.9°	65°56.7'	+34.9'	117.9°	65°27.7'	+36.7'	119.9°	64°56.9'	+38.5'	121.7°	64°24.6'	+40.0'	123.5°	63°50.7'	+41.5'	125.2°	63°15.4'	+42.9'	126.9°	16
17	66°56.8'	+31.2'	113.8°	66°31.6'	+33.3'	115.9°	66°04.4'	+35.2'	118.0°	65°35.4'	+37.1'	119.9°	65°04.6'	+38.8'	121.8°	64°32.2'	+40.4'	123.6°	63°58.3'	+41.8'	125.3°	17
18	67°28.0'	+29.3'	111.6°	67°04.9'	+31.5'	113.8°	66°39.6'	+33.6'	115.9°	66°12.4'	+35.6'	118.0°	65°43.4'	+37.4'	119.9°	65°12.6'	+39.1'	121.8°	64°40.1'	+40.7'	123.6°	18
19	67°57.4'	+27.3'	109.3°	67°36.4'	+29.7'	111.6°	67°13.2'	+31.9'	113.8°	66°48.0'	+33.9'	116.0°	66°20.7'	+35.9'	118.0°	65°51.6'	+37.7'	120.0°	65°20.8'	+39.4'	121.9°	19
20	68°24.7'	+25.2'	106.9°	68°06.1'	+27.6'	109.3°	67°45.1'	+30.0'	111.6°	67°21.9'	+32.2'	113.8°	66°56.6'	+34.3'	116.0°	66°29.3'	+36.2'	118.1°	66°00.2'	+38.0'	120.1°	20
21	68°49.9'	+22.9'	104.4°	68°33.7'	+25.5'	106.9°	68°15.1'	+28.0'	109.3°	67°54.1'	+30.3'	111.6°	67°30.9'	+32.5'	113.9°	67°05.6'	+34.6'	116.0°	66°38.2'	+36.5'	118.1°	21
22	69°12.8'	+20.5'	101.8°	68°59.2'	+23.2'	104.4°	68°43.0'	+25.8'	106.9°	68°24.4'	+28.3'	109.3°	68°03.4'	+30.6'	111.7°	67°40.1'	+32.9'	113.9°	67°14.8'	+34.9'	116.1°	22
23	69°33.3'	+18.0'	99.2°	69°22.4'	+20.8'	101.8°	69°08.8'	+23.5'	104.4°	68°52.7'	+26.1'	106.9°	68°34.0'	+28.6'	109.3°	68°13.0'	+31.0'	111.7°	67°49.7'	+33.2'	114.0°	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°22.0'	+48.1'	137.9°	53°37.1'	+48.8'	138.8°	52°51.7'	+49.5'	139.7°	52°05.7'	+50.1'	140.5°	51°19.1'	+50.7'	141.3°	50°32.0'	+51.2'	142.1°	49°44.5'	+51.8'	142.8°	0
1	55°10.1'	+47.5'	136.8°	54°25.9'	+48.3'	137.8°	53°41.2'	+49.0'	138.7°	52°55.8'	+49.7'	139.6°	52°09.8'	+50.3'	140.4°	51°23.3'	+50.9'	141.2°	50°36.2'	+51.4'	142.0°	1
2	55°57.6'	+46.9'	135.8°	55°14.2'	+47.8'	136.8°	54°30.2'	+48.5'	137.7°	53°45.4'	+49.2'	138.7°	53°00.1'	+49.9'	139.5°	52°14.1'	+50.5'	140.4°	51°27.7'	+51.1'	141.2°	2
3	56°44.5'	+46.3'	134.6°	56°02.0'	+47.2'	135.7°	55°18.7'	+48.0'	136.7°	54°34.7'	+48.7'	137.7°	53°50.0'	+49.4'	138.6°	53°04.6'	+50.1'	139.5°	52°18.7'	+50.7'	140.3°	3
4	57°30.9'	+45.6'	133.5°	56°49.2'	+46.5'	134.6°	56°06.6'	+47.4'	135.6°	55°23.4'	+48.2'	136.7°	54°39.4'	+48.9'	137.6°	53°54.7'	+49.6'	138.6°	53°09.4'	+50.3'	139.5°	4
5	58°16.5'	+44.9'	132.2°	57°35.7'	+45.9'	133.4°	56°54.0'	+46.8'	134.5°	56°11.6'	+47.6'	135.6°	55°28.3'	+48.4'	136.6°	54°44.3'	+49.2'	137.6°	53°59.7'	+49.8'	138.5°	5
6	59°01.4'	+44.1'	131.0°	58°21.6'	+45.2'	132.2°	57°40.8'	+46.1'	133.4°	56°59.2'	+47.0'	134.5°	56°16.7'	+47.9'	135.6°	55°33.5'	+48.6'	136.6°	54°49.5'	+49.4'	137.6°	6
7	59°45.5'	+43.3'	129.6°	59°06.7'	+44.4'	130.9°	58°26.9'	+45.4'	132.2°	57°46.2'	+46.4'	133.3°	57°04.6'	+47.3'	134.5°	56°22.1'	+48.1'	135.6°	55°38.9'	+48.9'	136.6°	7
8	60°28.8'	+42.4'	128.3°	59°51.1'	+43.5'	129.6°	59°12.3'	+44.6'	130.9°	58°32.5'	+45.7'	132.1°	57°51.8'	+46.6'	133.3°	57°10.2'	+47.5'	134.5°	56°27.8'	+48.3'	135.5°	8
9	61°11.2'	+41.4'	126.8°	60°34.6'	+42.6'	128.2°	59°57.0'	+43.8'	129.6°	59°18.2'	+44.9'	130.9°	58°38.4'	+45.9'	132.1°	57°57.7'	+46.9'	133.3°	57°16.1'	+47.7'	134.5°	9
10	61°52.6'	+40.3'	125.3°	61°17.3'	+41.7'	126.8°	60°40.8'	+42.9'	128.2°	60°03.1'	+44.1'	129.6°	59°24.3'	+45.2'	130.9°	58°44.6'	+46.2'	132.1°	58°03.9'	+47.1'	133.3°	10
11	62°32.9'	+39.2'	123.7°	61°59.0'	+40.6'	125.3°	61°23.7'	+42.0'	126.8°	60°47.2'	+43.2'	128.2°	60°09.5'	+44.3'	129.6°	59°30.7'	+45.4'	130.9°	58°51.0'	+46.4'	132.1°	11
12	63°12.1'	+38.0'	122.0°	62°39.6'	+39.5'	123.7°	62°05.6'	+40.9'	125.3°	61°30.4'	+42.2'	126.8°	60°53.8'	+43.5'	128.2°	60°16.2'	+44.6'	129.6°	59°37.4'	+45.7'	130.9°	12
13	63°50.2'	+36.7'	120.3°	63°19.1'	+38.3'	122.0°	62°46.6'	+39.8'	123.7°	62°12.6'	+41.2'	125.3°	61°37.3'	+42.5'	126.8°	61°00.8'	+43.8'	128.2°	60°23.1'	+44.9'	129.6°	13
14	64°26.9'	+35.3'	118.5°	63°57.4'	+37.0'	120.3°	63°26.4'	+38.6'	122.0°	62°53.8'	+40.1'	123.7°	62°19.8'	+41.5'	125.3°	61°44.5'	+42.8'	126.8°	61°08.0'	+44.0'	128.3°	14
15	65°02.1'	+33.8'	116.6°	64°34.4'	+35.6'	118.5°	64°05.0'	+37.3'	120.3°	63°33.9'	+38.9'	122.0°	63°01.4'	+40.4'	123.7°	62°27.4'	+41.8'	125.3°	61°52.1'	+43.1'	126.8°	15
16	65°35.9'	+32.2'	114.6°	65°10.0'	+34.1'	116.6°	64°42.3'	+35.9'	118.5°	64°12.8'	+37.6'	120.3°	63°41.8'	+39.2'	122.0°	63°09.2'	+40.7'	123.7°	62°35.2'	+42.1'	125.3°	16
17	66°08.1'	+30.5'	112.5°	65°44.1'	+32.5'	114.6°	65°18.2'	+34.4'	116.6°	64°50.5'	+36.2'	118.5°	64°21.0'	+38.0'	120.3°	63°49.9'	+39.5'	122.1°	63°17.3'	+41.0'	123.8°	17
18	66°38.6'	+28.6'	110.4°	66°16.6'	+30.8'	112.5°	65°52.6'	+32.8'	114.6°	65°26.7'	+34.8'	116.6°	64°59.0'	+36.6'	118.5°	64°29.5'	+38.3'	120.4°	63°58.3'	+39.9'	122.1°	18
19	67°07.2'	+26.7'	108.2°	66°47.4'	+28.9'	110.4°	66°25.5'	+31.1'	112.5°	66°01.5'	+33.2'	114.6°	65°35.5'	+35.1'	116.6°	65°07.7'	+36.9'	118.5°	64°38.2'	+38.6'	120.4°	19
20	67°33.9'	+24.6'	105.8°	67°16.4'	+27.0'	108.1°	66°56.6'	+29.3'	110.4°	66°34.6'	+31.4'	112.5°	66°10.6'	+33.5'	114.6°	65°4						

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

24° 336° LHA

Latitude SAME as 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°46.0'	+47.4'	136.5°	53°02.1'	+48.1'	137.4°	52°17.6'	+48.8'	138.3°	51°32.5'	+49.5'	139.2°	50°46.8'	+50.1'	140.0°	50°00.6'	+50.7'	140.7°	49°13.9'	+51.2'	141.5°	0
1	54°33.4'	+46.8'	135.5°	53°50.2'	+47.6'	136.4°	53°06.4'	+48.3'	137.4°	52°22.0'	+49.0'	138.2°	51°36.9'	+49.7'	139.1°	50°51.3'	+50.3'	139.9°	50°05.2'	+50.9'	140.7°	1
2	55°20.2'	+46.2'	134.4°	54°37.8'	+47.0'	135.4°	53°54.8'	+47.8'	136.4°	53°11.0'	+48.6'	137.3°	52°26.6'	+49.2'	138.2°	51°41.6'	+49.9'	139.0°	50°56.0'	+50.5'	139.8°	2
3	56°06.4'	+45.6'	133.2°	55°24.9'	+46.4'	134.3°	54°42.6'	+47.3'	135.3°	53°59.6'	+48.1'	136.3°	53°15.9'	+48.8'	137.2°	52°31.5'	+49.5'	138.1°	51°46.5'	+50.1'	139.0°	3
4	56°52.0'	+44.9'	132.1°	56°11.3'	+45.8'	133.2°	55°29.9'	+46.7'	134.2°	54°47.6'	+47.5'	135.3°	54°04.6'	+48.3'	136.2°	53°21.0'	+49.0'	137.2°	52°36.6'	+49.7'	138.1°	4
5	57°36.9'	+44.1'	130.8°	56°57.1'	+45.1'	132.0°	56°16.6'	+46.1'	133.1°	55°35.1'	+46.9'	134.2°	54°52.9'	+47.7'	135.2°	54°10.0'	+48.5'	136.2°	53°26.3'	+49.2'	137.1°	5
6	58°21.0'	+43.3'	129.6°	57°42.3'	+44.4'	130.8°	57°02.6'	+45.4'	132.0°	56°22.1'	+46.3'	133.1°	55°40.7'	+47.2'	134.2°	54°58.5'	+48.0'	135.2°	54°15.5'	+48.7'	136.2°	6
7	59°04.3'	+42.5'	128.2°	58°26.7'	+43.6'	129.5°	57°48.0'	+44.7'	130.7°	57°08.4'	+45.6'	131.9°	56°27.8'	+46.6'	133.1°	55°46.5'	+47.4'	134.1°	55°04.3'	+48.2'	135.2°	7
8	59°46.8'	+41.6'	126.8°	59°10.3'	+42.8'	128.2°	58°32.6'	+43.9'	129.5°	57°54.0'	+44.9'	130.7°	57°14.4'	+45.9'	131.9°	56°33.9'	+46.8'	133.0°	55°52.5'	+47.7'	134.1°	8
9	60°28.4'	+40.6'	125.4°	59°53.0'	+41.8'	126.8°	59°16.5'	+43.0'	128.2°	58°38.9'	+44.1'	129.5°	58°00.3'	+45.2'	130.7°	57°20.7'	+46.2'	131.9°	56°40.2'	+47.1'	133.0°	9
10	61°09.0'	+39.5'	123.9°	60°34.9'	+40.9'	125.4°	59°59.5'	+42.1'	126.8°	59°23.0'	+43.3'	128.1°	58°45.5'	+44.4'	129.4°	58°06.8'	+45.5'	130.7°	57°27.2'	+46.4'	131.9°	10
11	61°48.5'	+38.4'	122.3°	61°15.7'	+39.8'	123.9°	60°41.7'	+41.2'	125.3°	60°06.4'	+42.4'	126.8°	59°29.9'	+43.6'	128.1°	58°52.3'	+44.7'	129.4°	58°13.7'	+45.7'	130.7°	11
12	62°26.9'	+37.2'	120.7°	61°55.6'	+38.7'	122.3°	61°22.8'	+40.1'	123.8°	60°48.8'	+41.5'	125.3°	60°13.5'	+42.7'	126.8°	59°37.0'	+43.9'	128.1°	58°59.4'	+45.0'	129.4°	12
13	63°04.1'	+35.9'	119.0°	62°34.3'	+37.5'	120.6°	62°03.0'	+39.0'	122.3°	61°30.2'	+40.4'	123.8°	60°56.2'	+41.8'	125.3°	60°20.9'	+43.0'	126.8°	59°44.4'	+44.2'	128.1°	13
14	63°40.0'	+34.5'	117.2°	63°11.8'	+36.2'	118.9°	62°42.0'	+37.8'	120.6°	62°10.7'	+39.3'	122.3°	61°37.9'	+40.7'	123.8°	61°03.9'	+42.1'	125.3°	60°28.5'	+43.3'	126.8°	14
15	64°14.5'	+33.0'	115.3°	63°48.0'	+34.8'	117.1°	63°19.8'	+36.5'	118.9°	62°50.0'	+38.1'	120.6°	62°18.7'	+39.6'	122.3°	61°45.9'	+41.1'	123.9°	61°11.9'	+42.4'	125.4°	15
16	64°47.5'	+31.4'	113.4°	64°22.8'	+33.4'	115.3°	63°56.3'	+35.2'	117.1°	63°28.1'	+36.9'	118.9°	62°58.3'	+38.5'	120.6°	62°27.0'	+40.0'	122.3°	61°54.2'	+41.4'	123.9°	16
17	65°19.0'	+29.8'	111.3°	64°56.2'	+31.8'	113.3°	64°31.5'	+33.7'	115.3°	64°05.0'	+35.5'	117.1°	63°36.8'	+37.2'	118.9°	63°07.0'	+38.8'	120.7°	62°35.6'	+40.3'	122.3°	17
18	65°48.7'	+28.0'	109.2°	65°27.9'	+30.1'	111.3°	65°05.2'	+32.1'	113.3°	64°40.5'	+34.0'	115.3°	64°14.0'	+35.8'	117.1°	63°45.7'	+37.5'	119.0°	63°15.9'	+39.1'	120.7°	18
19	66°16.7'	+26.1'	107.1°	65°58.0'	+28.3'	109.2°	65°37.3'	+30.4'	111.3°	65°14.5'	+32.4'	113.3°	64°49.8'	+34.4'	115.3°	64°23.3'	+36.2'	117.2°	63°55.0'	+37.9'	119.0°	19
20	66°42.8'	+24.1'	104.8°	66°26.3'	+26.4'	107.0°	66°07.7'	+28.6'	109.2°	65°46.9'	+30.8'	111.3°	65°24.1'	+32.8'	113.3°	64°59.4'	+34.7'	115.3°	64°32.9'	+36.5'	117.2°	20
21	67°06.8'	+21.9'	102.5°	66°52.7'	+24.4'	104.8°	66°36.3'	+26.7'	107.0°	66°17.7'	+29.0'	109.2°	65°56.9'	+31.1'	111.3°	65°34.1'	+33.1'	113.4°	65°09.4'	+35.0'	115.3°	21
22	67°28.8'	+19.7'	100.1°	67°17.1'	+22.3'	102.4°	67°03.0'	+24.7'	104.7°	66°46.6'	+27.1'	107.0°	66°28.0'	+29.3'	109.2°	66°07.2'	+31.4'	111.3°	65°44.4'	+33.5'	113.4°	22
23	67°48.5'	+17.4'	97.6°	67°39.4'	+20.0'	100.0°	67°27.7'	+22.6'	102.4°	67°13.7'	+25.0'	104.7°	66°57.3'	+27.4'	107.0°	66°38.7'	+29.7'	109.2°	66°17.9'	+31.8'	111.3°	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

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°09.1'	+46.7'	135.2°	52°26.2'	+47.5'	136.1°	51°42.6'	+48.2'	137.0°	50°58.4'	+48.9'	137.8°	50°13.7'	+49.5'	138.7°	49°28.3'	+50.1'	139.4°	48°42.5'	+50.7'	140.2°	0
1	53°55.8'	+46.1'	134.1°	53°13.6'	+46.9'	135.1°	52°30.8'	+47.7'	136.0°	51°47.3'	+48.4'	136.9°	51°03.2'	+49.1'	137.8°	50°18.4'	+49.7'	138.6°	49°33.2'	+50.3'	139.4°	1
2	54°41.9'	+45.5'	133.0°	54°00.6'	+46.4'	134.1°	53°18.5'	+47.2'	135.0°	52°35.7'	+47.9'	135.9°	51°52.2'	+48.6'	136.8°	51°08.2'	+49.3'	137.7°	50°23.5'	+49.9'	138.5°	2
3	55°27.4'	+44.8'	131.9°	54°46.9'	+45.7'	133.0°	54°05.6'	+46.6'	134.0°	53°23.6'	+47.4'	134.9°	52°40.9'	+48.1'	135.9°	51°57.5'	+48.9'	136.8°	51°13.4'	+49.5'	137.6°	3
4	56°12.2'	+44.1'	130.7°	55°32.6'	+45.1'	131.8°	54°52.2'	+46.0'	132.9°	54°11.0'	+46.8'	133.9°	53°29.0'	+47.6'	134.9°	52°46.3'	+48.4'	135.8°	52°03.0'	+49.1'	136.7°	4
5	56°56.4'	+43.4'	129.5°	56°17.7'	+44.4'	130.6°	55°38.2'	+45.3'	131.8°	54°57.8'	+46.2'	132.8°	54°16.6'	+47.1'	133.9°	53°34.7'	+47.9'	134.8°	52°52.0'	+48.6'	135.8°	5
6	57°39.7'	+42.6'	128.2°	57°02.1'	+43.6'	129.4°	56°23.6'	+44.7'	130.6°	55°44.1'	+45.6'	131.7°	55°03.7'	+46.5'	132.8°	54°22.6'	+47.3'	133.8°	53°40.7'	+48.1'	134.8°	6
7	58°22.3'	+41.7'	126.9°	57°45.8'	+42.9'	128.2°	57°08.2'	+43.9'	129.4°	56°29.7'	+44.9'	130.5°	55°50.2'	+45.9'	131.7°	55°09.9'	+46.8'	132.7°	54°28.8'	+47.6'	133.8°	7
8	59°04.0'	+40.8'	125.5°	58°28.6'	+42.0'	126.8°	57°52.1'	+43.1'	128.1°	57°14.6'	+44.2'	129.3°	56°36.1'	+45.2'	130.5°	55°56.7'	+46.1'	131.6°	55°16.4'	+47.0'	132.7°	8
9	59°44.8'	+39.8'	124.1°	59°10.6'	+41.1'	125.4°	58°35.3'	+42.3'	126.8°	57°58.8'	+43.4'	128.1°	57°21.3'	+44.5'	129.3°	56°42.8'	+45.5'	130.5°	56°03.4'	+46.4'	131.6°	9
10	60°24.6'	+38.8'	122.6°	59°51.7'	+40.1'	124.0°	59°17.6'	+41.4'	125.4°	58°42.2'	+42.6'	126.8°	58°05.8'	+43.7'	128.0°	57°28.3'	+44.8'	129.3°	56°49.8'	+45.7'	130.5°	10
11	61°03.4'	+37.6'	121.0°	60°31.8'	+39.1'	122.5°	59°58.9'	+40.4'	124.0°	59°24.8'	+41.7'	125.4°	58°49.5'	+42.9'	126.7°	58°13.0'	+44.0'	128.0°	57°35.5'	+45.0'	129.3°	11
12	61°41.0'	+36.4'	119.4°	61°10.9'	+37.9'	121.0°	60°39.3'	+39.4'	122.5°	60°06.5'	+40.7'	124.0°	59°32.3'	+42.0'	125.4°	58°57.0'	+43.2'	126.7°	58°20.6'	+44.3'	128.0°	12
13	62°17.5'	+35.1'	117.7°	61°48.8'	+36.7'	119.3°	61°18.7'	+38.3'	120.9°	60°47.2'	+39.7'	122.5°	60°14.3'	+41.0'	123.9°	59°40.2'	+42.3'	125.4°	59°04.9'	+43.5'	126.7°	13
14	62°52.6'	+33.8'	115.9°	62°25.6'	+35.5'	117.6°	61°57.0'	+37.1'	119.3°	61°26.9'	+38.6'	120.9°	60°55.3'	+40.0'	122.5°	60°22.5'	+41.3'	123.9°	59°48.3'	+42.6'	125.4°	14
15	63°26.4'	+32.3'	114.1°	63°01.0'	+34.1'	115.9°	62°34.0'	+35.8'	117.6°	62°05.4'	+37.4'	119.3°	61°35.3'	+38.9'	120.9°	61°03.8'	+40.3'	122.5°	60°30.9'	+41.7'	124.0°	15
16	63°58.7'	+30.8'	112.2°	63°35.1'	+32.6'	114.0°	63°09.8'	+34.4'	115.9°	62°42.8'	+36.1'	117.6°	62°14.2'	+37.7'	119.3°	61°44.1'	+39.2'	120.9°	61°12.6'	+40.6'	122.5°	16
17	64°29.5'	+29.1'	110.2°	64°07.8'	+31.1'	112.1°	63°44.2'	+33.0'	114.0°	63°18.9'	+34.8'	115.8°	62°52.0'	+36.5'	117.6°	62°23.4'	+38.1'	119.3°	61°53.3'	+39.6'	120.9°	17
18	64°58.6'	+27.4'	108.2°	64°38.9'	+29.4'	110.2°	64°17.2'	+31.4'	112.1°	63°53.7'	+33.3'	114.0°	63°28.4'	+35.1'	115.8°	63°01.4'	+36.8'	117.6°	62°32.8'	+38.4'	119.3°	18
19	65°25.9'	+25.5'	106.0°	65°08.3'	+27.7'	108.1°	64°48.7'	+29.8'	110.1°	64°27.0'	+31.8'	112.1°	64°03.5'	+33.7'	114.0°	63°38.2'	+35.5'	115.9°	63°11.2'	+37.2'	117.6°	19
20	65°51.5'	+23.6'	103.8°	65°36.0'	+25.9'	106.0°	65°18.4'	+28.0'	108.1°	64°58.8'	+30.1'	110.1°	64°37.2'	+32.1'	112.1°	64°1						

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

26° 334° LHA

Latitude SAME as Declination

26° 334° 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	52°31.3'	+46.0'	133.9°	51°49.4'	+46.8'	134.8°	51°06.7'	+47.5'	135.7°	50°23.5'	+48.2'	136.6°	49°39.6'	+48.9'	137.4°	48°55.2'	+49.5'	138.2°	48°10.2'	+50.1'	138.9°	0
1	53°17.3'	+45.4'	132.8°	52°36.2'	+46.3'	133.8°	51°54.3'	+47.0'	134.7°	51°11.7'	+47.8'	135.6°	50°28.5'	+48.5'	136.5°	49°44.7'	+49.1'	137.3°	49°00.4'	+49.8'	138.1°	1
2	54°02.8'	+44.8'	131.7°	53°22.4'	+45.7'	132.7°	52°41.3'	+46.5'	133.7°	51°59.5'	+47.3'	134.6°	51°17.0'	+48.0'	135.5°	50°33.9'	+48.7'	136.4°	49°50.1'	+49.4'	137.2°	2
3	54°47.6'	+44.1'	130.6°	54°08.1'	+45.1'	131.7°	53°27.8'	+45.9'	132.7°	52°46.8'	+46.7'	133.6°	52°05.0'	+47.5'	134.6°	51°22.6'	+48.3'	135.5°	50°39.5'	+48.9'	136.3°	3
4	55°31.7'	+43.4'	129.4°	54°53.1'	+44.4'	130.5°	54°13.7'	+45.3'	131.6°	53°33.5'	+46.2'	132.6°	52°52.5'	+47.0'	133.6°	52°10.8'	+47.8'	134.5°	51°28.4'	+48.5'	135.4°	4
5	56°15.1'	+42.7'	128.2°	55°37.5'	+43.7'	129.3°	54°59.1'	+44.7'	130.4°	54°19.7'	+45.6'	131.5°	53°39.5'	+46.4'	132.5°	52°58.6'	+47.3'	133.5°	52°16.9'	+48.0'	134.5°	5
6	56°57.7'	+41.8'	126.9°	56°21.2'	+42.9'	128.1°	55°43.7'	+44.0'	129.3°	55°05.3'	+44.9'	130.4°	54°26.0'	+45.8'	131.4°	53°45.9'	+46.7'	132.5°	53°05.0'	+47.5'	133.5°	6
7	57°39.6'	+41.0'	125.6°	57°04.1'	+42.1'	126.8°	56°27.7'	+43.2'	128.0°	55°50.2'	+44.2'	129.2°	55°11.8'	+45.2'	130.3°	54°32.6'	+46.1'	131.4°	53°52.5'	+47.0'	132.4°	7
8	58°20.6'	+40.0'	124.2°	57°46.3'	+41.3'	125.5°	57°10.9'	+42.4'	126.8°	56°34.4'	+43.5'	128.0°	55°57.0'	+44.5'	129.2°	55°18.7'	+45.5'	130.3°	54°39.4'	+46.4'	131.4°	8
9	59°00.6'	+39.1'	122.8°	58°27.5'	+40.3'	124.1°	57°53.3'	+41.6'	125.5°	57°17.9'	+42.7'	126.7°	56°41.5'	+43.8'	128.0°	56°04.1'	+44.8'	129.1°	55°25.8'	+45.8'	130.3°	9
10	59°39.7'	+38.0'	121.3°	59°07.9'	+39.4'	122.7°	58°34.9'	+40.7'	124.1°	58°00.6'	+41.9'	125.4°	57°25.3'	+43.0'	126.7°	56°49.0'	+44.1'	127.9°	56°11.6'	+45.1'	129.1°	10
11	60°17.7'	+36.9'	119.7°	59°47.3'	+38.3'	121.2°	59°15.5'	+39.7'	122.7°	58°42.5'	+41.0'	124.1°	58°08.3'	+42.2'	125.4°	57°33.0'	+43.3'	126.7°	56°56.7'	+44.4'	127.9°	11
12	60°54.6'	+35.7'	118.1°	60°25.6'	+37.2'	119.7°	59°55.2'	+38.6'	121.2°	59°23.5'	+40.0'	122.6°	58°50.5'	+41.3'	124.0°	58°16.3'	+42.5'	125.4°	57°41.0'	+43.6'	126.7°	12
13	61°30.3'	+34.4'	116.5°	61°02.8'	+36.0'	118.1°	60°33.8'	+37.5'	119.6°	60°03.5'	+39.0'	121.2°	59°31.8'	+40.3'	122.6°	58°58.8'	+41.6'	124.0°	58°24.7'	+42.8'	125.4°	13
14	62°04.7'	+33.1'	114.7°	61°38.8'	+34.8'	116.4°	61°11.4'	+36.4'	118.0°	60°42.4'	+37.9'	119.6°	60°12.1'	+39.3'	121.1°	59°40.4'	+40.6'	122.6°	59°07.4'	+41.9'	124.0°	14
15	62°37.8'	+31.6'	112.9°	62°13.6'	+33.4'	114.7°	61°47.7'	+35.1'	116.4°	61°20.3'	+36.7'	118.0°	60°51.4'	+38.2'	119.6°	60°21.0'	+39.6'	121.1°	59°49.4'	+41.0'	122.6°	15
16	63°09.4'	+30.1'	111.1°	62°47.0'	+32.0'	112.9°	62°22.8'	+33.8'	114.6°	61°57.0'	+35.4'	116.3°	61°29.6'	+37.0'	118.0°	61°00.7'	+38.5'	119.6°	60°30.3'	+40.0'	121.1°	16
17	63°39.6'	+28.5'	109.1°	63°19.0'	+30.5'	111.0°	62°56.6'	+32.3'	112.8°	62°32.4'	+34.1'	114.6°	62°06.6'	+35.8'	116.3°	61°39.2'	+37.4'	118.0°	61°10.3'	+38.9'	119.6°	17
18	64°08.1'	+26.8'	107.1°	63°49.4'	+28.9'	109.1°	63°28.9'	+30.8'	111.0°	63°06.5'	+32.7'	112.8°	62°42.4'	+34.4'	114.6°	62°16.6'	+36.1'	116.3°	61°49.2'	+37.7'	118.0°	18
19	64°34.9'	+25.0'	105.1°	64°18.3'	+27.2'	107.1°	63°59.7'	+29.2'	109.0°	63°39.2'	+31.2'	110.9°	63°16.8'	+33.0'	112.8°	62°52.7'	+34.8'	114.6°	62°26.9'	+36.5'	116.4°	19
20	65°00.0'	+23.1'	102.9°	64°45.4'	+25.4'	105.0°	64°28.9'	+27.5'	107.0°	64°10.3'	+29.5'	109.0°	63°49.9'	+31.5'	110.9°	63°27.5'	+33.4'	112.8°	63°03.4'	+35.2'	114.6°	20
21	65°23.1'	+21.2'	100.7°	65°10.8'	+23.5'	102.9°	64°56.4'	+25.7'	104.9°	64°39.9'	+27.8'	107.0°	64°21.4'	+29.9'	109.0°	64°00.9'	+31.9'	110.9°	63°38.5'	+33.7'	112.8°	21
22	65°44.2'	+19.1'	98.5°	65°34.3'	+21.5'	100.6°	65°22.1'	+23.8'	102.8°	65°07.7'	+26.0'	104.9°	64°51.3'	+28.2'	107.0°	64°32.7'	+30.3'	109.0°	64°12.3'	+32.2'	110.9°	22
23	66°03.3'	+17.0'	96.1°	65°55.7'	+19.4'	98.4°	65°45.9'	+21.8'	100.6°	65°33.8'	+24.1'	102.7°	65°19.4'	+26.4'	104.9°	65°03.0'	+28.5'	106.9°	64°44.5'	+30.6'	109.0°	23
Dec°	28			29			30			31			32			33			34			Dec°

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

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°52.8'	+45.3'	132.7°	51°11.7'	+46.2'	133.6°	50°30.1'	+46.9'	134.5°	49°47.7'	+47.6'	135.3°	49°04.8'	+48.3'	136.1°	48°21.2'	+49.0'	136.9°	47°37.1'	+49.6'	137.7°	0
1	52°38.1'	+44.7'	131.6°	51°57.9'	+45.6'	132.5°	51°17.0'	+46.4'	133.5°	50°35.4'	+47.2'	134.4°	49°53.1'	+47.9'	135.2°	49°10.2'	+48.6'	136.0°	48°26.7'	+49.2'	136.8°	1
2	53°22.8'	+44.1'	130.5°	52°43.5'	+45.0'	131.5°	52°03.4'	+45.9'	132.4°	51°22.5'	+46.7'	133.4°	50°41.0'	+47.4'	134.3°	49°58.8'	+48.1'	135.1°	49°15.9'	+48.8'	135.9°	2
3	54°07.0'	+43.4'	129.3°	53°28.5'	+44.4'	130.4°	52°49.2'	+45.3'	131.4°	52°09.2'	+46.1'	132.4°	51°28.4'	+46.9'	133.3°	50°46.9'	+47.7'	134.2°	50°04.7'	+48.4'	135.1°	3
4	54°50.4'	+42.7'	128.1°	54°12.9'	+43.7'	129.2°	53°34.5'	+44.6'	130.3°	52°55.3'	+45.5'	131.3°	52°15.3'	+46.4'	132.3°	51°34.6'	+47.2'	133.2°	50°53.1'	+47.9'	134.1°	4
5	55°33.1'	+41.9'	126.9°	54°56.6'	+43.0'	128.1°	54°19.1'	+44.0'	129.0°	53°40.8'	+44.9'	130.2°	53°01.7'	+45.8'	131.2°	52°21.7'	+46.6'	132.2°	51°41.0'	+47.4'	133.2°	5
6	56°15.0'	+41.1'	125.6°	55°39.6'	+42.2'	126.8°	55°03.1'	+43.3'	128.0°	54°25.7'	+44.3'	129.1°	53°47.5'	+45.2'	130.2°	53°08.4'	+46.1'	131.2°	52°28.5'	+46.9'	132.2°	6
7	56°56.2'	+40.3'	124.3°	56°21.8'	+41.4'	125.6°	55°46.4'	+42.5'	126.8°	55°10.7'	+43.6'	127.9°	54°32.7'	+44.5'	129.0°	53°54.4'	+45.5'	130.1°	53°15.4'	+46.4'	131.1°	7
8	57°36.4'	+39.3'	122.9°	57°03.2'	+40.6'	124.2°	56°28.9'	+41.7'	125.5°	55°53.6'	+42.8'	126.7°	55°17.2'	+43.9'	127.9°	54°39.9'	+44.8'	129.0°	54°01.7'	+45.8'	130.1°	8
9	58°15.8'	+38.4'	121.5°	57°43.8'	+39.6'	122.9°	57°10.6'	+40.9'	124.2°	56°36.4'	+42.0'	125.4°	56°01.1'	+43.1'	126.7°	55°24.8'	+44.2'	127.8°	54°47.5'	+45.1'	128.9°	9
10	58°54.1'	+37.3'	120.0°	58°23.4'	+38.7'	121.5°	57°51.5'	+40.0'	122.8°	57°18.4'	+41.2'	124.1°	56°44.2'	+42.3'	125.4°	56°08.9'	+43.4'	126.6°	55°32.6'	+44.5'	127.8°	10
11	59°31.4'	+36.2'	118.5°	59°02.1'	+37.6'	120.0°	58°31.5'	+39.0'	121.4°	57°59.6'	+40.3'	122.8°	57°26.5'	+41.5'	124.1°	56°52.3'	+42.6'	125.4°	56°17.1'	+43.7'	126.6°	11
12	60°07.6'	+35.0'	116.9°	59°39.7'	+36.5'	118.5°	59°10.4'	+38.0'	119.9°	58°39.9'	+39.3'	121.4°	58°08.0'	+40.6'	122.7°	57°35.0'	+41.8'	124.1°	57°00.8'	+43.0'	125.3°	12
13	60°42.6'	+33.8'	115.3°	60°16.2'	+35.3'	116.9°	59°48.4'	+36.9'	118.4°	59°19.2'	+38.3'	119.9°	58°48.6'	+39.6'	121.3°	58°16.8'	+40.9'	122.7°	57°43.8'	+42.1'	124.1°	13
14	61°16.4'	+32.4'	113.6°	60°51.6'	+34.1'	115.2°	60°25.2'	+35.7'	116.8°	59°57.4'	+37.2'	118.4°	59°28.2'	+38.6'	119.9°	58°57.7'	+40.0'	121.3°	58°25.9'	+41.3'	122.7°	14
15	61°48.8'	+31.0'	111.8°	61°25.7'	+32.8'	113.5°	61°00.9'	+34.4'	115.2°	60°34.6'	+36.0'	116.8°	60°06.9'	+37.5'	118.3°	59°37.7'	+39.0'	119.9°	59°07.2'	+40.3'	121.3°	15
16	62°19.8'	+29.5'	110.0°	61°58.4'	+31.4'	111.8°	61°35.4'	+33.1'	113.5°	61°10.7'	+34.8'	115.1°	60°44.4'	+36.4'	116.8°	60°16.6'	+37.9'	118.3°	59°47.5'	+39.3'	119.8°	16
17	62°49.4'	+28.0'	108.1°	62°29.8'	+29.9'	109.9°	62°08.5'	+31.7'	111.7°	61°45.4'	+33.5'	113.4°	61°20.8'	+35.1'	115.1°	60°54.5'	+36.7'	116.8°	60°26.8'	+38.2'	118.3°	17
18	63°17.3'	+26.3'	106.1°	62°59.7'	+28.3'	108.0°	62°40.2'	+30.2'	109.9°	62°18.9'	+32.1'	111.7°	61°55.9'	+33.8'	113.4°	61°31.2'	+35.5'	115.1°	61°05.0'	+37.1'	116.8°	18
19	63°43.6'	+24.6'	104.1°	63°28.0'	+26.6'	106.1°	63°10.4'	+28.7'	108.0°	62°51.0'	+30.6'	109.8°	62°29.7'	+32.4'	111.6°	62°06.7'	+34.2'	113.4°	61°42.1'	+35.9'	115.1°	19
20	64°08.2'	+22.7'	102.1°	63°54.6'	+24.9'	104.1°	63°39.1'	+27.0'	106.0°	63°21.6'	+29.0'	107.9°	63°02.1'	+30.9'	109.8°	62°40.9'	+32.8'	111.6°	62°17.9'	+34.5'	113.4°	20
21	64°30.9'	+20.8'	99.9°	64°19.5'	+23.1'	102.0°	64°06.1'	+25.2'	104.0°	63°50.6'	+27.3'	106.0°	63°33.1'									



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

28° 332° LHA

Latitude SAME as 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°13.4'	+44.7'	131.4°	50°33.3'	+45.5'	132.4°	49°52.6'	+46.3'	133.2°	49°11.2'	+47.0'	134.1°	48°29.1'	+47.8'	134.9°	47°46.5'	+48.4'	135.7°	47°03.2'	+49.1'	136.4°	0			
1	51°58.1'	+44.1'	130.4°	51°18.9'	+44.9'	131.3°	50°38.9'	+45.8'	132.2°	49°58.2'	+46.6'	133.1°	49°16.9'	+47.3'	134.0°	48°34.9'	+48.0'	134.8°	47°52.3'	+48.7'	135.6°	1			
2	52°42.2'	+43.4'	129.3°	52°03.8'	+44.4'	130.3°	51°24.7'	+45.2'	131.2°	50°44.8'	+46.0'	132.1°	50°04.1'	+46.8'	133.0°	49°22.9'	+47.6'	133.9°	48°41.0'	+48.3'	134.7°	2			
3	53°25.6'	+42.8'	128.1°	52°48.2'	+43.7'	129.2°	52°09.9'	+44.6'	130.2°	51°30.8'	+45.5'	131.1°	50°51.0'	+46.3'	132.0°	50°10.4'	+47.1'	132.9°	49°29.2'	+47.8'	133.8°	3			
4	54°08.4'	+42.0'	126.9°	53°31.9'	+43.0'	128.0°	52°54.5'	+44.0'	129.1°	52°16.3'	+44.9'	130.1°	51°37.3'	+45.8'	131.0°	50°57.5'	+46.6'	132.0°	50°17.0'	+47.3'	132.9°	4			
5	54°50.4'	+41.3'	125.7°	54°14.9'	+42.3'	126.8°	53°38.5'	+43.3'	127.9°	53°01.2'	+44.3'	129.0°	52°23.0'	+45.2'	130.0°	51°44.1'	+46.0'	131.0°	51°04.4'	+46.8'	131.9°	5			
6	55°31.7'	+40.4'	124.4°	54°57.2'	+41.6'	125.6°	54°21.8'	+42.6'	126.7°	53°45.5'	+43.6'	127.8°	53°08.2'	+44.6'	128.9°	52°30.1'	+45.5'	129.9°	51°51.2'	+46.3'	130.9°	6			
7	56°12.1'	+39.6'	123.1°	55°38.8'	+40.7'	124.3°	55°04.4'	+41.9'	125.5°	54°29.1'	+42.9'	126.7°	53°52.8'	+43.9'	127.8°	53°15.6'	+44.9'	128.8°	52°37.6'	+45.8'	129.9°	7			
8	56°51.7'	+38.6'	121.7°	56°19.5'	+39.9'	123.0°	55°46.3'	+41.1'	124.3°	55°12.0'	+42.2'	125.5°	54°36.7'	+43.2'	126.6°	54°00.5'	+44.2'	127.7°	53°23.3'	+45.2'	128.8°	8			
9	57°30.3'	+37.7'	120.3°	56°59.4'	+39.0'	121.7°	56°27.3'	+40.2'	123.0°	55°54.2'	+41.4'	124.2°	55°19.9'	+42.5'	125.4°	54°44.7'	+43.5'	126.6°	54°08.5'	+44.5'	127.7°	9			
10	58°08.0'	+36.6'	118.9°	57°38.4'	+38.0'	120.3°	57°07.5'	+39.3'	121.6°	56°35.5'	+40.5'	122.9°	56°02.4'	+41.7'	124.1°	55°28.2'	+42.8'	125.3°	54°53.0'	+43.8'	126.5°	10			
11	58°44.6'	+35.5'	117.4°	58°16.4'	+37.0'	118.8°	57°46.8'	+38.3'	120.2°	57°16.0'	+39.6'	121.5°	56°44.1'	+40.8'	122.8°	56°11.0'	+42.0'	124.1°	55°36.8'	+43.1'	125.3°	11			
12	59°20.1'	+34.4'	115.8°	58°53.3'	+35.9'	117.3°	58°25.1'	+37.3'	118.7°	57°55.7'	+38.7'	120.1°	57°24.9'	+39.9'	121.5°	56°53.0'	+41.2'	122.8°	56°19.9'	+42.3'	124.1°	12			
13	59°54.5'	+33.1'	114.2°	59°29.2'	+34.7'	115.7°	59°02.4'	+36.2'	117.2°	58°34.3'	+37.6'	118.7°	58°04.9'	+39.0'	120.1°	57°34.2'	+40.3'	121.5°	57°02.2'	+41.5'	122.8°	13			
14	60°27.6'	+31.8'	112.5°	60°03.9'	+33.5'	114.1°	59°38.6'	+35.0'	115.7°	59°11.9'	+36.5'	117.2°	58°43.9'	+38.0'	118.6°	58°14.4'	+39.3'	120.1°	57°43.8'	+40.6'	121.4°	14			
15	60°59.4'	+30.4'	110.8°	60°37.4'	+32.2'	112.4°	60°13.7'	+33.8'	114.0°	59°48.5'	+35.4'	115.6°	59°21.8'	+36.9'	117.1°	58°53.8'	+38.3'	118.6°	58°24.4'	+39.7'	120.1°	15			
16	61°29.9'	+29.0'	109.0°	61°09.5'	+30.8'	110.7°	60°47.5'	+32.5'	112.4°	60°23.9'	+34.2'	114.0°	59°58.7'	+35.8'	115.6°	59°32.1'	+37.3'	117.1°	59°04.1'	+38.7'	118.6°	16			
17	61°58.9'	+27.5'	107.1°	61°40.3'	+29.3'	108.9°	61°20.0'	+31.1'	110.6°	60°58.1'	+32.9'	112.3°	60°34.5'	+34.5'	114.0°	60°09.4'	+36.1'	115.6°	59°42.7'	+37.6'	117.1°	17			
18	62°26.3'	+25.8'	105.2°	62°09.6'	+27.8'	107.0°	61°51.2'	+29.7'	108.8°	61°30.9'	+31.5'	110.6°	61°09.0'	+33.2'	112.3°	60°45.5'	+34.9'	113.9°	60°20.4'	+36.5'	115.5°	18			
19	62°52.2'	+24.2'	103.2°	62°37.4'	+26.2'	105.1°	62°20.9'	+28.2'	107.0°	62°02.4'	+30.0'	108.8°	61°42.3'	+31.9'	110.5°	61°20.4'	+33.6'	112.3°	60°56.8'	+35.3'	113.9°	19			
20	63°16.3'	+22.4'	101.2°	63°03.6'	+24.5'	103.2°	62°49.0'	+26.5'	105.1°	62°32.5'	+28.5'	106.9°	62°14.1'	+30.4'	108.7°	61°54.0'	+32.2'	110.5°	61°32.1'	+34.0'	112.2°	20			
21	63°38.7'	+20.5'	99.1°	63°38.7'	+22.7'	101.1°	63°15.6'	+24.8'	103.1°	63°01.0'	+26.9'	105.0°	62°44.5'	+28.9'	106.9°	62°44.5'	+28.9'	106.8°	62°06.1'	+32.6'	110.5°	21			
22	63°59.2'	+18.6'	97.0°	63°59.2'	+20.9'	99.0°	63°40.4'	+23.1'	101.0°	63°27.9'	+25.2'	103.0°	63°13.4'	+27.3'	104.9°	62°57.0'	+29.2'	106.8°	62°38.7'	+31.2'	108.7°	22			
23	64°17.9'	+16.6'	94.8°	64°17.9'	+18.9'	96.9°	64°03.5'	+21.2'	98.9°	63°53.1'	+23.4'	101.0°	63°40.7'	+25.5'	102.9°	63°26.2'	+27.6'	104.9°	63°09.8'	+29.6'	106.8°	23			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	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			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°33.3'	+44.0'	130.3°	49°54.2'	+44.9'	131.2°	49°14.4'	+45.7'	132.1°	48°33.8'	+46.5'	132.9°	47°52.7'	+47.2'	133.7°	47°10.9'	+47.9'	134.5°	46°28.6'	+48.5'	135.3°	0
1	51°17.4'	+43.4'	129.2°	50°39.1'	+44.3'	130.1°	50°00.0'	+45.2'	131.1°	49°20.3'	+46.0'	131.9°	48°39.9'	+46.7'	132.8°	47°58.8'	+47.4'	133.6°	47°17.1'	+48.1'	134.4°	1
2	52°00.8'	+42.8'	128.1°	51°23.4'	+43.7'	129.1°	50°45.2'	+44.6'	130.0°	50°06.3'	+45.4'	130.9°	49°26.6'	+46.2'	131.8°	48°46.2'	+47.0'	132.7°	48°05.3'	+47.7'	133.5°	2
3	52°43.6'	+42.1'	126.9°	52°07.1'	+43.1'	128.0°	51°29.8'	+44.0'	129.0°	50°51.7'	+44.9'	129.9°	50°12.8'	+45.7'	130.8°	49°33.2'	+46.5'	131.7°	48°53.0'	+47.3'	132.6°	3
4	53°25.7'	+41.4'	125.7°	52°50.2'	+42.4'	126.8°	52°13.8'	+43.4'	127.9°	51°36.6'	+44.3'	128.9°	50°58.5'	+45.2'	129.8°	50°19.7'	+46.0'	130.7°	49°40.2'	+46.8'	131.6°	4
5	54°07.1'	+40.6'	124.5°	53°32.6'	+41.7'	125.6°	52°57.2'	+42.7'	126.7°	52°20.9'	+43.7'	127.8°	51°43.7'	+44.6'	128.8°	51°05.7'	+45.5'	129.7°	50°27.0'	+46.3'	130.7°	5
6	54°47.6'	+39.8'	123.2°	54°14.2'	+40.9'	124.4°	53°39.8'	+42.0'	125.5°	53°04.5'	+43.0'	126.6°	52°28.3'	+44.0'	127.7°	51°51.2'	+44.9'	128.7°	51°13.3'	+45.7'	129.7°	6
7	55°27.4'	+38.9'	121.9°	54°55.1'	+40.1'	123.1°	54°21.8'	+41.2'	124.3°	53°47.5'	+42.3'	125.5°	53°12.2'	+43.3'	126.5°	52°36.1'	+44.3'	127.6°	51°59.0'	+45.2'	128.6°	7
8	56°06.3'	+38.0'	120.6°	55°35.2'	+39.2'	121.8°	55°03.0'	+40.4'	123.1°	54°29.8'	+41.5'	124.2°	53°55.5'	+42.6'	125.4°	53°20.3'	+43.6'	126.5°	52°44.2'	+44.6'	127.5°	8
9	56°44.3'	+37.0'	119.2°	56°14.5'	+38.3'	120.5°	55°43.4'	+39.6'	121.8°	55°11.3'	+40.7'	123.0°	54°38.1'	+41.9'	124.2°	54°03.9'	+42.9'	125.3°	53°28.8'	+43.9'	126.4°	9
10	57°21.3'	+36.0'	117.7°	56°52.8'	+37.3'	119.1°	56°23.0'	+38.6'	120.4°	55°52.0'	+39.9'	121.7°	55°20.0'	+41.1'	122.9°	54°46.8'	+42.2'	124.1°	54°12.7'	+43.2'	125.3°	10
11	57°57.3'	+34.9'	116.2°	57°30.1'	+36.3'	117.7°	57°01.6'	+37.7'	119.0°	56°31.9'	+39.0'	120.3°	56°01.0'	+40.2'	121.6°	55°29.0'	+41.4'	122.9°	54°55.9'	+42.5'	124.1°	11
12	58°32.2'	+33.7'	114.7°	58°06.5'	+35.2'	116.2°	57°39.3'	+36.7'	117.6°	57°10.9'	+38.0'	119.0°	56°41.3'	+39.3'	120.3°	56°10.4'	+40.6'	121.6°	55°38.4'	+41.7'	122.8°	12
13	59°06.0'	+32.5'	113.1°	58°41.7'	+34.1'	114.6°	58°16.0'	+35.6'	116.1°	57°48.9'	+37.0'	117.5°	57°20.6'	+38.4'	118.9°	56°51.0'	+39.7'	120.2°	56°20.1'	+40.9'	121.6°	13
14	59°38.5'	+31.2'	111.4°	59°15.8'	+32.9'	113.0°	58°51.6'	+34.4'	114.5°	58°26.0'	+35.9'	116.0°	57°59.0'	+37.4'	117.5°	57°30.6'	+38.7'	118.9°	57°01.0'	+40.0'	120.2°	14
15	60°09.7'	+29.9'	109.7°	59°48.7'	+31.6'	111.4°	59°26.0'	+33.2'	112.9°	59°01.9'	+34.8'	114.5°	58°36.3'	+36.3'	116.0°	58°09.4'	+37.7'	117.4°	57°41.1'	+39.1'	118.8°	15
16	60°39.6'	+28.5'	108.0°	60°20.3'	+30.3'	109.7°	59°59.3'	+32.0'	111.3°	59°36.7'	+33.6'	112.9°	59°12.6'	+35.2'	114.4°	58°47.1'	+36.7'	115.9°	58°20.1'	+38.1'	117.4°	16
17	61°08.1'	+27.0'	106.2°	60°50.5'	+28.8'	107.9°	60°31.2'	+30.6'	109.6°	60°10.3'	+32.3'	111.2°	59°47.8'	+34.0'	112.8°	59°23.7'	+35.5'	114.4°	58°58.2'	+37.0'	115.9°	17
18	61°35.1'	+25.4'	104.3°	61°19.3'	+27.3'	106.1°	61°01.8'	+29.2'	107.8°	60°42.6'	+31.0'	109.5°	60°21.7'	+32.7'	111.2°	59°59.3'	+34.3'	112.8°	59°35.3'	+35.9'	114.4°	18
19	62°00.5'	+23.8'	102.4°	61°46.7'	+25.8'	104.2°	61°31.0'	+27.7'	106.0°	61°13.6'	+29.6'	107.8°	60°54.4'	+31.3'	109.5°	60°33.6'	+33.1'	111.2°	60°11.2'	+34.7'	112.8°	19
20	62°24.3'	+22.1'	100.4°	62°12.4'	+24.1'	102.3°	61°58.7'	+26.1'	104.1°	61°43.2'	+28.1'	105.9°	61°25									

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

30° 330° LHA

Latitude SAME as 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°52.6'	+43.4'	129.1°	49°14.4'	+44.3'	130.0°	48°35.4'	+45.1'	130.9°	47°55.8'	+45.9'	131.7°	47°15.6'	+46.6'	132.5°	46°34.7'	+47.3'	133.3°	45°53.2'	+48.0'	134.1°	0
1	50°36.0'	+42.8'	128.0°	49°58.6'	+43.7'	129.0°	49°20.5'	+44.6'	129.9°	48°41.7'	+45.4'	130.8°	48°02.2'	+46.2'	131.6°	47°22.0'	+46.9'	132.4°	46°41.2'	+47.6'	133.2°	1
2	51°18.8'	+42.1'	126.9°	50°42.3'	+43.1'	127.9°	50°05.1'	+44.0'	128.9°	49°27.1'	+44.8'	129.8°	48°48.3'	+45.7'	130.6°	48°08.9'	+46.4'	131.5°	47°28.8'	+47.2'	132.3°	2
3	52°00.9'	+41.5'	125.8°	51°25.4'	+42.4'	126.8°	50°49.1'	+43.4'	127.8°	50°11.9'	+44.3'	128.7°	49°34.0'	+45.1'	129.7°	48°55.3'	+45.9'	130.5°	48°16.0'	+46.7'	131.4°	3
4	52°42.4'	+40.7'	124.6°	52°07.9'	+41.8'	125.7°	51°32.4'	+42.7'	126.7°	50°56.2'	+43.7'	127.7°	50°19.1'	+44.6'	128.6°	49°41.3'	+45.4'	129.6°	49°02.7'	+46.2'	130.5°	4
5	53°23.1'	+40.0'	123.4°	52°49.6'	+41.0'	124.5°	52°15.2'	+42.1'	125.5°	51°39.9'	+43.1'	126.6°	51°03.7'	+44.0'	127.6°	50°26.7'	+44.9'	128.5°	49°48.9'	+45.7'	129.5°	5
6	54°03.1'	+39.1'	122.1°	53°30.7'	+40.3'	123.3°	52°57.3'	+41.4'	124.4°	52°22.9'	+42.4'	125.4°	51°47.7'	+43.4'	126.5°	51°11.6'	+44.3'	127.5°	50°34.7'	+45.2'	128.5°	6
7	54°42.2'	+38.3'	120.8°	54°10.9'	+39.5'	122.0°	53°38.6'	+40.6'	123.2°	53°05.3'	+41.7'	124.3°	52°31.0'	+42.7'	125.4°	51°55.9'	+43.7'	126.4°	51°19.8'	+44.6'	127.4°	7
8	55°20.5'	+37.4'	119.5°	54°50.4'	+38.6'	120.7°	54°19.2'	+39.8'	121.9°	53°47.0'	+40.9'	123.1°	53°13.7'	+42.0'	124.2°	52°39.5'	+43.0'	125.3°	52°04.4'	+44.0'	126.3°	8
9	55°57.8'	+36.4'	118.1°	55°29.0'	+37.7'	119.4°	54°59.0'	+38.9'	120.6°	54°27.9'	+40.1'	121.8°	53°55.7'	+41.2'	123.0°	53°22.6'	+42.3'	124.1°	52°48.4'	+43.3'	125.2°	9
10	56°34.2'	+35.4'	116.6°	56°06.7'	+36.7'	118.0°	55°37.9'	+38.0'	119.3°	55°08.0'	+39.3'	120.5°	54°37.0'	+40.5'	121.7°	54°04.9'	+41.6'	122.9°	53°31.8'	+42.7'	124.1°	10
11	57°09.6'	+34.3'	115.2°	56°43.4'	+35.7'	116.6°	56°16.0'	+37.1'	117.9°	55°47.3'	+38.4'	119.2°	55°17.4'	+39.6'	120.5°	54°46.5'	+40.8'	121.7°	54°14.4'	+41.9'	122.9°	11
12	57°43.9'	+33.2'	113.6°	57°19.1'	+34.6'	115.1°	56°53.0'	+36.1'	116.5°	56°25.7'	+37.4'	117.8°	55°57.1'	+38.7'	119.1°	55°27.3'	+40.0'	120.4°	54°56.3'	+41.1'	121.6°	12
13	58°17.0'	+32.0'	112.1°	57°53.8'	+33.5'	113.6°	57°29.1'	+35.0'	115.0°	57°03.1'	+36.4'	116.4°	56°35.8'	+37.8'	117.8°	56°07.2'	+39.1'	119.1°	55°37.5'	+40.3'	120.4°	13
14	58°49.0'	+30.7'	110.4°	58°27.3'	+32.3'	112.0°	58°04.1'	+33.9'	113.5°	57°39.5'	+35.4'	114.9°	57°13.6'	+36.8'	116.3°	56°46.3'	+38.1'	117.7°	56°17.8'	+39.4'	119.0°	14
15	59°19.7'	+29.4'	108.8°	58°59.6'	+31.1'	110.4°	58°38.0'	+32.7'	111.9°	58°14.9'	+34.2'	113.4°	57°50.4'	+35.7'	114.9°	57°24.5'	+37.2'	116.3°	56°57.2'	+38.5'	117.7°	15
16	59°49.1'	+28.0'	107.1°	59°30.7'	+29.8'	108.7°	59°10.7'	+31.4'	110.3°	58°49.1'	+33.1'	111.8°	58°26.1'	+34.6'	113.3°	58°01.6'	+36.1'	114.8°	57°35.8'	+37.5'	116.2°	16
17	60°17.1'	+26.5'	105.3°	60°00.5'	+28.4'	107.0°	59°42.1'	+30.1'	108.6°	59°22.2'	+31.8'	110.2°	59°00.7'	+33.4'	111.8°	58°37.7'	+35.0'	113.3°	58°13.3'	+36.5'	114.8°	17
18	60°43.7'	+25.0'	103.5°	60°28.8'	+26.9'	105.2°	60°12.2'	+28.7'	106.9°	59°54.0'	+30.5'	108.5°	59°34.1'	+32.2'	110.1°	59°12.7'	+33.8'	111.7°	58°49.8'	+35.4'	113.3°	18
19	61°08.7'	+23.4'	101.6°	60°55.7'	+25.4'	103.4°	60°41.0'	+27.3'	105.1°	60°24.5'	+29.1'	106.8°	60°06.3'	+30.9'	108.5°	59°46.5'	+32.6'	110.1°	59°25.1'	+34.2'	111.7°	19
20	61°32.1'	+21.8'	99.7°	61°21.1'	+23.8'	101.5°	61°08.2'	+25.7'	103.3°	60°53.6'	+27.6'	105.0°	60°37.2'	+29.5'	106.7°	60°19.1'	+31.2'	108.4°	59°59.3'	+32.9'	110.1°	20
21	61°53.9'	+20.1'	97.7°	61°44.9'	+22.1'	99.6°	61°34.0'	+24.1'	101.4°	61°21.2'	+26.1'	103.2°	61°06.7'	+28.0'	104.9°	60°50.3'	+29.9'	106.7°	60°32.2'	+31.6'	108.4°	21
22	62°13.9'	+18.3'	95.7°	62°07.0'	+20.4'	97.6°	61°58.1'	+22.5'	99.4°	61°47.3'	+24.5'	101.3°	61°34.7'	+26.5'	103.1°	61°20.2'	+28.4'	104.9°	61°03.9'	+30.2'	106.6°	22
23	62°32.2'	+16.4'	93.6°	62°27.4'	+18.6'	95.6°	62°20.6'	+20.7'	97.5°	62°11.8'	+22.8'	99.3°	62°01.1'	+24.9'	101.2°	61°48.6'	+26.8'	103.0°	61°34.1'	+28.8'	104.8°	23
Dec°	28			29			30			31			32			33			34			Dec°

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

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°11.2'	+42.8'	128.0°	48°33.8'	+43.7'	128.9°	47°55.8'	+44.5'	129.8°	47°17.1'	+45.3'	130.6°	46°37.7'	+46.1'	131.4°	45°57.7'	+46.8'	132.2°	45°17.1'	+47.5'	132.9°	0
1	49°53.9'	+42.2'	126.9°	49°17.5'	+43.1'	127.9°	48°40.3'	+44.0'	128.8°	48°02.4'	+44.8'	129.6°	47°23.8'	+45.6'	130.5°	46°44.5'	+46.4'	131.3°	46°04.6'	+47.1'	132.1°	1
2	50°36.1'	+41.5'	125.8°	50°00.6'	+42.5'	126.8°	49°24.3'	+43.4'	127.7°	48°47.2'	+44.3'	128.6°	48°09.4'	+45.1'	129.5°	47°30.9'	+45.9'	130.4°	46°51.7'	+46.6'	131.2°	2
3	51°17.7'	+40.8'	124.7°	50°43.1'	+41.8'	125.7°	50°07.7'	+42.8'	126.6°	49°31.5'	+43.7'	127.6°	48°54.5'	+44.6'	128.5°	48°16.8'	+45.4'	129.4°	47°38.3'	+46.2'	130.2°	3
4	51°58.5'	+40.1'	123.5°	51°24.9'	+41.1'	124.5°	50°50.5'	+42.1'	125.5°	50°15.2'	+43.1'	126.5°	49°39.1'	+44.0'	127.5°	49°02.2'	+44.9'	128.4°	48°24.5'	+45.7'	129.3°	4
5	52°38.6'	+39.3'	122.3°	52°06.1'	+40.4'	123.4°	51°32.6'	+41.5'	124.4°	50°58.3'	+42.5'	125.4°	50°23.1'	+43.4'	126.4°	49°47.0'	+44.3'	127.4°	49°10.2'	+45.2'	128.3°	5
6	53°17.9'	+38.5'	121.0°	52°46.5'	+39.7'	122.1°	52°14.1'	+40.7'	123.2°	51°40.7'	+41.8'	124.3°	51°06.5'	+42.8'	125.3°	50°31.3'	+43.7'	126.3°	49°55.4'	+44.6'	127.3°	6
7	53°56.4'	+37.7'	119.7°	53°26.2'	+38.9'	120.9°	52°54.8'	+40.0'	122.0°	52°22.5'	+41.1'	123.1°	51°49.2'	+42.1'	124.2°	51°15.1'	+43.1'	125.2°	50°40.0'	+44.0'	126.2°	7
8	54°34.1'	+36.8'	118.4°	54°05.0'	+38.0'	119.6°	53°34.8'	+39.2'	120.8°	53°03.6'	+40.3'	121.9°	52°31.4'	+41.4'	123.0°	51°58.2'	+42.4'	124.1°	51°24.1'	+43.4'	125.2°	8
9	55°10.8'	+35.8'	117.0°	54°43.0'	+37.1'	118.3°	54°14.0'	+38.3'	119.5°	53°43.9'	+39.5'	120.7°	53°12.8'	+40.7'	121.8°	52°40.6'	+41.7'	123.0°	52°07.5'	+42.8'	124.0°	9
10	55°46.6'	+34.8'	115.6°	55°20.1'	+36.1'	116.9°	54°52.4'	+37.4'	118.2°	54°23.5'	+38.7'	119.4°	53°53.4'	+39.9'	120.6°	53°22.4'	+41.0'	121.8°	52°50.3'	+42.1'	122.9°	10
11	56°21.4'	+33.7'	114.1°	55°56.3'	+35.1'	115.5°	55°29.8'	+36.5'	116.8°	55°02.1'	+37.8'	118.1°	54°33.3'	+39.0'	119.3°	54°03.4'	+40.2'	120.5°	53°32.4'	+41.4'	121.7°	11
12	56°55.2'	+32.6'	112.6°	56°31.4'	+34.1'	114.0°	56°06.3'	+35.5'	115.4°	55°40.0'	+36.9'	116.7°	55°12.4'	+38.2'	118.0°	54°43.6'	+39.4'	119.3°	54°13.7'	+40.6'	120.5°	12
13	57°27.8'	+31.4'	111.1°	57°05.5'	+33.0'	112.5°	56°41.8'	+34.5'	113.9°	56°16.8'	+35.9'	115.3°	55°50.5'	+37.2'	116.6°	55°23.0'	+38.5'	117.9°	54°54.3'	+39.8'	119.2°	13
14	57°59.2'	+30.2'	109.5°	57°38.5'	+31.8'	111.0°	57°16.3'	+33.3'	112.4°	56°52.7'	+34.8'	113.9°	56°27.8'	+36.2'	115.2°	56°01.5'	+37.6'	116.6°	55°34.1'	+38.9'	117.9°	14
15	58°29.4'	+28.9'	107.8°	58°10.3'	+30.6'	109.4°	57°49.6'	+32.2'	110.9°	57°27.5'	+33.7'	112.4°	57°04.0'	+35.2'	113.8°	56°39.1'	+36.6'	115.2°	56°13.0'	+38.0'	116.5°	15
16	58°58.3'	+27.6'	106.2°	58°40.9'	+29.3'	107.7°	58°21.8'	+30.9'	109.3°	58°01.2'	+32.6'	110.8°	57°39.2'	+34.1'	112.3°	57°15.7'	+35.6'	113.7°	56°50.9'	+37.0'	115.1°	16
17	59°25.9'	+26.1'	104.4°	59°10.1'	+27.9'	106.0°	58°52.7'	+29.7'	107.6°	58°33.8'	+31.3'	109.2°	58°13.3'	+32.9'	110.7°	57°51.3'	+34.5'	112.2°	57°27.9'	+36.0'	113.7°	17
18	59°52.0'	+24.7'	102.6°	59°38.1'	+26.5'	104.3°	59°22.4'	+28.3'	105.9°	59°05.1'	+30.0'	107.6°	58°46.2'	+31.7'	109.1°	58°25.8'	+33.3'	110.7°	58°03.9'	+34.9'	112.2°	18
19	60°16.7'	+23.1'	100.8°	60°04.6'	+25.0'	102.5°	59°50.7'	+26.9'	104.2°	59°35.1'	+28.7'	105.9°	59°17.9'	+30.4'	107.5°	58°59.1'	+32.1'	109.1°	58°38.7'	+33.7'	110.6°	19
20	60°39.8'	+21.5'	98.9°	60°29.6'	+23.5'	100.7°	60°17.6'	+25.4'	102.4°	60°03.8'	+27.3'	104.1°	59°48.3'	+29.1'	105.8°	59°31.2'	+30.8'	107.4°	59°12.4'	+32.5'	109.0°	20
21	61°01.3'	+19.8'	97.0°	60°53.1'	+21.9'	98.8°	60°43.0'	+23.8'	100.6°	60°31.1'	+25.8'	102.3°	60°17.4'	+27.6'								

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

**32° 328° LHA**

**Latitude SAME as 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°29.1'	+42.2'	126.9°	47°52.7'	+43.1'	127.8°	47°15.6'	+43.9'	128.7°	46°37.7'	+44.8'	129.5°	45°59.2'	+45.5'	130.3°	45°20.1'	+46.3'	131.1°	44°40.4'	+47.0'	131.8°	0
1	49°11.3'	+41.6'	125.8°	48°35.8'	+42.5'	126.8°	47°59.5'	+43.4'	127.7°	47°22.5'	+44.2'	128.5°	46°44.8'	+45.1'	129.4°	46°06.4'	+45.8'	130.2°	45°27.4'	+46.6'	130.9°	1
2	49°52.9'	+40.9'	124.7°	49°18.3'	+41.9'	125.7°	48°42.9'	+42.8'	126.6°	48°06.7'	+43.7'	127.5°	47°29.8'	+44.5'	128.4°	46°52.2'	+45.4'	129.2°	46°13.9'	+46.1'	130.0°	2
3	50°33.8'	+40.2'	123.6°	50°00.2'	+41.2'	124.6°	49°25.7'	+42.2'	125.5°	48°50.4'	+43.1'	126.5°	48°14.4'	+44.0'	127.4°	47°37.6'	+44.9'	128.3°	47°00.1'	+45.7'	129.1°	3
4	51°14.0'	+39.5'	122.4°	50°41.4'	+40.6'	123.4°	50°07.9'	+41.6'	124.4°	49°33.5'	+42.5'	125.4°	48°58.4'	+43.4'	126.4°	48°22.4'	+44.3'	127.3°	47°45.7'	+45.2'	128.1°	4
5	51°53.5'	+38.7'	121.2°	51°22.0'	+39.8'	122.3°	50°49.5'	+40.9'	123.3°	50°16.1'	+41.9'	124.3°	49°41.8'	+42.9'	125.3°	49°06.7'	+43.8'	126.2°	48°30.9'	+44.6'	127.2°	5
6	52°32.3'	+37.9'	120.0°	52°01.8'	+39.1'	121.1°	51°30.4'	+40.2'	122.1°	50°58.0'	+41.2'	123.2°	50°24.7'	+42.2'	124.2°	49°50.5'	+43.2'	125.2°	49°15.5'	+44.1'	126.1°	6
7	53°10.2'	+37.1'	118.7°	52°40.9'	+38.3'	119.8°	52°10.5'	+39.4'	120.9°	51°39.2'	+40.5'	122.0°	51°06.9'	+41.6'	123.1°	50°33.7'	+42.6'	124.1°	49°59.6'	+43.5'	125.1°	7
8	53°47.3'	+36.2'	117.3°	53°19.1'	+37.4'	118.5°	52°49.9'	+38.6'	119.7°	52°19.7'	+39.8'	120.8°	51°48.4'	+40.9'	121.9°	51°16.2'	+41.9'	123.0°	50°43.1'	+42.9'	124.0°	8
9	54°23.4'	+35.2'	116.0°	53°56.6'	+36.5'	117.2°	53°28.6'	+37.8'	118.4°	52°59.5'	+39.0'	119.6°	52°29.3'	+40.1'	120.7°	51°58.1'	+41.2'	121.8°	51°26.0'	+42.2'	122.9°	9
10	54°58.7'	+34.2'	114.6°	54°33.1'	+35.6'	115.9°	54°06.3'	+36.9'	117.1°	53°38.4'	+38.1'	118.3°	53°09.4'	+39.3'	119.5°	52°39.3'	+40.5'	120.6°	52°08.2'	+41.5'	121.8°	10
11	55°32.9'	+33.2'	113.1°	55°08.7'	+34.6'	114.5°	54°43.2'	+36.0'	115.8°	54°16.6'	+37.3'	117.0°	53°48.7'	+38.5'	118.2°	53°19.8'	+39.7'	119.4°	52°49.8'	+40.8'	120.6°	11
12	56°06.1'	+32.1'	111.7°	55°43.3'	+33.6'	113.0°	55°19.2'	+35.0'	114.4°	54°53.8'	+36.3'	115.7°	54°27.2'	+37.6'	116.9°	53°59.5'	+38.9'	118.2°	53°30.6'	+40.0'	119.4°	12
13	56°38.2'	+30.9'	110.1°	56°16.8'	+32.5'	111.5°	55°54.1'	+33.9'	112.9°	55°30.1'	+35.3'	114.3°	55°04.8'	+36.7'	115.6°	54°38.3'	+38.0'	116.8°	54°10.7'	+39.2'	118.1°	13
14	57°09.1'	+29.7'	108.6°	56°49.3'	+31.3'	110.0°	56°28.1'	+32.8'	111.4°	56°05.5'	+34.3'	112.8°	55°41.5'	+35.7'	114.2°	55°16.3'	+37.1'	115.5°	54°49.9'	+38.4'	116.8°	14
15	57°38.9'	+28.5'	107.0°	57°20.6'	+30.1'	108.4°	57°00.9'	+31.7'	109.9°	56°39.8'	+33.2'	111.3°	56°17.3'	+34.7'	112.7°	55°53.4'	+36.1'	114.1°	55°28.2'	+37.4'	115.4°	15
16	58°07.4'	+27.2'	105.3°	57°50.7'	+28.8'	106.8°	57°32.6'	+30.5'	108.3°	57°13.0'	+32.1'	109.8°	56°51.9'	+33.6'	111.3°	56°29.5'	+35.1'	112.7°	56°05.7'	+36.5'	114.1°	16
17	58°34.5'	+25.8'	103.6°	58°19.6'	+27.5'	105.2°	58°03.1'	+29.2'	106.7°	57°45.1'	+30.9'	108.2°	57°25.5'	+32.5'	109.7°	57°04.6'	+34.0'	111.2°	56°42.2'	+35.5'	112.6°	17
18	59°00.3'	+24.3'	101.9°	58°47.1'	+26.1'	103.5°	58°32.3'	+27.9'	105.1°	58°15.9'	+29.6'	106.6°	57°58.0'	+31.3'	108.2°	57°38.6'	+32.9'	109.7°	57°17.6'	+34.4'	111.1°	18
19	59°24.6'	+22.8'	100.1°	59°13.3'	+24.7'	101.7°	59°00.2'	+26.5'	103.4°	58°45.6'	+28.3'	105.0°	58°29.3'	+30.0'	106.5°	58°11.4'	+31.7'	108.1°	57°52.0'	+33.2'	109.6°	19
20	59°47.4'	+21.3'	98.2°	59°38.0'	+23.2'	99.9°	59°26.8'	+25.1'	101.6°	59°13.8'	+26.9'	103.3°	58°59.3'	+28.7'	104.9°	58°43.1'	+30.4'	106.5°	58°25.3'	+32.0'	108.0°	20
21	60°08.7'	+19.7'	96.4°	60°01.2'	+21.6'	98.1°	59°51.8'	+23.6'	99.8°	59°40.7'	+25.5'	101.5°	59°27.9'	+27.3'	103.2°	59°13.4'	+29.1'	104.8°	58°57.3'	+30.8'	106.4°	21
22	60°28.4'	+18.0'	94.5°	60°22.8'	+20.0'	96.2°	60°15.4'	+22.0'	98.0°	60°06.2'	+23.9'	99.7°	59°55.2'	+25.8'	101.4°	59°42.5'	+27.7'	103.1°	59°28.1'	+29.5'	104.7°	22
23	60°46.4'	+16.3'	92.5°	60°42.8'	+18.3'	94.3°	60°37.4'	+20.4'	96.1°	60°30.1'	+22.9'	97.8°	60°21.0'	+24.3'	99.6°	60°10.2'	+26.2'	101.3°	59°57.5'	+28.1'	103.0°	23
Dec°	28			29			30			31			32			33			34			Dec°

**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**

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°46.5'	+41.6'	125.9°	47°10.9'	+42.5'	126.7°	46°34.7'	+43.4'	127.6°	45°57.7'	+44.2'	128.4°	45°20.1'	+45.0'	129.2°	44°41.9'	+45.8'	130.0°	44°03.0'	+46.5'	130.7°	0
1	48°28.1'	+41.0'	124.8°	47°53.4'	+41.9'	125.7°	47°18.1'	+42.8'	126.6°	46°41.9'	+43.7'	127.4°	46°05.1'	+44.5'	128.3°	45°27.6'	+45.3'	129.1°	44°49.5'	+46.1'	129.8°	1
2	49°09.1'	+40.3'	123.7°	48°35.4'	+41.3'	124.6°	48°00.9'	+42.3'	125.5°	47°25.6'	+43.1'	126.4°	46°49.6'	+44.0'	127.3°	46°12.9'	+44.8'	128.1°	45°35.6'	+45.6'	128.9°	2
3	49°49.4'	+39.6'	122.5°	49°16.7'	+40.7'	123.5°	48°43.1'	+41.6'	124.5°	48°08.8'	+42.6'	125.4°	47°33.6'	+43.5'	126.3°	46°57.8'	+44.3'	127.2°	46°21.2'	+45.1'	128.0°	3
4	50°29.0'	+38.9'	121.4°	49°57.4'	+40.0'	122.4°	49°24.8'	+41.0'	123.4°	48°51.4'	+42.0'	124.3°	48°17.1'	+42.9'	125.3°	47°42.1'	+43.8'	126.2°	47°06.3'	+44.6'	127.0°	4
5	51°08.0'	+38.2'	120.2°	50°37.3'	+39.3'	121.2°	50°05.8'	+40.3'	122.2°	49°33.3'	+41.3'	123.2°	49°00.0'	+42.3'	124.2°	48°25.9'	+43.2'	125.1°	47°50.9'	+44.1'	126.1°	5
6	51°46.1'	+37.4'	118.9°	51°16.6'	+38.5'	120.0°	50°46.1'	+39.6'	121.1°	50°14.7'	+40.7'	122.1°	49°42.3'	+41.7'	123.1°	49°09.1'	+42.6'	124.1°	48°35.1'	+43.6'	125.0°	6
7	52°23.5'	+36.5'	117.6°	51°55.1'	+37.7'	118.8°	51°25.7'	+38.9'	119.9°	50°55.3'	+40.0'	121.0°	50°24.0'	+41.0'	122.0°	49°51.8'	+42.0'	123.0°	49°18.6'	+43.0'	124.0°	7
8	53°00.0'	+35.6'	116.3°	52°32.8'	+36.9'	117.5°	52°04.6'	+38.1'	118.7°	51°35.3'	+39.2'	119.8°	51°05.0'	+40.3'	120.8°	50°33.8'	+41.4'	121.9°	50°01.6'	+42.4'	122.9°	8
9	53°35.6'	+34.7'	115.0°	53°09.7'	+36.0'	116.2°	52°42.6'	+37.2'	117.4°	52°14.5'	+38.4'	118.5°	51°45.3'	+39.6'	119.7°	51°15.1'	+40.7'	120.7°	50°44.0'	+41.7'	121.8°	9
10	54°10.3'	+33.7'	113.6°	53°45.7'	+35.1'	114.9°	53°19.9'	+36.4'	116.1°	52°52.9'	+37.6'	117.3°	52°24.9'	+38.8'	118.4°	51°55.8'	+39.9'	119.6°	51°25.7'	+41.0'	120.7°	10
11	54°44.0'	+32.7'	112.2°	54°20.7'	+34.1'	113.5°	53°56.2'	+35.4'	114.7°	53°30.5'	+36.7'	116.0°	53°03.7'	+38.0'	117.2°	52°35.7'	+39.2'	118.3°	52°06.7'	+40.3'	119.5°	11
12	55°16.7'	+31.6'	110.7°	54°54.8'	+33.1'	112.1°	54°31.7'	+34.5'	113.4°	54°07.2'	+35.8'	114.6°	53°41.6'	+37.1'	115.9°	53°14.9'	+38.3'	117.1°	52°47.0'	+39.5'	118.3°	12
13	55°48.3'	+30.5'	109.2°	55°27.9'	+32.0'	110.6°	55°06.1'	+33.4'	111.9°	54°43.1'	+34.8'	113.3°	54°18.7'	+36.2'	114.5°	53°53.2'	+37.5'	115.8°	53°26.6'	+38.7'	117.0°	13
14	56°18.8'	+29.3'	107.7°	55°59.9'	+30.9'	109.1°	55°39.5'	+32.4'	110.5°	55°17.9'	+33.8'	111.8°	54°54.9'	+35.2'	113.2°	54°30.7'	+36.6'	114.5°	54°05.3'	+37.9'	115.7°	14
15	56°48.1'	+28.1'	106.1°	56°30.7'	+29.7'	107.5°	56°11.9'	+31.2'	109.0°	55°51.7'	+32.8'	110.4°	55°30.2'	+34.2'	111.7°	55°07.3'	+35.6'	113.1°	54°43.1'	+37.0'	114.4°	15
16	57°16.2'	+26.8'	104.5°	57°00.4'	+28.4'	106.0°	56°43.2'	+30.1'	107.4°	56°24.5'	+31.6'	108.9°	56°04.4'	+33.1'	110.3°	55°42.9'	+34.6'	111.7°	55°20.1'	+36.0'	113.0°	16
17	57°42.9'	+25.4'	102.8°	57°28.8'	+27.2'	104.3°	57°13.2'	+28.8'	105.8°	56°56.1'	+30.5'	107.3°	56°37.5'	+32.0'	108.8°	56°17.5'	+33.5'	110.2°	55°56.1'	+35.0'	111.6°	17
18	58°08.4'	+24.0'	101.1°	57°56.0'	+25.8'	102.7°	57°42.1'	+27.5'	104.2°	57°26.6'	+29.2'	105.7°	57°09.5'	+30.8'	107.2°	56°51.0'	+32.4'	108.7°	56°31.1'	+33.9'	110.1°	18
19	58°32.4'	+22.6'	99.4°	58°21.8'	+24.4'	101.0°	58°09.6'	+26.2'	102.5°	57°55.8'	+27.9'	104.1°	57°40.4'	+29.6'	105.6°	57°23.4'	+31.2'	107.1°	57°05.0'	+32.8'	108.6°	19
20	58°55.0'	+21.1'	97.6°	58°46.2'	+23.0'	99.2°	58°35.8'	+24.8'	100.8°	58°23.7'	+26.6'	102.4°	58°10.0'	+28.3'	104.0°	57°54.7'	+30.0'	105.5°	57°37.8'	+31.6'	107.1°	20
21	59°16.0'	+19.5'	95.7°	59°09.2'	+21.4'	97.4°	59°00.6'	+23.3'	99.1°	58°50.3'	+25.2'											

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

34° 326° LHA

Latitude SAME as 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°03.2'	+41.0'	124.8°	46°28.6'	+42.0'	125.7°	45°53.2'	+42.8'	126.5°	45°17.1'	+43.7'	127.4°	44°40.4'	+44.5'	128.2°	44°03.0'	+45.2'	128.9°	43°25.0'	+46.0'	129.7°	0
1	47°44.3'	+40.4'	123.8°	47°10.6'	+41.4'	124.7°	46°36.0'	+42.3'	125.5°	46°00.8'	+43.2'	126.4°	45°24.9'	+44.0'	127.2°	44°48.3'	+44.8'	128.0°	44°11.0'	+45.6'	128.8°	1
2	48°24.7'	+39.8'	122.7°	47°51.9'	+40.8'	123.6°	47°18.3'	+41.7'	124.5°	46°44.0'	+42.6'	125.4°	46°08.9'	+43.5'	126.2°	45°33.1'	+44.3'	127.1°	44°56.6'	+45.1'	127.9°	2
3	49°04.5'	+39.1'	121.5°	48°32.7'	+40.1'	122.5°	48°00.0'	+41.1'	123.4°	47°26.6'	+42.0'	124.3°	46°52.3'	+42.9'	125.2°	46°17.4'	+43.8'	126.1°	45°41.7'	+44.6'	126.9°	3
4	49°43.6'	+38.4'	120.4°	49°12.8'	+39.4'	121.4°	48°41.1'	+40.5'	122.3°	48°08.6'	+41.4'	123.3°	47°35.3'	+42.4'	124.2°	47°01.2'	+43.3'	125.1°	46°26.3'	+44.1'	126.0°	4
5	50°21.9'	+37.6'	119.2°	49°52.2'	+38.7'	120.2°	49°21.6'	+39.8'	121.2°	48°50.1'	+40.8'	122.2°	48°17.7'	+41.8'	123.1°	47°44.5'	+42.7'	124.1°	47°10.5'	+43.6'	125.0°	5
6	50°59.5'	+36.8'	117.9°	50°30.9'	+38.0'	119.0°	50°01.4'	+39.1'	120.0°	49°30.9'	+40.1'	121.1°	48°59.4'	+41.1'	122.1°	48°27.2'	+42.1'	123.0°	47°54.1'	+43.1'	123.9°	6
7	51°36.3'	+36.0'	116.7°	51°08.9'	+37.2'	117.8°	50°40.4'	+38.3'	118.9°	50°11.0'	+39.4'	119.9°	49°40.6'	+40.5'	120.9°	49°09.3'	+41.5'	121.9°	48°37.1'	+42.5'	122.9°	7
8	52°12.3'	+35.1'	115.4°	51°46.1'	+36.3'	116.5°	51°18.8'	+37.5'	117.6°	50°50.4'	+38.7'	118.7°	50°21.1'	+39.8'	119.8°	49°50.8'	+40.8'	120.8°	49°19.6'	+41.9'	121.8°	8
9	52°47.4'	+34.2'	114.0°	52°22.4'	+35.5'	115.2°	51°56.3'	+36.7'	116.4°	51°29.1'	+37.9'	117.5°	51°00.9'	+39.1'	118.6°	50°31.6'	+40.2'	119.7°	50°01.5'	+41.2'	120.7°	9
10	53°21.6'	+33.2'	112.7°	52°57.9'	+34.6'	113.9°	52°33.0'	+35.8'	115.1°	52°07.0'	+37.1'	116.3°	51°39.9'	+38.3'	117.4°	51°11.8'	+39.4'	118.5°	50°42.7'	+40.5'	119.6°	10
11	53°54.8'	+32.2'	111.3°	53°32.4'	+33.6'	112.5°	53°08.8'	+34.9'	113.8°	52°44.1'	+36.2'	115.0°	52°18.2'	+37.5'	116.1°	51°51.2'	+38.7'	117.3°	51°23.2'	+39.8'	118.4°	11
12	54°27.0'	+31.1'	109.8°	54°06.0'	+32.6'	111.1°	53°43.8'	+34.0'	112.4°	53°20.3'	+35.3'	113.6°	52°55.7'	+36.6'	114.9°	52°29.9'	+37.8'	116.0°	52°03.0'	+39.0'	117.2°	12
13	54°58.2'	+30.0'	108.3°	54°38.6'	+31.5'	109.7°	54°17.8'	+33.0'	111.0°	53°55.6'	+34.4'	112.3°	53°32.3'	+35.7'	113.5°	53°07.7'	+37.0'	114.8°	52°42.0'	+38.2'	116.0°	13
14	55°28.2'	+28.9'	106.8°	55°10.1'	+30.4'	108.2°	54°50.7'	+31.9'	109.6°	54°30.0'	+33.4'	110.9°	54°08.0'	+34.8'	112.2°	53°44.7'	+36.1'	113.4°	53°20.3'	+37.4'	114.7°	14
15	55°57.1'	+27.7'	105.3°	55°40.6'	+29.3'	106.7°	55°22.6'	+30.8'	108.1°	55°03.4'	+32.3'	109.4°	54°42.7'	+33.8'	110.8°	54°20.8'	+35.1'	112.1°	53°57.6'	+36.5'	113.4°	15
16	56°24.8'	+26.4'	103.7°	56°09.8'	+28.1'	105.1°	55°53.5'	+29.7'	106.6°	55°35.7'	+31.2'	108.0°	55°16.5'	+32.7'	109.3°	54°56.0'	+34.2'	110.7°	54°34.1'	+35.5'	112.0°	16
17	56°51.2'	+25.1'	102.0°	56°37.9'	+26.8'	103.5°	56°23.1'	+28.5'	105.0°	56°06.9'	+30.1'	106.4°	55°49.2'	+31.6'	107.8°	55°30.1'	+33.1'	109.2°	55°09.7'	+34.6'	110.6°	17
18	57°16.3'	+23.8'	100.4°	57°04.7'	+25.5'	101.9°	56°51.6'	+27.2'	103.4°	56°36.9'	+28.9'	104.9°	56°20.8'	+30.5'	106.3°	56°03.2'	+32.0'	107.8°	55°44.2'	+33.5'	109.2°	18
19	57°40.1'	+22.3'	98.7°	57°30.2'	+24.1'	100.2°	57°18.8'	+25.9'	101.8°	57°05.8'	+27.6'	103.3°	56°51.3'	+29.3'	104.8°	56°35.2'	+30.9'	106.2°	56°17.7'	+32.4'	107.7°	19
20	58°02.4'	+20.9'	96.9°	57°54.4'	+22.7'	98.5°	57°44.7'	+24.5'	100.1°	57°33.4'	+26.3'	101.6°	57°20.5'	+28.0'	103.2°	57°06.1'	+29.7'	104.7°	56°50.2'	+31.3'	106.1°	20
21	58°23.3'	+19.4'	95.1°	58°17.1'	+21.3'	96.8°	58°09.2'	+23.1'	98.4°	57°59.7'	+24.9'	99.9°	57°48.5'	+26.7'	101.5°	57°35.8'	+28.4'	103.0°	57°21.4'	+30.1'	104.6°	21
22	58°42.7'	+17.8'	93.3°	58°38.4'	+19.7'	95.0°	58°32.3'	+21.6'	96.6°	58°24.6'	+23.5'	98.2°	58°15.2'	+25.3'	99.8°	58°04.1'	+27.1'	101.4°	57°51.5'	+28.8'	103.0°	22
23	59°00.5'	+16.2'	91.5°	58°58.1'	+18.2'	93.1°	58°53.9'	+20.1'	94.8°	58°48.1'	+22.0'	96.4°	58°40.5'	+23.9'	98.1°	58°31.2'	+25.7'	99.7°	58°20.3'	+27.5'	101.3°	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

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°19.5'	+40.5'	123.8°	45°45.7'	+41.4'	124.7°	45°11.2'	+42.3'	125.5°	44°36.0'	+43.1'	126.3°	44°00.1'	+44.0'	127.1°	43°23.6'	+44.8'	127.9°	42°46.4'	+45.5'	128.6°	0
1	47°00.0'	+39.9'	122.8°	46°27.1'	+40.8'	123.7°	45°53.5'	+41.7'	124.5°	45°19.1'	+42.6'	125.4°	44°44.1'	+43.5'	126.2°	44°08.3'	+44.3'	127.0°	43°31.9'	+45.1'	127.7°	1
2	47°39.9'	+39.2'	121.7°	47°08.0'	+40.2'	122.6°	46°35.2'	+41.2'	123.5°	46°01.8'	+42.1'	124.3°	45°27.6'	+43.0'	125.2°	44°52.6'	+43.8'	126.0°	44°17.0'	+44.6'	126.8°	2
3	48°19.1'	+38.5'	120.5°	47°48.2'	+39.6'	121.5°	47°16.4'	+40.6'	122.4°	46°43.9'	+41.5'	123.3°	46°10.5'	+42.4'	124.2°	45°36.4'	+43.3'	125.0°	45°01.6'	+44.1'	125.9°	3
4	48°57.6'	+37.8'	119.4°	48°27.7'	+38.9'	120.4°	47°57.0'	+39.9'	121.3°	47°25.4'	+40.9'	122.3°	46°52.9'	+41.9'	123.2°	46°19.7'	+42.8'	124.0°	45°45.8'	+43.6'	124.9°	4
5	49°35.4'	+37.1'	118.2°	49°06.6'	+38.2'	119.2°	48°36.9'	+39.3'	120.2°	48°06.3'	+40.3'	121.2°	47°34.8'	+41.3'	122.1°	47°02.5'	+42.2'	123.0°	46°29.4'	+43.1'	123.9°	5
6	50°12.5'	+36.3'	117.0°	49°44.8'	+37.4'	118.0°	49°16.2'	+38.5'	119.0°	48°46.6'	+39.6'	120.0°	48°16.1'	+40.6'	121.0°	47°44.7'	+41.6'	122.0°	47°12.6'	+42.6'	122.9°	6
7	50°48.8'	+35.5'	115.7°	50°22.3'	+36.7'	116.8°	49°54.7'	+37.8'	117.9°	49°26.2'	+38.9'	118.9°	48°56.7'	+40.0'	119.9°	48°26.4'	+41.0'	120.9°	47°55.1'	+42.0'	121.8°	7
8	51°24.3'	+34.6'	114.4°	50°58.9'	+35.8'	115.6°	50°32.5'	+37.0'	116.7°	50°05.1'	+38.2'	117.7°	49°36.7'	+39.3'	118.8°	49°07.4'	+40.3'	119.8°	48°37.1'	+41.4'	120.8°	8
9	51°58.9'	+33.7'	113.1°	51°34.7'	+35.0'	114.3°	51°09.5'	+36.2'	115.4°	50°43.3'	+37.4'	116.5°	50°16.0'	+38.6'	117.6°	49°47.7'	+39.7'	118.6°	49°18.5'	+40.7'	119.7°	9
10	52°32.5'	+32.7'	111.8°	52°09.7'	+34.1'	113.0°	51°45.8'	+35.4'	114.1°	51°20.7'	+36.6'	115.3°	50°54.5'	+37.8'	116.4°	50°27.4'	+38.9'	117.5°	49°59.2'	+40.0'	118.5°	10
11	53°05.3'	+31.7'	110.4°	52°43.8'	+33.1'	111.6°	52°21.1'	+34.5'	112.8°	51°57.3'	+35.7'	114.0°	51°32.3'	+37.0'	115.1°	51°06.3'	+38.2'	116.3°	50°39.2'	+39.3'	117.4°	11
12	53°37.0'	+30.7'	108.9°	53°16.9'	+32.1'	110.2°	52°55.6'	+33.5'	111.5°	52°33.0'	+34.9'	112.7°	52°09.3'	+36.1'	113.9°	51°44.5'	+37.4'	115.0°	51°18.6'	+38.6'	116.2°	12
13	54°07.7'	+29.6'	107.5°	53°49.1'	+31.1'	108.8°	53°29.1'	+32.5'	110.1°	53°07.9'	+33.9'	111.3°	52°45.5'	+35.2'	112.6°	52°21.9'	+36.5'	113.8°	51°57.1'	+37.8'	114.9°	13
14	54°37.4'	+28.5'	106.0°	54°20.2'	+30.0'	107.3°	54°01.6'	+31.5'	108.7°	53°41.8'	+32.9'	109.9°	53°20.7'	+34.3'	111.2°	52°58.4'	+35.6'	112.5°	52°34.9'	+36.9'	113.7°	14
15	55°05.9'	+27.3'	104.5°	54°50.2'	+28.9'	105.8°	54°33.1'	+30.4'	107.2°	54°14.7'	+31.9'	108.5°	53°55.0'	+33.3'	109.8°	53°34.0'	+34.7'	111.1°	53°11.8'	+36.0'	112.4°	15
16	55°33.2'	+26.1'	102.9°	55°19.1'	+27.7'	104.3°	55°03.6'	+29.3'	105.7°	54°46.6'	+30.8'	107.1°	54°28.3'	+32.3'	108.4°	54°08.7'	+33.7'	109.7°	53°47.9'	+35.1'	111.0°	16
17	55°59.3'	+24.8'	101.3°	55°46.8'	+26.5'	102.7°	55°32.8'	+28.1'	104.2°	55°17.4'	+29.7'	105.6°	55°00.6'	+31.2'	106.9°	54°42.5'	+32.7'	108.3°	54°23.0'	+34.1'	109.6°	17
18	56°24.1'	+23.5'	99.7°	56°13.3'	+25.2'	101.1°	56°01.0'	+26.9'	102.6°	55°47.1'	+28.5'	104.0°	55°31.9'	+30.1'	105.5°	55°15.2'	+31.6'	106.8°	54°57.1'	+33.1'	108.2°	18
19	56°47.7'	+22.1'	98.0°	56°38.5'	+23.9'	99.5°	56°27.9'	+25.6'	101.0°	56°15.7'	+27.3'	102.5°	56°02.0'	+28.9'	103.9°	55°46.8'	+30.5'	105.3°	55°30.2'	+32.0'	106.7°	19
20	57°09.8'	+20.7'	96.3°	57°02.4'	+22.5'	97.8°	56°53.5'	+24.3'	99.3°	56°42.9'	+26.0'	100.8°	56°30.9'	+27.7'	102.3°	56°17.3'	+29.3'	103.8°				

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

**36° 324° LHA**

**Latitude SAME as 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°35.2'	+40.0'	122.9°	45°02.3'	+40.9'	123.7°	44°28.7'	+41.8'	124.5°	43°54.3'	+42.6'	125.3°	43°19.3'	+43.5'	126.1°	42°43.6'	+44.3'	126.9°	42°07.3'	+45.0'	127.6°	0
1	46°15.2'	+39.3'	121.8°	45°43.2'	+40.3'	122.7°	45°10.4'	+41.2'	123.5°	44°36.9'	+42.1'	124.4°	44°02.7'	+43.0'	125.2°	43°27.8'	+43.8'	125.9°	42°52.3'	+44.6'	126.7°	1
2	46°54.5'	+38.7'	120.7°	46°23.5'	+39.7'	121.6°	45°51.7'	+40.7'	122.5°	45°19.1'	+41.6'	123.3°	44°45.7'	+42.5'	124.2°	44°11.7'	+43.3'	125.0°	43°36.9'	+44.1'	125.8°	2
3	47°33.2'	+38.0'	119.6°	47°03.2'	+39.0'	120.5°	46°32.3'	+40.0'	121.4°	46°00.6'	+41.0'	122.3°	45°28.2'	+41.9'	123.2°	44°55.0'	+42.8'	124.0°	44°21.1'	+43.7'	124.8°	3
4	48°11.2'	+37.3'	118.4°	47°42.2'	+38.4'	119.4°	47°12.4'	+39.4'	120.3°	46°41.6'	+40.4'	121.3°	46°10.1'	+41.4'	122.1°	45°37.8'	+42.3'	123.0°	45°04.7'	+43.2'	123.9°	4
5	48°48.5'	+36.6'	117.2°	48°20.6'	+37.7'	118.2°	47°51.8'	+38.7'	119.2°	47°22.0'	+39.8'	120.2°	46°51.5'	+40.8'	121.1°	46°20.1'	+41.7'	122.0°	45°47.9'	+42.6'	122.9°	5
6	49°25.1'	+35.8'	116.0°	48°58.3'	+36.9'	117.1°	48°30.5'	+38.0'	118.1°	48°01.8'	+39.1'	119.1°	47°32.2'	+40.1'	120.0°	47°01.8'	+41.1'	120.9°	46°30.5'	+42.1'	121.9°	6
7	50°00.9'	+35.0'	114.8°	49°35.2'	+36.2'	115.9°	49°08.6'	+37.3'	116.9°	48°40.9'	+38.4'	117.9°	48°12.4'	+39.5'	118.9°	47°42.9'	+40.5'	119.9°	47°12.6'	+41.5'	120.8°	7
8	50°35.8'	+34.1'	113.5°	50°11.4'	+35.4'	114.6°	49°45.9'	+36.5'	115.7°	49°19.4'	+37.7'	116.7°	48°51.9'	+38.8'	117.8°	48°23.5'	+39.9'	118.8°	47°54.1'	+40.9'	119.7°	8
9	51°10.0'	+33.2'	112.2°	50°46.7'	+34.5'	113.3°	50°22.4'	+35.7'	114.5°	49°57.1'	+36.9'	115.5°	49°30.7'	+38.1'	116.6°	49°03.3'	+39.2'	117.6°	48°35.0'	+40.3'	118.6°	9
10	51°43.2'	+32.3'	110.9°	51°21.2'	+33.6'	112.0°	50°58.2'	+34.9'	113.2°	50°34.0'	+36.1'	114.3°	50°08.8'	+37.3'	115.4°	49°42.5'	+38.5'	116.5°	49°15.3'	+39.6'	117.5°	10
11	52°15.5'	+31.3'	109.5°	51°54.9'	+32.7'	110.7°	51°33.1'	+34.0'	111.9°	51°10.1'	+35.3'	113.0°	50°46.1'	+36.5'	114.2°	50°21.0'	+37.7'	115.3°	49°54.9'	+38.9'	116.4°	11
12	52°46.8'	+30.3'	108.1°	52°27.5'	+31.7'	109.3°	52°07.1'	+33.1'	110.6°	51°45.4'	+34.4'	111.7°	51°22.6'	+35.7'	112.9°	50°58.7'	+36.9'	114.1°	50°33.7'	+38.1'	115.2°	12
13	53°17.1'	+29.2'	106.7°	52°59.3'	+30.7'	107.9°	52°40.2'	+32.1'	109.2°	52°19.8'	+33.5'	110.4°	51°58.3'	+34.8'	111.6°	51°35.6'	+36.1'	112.8°	51°11.8'	+37.3'	113.9°	13
14	53°46.3'	+28.1'	105.2°	53°30.0'	+29.6'	106.5°	53°12.3'	+31.1'	107.8°	52°53.3'	+32.5'	109.0°	52°33.1'	+33.9'	110.3°	52°11.7'	+35.2'	111.5°	51°49.1'	+36.5'	112.7°	14
15	54°14.5'	+27.0'	103.7°	53°59.6'	+28.5'	105.0°	53°43.4'	+30.1'	106.4°	53°25.8'	+31.5'	107.6°	53°07.0'	+32.9'	108.9°	52°46.9'	+34.3'	110.2°	52°25.6'	+35.6'	111.4°	15
16	54°41.5'	+25.8'	102.2°	54°28.2'	+27.4'	103.5°	54°13.4'	+28.9'	104.9°	53°57.3'	+30.5'	106.2°	53°39.9'	+31.9'	107.5°	53°21.2'	+33.3'	108.8°	53°01.3'	+34.7'	110.1°	16
17	55°07.3'	+24.6'	100.6°	54°55.5'	+26.2'	102.0°	54°42.4'	+27.8'	103.4°	54°27.8'	+29.4'	104.7°	54°11.9'	+30.9'	106.1°	53°54.6'	+32.3'	107.4°	53°36.0'	+33.8'	108.7°	17
18	55°31.9'	+23.3'	99.0°	55°21.8'	+25.0'	100.4°	55°10.2'	+26.6'	101.8°	54°57.2'	+28.2'	103.2°	54°42.7'	+29.8'	104.6°	54°26.9'	+31.3'	106.0°	54°09.7'	+32.8'	107.3°	18
19	55°55.1'	+22.0'	97.3°	55°46.7'	+23.7'	98.8°	55°36.8'	+25.4'	100.3°	55°25.4'	+27.0'	101.7°	55°12.5'	+28.6'	103.1°	54°58.2'	+30.2'	104.5°	54°42.5'	+31.7'	105.9°	19
20	56°17.1'	+20.6'	95.7°	56°10.4'	+22.3'	97.2°	56°02.1'	+24.1'	98.6°	55°52.4'	+25.8'	100.1°	55°41.1'	+27.4'	101.5°	55°28.4'	+29.0'	103.0°	55°14.2'	+30.6'	104.4°	20
21	56°37.7'	+19.2'	94.0°	56°32.7'	+21.0'	95.5°	56°26.2'	+22.7'	97.0°	56°18.1'	+24.5'	98.5°	56°08.5'	+26.2'	100.0°	55°57.4'	+27.8'	101.4°	55°44.8'	+29.4'	102.9°	21
22	56°56.9'	+17.7'	92.2°	56°53.7'	+19.5'	93.8°	56°48.9'	+21.3'	95.3°	56°42.6'	+23.1'	96.8°	56°34.7'	+24.9'	98.3°	56°25.2'	+26.6'	99.8°	56°14.2'	+28.2'	101.3°	22
23	57°14.6'	+16.2'	90.5°	57°13.2'	+18.1'	92.0°	57°10.3'	+19.9'	93.6°	57°05.7'	+21.7'	95.1°	56°59.6'	+23.5'	96.7°	56°51.8'	+25.3'	98.2°	56°42.5'	+27.0'	99.7°	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**

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°50.5'	+39.4'	121.9°	44°18.4'	+40.4'	122.8°	43°45.6'	+41.3'	123.6°	43°12.1'	+42.1'	124.4°	42°37.9'	+43.0'	125.1°	42°03.1'	+43.8'	125.9°	41°27.6'	+44.6'	126.6°	0
1	45°29.9'	+38.8'	120.9°	44°58.8'	+39.8'	121.7°	44°26.9'	+40.7'	122.6°	43°54.2'	+41.6'	123.4°	43°20.9'	+42.5'	124.2°	42°46.8'	+43.3'	124.9°	42°12.2'	+44.1'	125.7°	1
2	46°08.8'	+38.2'	119.8°	45°38.6'	+39.2'	120.7°	45°07.6'	+40.2'	121.5°	44°35.8'	+41.1'	122.4°	44°03.4'	+42.0'	123.2°	43°30.2'	+42.8'	124.0°	42°56.3'	+43.7'	124.8°	2
3	46°46.9'	+37.5'	118.6°	46°17.8'	+38.5'	119.6°	45°47.7'	+39.5'	120.5°	45°16.9'	+40.5'	121.3°	44°45.3'	+41.4'	122.2°	44°13.0'	+42.3'	123.0°	43°40.0'	+43.2'	123.8°	3
4	47°24.4'	+36.8'	117.5°	46°56.3'	+37.9'	118.4°	46°27.3'	+38.9'	119.4°	45°57.4'	+39.9'	120.3°	45°26.8'	+40.9'	121.2°	44°55.4'	+41.8'	122.0°	44°23.2'	+42.7'	122.9°	4
5	48°01.2'	+36.1'	116.3°	47°34.2'	+37.2'	117.3°	47°06.2'	+38.3'	118.3°	46°37.4'	+39.3'	119.2°	46°07.7'	+40.3'	120.1°	45°37.2'	+41.3'	121.0°	45°05.9'	+42.2'	121.9°	5
6	48°37.3'	+35.3'	115.1°	48°11.4'	+36.5'	116.1°	47°44.5'	+37.6'	117.1°	47°16.7'	+38.6'	118.1°	46°48.0'	+39.7'	119.0°	46°18.4'	+40.7'	120.0°	45°48.1'	+41.6'	120.8°	6
7	49°12.6'	+34.5'	113.9°	48°47.8'	+35.7'	114.9°	48°22.0'	+36.8'	116.0°	47°55.3'	+38.0'	117.0°	47°27.6'	+39.0'	117.9°	46°59.1'	+40.1'	118.9°	46°29.7'	+41.0'	119.8°	7
8	49°47.1'	+33.7'	112.6°	49°23.5'	+34.9'	113.7°	48°58.9'	+36.1'	114.8°	48°33.2'	+37.2'	115.8°	48°06.7'	+38.3'	116.8°	47°39.1'	+39.4'	117.8°	47°10.7'	+40.4'	118.7°	8
9	50°20.8'	+32.8'	111.3°	49°58.4'	+34.1'	112.4°	49°35.0'	+35.3'	113.5°	49°10.5'	+36.5'	114.6°	48°45.0'	+37.6'	115.6°	48°18.6'	+38.7'	116.7°	47°51.2'	+39.8'	117.6°	9
10	50°53.5'	+31.9'	110.0°	50°32.4'	+33.2'	111.2°	50°10.2'	+34.5'	112.3°	49°47.0'	+35.7'	113.4°	49°22.6'	+36.9'	114.5°	48°57.3'	+38.0'	115.5°	48°31.0'	+39.1'	116.5°	10
11	51°25.4'	+30.9'	108.7°	51°05.6'	+32.3'	109.8°	50°44.7'	+33.6'	111.0°	50°22.6'	+34.9'	112.1°	49°59.5'	+36.1'	113.2°	49°35.3'	+37.3'	114.3°	49°10.1'	+38.4'	115.4°	11
12	51°56.3'	+29.9'	107.3°	51°37.9'	+31.3'	108.5°	51°18.3'	+32.7'	109.7°	50°57.5'	+34.0'	110.8°	50°35.6'	+35.3'	112.0°	50°12.6'	+36.5'	113.1°	49°48.5'	+37.7'	114.2°	12
13	52°26.2'	+28.9'	105.9°	52°09.2'	+30.3'	107.1°	51°51.0'	+31.7'	108.3°	51°31.5'	+33.1'	109.5°	51°10.9'	+34.4'	110.7°	50°49.1'	+35.7'	111.9°	50°26.2'	+36.9'	113.0°	13
14	52°55.1'	+27.8'	104.4°	52°39.5'	+29.3'	105.7°	52°22.7'	+30.7'	106.9°	52°04.6'	+32.1'	108.2°	51°45.3'	+33.5'	109.4°	51°24.7'	+34.8'	110.6°	51°03.1'	+36.1'	111.7°	14
15	53°22.9'	+26.7'	102.9°	53°08.8'	+28.2'	104.2°	52°53.4'	+29.7'	105.5°	52°36.7'	+31.1'	106.8°	52°18.7'	+32.6'	108.0°	51°59.6'	+33.9'	109.3°	51°39.2'	+35.2'	110.5°	15
16	53°49.6'	+25.5'	101.4°	53°37.1'	+27.1'	102.8°	53°23.1'	+28.6'	104.1°	53°07.9'	+30.1'	105.4°	52°51.3'	+31.6'	106.7°	52°33.5'	+33.0'	107.9°	52°14.4'	+34.3'	109.1°	16
17	54°15.2'	+24.3'	99.9°	54°04.1'	+25.9'	101.3°	53°51.7'	+27.5'	102.6°	53°38.0'	+29.0'	103.9°	53°22.9'	+30.5'	105.2°	53°06.4'	+32.0'	106.5°	52°48.7'	+33.4'	107.8°	17
18	54°39.5'	+23.1'	98.3°	54°30.1'	+24.7'	99.7°	54°19.3'	+26.3'	101.1°	54°07.0'	+27.9'	102.4°	53°53.4'	+29.5'	103.8°	53°38.4'	+31.0'	105.1°	53°22.1'	+32.4'	106.4°	18
19	55°02.6'	+21.8'	96.7°	54°54.8'	+23.5'	98.1°	54°45.6'	+25.1'	99.5°	54°34.9'	+26.8'	100.9°	54°22.9'	+28.3'	102.3°	54°09.4'	+29.9'	103.7°	53°54.5'	+31.4'	105.0°	19
20	55°24.4'	+20.5'	95.1°	55°18.3'	+22.2'	96.5°	55°10.7'	+23.9'	98.0°	55°01.7'	+25.5'	99.4°	54°51.2'	+27.2'	100.8°							

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

**38° 322° LHA**

**Latitude SAME as 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°05.3'	+38.9'	121.0°	43°34.1'	+39.9'	121.8°	43°02.1'	+40.8'	122.6°	42°29.4'	+41.7'	123.4°	41°56.0'	+42.5'	124.1°	41°22.0'	+43.3'	124.9°	40°47.4'	+44.1'	125.6°	0
1	44°44.2'	+38.3'	119.9°	44°13.9'	+39.3'	120.8°	43°42.8'	+40.2'	121.6°	43°11.0'	+41.1'	122.4°	42°38.5'	+42.0'	123.2°	42°05.3'	+42.9'	124.0°	41°31.5'	+43.7'	124.7°	1
2	45°22.6'	+37.7'	118.8°	44°53.2'	+38.7'	119.7°	44°23.1'	+39.7'	120.6°	43°52.2'	+40.6'	121.4°	43°20.5'	+41.5'	122.2°	42°48.2'	+42.4'	123.0°	42°15.2'	+43.2'	123.8°	2
3	46°00.2'	+37.0'	117.7°	45°31.9'	+38.1'	118.6°	45°02.7'	+39.1'	119.5°	44°32.8'	+40.0'	120.4°	44°02.1'	+41.0'	121.2°	43°30.6'	+41.9'	122.0°	42°58.4'	+42.7'	122.8°	3
4	46°37.3'	+36.3'	116.6°	46°10.0'	+37.4'	117.5°	45°41.8'	+38.4'	118.4°	45°12.8'	+39.4'	119.3°	44°43.0'	+40.4'	120.2°	44°12.5'	+41.3'	121.0°	43°41.2'	+42.2'	121.9°	4
5	47°13.6'	+35.6'	115.4°	46°47.4'	+36.7'	116.4°	46°20.2'	+37.8'	117.3°	45°52.3'	+38.8'	118.3°	45°23.4'	+39.8'	119.2°	44°53.8'	+40.8'	120.0°	44°23.4'	+41.7'	120.9°	5
6	47°49.2'	+34.8'	114.2°	47°24.1'	+36.0'	115.2°	46°58.0'	+37.1'	116.2°	46°31.1'	+38.2'	117.2°	46°03.3'	+39.2'	118.1°	45°34.6'	+40.2'	119.0°	45°05.1'	+41.2'	119.9°	6
7	48°24.0'	+34.0'	113.0°	48°00.1'	+35.2'	114.0°	47°35.1'	+36.4'	115.0°	47°09.3'	+37.5'	116.0°	46°42.5'	+38.6'	117.0°	46°14.8'	+39.6'	117.9°	45°46.3'	+40.6'	118.8°	7
8	48°58.1'	+33.2'	111.8°	48°35.3'	+34.4'	112.8°	48°11.5'	+35.6'	113.9°	47°46.8'	+36.8'	114.9°	47°21.1'	+37.9'	115.9°	46°54.4'	+39.0'	116.8°	46°26.9'	+40.0'	117.8°	8
9	49°31.3'	+32.4'	110.5°	49°09.7'	+33.6'	111.6°	48°47.2'	+34.9'	112.6°	48°23.5'	+36.0'	113.7°	47°59.0'	+37.2'	114.7°	47°33.4'	+38.3'	115.7°	47°06.9'	+39.4'	116.7°	9
10	50°03.6'	+31.5'	109.2°	49°43.4'	+32.8'	110.3°	49°22.0'	+34.0'	111.4°	48°59.6'	+35.3'	112.5°	48°36.1'	+36.4'	113.5°	48°11.7'	+37.6'	114.6°	47°46.3'	+38.7'	115.6°	10
11	50°35.1'	+30.5'	107.9°	50°16.1'	+31.9'	109.0°	49°56.0'	+33.2'	110.1°	49°34.8'	+34.4'	111.2°	49°12.6'	+35.7'	112.3°	48°49.3'	+36.9'	113.4°	48°25.0'	+38.0'	114.4°	11
12	51°05.6'	+29.6'	106.5°	50°48.0'	+30.9'	107.7°	50°29.2'	+32.3'	108.8°	50°09.3'	+33.6'	110.0°	49°48.3'	+34.9'	111.1°	49°26.1'	+36.1'	112.2°	49°03.0'	+37.3'	113.2°	12
13	51°35.2'	+28.5'	105.1°	51°19.0'	+30.0'	106.3°	51°01.5'	+31.4'	107.5°	50°42.9'	+32.7'	108.7°	50°23.1'	+34.0'	109.8°	50°02.2'	+35.3'	110.9°	49°40.2'	+36.5'	112.0°	13
14	52°03.7'	+27.5'	103.7°	51°48.9'	+29.0'	104.9°	51°32.9'	+30.4'	106.1°	51°15.6'	+31.8'	107.3°	50°57.1'	+33.1'	108.5°	50°37.5'	+34.4'	109.7°	50°16.7'	+35.7'	110.8°	14
15	52°31.2'	+26.4'	102.2°	52°17.9'	+27.9'	103.5°	52°03.3'	+29.4'	104.7°	51°47.4'	+30.8'	106.0°	51°30.3'	+32.2'	107.2°	51°11.9'	+33.5'	108.4°	50°52.4'	+34.9'	109.5°	15
16	52°57.6'	+25.3'	100.7°	52°45.8'	+26.8'	102.0°	52°32.6'	+28.3'	103.3°	52°18.2'	+29.8'	104.6°	52°02.4'	+31.2'	105.8°	51°45.5'	+32.6'	107.0°	51°27.3'	+34.0'	108.2°	16
17	53°22.9'	+24.1'	99.2°	53°12.6'	+25.7'	100.5°	53°01.0'	+27.2'	101.9°	52°48.0'	+28.7'	103.1°	52°33.7'	+30.2'	104.4°	52°18.1'	+31.7'	105.7°	52°01.3'	+33.0'	106.9°	17
18	53°47.0'	+22.9'	97.7°	53°38.3'	+24.5'	99.0°	53°28.2'	+26.1'	100.4°	53°16.7'	+27.7'	101.7°	53°03.9'	+29.2'	103.0°	52°49.8'	+30.6'	104.3°	52°34.3'	+32.1'	105.5°	18
19	54°09.9'	+21.6'	96.1°	54°02.8'	+23.3'	97.5°	53°54.3'	+24.9'	98.8°	53°44.4'	+26.5'	100.2°	53°33.1'	+28.1'	101.5°	53°20.4'	+29.6'	102.8°	53°06.4'	+31.1'	104.1°	19
20	54°31.6'	+20.4'	94.5°	54°26.1'	+22.0'	95.9°	54°19.2'	+23.7'	97.3°	54°10.9'	+25.3'	98.7°	54°01.1'	+26.9'	100.0°	53°50.0'	+28.5'	101.4°	53°37.5'	+30.0'	102.7°	20
21	54°51.9'	+19.0'	92.9°	54°48.2'	+20.7'	94.3°	54°42.9'	+22.4'	95.7°	54°36.2'	+24.1'	97.1°	54°28.1'	+25.8'	98.5°	54°18.5'	+27.4'	99.9°	54°07.5'	+28.9'	101.2°	21
22	55°11.0'	+17.7'	91.2°	55°08.9'	+19.4'	92.7°	55°05.4'	+21.1'	94.1°	55°00.3'	+22.8'	95.5°	54°53.8'	+24.5'	96.9°	54°45.8'	+26.2'	98.3°	54°36.4'	+27.8'	99.7°	22
23	55°28.6'	+16.3'	89.5°	55°28.3'	+18.0'	91.0°	55°26.5'	+19.8'	92.5°	55°23.2'	+21.5'	93.9°	55°18.4'	+23.3'	95.3°	55°12.0'	+24.9'	96.8°	55°04.2'	+26.6'	98.2°	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**

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°19.7'	+38.4'	120.1°	42°49.2'	+39.4'	120.9°	42°18.1'	+40.3'	121.7°	41°46.2'	+41.2'	122.5°	41°13.7'	+42.0'	123.2°	40°40.5'	+42.9'	123.9°	40°06.7'	+43.7'	124.6°	0
1	43°58.1'	+37.8'	119.0°	43°28.6'	+38.8'	119.9°	42°58.4'	+39.8'	120.7°	42°27.4'	+40.7'	121.5°	41°55.7'	+41.6'	122.2°	41°23.4'	+42.4'	123.0°	40°50.4'	+43.2'	123.7°	1
2	44°36.0'	+37.2'	118.0°	44°07.4'	+38.2'	118.8°	43°38.1'	+39.2'	119.7°	43°08.1'	+40.1'	120.5°	42°37.3'	+41.0'	121.3°	42°05.8'	+41.9'	122.0°	41°33.6'	+42.8'	122.8°	2
3	45°13.2'	+36.5'	116.8°	44°45.6'	+37.6'	117.7°	44°17.3'	+38.6'	118.6°	43°48.2'	+39.6'	119.5°	43°18.3'	+40.5'	120.3°	42°47.7'	+41.4'	121.1°	42°16.4'	+42.3'	121.9°	3
4	45°49.7'	+35.9'	115.7°	45°23.2'	+36.9'	116.6°	44°55.9'	+38.0'	117.5°	44°27.8'	+39.0'	118.4°	43°58.8'	+40.0'	119.3°	43°29.1'	+40.9'	120.1°	42°58.7'	+41.8'	120.9°	4
5	46°25.6'	+35.1'	114.6°	46°00.2'	+36.3'	115.5°	45°33.9'	+37.3'	116.4°	45°06.8'	+38.4'	117.3°	44°38.8'	+39.4'	118.2°	44°10.0'	+40.4'	119.1°	43°40.5'	+41.3'	119.9°	5
6	47°00.7'	+34.4'	113.4°	46°36.4'	+35.5'	114.4°	46°11.2'	+36.7'	115.3°	45°45.1'	+37.7'	116.2°	45°18.2'	+38.8'	117.1°	44°50.4'	+39.8'	118.0°	44°21.8'	+40.7'	118.9°	6
7	47°35.1'	+33.6'	112.2°	47°12.0'	+34.8'	113.2°	46°47.9'	+35.9'	114.2°	46°22.9'	+37.1'	115.1°	45°57.0'	+38.1'	116.1°	45°30.2'	+39.2'	117.0°	45°02.5'	+40.2'	117.9°	7
8	48°08.7'	+32.8'	110.9°	47°46.8'	+34.0'	112.0°	47°23.8'	+35.2'	113.0°	47°00.0'	+36.4'	114.0°	46°35.1'	+37.5'	114.9°	46°09.3'	+38.5'	115.9°	45°42.7'	+39.6'	116.8°	8
9	48°41.5'	+32.0'	109.7°	48°20.8'	+33.2'	110.7°	47°59.0'	+34.4'	111.8°	47°36.3'	+35.6'	112.8°	47°12.6'	+36.8'	113.8°	46°47.9'	+37.9'	114.8°	46°22.3'	+38.9'	115.7°	9
10	49°13.5'	+31.1'	108.4°	48°54.0'	+32.4'	109.5°	48°33.5'	+33.6'	110.5°	48°11.9'	+34.9'	111.6°	47°49.3'	+36.0'	112.6°	47°25.8'	+37.2'	113.6°	47°01.2'	+38.3'	114.6°	10
11	49°44.6'	+30.2'	107.1°	49°26.4'	+31.5'	108.2°	49°07.1'	+32.8'	109.3°	48°46.8'	+34.1'	110.4°	48°25.4'	+35.3'	111.4°	48°02.9'	+36.5'	112.5°	47°39.5'	+37.6'	113.5°	11
12	50°14.7'	+29.2'	105.7°	49°57.9'	+30.6'	106.9°	49°39.9'	+31.9'	108.0°	49°20.8'	+33.2'	109.1°	49°00.6'	+34.5'	110.2°	48°39.4'	+35.7'	111.3°	48°17.1'	+36.9'	112.3°	12
13	50°44.0'	+28.2'	104.4°	50°28.5'	+29.6'	105.5°	50°11.8'	+31.0'	106.7°	49°54.0'	+32.3'	107.8°	49°35.1'	+33.6'	108.9°	49°15.1'	+34.9'	110.0°	48°54.0'	+36.1'	111.1°	13
14	51°12.2'	+27.2'	102.9°	50°58.1'	+28.7'	104.2°	50°42.9'	+30.1'	105.3°	50°26.4'	+31.4'	106.5°	50°08.8'	+32.8'	107.7°	49°50.0'	+34.1'	108.8°	49°30.1'	+35.3'	109.9°	14
15	51°39.4'	+26.1'	101.5°	51°26.8'	+27.6'	102.8°	51°12.9'	+29.1'	104.0°	50°57.8'	+30.5'	105.2°	50°41.5'	+31.9'	106.3°	50°24.1'	+33.2'	107.5°	50°05.4'	+34.5'	108.7°	15
16	52°05.5'	+25.0'	100.1°	51°54.4'	+26.6'	101.3°	51°42.0'	+28.1'	102.6°	51°28.3'	+29.5'	103.8°	51°13.4'	+30.9'	105.0°	50°57.3'	+32.3'	106.2°	50°39.9'	+33.6'	107.4°	16
17	52°30.6'	+23.9'	98.6°	52°21.0'	+25.5'	99.9°	52°10.0'	+27.0'	101.1°	51°57.8'	+28.5'	102.4°	51°44.3'	+29.9'	103.6°	51°29.6'	+31.3'	104.8°	51°13.6'	+32.7'	106.1°	17
18	52°54.5'	+22.7'	97.1°	52°46.4'	+24.3'	98.4°	52°37.0'	+25.9'	99.7°	52°26.3'	+27.4'	100.9°	52°14.2'	+28.9'	102.2°	52°00.9'	+30.4'	103.5°	51°46.3'	+31.8'	104.7°	18
19	53°17.2'	+21.5'	95.5°	53°10.8'	+23.1'	96.9°	53°02.9'	+24.7'	98.2°	52°53.7'	+26.3'	99.5°	52°43.1'	+27.8'	100.8°	52°31.3'	+29.3'	102.1°	52°18.1'	+30.8'	103.3°	19
20	53°38.7'	+20.3'	94.0°	53°33.9'	+21.9'	95.3°	53°27.6'	+23.6'	96.6°	53°20.0'	+25.2'	98.0°	53°11.0'	+26.7'	99.3°	53°00.6'						

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

40° 320° LHA

Latitude SAME as 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°33.7'	+38.0'	119.2°	42°04.0'	+38.9'	120.0°	41°33.6'	+39.8'	120.8°	41°02.6'	+40.7'	121.5°	40°30.9'	+41.6'	122.3°	39°58.5'	+42.4'	123.0°	39°25.6'	+43.2'	123.7°	0
1	43°11.6'	+37.4'	118.2°	42°42.9'	+38.3'	119.0°	42°13.5'	+39.3'	119.8°	41°43.3'	+40.2'	120.6°	41°12.5'	+41.1'	121.3°	40°40.9'	+42.0'	122.1°	40°08.8'	+42.8'	122.8°	1
2	43°49.0'	+36.7'	117.1°	43°21.3'	+37.8'	117.9°	42°52.8'	+38.7'	118.8°	42°23.5'	+39.7'	119.6°	41°53.6'	+40.6'	120.3°	41°22.9'	+41.5'	121.1°	40°51.6'	+42.3'	121.9°	2
3	44°25.7'	+36.1'	116.0°	43°59.0'	+37.1'	116.9°	43°31.5'	+38.1'	117.7°	43°03.2'	+39.1'	118.5°	42°34.2'	+40.1'	119.4°	42°04.4'	+41.0'	120.1°	41°33.9'	+41.9'	120.9°	3
4	45°01.8'	+35.4'	114.9°	44°36.1'	+36.5'	115.8°	44°09.7'	+37.5'	116.6°	43°42.3'	+38.5'	117.5°	43°14.3'	+39.5'	118.3°	42°45.4'	+40.5'	119.2°	42°15.8'	+41.4'	120.0°	4
5	45°37.2'	+34.7'	113.7°	45°12.6'	+35.8'	114.6°	44°47.2'	+36.9'	115.5°	44°20.9'	+37.9'	116.4°	43°53.8'	+38.9'	117.3°	43°25.9'	+39.9'	118.1°	42°57.2'	+40.9'	119.0°	5
6	46°11.9'	+34.0'	112.5°	45°48.5'	+35.1'	113.5°	45°24.1'	+36.2'	114.4°	44°58.8'	+37.3'	115.3°	44°32.7'	+38.3'	116.2°	44°05.8'	+39.4'	117.1°	43°38.1'	+40.3'	118.0°	6
7	46°45.9'	+33.2'	111.3°	46°23.6'	+34.4'	112.3°	46°00.3'	+35.5'	113.3°	45°36.1'	+36.6'	114.2°	45°11.1'	+37.7'	115.2°	44°45.1'	+38.8'	116.1°	44°18.4'	+39.8'	116.9°	7
8	47°19.1'	+32.4'	110.1°	46°58.0'	+33.6'	111.1°	46°35.8'	+34.8'	112.1°	46°12.8'	+35.9'	113.1°	45°48.8'	+37.1'	114.0°	45°23.9'	+38.1'	115.0°	44°58.1'	+39.2'	115.9°	8
9	47°51.5'	+31.6'	108.9°	47°31.6'	+32.8'	109.9°	47°10.7'	+34.0'	110.9°	46°48.7'	+35.2'	111.9°	46°25.8'	+36.4'	112.9°	46°02.0'	+37.5'	113.9°	45°37.3'	+38.5'	114.8°	9
10	48°23.1'	+30.7'	107.6°	48°04.4'	+32.0'	108.7°	47°44.7'	+33.3'	109.7°	47°24.0'	+34.5'	110.7°	47°02.2'	+35.6'	111.7°	46°39.5'	+36.8'	112.7°	46°15.8'	+37.9'	113.7°	10
11	48°53.8'	+29.8'	106.3°	48°36.4'	+31.1'	107.4°	48°18.0'	+32.4'	108.5°	47°58.4'	+33.7'	109.5°	47°37.9'	+34.9'	110.6°	47°16.3'	+36.1'	111.6°	46°53.7'	+37.2'	112.6°	11
12	49°23.7'	+28.9'	105.0°	49°07.6'	+30.3'	106.1°	48°50.4'	+31.6'	107.2°	48°32.1'	+32.9'	108.3°	48°12.8'	+34.1'	109.3°	47°52.4'	+35.3'	110.4°	47°31.0'	+36.5'	111.4°	12
13	49°52.6'	+27.9'	103.6°	49°37.8'	+29.3'	104.8°	49°22.0'	+30.7'	105.9°	49°05.0'	+32.0'	107.0°	48°46.9'	+33.3'	108.1°	48°27.7'	+34.5'	109.2°	48°07.5'	+35.8'	110.2°	13
14	50°20.5'	+26.9'	102.2°	50°07.2'	+28.4'	103.4°	49°52.7'	+29.8'	104.6°	49°37.0'	+31.1'	105.7°	49°20.2'	+32.4'	106.8°	49°02.2'	+33.7'	107.9°	48°43.2'	+35.0'	109.0°	14
15	50°47.4'	+25.9'	100.8°	50°35.5'	+27.4'	102.0°	50°22.4'	+28.8'	103.2°	50°08.1'	+30.2'	104.4°	49°52.6'	+31.6'	105.5°	49°36.0'	+32.9'	106.7°	49°18.2'	+34.2'	107.8°	15
16	51°13.3'	+24.8'	99.4°	51°02.9'	+26.3'	100.6°	50°51.2'	+27.8'	101.8°	50°38.3'	+29.2'	103.0°	50°24.2'	+30.6'	104.2°	50°08.8'	+32.0'	105.4°	49°52.4'	+33.3'	106.5°	16
17	51°38.2'	+23.7'	97.9°	51°29.2'	+25.3'	99.2°	51°19.0'	+26.8'	100.4°	51°07.5'	+28.2'	101.6°	50°54.8'	+29.7'	102.9°	50°40.8'	+31.1'	104.0°	50°25.7'	+32.4'	105.2°	17
18	52°01.9'	+22.6'	96.5°	51°54.5'	+24.1'	97.7°	51°45.8'	+25.7'	99.0°	51°35.7'	+27.2'	100.2°	51°24.4'	+28.7'	101.5°	51°11.9'	+30.1'	102.7°	50°58.1'	+31.5'	103.9°	18
19	52°24.5'	+21.4'	94.9°	52°18.6'	+23.0'	96.2°	52°11.4'	+24.6'	97.5°	52°02.9'	+26.1'	98.8°	51°53.1'	+27.6'	100.1°	51°42.0'	+29.1'	101.3°	51°29.6'	+30.5'	102.5°	19
20	52°45.9'	+20.2'	93.4°	52°41.6'	+21.8'	94.7°	52°36.0'	+23.4'	96.0°	52°29.0'	+25.0'	97.3°	52°20.7'	+26.5'	98.6°	52°11.1'	+28.1'	99.9°	52°00.1'	+29.5'	101.1°	20
21	53°06.1'	+18.9'	91.8°	53°03.4'	+20.6'	93.2°	52°59.4'	+22.2'	94.5°	52°54.0'	+23.8'	95.8°	52°47.3'	+25.4'	97.1°	52°39.1'	+27.0'	98.4°	52°29.7'	+28.5'	99.7°	21
22	53°25.0'	+17.7'	90.3°	53°24.0'	+19.3'	91.6°	53°21.7'	+21.0'	93.0°	53°17.9'	+22.6'	94.3°	53°12.7'	+24.3'	95.6°	53°06.1'	+25.8'	97.0°	52°58.2'	+27.4'	98.3°	22
23	53°42.7'	+16.4'	88.6°	53°43.4'	+18.1'	90.0°	53°42.7'	+19.7'	91.4°	53°40.5'	+21.4'	92.7°	53°36.9'	+23.1'	94.1°	53°31.9'	+24.7'	95.4°	53°25.6'	+26.3'	96.8°	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

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°47.2'	+37.5'	118.4°	41°18.4'	+38.5'	119.1°	40°48.8'	+39.4'	119.9°	40°18.6'	+40.3'	120.6°	39°47.6'	+41.1'	121.4°	39°16.1'	+42.0'	122.1°	38°43.9'	+42.8'	122.8°	0
1	42°24.7'	+36.9'	117.3°	41°56.8'	+37.9'	118.1°	41°28.2'	+38.8'	118.9°	40°58.8'	+39.8'	119.7°	40°28.8'	+40.7'	120.4°	39°58.1'	+41.5'	121.1°	39°26.7'	+42.4'	121.8°	1
2	43°01.6'	+36.3'	116.2°	42°34.7'	+37.3'	117.1°	42°07.0'	+38.3'	117.9°	41°38.6'	+39.2'	118.7°	41°09.5'	+40.2'	119.4°	40°39.6'	+41.1'	120.2°	40°09.1'	+41.9'	120.9°	2
3	43°37.9'	+35.6'	115.2°	43°12.0'	+36.7'	116.0°	42°45.3'	+37.7'	116.8°	42°17.9'	+38.7'	117.7°	41°49.6'	+39.6'	118.5°	41°20.7'	+40.6'	119.2°	40°51.0'	+41.5'	120.0°	3
4	44°13.6'	+35.0'	114.0°	43°48.7'	+36.1'	114.9°	43°23.0'	+37.1'	115.8°	42°56.5'	+38.1'	116.6°	42°29.3'	+39.1'	117.4°	42°01.3'	+40.1'	118.2°	41°32.5'	+41.0'	119.0°	4
5	44°48.6'	+34.3'	112.9°	44°24.8'	+35.4'	113.8°	44°00.1'	+36.5'	114.7°	43°34.7'	+37.5'	115.6°	43°08.4'	+38.5'	116.4°	42°41.3'	+39.5'	117.2°	42°13.5'	+40.5'	118.0°	5
6	45°22.9'	+33.6'	111.7°	45°00.2'	+34.7'	112.7°	44°36.6'	+35.8'	113.6°	44°12.2'	+36.9'	114.5°	43°46.9'	+37.9'	115.3°	43°20.8'	+38.9'	116.2°	42°53.9'	+39.9'	117.0°	6
7	45°56.4'	+32.8'	110.5°	45°34.9'	+34.0'	111.5°	45°12.4'	+35.1'	112.4°	44°49.1'	+36.2'	113.4°	44°24.9'	+37.3'	114.3°	43°59.8'	+38.4'	115.2°	43°33.9'	+39.4'	116.0°	7
8	46°29.2'	+32.0'	109.3°	46°08.9'	+33.2'	110.3°	45°47.6'	+34.4'	111.3°	45°25.3'	+35.6'	112.2°	45°02.2'	+36.7'	113.2°	44°38.1'	+37.7'	114.1°	44°13.2'	+38.8'	115.0°	8
9	47°01.3'	+31.2'	108.1°	46°42.1'	+32.5'	109.1°	46°22.0'	+33.7'	110.1°	46°00.9'	+34.8'	111.1°	45°38.8'	+36.0'	112.0°	45°15.9'	+37.1'	113.0°	44°52.0'	+38.2'	113.9°	9
10	47°32.5'	+30.4'	106.8°	47°14.6'	+31.7'	107.9°	46°55.7'	+32.9'	108.9°	46°35.7'	+34.1'	109.9°	46°14.8'	+35.3'	110.9°	45°52.9'	+36.4'	111.9°	45°30.1'	+37.5'	112.8°	10
11	48°02.9'	+29.5'	105.6°	47°46.2'	+30.8'	106.6°	47°28.6'	+32.1'	107.7°	47°09.8'	+33.3'	108.7°	46°50.1'	+34.5'	109.7°	46°29.4'	+35.7'	110.7°	46°07.7'	+36.8'	111.7°	11
12	48°32.4'	+28.6'	104.3°	48°17.1'	+29.9'	105.3°	48°00.6'	+31.3'	106.4°	47°43.2'	+32.5'	107.5°	47°24.6'	+33.8'	108.5°	47°05.1'	+35.0'	109.5°	46°44.5'	+36.1'	110.5°	12
13	49°01.0'	+27.7'	102.9°	48°47.0'	+29.0'	104.0°	48°31.9'	+30.4'	105.1°	48°15.7'	+31.7'	106.2°	47°58.4'	+33.0'	107.3°	47°40.0'	+34.2'	108.3°	47°20.7'	+35.4'	109.4°	13
14	49°28.6'	+26.7'	101.6°	49°16.0'	+28.1'	102.7°	49°02.3'	+29.5'	103.8°	48°47.4'	+30.8'	104.9°	48°31.4'	+32.1'	106.0°	48°14.2'	+33.4'	107.1°	47°56.1'	+34.6'	108.2°	14
15	49°55.3'	+25.7'	100.2°	49°44.1'	+27.1'	101.3°	49°31.7'	+28.5'	102.5°	49°18.2'	+29.9'	103.6°	49°03.5'	+31.3'	104.7°	48°47.7'	+32.6'	105.9°	48°30.7'	+33.8'	106.9°	15
16	50°21.0'	+24.6'	98.8°	50°11.3'	+26.1'	100.0°	50°00.3'	+27.6'	101.1°	49°48.1'	+29.0'	102.3°	49°34.7'	+30.4'	103.4°	49°20.2'	+31.7'	104.6°	49°04.6'	+33.0'	105.7°	16
17	50°45.6'	+23.6'	97.3°	50°37.4'	+25.1'	98.5°	50°27.8'	+26.5'	99.7°	50°17.1'	+28.0'	100.9°	50°05.1'	+29.4'	102.1°	49°51.9'	+30.8'	103.3°	49°37.6'	+32.1'	104.4°	17
18	51°09.2'	+22.5'	95.9°	51°02.4'	+24.0'	97.1°	50°54.4'	+25.5'	98.3°	50°45.1'	+27.0'	99.5°	50°34.5'	+28.4'	100.7°	50°22.7'	+29.9'	101.9°	50°09.7'	+31.2'	103.1°	18
19	51°31.7'	+21.3'	94.4°	51°26.4'	+22.9'	95.6°	51°19.9'	+24.4'	96.9°	51°12.1'	+25.9'	98.1°	51°02.9'	+27.4'	99.3°	50°52.6'	+28.9'	100.6°	50°41.0'	+30.3'	101.8°	19
20	51°53.0'	+20.1'	92.9°	51°49.3'	+21.7'	94.1°	51°44.3'	+23.3'	95.4°	51°38.0'	+24.8'	96.7°	51°30.4'	+26.4'	97.9°	51°21.5'	+27.9'	99.2°	51°11.3'	+29.3'	100.4°	

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

42° 318° LHA

Latitude SAME as 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°00.5'	+37.0'	117.5°	40°32.4'	+38.0'	118.3°	40°03.6'	+38.9'	119.0°	39°34.1'	+39.8'	119.8°	39°04.0'	+40.7'	120.5°	38°33.2'	+41.6'	121.2°	38°01.9'	+42.4'	121.8°	0
1	41°37.5'	+36.5'	116.5°	41°10.4'	+37.5'	117.3°	40°42.5'	+38.4'	118.0°	40°14.0'	+39.3'	118.8°	39°44.7'	+40.2'	119.5°	39°14.8'	+41.1'	120.2°	38°44.3'	+42.0'	120.9°	1
2	42°14.0'	+35.9'	115.4°	41°47.8'	+36.9'	116.2°	41°20.9'	+37.9'	117.0°	40°53.3'	+38.8'	117.8°	40°25.0'	+39.8'	118.6°	39°55.9'	+40.7'	119.3°	39°26.2'	+41.5'	120.0°	2
3	42°49.8'	+35.2'	114.3°	42°24.7'	+36.3'	115.2°	41°58.8'	+37.3'	116.0°	41°32.1'	+38.3'	116.8°	41°04.7'	+39.2'	117.6°	40°36.6'	+40.2'	118.3°	40°07.8'	+41.1'	119.1°	3
4	43°25.0'	+34.6'	113.2°	43°01.0'	+35.6'	114.1°	42°36.1'	+36.7'	114.9°	42°10.4'	+37.7'	115.8°	41°43.9'	+38.7'	116.6°	41°16.7'	+39.6'	117.3°	40°48.8'	+40.6'	118.1°	4
5	43°59.6'	+33.9'	112.1°	43°36.6'	+35.0'	113.0°	43°12.8'	+36.1'	113.8°	42°48.1'	+37.1'	114.7°	42°22.6'	+38.1'	115.5°	41°56.4'	+39.1'	116.3°	41°29.4'	+40.1'	117.1°	5
6	44°33.5'	+33.2'	111.0°	44°11.6'	+34.3'	111.9°	43°48.8'	+35.4'	112.7°	43°25.2'	+36.5'	113.6°	43°00.8'	+37.5'	114.5°	42°35.5'	+38.6'	115.3°	42°09.5'	+39.5'	116.1°	6
7	45°06.7'	+32.4'	109.8°	44°45.9'	+33.6'	110.7°	44°24.3'	+34.8'	111.6°	44°01.7'	+35.9'	112.5°	43°38.3'	+36.9'	113.4°	43°14.1'	+38.0'	114.3°	42°49.0'	+39.0'	115.1°	7
8	45°39.1'	+31.7'	108.6°	45°19.5'	+32.9'	109.5°	44°59.0'	+34.0'	110.5°	44°37.6'	+35.2'	111.4°	44°15.2'	+36.3'	112.3°	43°52.0'	+37.4'	113.2°	43°28.0'	+38.4'	114.1°	8
9	46°10.8'	+30.9'	107.3°	45°52.4'	+32.1'	108.3°	45°33.1'	+33.3'	109.3°	45°12.8'	+34.5'	110.3°	44°51.5'	+35.6'	111.2°	44°29.4'	+36.7'	112.1°	44°06.4'	+37.8'	113.0°	9
10	46°41.7'	+30.1'	106.1°	46°24.5'	+31.3'	107.1°	46°06.4'	+32.6'	108.1°	45°47.2'	+33.8'	109.1°	45°27.1'	+34.9'	110.1°	45°06.1'	+36.1'	111.0°	44°44.1'	+37.2'	111.9°	10
11	47°11.8'	+29.2'	104.8°	46°55.9'	+30.5'	105.9°	46°38.9'	+31.8'	106.9°	46°21.0'	+33.0'	107.9°	46°02.1'	+34.2'	108.9°	45°42.2'	+35.4'	109.9°	45°21.3'	+36.5'	110.8°	11
12	47°41.0'	+28.3'	103.5°	47°26.4'	+29.6'	104.6°	47°10.7'	+30.9'	105.7°	46°54.0'	+32.2'	106.7°	46°36.3'	+33.4'	107.7°	46°17.5'	+34.6'	108.7°	45°57.8'	+35.8'	109.7°	12
13	48°09.3'	+27.4'	102.2°	47°56.0'	+28.8'	103.3°	47°41.7'	+30.1'	104.4°	47°26.2'	+31.4'	105.4°	47°09.7'	+32.7'	106.5°	46°52.2'	+33.9'	107.5°	46°33.6'	+35.1'	108.5°	13
14	48°36.7'	+26.5'	100.9°	48°24.8'	+27.8'	102.0°	48°11.7'	+29.2'	103.1°	47°57.6'	+30.5'	104.2°	47°42.4'	+31.8'	105.2°	47°26.0'	+33.1'	106.3°	47°08.7'	+34.3'	107.3°	14
15	49°03.1'	+25.5'	99.5°	48°52.6'	+26.9'	100.7°	48°40.9'	+28.3'	101.8°	48°28.1'	+29.7'	102.9°	48°14.2'	+31.0'	104.0°	47°59.2'	+32.3'	105.1°	47°43.0'	+33.6'	106.1°	15
16	49°28.6'	+24.5'	98.1°	49°19.5'	+25.9'	99.3°	49°09.2'	+27.3'	100.4°	48°57.8'	+28.7'	101.6°	48°45.2'	+30.1'	102.7°	48°31.4'	+31.4'	103.8°	48°16.6'	+32.7'	104.9°	16
17	49°53.1'	+23.4'	96.7°	49°45.4'	+24.9'	97.9°	49°36.6'	+26.4'	99.1°	49°26.5'	+27.8'	100.2°	49°15.3'	+29.2'	101.4°	49°02.9'	+30.6'	102.5°	48°49.3'	+31.9'	103.6°	17
18	50°16.5'	+22.3'	95.3°	50°10.3'	+23.8'	96.5°	50°02.9'	+25.3'	97.7°	49°54.3'	+26.8'	98.9°	49°44.5'	+28.2'	100.0°	49°33.4'	+29.6'	101.2°	49°21.2'	+31.0'	102.3°	18
19	50°38.8'	+21.2'	93.8°	50°34.2'	+22.8'	95.0°	50°28.3'	+24.3'	96.3°	50°21.1'	+25.8'	97.5°	50°12.7'	+27.2'	98.7°	50°03.1'	+28.7'	99.8°	49°52.2'	+30.1'	101.0°	19
20	51°00.1'	+20.1'	92.4°	50°56.9'	+21.7'	93.6°	50°52.5'	+23.2'	94.8°	50°46.9'	+24.7'	96.0°	50°39.9'	+26.2'	97.3°	50°31.7'	+27.7'	98.5°	50°22.3'	+29.1'	99.7°	20
21	51°20.1'	+18.9'	90.9°	51°18.6'	+20.5'	92.1°	51°15.7'	+22.1'	93.3°	51°11.6'	+23.6'	94.6°	51°06.1'	+25.2'	95.8°	50°59.4'	+26.7'	97.1°	50°51.4'	+28.1'	98.3°	21
22	51°39.1'	+17.7'	89.3°	51°39.1'	+19.3'	90.6°	51°37.8'	+20.9'	91.9°	51°35.2'	+22.5'	93.1°	51°31.3'	+24.1'	94.4°	51°26.1'	+25.6'	95.6°	51°19.5'	+27.1'	96.9°	22
23	51°56.8'	+16.5'	87.8°	51°58.4'	+18.1'	89.1°	51°58.7'	+19.7'	90.3°	51°57.7'	+21.3'	91.6°	51°55.4'	+22.9'	92.9°	51°51.7'	+24.5'	94.2°	51°46.6'	+26.0'	95.4°	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

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°13.3'	+36.6'	116.7°	39°46.0'	+37.6'	117.5°	39°18.0'	+38.5'	118.2°	38°49.3'	+39.4'	118.9°	38°19.9'	+40.3'	119.6°	37°50.0'	+41.2'	120.3°	37°19.4'	+42.0'	120.9°	0
1	40°49.9'	+36.0'	115.7°	40°23.5'	+37.0'	116.5°	39°56.5'	+38.0'	117.2°	39°28.7'	+38.9'	117.9°	39°00.3'	+39.8'	118.7°	38°31.2'	+40.7'	119.4°	38°01.4'	+41.6'	120.0°	1
2	41°26.0'	+35.4'	114.6°	41°00.6'	+36.5'	115.4°	40°34.5'	+37.5'	116.2°	40°07.6'	+38.4'	116.9°	39°40.1'	+39.3'	117.7°	39°11.9'	+40.2'	118.4°	38°43.0'	+41.1'	119.1°	2
3	42°01.4'	+34.8'	113.5°	41°37.0'	+35.9'	114.4°	41°11.9'	+36.9'	115.2°	40°46.0'	+37.9'	115.9°	40°19.4'	+38.8'	116.7°	39°52.1'	+39.8'	117.5°	39°24.1'	+40.7'	118.2°	3
4	42°36.2'	+34.2'	112.4°	42°12.9'	+35.3'	113.3°	41°48.8'	+36.3'	114.1°	41°23.9'	+37.3'	114.9°	40°58.3'	+38.3'	115.7°	40°31.9'	+39.3'	116.5°	40°04.8'	+40.2'	117.2°	4
5	43°10.4'	+33.5'	111.3°	42°48.2'	+34.6'	112.2°	42°25.1'	+35.7'	113.0°	42°01.2'	+36.7'	113.9°	41°36.6'	+37.7'	114.7°	41°11.1'	+38.7'	115.5°	40°45.0'	+39.7'	116.3°	5
6	43°43.9'	+32.8'	110.2°	43°22.8'	+33.9'	111.1°	43°00.8'	+35.0'	111.9°	42°38.0'	+36.1'	112.8°	42°14.3'	+37.2'	113.6°	41°49.9'	+38.2'	114.5°	41°24.6'	+39.2'	115.3°	6
7	44°16.7'	+32.1'	109.0°	43°56.7'	+33.3'	109.9°	43°35.8'	+34.4'	110.8°	43°14.1'	+35.5'	111.7°	42°51.5'	+36.6'	112.6°	42°28.0'	+37.6'	113.4°	42°03.8'	+38.6'	114.2°	7
8	44°48.8'	+31.3'	107.8°	44°30.0'	+32.5'	108.8°	44°10.2'	+33.7'	109.7°	43°49.6'	+34.8'	110.6°	43°28.0'	+35.9'	111.5°	43°05.6'	+37.0'	112.4°	42°42.4'	+38.0'	113.2°	8
9	45°20.1'	+30.6'	106.6°	45°02.5'	+31.8'	107.6°	44°43.9'	+33.0'	108.5°	44°24.4'	+34.1'	109.5°	44°04.0'	+35.3'	110.4°	43°42.6'	+36.4'	111.3°	43°20.4'	+37.4'	112.2°	9
10	45°50.7'	+29.8'	105.4°	45°34.3'	+31.0'	106.4°	45°16.9'	+32.2'	107.3°	44°58.5'	+33.4'	108.3°	44°39.2'	+34.6'	109.2°	44°19.0'	+35.7'	110.2°	43°57.9'	+36.8'	111.1°	10
11	46°20.5'	+28.9'	104.1°	46°05.3'	+30.2'	105.1°	45°49.1'	+31.5'	106.1°	45°32.0'	+32.7'	107.1°	45°13.8'	+33.9'	108.1°	44°54.7'	+35.0'	109.0°	44°34.7'	+36.2'	110.0°	11
12	46°49.4'	+28.1'	102.9°	46°35.5'	+29.4'	103.9°	46°20.6'	+30.7'	104.9°	46°04.6'	+31.9'	105.9°	45°47.7'	+33.1'	106.9°	45°29.7'	+34.3'	107.9°	45°10.8'	+35.5'	108.8°	12
13	47°17.4'	+27.2'	101.6°	47°04.9'	+28.5'	102.6°	46°51.2'	+29.8'	103.7°	46°36.5'	+31.1'	104.7°	46°20.8'	+32.4'	105.7°	46°04.1'	+33.6'	106.7°	45°46.3'	+34.8'	107.7°	13
14	47°44.6'	+26.2'	100.2°	47°33.4'	+27.6'	101.3°	47°21.1'	+29.0'	102.4°	47°07.7'	+30.3'	103.4°	46°53.2'	+31.6'	104.5°	46°37.7'	+32.8'	105.5°	46°21.1'	+34.0'	106.5°	14
15	48°10.8'	+25.3'	98.9°	48°01.0'	+26.7'	100.0°	47°50.0'	+28.1'	101.1°	47°37.9'	+29.4'	102.2°	47°24.7'	+30.7'	103.2°	47°10.5'	+32.0'	104.3°	46°55.1'	+33.3'	105.3°	15
16	48°36.1'	+24.3'	97.5°	48°27.7'	+25.7'	98.7°	48°18.1'	+27.1'	99.8°	48°07.3'	+28.5'	100.9°	47°55.5'	+29.9'	102.0°	47°42.5'	+31.2'	103.0°	47°28.4'	+32.5'	104.1°	16
17	49°00.4'	+23.3'	96.1°	48°53.4'	+24.7'	97.3°	48°45.2'	+26.2'	98.4°	48°35.9'	+27.6'	99.5°	48°25.3'	+29.0'	100.7°	48°13.7'	+30.3'	101.8°	48°00.9'	+31.6'	102.8°	17
18	49°23.7'	+22.2'	94.7°	49°18.2'	+23.7'	95.9°	49°11.4'	+25.2'	97.0°	49°03.4'	+26.6'	98.2°	48°54.3'	+28.0'	99.3°	48°44.0'	+29.4'	100.5°	48°32.5'	+30.8'	101.6°	18
19	49°45.9'	+21.2'	93.3°	49°41.9'	+22.7'	94.5°	49°36.6'	+24.2'	95.7°	49°30.1'	+25.6'	96.8°	49°22.3'	+27.1'	98.0°	49°13.4'	+28.5'	99.1°	49°03.3'	+29.9'	100.3°	19
20	50°07.1'	+20.1'	91.8°	50°04.6'	+21.6'	93.0°	50°00.7'	+23.1'	94.2°	49°55.7'	+24.6'	95.4°	49°49.4'	+26.1'	96.6°	49°41.9'	+27.5'	97.8°	49°33.2'	+28.9'	98.9°	20



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°25.8'	+36.2'	115.9°	38°59.2'	+37.2'	116.7°	38°32.0'	+38.1'	117.4°	38°04.1'	+39.0'	118.1°	37°35.5'	+39.9'	118.8°	37°06.3'	+40.8'	119.4°	36°36.6'	+41.6'	120.1°	0
1	40°02.0'	+35.6'	114.9°	39°36.4'	+36.6'	115.6°	39°10.1'	+37.6'	116.4°	38°43.1'	+38.5'	117.1°	38°15.4'	+39.4'	117.8°	37°47.1'	+40.3'	118.5°	37°18.2'	+41.2'	119.2°	1
2	40°37.6'	+35.0'	113.8°	40°13.0'	+36.1'	114.6°	39°47.7'	+37.1'	115.4°	39°21.6'	+38.0'	116.1°	38°54.9'	+39.0'	116.8°	38°27.4'	+39.9'	117.6°	37°59.3'	+40.7'	118.3°	2
3	41°12.7'	+34.4'	112.8°	40°49.1'	+35.5'	113.6°	40°24.7'	+36.5'	114.3°	39°59.6'	+37.5'	115.1°	39°33.8'	+38.4'	115.9°	39°07.3'	+39.4'	116.6°	38°40.1'	+40.3'	117.3°	3
4	41°47.1'	+33.8'	111.7°	41°24.6'	+34.9'	112.5°	41°01.2'	+35.9'	113.3°	40°37.1'	+36.9'	114.1°	40°12.3'	+37.9'	114.9°	39°46.7'	+38.9'	115.6°	39°20.4'	+39.8'	116.4°	4
5	42°20.9'	+33.1'	110.6°	41°59.4'	+34.2'	111.4°	41°37.1'	+35.3'	112.2°	41°14.0'	+36.4'	113.0°	40°50.2'	+37.4'	113.8°	40°25.5'	+38.4'	114.6°	40°00.2'	+39.3'	115.4°	5
6	42°54.1'	+32.5'	109.4°	42°33.7'	+33.6'	110.3°	42°12.5'	+34.7'	111.1°	41°50.4'	+35.8'	112.0°	41°27.5'	+36.8'	112.8°	41°03.9'	+37.8'	113.6°	40°39.5'	+38.8'	114.4°	6
7	43°26.5'	+31.8'	108.3°	43°07.3'	+32.9'	109.2°	42°47.1'	+34.0'	110.0°	42°26.2'	+35.1'	110.9°	42°04.3'	+36.2'	111.7°	41°41.7'	+37.2'	112.6°	41°18.3'	+38.3'	113.4°	7
8	43°58.3'	+31.0'	107.1°	43°40.2'	+32.2'	108.0°	43°21.2'	+33.4'	108.9°	43°01.3'	+34.5'	109.8°	42°40.5'	+35.6'	110.7°	42°19.0'	+36.7'	111.5°	41°56.5'	+37.7'	112.4°	8
9	44°29.3'	+30.3'	105.9°	44°12.4'	+31.5'	106.8°	43°54.5'	+32.7'	107.8°	43°35.8'	+33.8'	108.7°	43°16.1'	+34.9'	109.6°	42°55.6'	+36.0'	110.4°	42°34.2'	+37.1'	111.3°	9
10	44°59.5'	+29.5'	104.7°	44°43.8'	+30.7'	105.6°	44°27.2'	+31.9'	106.6°	44°09.6'	+33.1'	107.5°	43°51.1'	+34.3'	108.4°	43°31.6'	+35.4'	109.3°	43°11.3'	+36.5'	110.2°	10
11	45°29.0'	+28.7'	103.4°	45°14.6'	+29.9'	104.4°	44°59.1'	+31.2'	105.4°	44°42.7'	+32.4'	106.4°	44°25.3'	+33.6'	107.3°	44°07.0'	+34.7'	108.2°	43°47.8'	+35.8'	109.1°	11
12	45°57.7'	+27.8'	102.2°	45°44.5'	+29.1'	103.2°	45°30.3'	+30.4'	104.2°	45°15.1'	+31.6'	105.2°	44°58.9'	+32.8'	106.1°	44°41.7'	+34.0'	107.1°	44°23.6'	+35.2'	108.0°	12
13	46°25.5'	+26.9'	100.9°	46°13.6'	+28.3'	101.9°	46°00.7'	+29.6'	102.9°	45°46.7'	+30.8'	104.0°	45°31.7'	+32.1'	104.9°	45°15.8'	+33.3'	105.9°	44°58.8'	+34.5'	106.9°	13
14	46°52.4'	+26.0'	99.6°	46°41.9'	+27.4'	100.7°	46°30.2'	+28.7'	101.7°	46°17.6'	+30.0'	102.7°	46°03.8'	+31.3'	103.7°	45°49.1'	+32.5'	104.7°	45°33.3'	+33.8'	105.7°	14
15	47°18.5'	+25.1'	98.3°	47°09.3'	+26.5'	99.4°	46°59.0'	+27.9'	100.4°	46°47.6'	+29.2'	101.5°	46°35.1'	+30.5'	102.5°	46°21.6'	+31.8'	103.5°	46°07.1'	+33.0'	104.5°	15
16	47°43.6'	+24.2'	96.9°	47°35.8'	+25.6'	98.0°	47°26.8'	+27.0'	99.1°	47°16.8'	+28.3'	100.2°	47°05.6'	+29.6'	101.2°	46°53.4'	+31.0'	102.3°	46°40.1'	+32.2'	103.3°	16
17	48°07.7'	+23.2'	95.6°	48°01.3'	+24.6'	96.7°	47°53.8'	+26.0'	97.8°	47°45.1'	+27.4'	98.9°	47°35.3'	+28.8'	100.0°	47°24.3'	+30.1'	101.0°	47°12.3'	+31.4'	102.1°	17
18	48°30.9'	+22.2'	94.2°	48°25.9'	+23.6'	95.3°	48°19.8'	+25.1'	96.4°	48°12.5'	+26.5'	97.5°	48°04.0'	+27.9'	98.6°	47°54.5'	+29.2'	99.7°	47°43.7'	+30.6'	100.8°	18
19	48°53.0'	+21.1'	92.8°	48°49.5'	+22.6'	93.9°	48°44.8'	+24.1'	95.1°	48°39.0'	+25.5'	96.2°	48°31.9'	+26.9'	97.3°	48°23.7'	+28.3'	98.4°	48°14.3'	+29.7'	99.5°	19
20	49°14.2'	+20.0'	91.3°	49°12.1'	+21.5'	92.5°	49°08.9'	+23.0'	93.7°	49°04.5'	+24.5'	94.8°	48°58.8'	+26.0'	96.0°	48°52.0'	+27.4'	97.1°	48°44.0'	+28.8'	98.2°	20
21	49°34.2'	+18.9'	89.9°	49°33.7'	+20.5'	91.1°	49°31.9'	+22.0'	92.2°	49°29.0'	+23.5'	93.4°	49°24.8'	+25.0'	94.6°	49°19.4'	+26.4'	95.7°	49°12.8'	+27.8'	96.9°	21
22	49°53.1'	+17.8'	88.4°	49°53.1'	+19.4'	89.6°	49°53.9'	+20.9'	90.8°	49°52.5'	+22.4'	92.0°	49°49.8'	+23.9'	93.2°	49°45.8'	+25.4'	94.4°	49°40.6'	+26.9'	95.5°	22
23	50°10.9'	+16.7'	86.9°	50°13.5'	+18.2'	88.1°	50°14.8'	+19.8'	89.3°	50°14.9'	+21.3'	90.5°	50°13.7'	+22.9'	91.7°	50°11.2'	+24.4'	92.9°	50°07.5'	+25.9'	94.1°	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°38.0'	+35.8'	115.1°	38°12.2'	+36.8'	115.9°	37°45.7'	+37.7'	116.6°	37°18.5'	+38.6'	117.3°	36°50.7'	+39.5'	117.9°	36°22.3'	+40.4'	118.6°	35°53.3'	+41.2'	119.2°	0
1	39°13.8'	+35.2'	114.1°	38°48.9'	+36.2'	114.9°	38°23.4'	+37.2'	115.6°	37°57.1'	+38.1'	116.3°	37°30.2'	+39.0'	117.0°	37°02.7'	+39.9'	117.7°	36°34.6'	+40.8'	118.3°	1
2	39°49.0'	+34.7'	113.1°	39°25.2'	+35.7'	113.8°	39°00.6'	+36.7'	114.6°	38°35.3'	+37.6'	115.3°	38°09.3'	+38.6'	116.0°	37°42.6'	+39.5'	116.7°	37°15.4'	+40.4'	117.4°	2
3	40°23.7'	+34.1'	112.0°	40°00.8'	+35.1'	112.8°	39°37.2'	+36.1'	113.5°	39°12.9'	+37.1'	114.3°	38°47.9'	+38.1'	115.0°	38°22.1'	+39.0'	115.8°	37°55.7'	+39.9'	116.5°	3
4	40°57.8'	+33.4'	110.9°	40°35.9'	+34.5'	111.7°	40°13.4'	+35.5'	112.5°	39°50.0'	+36.6'	113.3°	39°25.9'	+37.6'	114.0°	39°01.1'	+38.5'	114.8°	38°35.6'	+39.4'	115.5°	4
5	41°31.2'	+32.8'	109.8°	41°10.4'	+33.9'	110.6°	40°48.9'	+35.0'	111.4°	40°26.6'	+36.0'	112.2°	40°03.5'	+37.0'	113.0°	39°39.6'	+38.0'	113.8°	39°15.1'	+39.0'	114.5°	5
6	42°04.0'	+32.1'	108.7°	41°44.3'	+33.2'	109.5°	41°23.9'	+34.3'	110.4°	41°02.6'	+35.4'	111.2°	40°40.5'	+36.4'	112.0°	40°17.6'	+37.5'	112.8°	39°54.0'	+38.4'	113.6°	6
7	42°36.1'	+31.4'	107.5°	42°17.6'	+32.6'	108.4°	41°58.2'	+33.7'	109.3°	41°38.0'	+34.8'	110.1°	41°16.9'	+35.9'	110.9°	40°55.1'	+36.9'	111.8°	40°32.5'	+37.9'	112.5°	7
8	43°07.5'	+30.7'	106.4°	42°50.2'	+31.9'	107.3°	42°31.9'	+33.0'	108.2°	42°12.8'	+34.2'	109.0°	41°52.8'	+35.3'	109.9°	41°32.0'	+36.3'	110.7°	41°10.4'	+37.4'	111.5°	8
9	43°38.2'	+30.0'	105.2°	43°22.1'	+31.2'	106.1°	43°04.9'	+32.4'	107.0°	42°46.9'	+33.5'	107.9°	42°28.1'	+34.6'	108.8°	42°08.3'	+35.7'	109.6°	41°47.7'	+36.8'	110.5°	9
10	44°08.2'	+29.2'	104.0°	43°53.2'	+30.4'	104.9°	43°37.3'	+31.6'	105.9°	43°20.4'	+32.8'	106.8°	43°02.7'	+34.0'	107.7°	42°44.0'	+35.1'	108.5°	42°24.5'	+36.2'	109.4°	10
11	44°37.4'	+28.4'	102.8°	44°23.7'	+29.7'	103.7°	44°08.9'	+30.9'	104.7°	43°53.3'	+32.1'	105.6°	43°36.7'	+33.3'	106.5°	43°19.1'	+34.4'	107.4°	43°00.7'	+35.5'	108.3°	11
12	45°05.8'	+27.6'	101.5°	44°53.3'	+28.9'	102.5°	44°39.8'	+30.1'	103.5°	44°25.4'	+31.4'	104.4°	44°09.9'	+32.6'	105.4°	43°53.5'	+33.7'	106.3°	43°36.2'	+34.9'	107.2°	12
13	45°33.4'	+26.7'	100.3°	45°22.2'	+28.0'	101.3°	45°10.0'	+29.3'	102.3°	44°56.7'	+30.6'	103.2°	44°42.5'	+31.8'	104.2°	44°27.3'	+33.0'	105.2°	44°11.1'	+34.2'	106.1°	13
14	46°00.1'	+25.9'	99.0°	45°50.2'	+27.2'	100.0°	45°39.3'	+28.5'	101.0°	45°27.3'	+29.8'	102.0°	45°14.3'	+31.1'	103.0°	45°00.3'	+32.3'	104.0°	44°45.3'	+33.5'	104.9°	14
15	46°26.0'	+25.0'	97.7°	46°17.4'	+26.3'	98.7°	46°07.8'	+27.7'	99.7°	45°57.1'	+29.0'	100.8°	45°45.4'	+30.3'	101.8°	45°32.6'	+31.5'	102.8°	45°18.8'	+32.8'	103.8°	15
16	46°51.0'	+24.0'	96.4°	46°43.8'	+25.4'	97.4°	46°35.5'	+26.8'	98.5°	46°26.1'	+28.1'	99.5°	46°15.7'	+29.4'	100.5°	46°04.2'	+30.7'	101.6°	45°51.6'	+32.0'	102.6°	16
17	47°15.0'	+23.1'	95.0°	47°09.2'	+24.5'	96.1°	47°02.3'	+25.9'	97.2°	46°54.2'	+27.2'	98.2°	46°45.1'	+28.6'	99.3°	46°34.9'	+29.9'	100.3°	46°23.6'	+31.2'	101.4°	17
18	47°38.0'	+22.1'	93.6°	47°33.7'	+23.5'	94.7°	47°28.1'	+24.9'	95.8°	47°21.5'	+26.3'	96.9°	47°13.7'	+27.7'	98.0°	47°04.8'	+29.1'	99.0°	46°54.8'	+30.4'	100.1°	18
19	48°00.1'	+21.1'	92.3°	47°57.2'	+22.5'	93.4°	47°53.1'	+24.0'	94.5°	47°47.8'	+25.4'	95.6°	47°41.4'	+26.8'	96.7°	47°33.9'	+28.2'	97.8°	47°25.2'	+29.5'	98.8°	19
20	48°21.2'	+20.0'	90.9°	48°19.7'	+21.5'	92.0°	48°17.0'	+23.0'	93.1°	48°13.2'	+24.4'	94.2°	48°08.2'	+25.9'	95.3°	48°02.0'	+27.3'	96.4°	47°54.7'	+28.6'	97.5°	20
21	48°4																					

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

46° 314° LHA

Latitude SAME as 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°49.9'	+35.4'	114.4°	37°24.8'	+36.4'	115.1°	36°59.0'	+37.3'	115.8°	36°32.6'	+38.2'	116.4°	36°05.6'	+39.1'	117.1°	35°38.0'	+40.0'	117.7°	35°09.8'	+40.8'	118.4°	0
1	38°25.3'	+34.9'	113.4°	38°01.2'	+35.8'	114.1°	37°36.4'	+36.8'	114.8°	37°10.9'	+37.8'	115.5°	36°44.7'	+38.7'	116.2°	36°18.0'	+39.6'	116.8°	35°50.6'	+40.4'	117.5°	1
2	39°00.2'	+34.3'	112.3°	38°37.0'	+35.3'	113.1°	38°13.2'	+36.3'	113.8°	37°48.6'	+37.3'	114.5°	37°23.4'	+38.2'	115.2°	36°57.5'	+39.1'	115.9°	36°31.0'	+40.0'	116.6°	2
3	39°34.5'	+33.7'	111.3°	39°12.3'	+34.7'	112.0°	38°49.5'	+35.8'	112.8°	38°25.9'	+36.7'	113.5°	38°01.6'	+37.7'	114.2°	37°36.7'	+38.6'	114.9°	37°11.0'	+39.6'	115.6°	3
4	40°08.1'	+33.1'	110.2°	39°47.1'	+34.2'	111.0°	39°25.2'	+35.2'	111.7°	39°02.6'	+36.2'	112.5°	38°39.3'	+37.2'	113.2°	38°15.3'	+38.2'	114.0°	37°50.6'	+39.1'	114.7°	4
5	40°41.2'	+32.5'	109.1°	40°21.2'	+33.5'	109.9°	40°00.4'	+34.6'	110.7°	39°38.8'	+35.7'	111.5°	39°16.5'	+36.7'	112.2°	38°53.5'	+37.7'	113.0°	38°29.7'	+38.6'	113.7°	5
6	41°13.7'	+31.8'	108.0°	40°54.8'	+32.9'	108.8°	40°35.0'	+34.0'	109.6°	40°14.5'	+35.1'	110.4°	39°53.2'	+36.1'	111.2°	39°31.1'	+37.1'	112.0°	39°08.3'	+38.1'	112.7°	6
7	41°45.5'	+31.1'	106.8°	41°27.7'	+32.3'	107.7°	41°09.0'	+33.4'	108.5°	40°49.6'	+34.5'	109.3°	40°29.3'	+35.5'	110.2°	40°08.2'	+36.6'	110.9°	39°46.4'	+37.6'	111.7°	7
8	42°16.6'	+30.4'	105.7°	42°00.0'	+31.6'	106.6°	41°42.4'	+32.7'	107.4°	41°24.1'	+33.9'	108.3°	41°04.8'	+34.9'	109.1°	40°44.8'	+36.0'	109.9°	40°24.0'	+37.0'	110.7°	8
9	42°47.0'	+29.7'	104.5°	42°31.6'	+30.9'	105.4°	42°15.2'	+32.1'	106.3°	41°57.9'	+33.2'	107.2°	41°39.8'	+34.3'	108.0°	41°20.8'	+35.4'	108.8°	41°01.0'	+36.5'	109.7°	9
10	43°16.7'	+28.9'	103.3°	43°02.4'	+30.2'	104.2°	42°47.2'	+31.4'	105.1°	42°31.1'	+32.5'	106.0°	42°14.1'	+33.7'	106.9°	41°56.2'	+34.8'	107.8°	41°37.5'	+35.9'	108.6°	10
11	43°45.7'	+28.2'	102.1°	43°32.6'	+29.4'	103.1°	43°18.6'	+30.6'	104.0°	43°03.6'	+31.8'	104.9°	42°47.8'	+33.0'	105.8°	42°31.0'	+34.1'	106.7°	42°13.4'	+35.3'	107.5°	11
12	44°13.9'	+27.4'	100.9°	44°02.0'	+28.6'	101.8°	43°49.2'	+29.9'	102.8°	43°35.5'	+31.1'	103.7°	43°20.8'	+32.3'	104.6°	43°05.2'	+33.5'	105.5°	42°48.6'	+34.6'	106.4°	12
13	44°41.2'	+26.5'	99.6°	44°30.7'	+27.8'	100.6°	44°19.1'	+29.1'	101.6°	44°06.6'	+30.4'	102.5°	43°53.1'	+31.6'	103.5°	43°38.6'	+32.8'	104.4°	43°23.2'	+34.0'	105.3°	13
14	45°07.8'	+25.7'	98.4°	44°58.5'	+27.0'	99.4°	44°48.2'	+28.3'	100.4°	44°37.0'	+29.6'	101.3°	44°24.7'	+30.8'	102.3°	44°11.4'	+32.1'	103.2°	43°57.2'	+33.3'	104.2°	14
15	45°33.5'	+24.8'	97.1°	45°25.5'	+26.2'	98.1°	45°16.5'	+27.5'	99.1°	45°06.5'	+28.8'	100.1°	44°55.5'	+30.1'	101.1°	44°43.5'	+31.3'	102.1°	44°30.5'	+32.5'	103.0°	15
16	45°58.3'	+23.9'	95.8°	45°51.7'	+25.3'	96.8°	45°44.0'	+26.6'	97.8°	45°35.3'	+28.0'	98.8°	45°25.6'	+29.3'	99.9°	45°14.8'	+30.5'	100.8°	45°03.0'	+31.8'	101.8°	16
17	46°22.2'	+23.0'	94.5°	46°17.0'	+24.4'	95.5°	46°10.7'	+25.7'	96.5°	46°03.3'	+27.1'	97.6°	45°54.8'	+28.4'	98.6°	45°45.3'	+29.7'	99.6°	45°34.8'	+31.0'	100.6°	17
18	46°45.2'	+22.0'	93.1°	46°41.3'	+23.4'	94.2°	46°36.4'	+24.8'	95.2°	46°30.4'	+26.2'	96.3°	46°23.3'	+27.6'	97.3°	46°15.1'	+28.9'	98.4°	46°05.8'	+30.2'	99.4°	18
19	47°07.2'	+21.0'	91.8°	47°04.8'	+22.5'	92.8°	47°01.2'	+23.9'	93.9°	46°56.6'	+25.3'	95.0°	46°50.8'	+26.7'	96.0°	46°44.0'	+28.0'	97.1°	46°36.0'	+29.4'	98.1°	19
20	47°28.2'	+20.0'	90.4°	47°27.2'	+21.5'	91.5°	47°25.1'	+22.9'	92.6°	47°21.9'	+24.4'	93.6°	47°17.5'	+25.8'	94.7°	47°12.0'	+27.1'	95.8°	47°05.4'	+28.5'	96.9°	20
21	47°48.2'	+19.0'	89.0°	47°48.7'	+20.5'	90.1°	47°48.1'	+21.9'	91.2°	47°46.3'	+23.4'	92.3°	47°43.3'	+24.8'	93.4°	47°39.2'	+26.2'	94.5°	47°33.9'	+27.6'	95.6°	21
22	48°07.2'	+17.9'	87.6°	48°09.2'	+19.4'	88.7°	48°10.0'	+20.9'	89.8°	48°09.6'	+22.4'	90.9°	48°08.1'	+23.8'	92.0°	48°05.4'	+25.3'	93.1°	48°01.5'	+26.7'	94.3°	22
23	48°25.2'	+16.9'	86.1°	48°28.6'	+18.4'	87.3°	48°30.9'	+19.9'	88.4°	48°32.0'	+21.4'	89.5°	48°31.9'	+22.8'	90.6°	48°30.7'	+24.3'	91.8°	48°28.2'	+25.7'	92.9°	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

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°01.5'	+35.0'	113.6°	36°37.1'	+36.0'	114.3°	36°12.1'	+36.9'	115.0°	35°46.4'	+37.9'	115.7°	35°20.1'	+38.8'	116.3°	34°53.3'	+39.6'	116.9°	34°25.8'	+40.5'	117.5°	0
1	37°36.5'	+34.5'	112.6°	37°13.1'	+35.5'	113.3°	36°49.0'	+36.4'	114.0°	36°24.3'	+37.4'	114.7°	35°58.9'	+38.3'	115.4°	35°32.9'	+39.2'	116.0°	35°06.3'	+40.1'	116.6°	1
2	38°11.0'	+33.9'	111.6°	37°48.6'	+34.9'	112.3°	37°25.5'	+35.9'	113.0°	37°01.7'	+36.9'	113.7°	36°37.2'	+37.8'	114.4°	36°12.1'	+38.8'	115.1°	35°46.4'	+39.7'	115.7°	2
3	38°45.0'	+33.4'	110.5°	38°23.5'	+34.4'	111.3°	38°01.4'	+35.4'	112.0°	37°38.6'	+36.4'	112.7°	37°15.1'	+37.4'	113.4°	36°50.9'	+38.3'	114.1°	36°26.0'	+39.2'	114.8°	3
4	39°18.3'	+32.8'	109.5°	38°57.9'	+33.8'	110.2°	38°36.8'	+34.9'	111.0°	38°15.0'	+35.9'	111.7°	37°52.4'	+36.9'	112.4°	37°29.2'	+37.8'	113.2°	37°05.2'	+38.8'	113.9°	4
5	39°51.1'	+32.1'	108.4°	39°31.8'	+33.2'	109.2°	39°11.7'	+34.3'	109.9°	38°50.9'	+35.3'	110.7°	38°29.3'	+36.3'	111.4°	38°07.0'	+37.3'	112.2°	37°44.0'	+38.3'	112.9°	5
6	40°23.2'	+31.5'	107.3°	40°05.0'	+32.6'	108.1°	39°46.2'	+33.7'	108.9°	39°26.2'	+34.8'	109.7°	39°05.6'	+35.8'	110.4°	38°44.3'	+36.8'	111.2°	38°22.3'	+37.8'	111.9°	6
7	40°54.7'	+30.8'	106.1°	40°37.6'	+32.0'	107.0°	40°19.7'	+33.1'	107.8°	40°00.9'	+34.2'	108.6°	39°41.4'	+35.2'	109.4°	39°21.1'	+36.3'	110.2°	39°00.1'	+37.3'	110.9°	7
8	41°25.5'	+30.1'	105.0°	41°09.6'	+31.3'	105.9°	40°52.8'	+32.4'	106.7°	40°35.1'	+33.6'	107.5°	40°16.6'	+34.6'	108.3°	39°57.4'	+35.7'	109.1°	39°37.3'	+36.7'	109.9°	8
9	41°55.7'	+29.4'	103.9°	41°40.9'	+30.6'	104.7°	41°25.2'	+31.8'	105.6°	41°08.7'	+32.9'	106.4°	40°51.3'	+34.0'	107.2°	40°33.1'	+35.1'	108.1°	40°14.1'	+36.2'	108.9°	9
10	42°25.1'	+28.7'	102.7°	42°11.5'	+29.9'	103.6°	41°57.0'	+31.1'	104.4°	41°41.6'	+32.3'	105.3°	41°25.3'	+33.4'	106.2°	41°08.2'	+34.5'	107.0°	40°50.2'	+35.6'	107.8°	10
11	42°53.8'	+28.0'	101.5°	42°41.4'	+29.2'	102.4°	42°28.1'	+30.4'	103.3°	42°13.9'	+31.6'	104.2°	41°58.7'	+32.7'	105.0°	41°42.7'	+33.9'	105.9°	41°25.8'	+35.0'	106.8°	11
12	43°21.8'	+27.2'	100.3°	43°10.6'	+28.4'	101.2°	42°58.5'	+29.7'	102.1°	42°45.4'	+30.9'	103.0°	42°31.5'	+32.1'	103.9°	42°16.6'	+33.2'	104.8°	42°00.8'	+34.4'	105.7°	12
13	43°49.0'	+26.4'	99.0°	43°39.0'	+27.7'	100.0°	43°28.2'	+28.9'	100.9°	43°16.3'	+30.1'	101.8°	43°03.5'	+31.4'	102.8°	42°49.8'	+32.5'	103.7°	42°35.2'	+33.7'	104.6°	13
14	44°15.3'	+25.5'	97.8°	44°06.7'	+26.8'	98.8°	43°57.1'	+28.1'	99.7°	43°46.5'	+29.4'	100.7°	43°34.9'	+30.6'	101.6°	43°22.4'	+31.8'	102.5°	43°08.9'	+33.0'	103.4°	14
15	44°40.9'	+24.7'	96.5°	44°33.5'	+26.0'	97.5°	44°25.2'	+27.3'	98.5°	44°15.9'	+28.6'	99.4°	44°05.5'	+29.9'	100.4°	43°54.2'	+31.1'	101.3°	43°41.9'	+32.3'	102.3°	15
16	45°05.5'	+23.8'	95.2°	44°59.5'	+25.2'	96.2°	44°52.5'	+26.5'	97.2°	44°44.5'	+27.8'	98.2°	44°35.4'	+29.1'	99.2°	44°25.3'	+30.4'	100.2°	44°14.2'	+31.6'	101.1°	16
17	45°29.3'	+22.9'	93.9°	45°24.7'	+24.3'	94.9°	45°19.0'	+25.6'	96.0°	45°12.3'	+27.0'	97.0°	45°04.5'	+28.3'	97.9°	44°55.7'	+29.6'	98.9°	44°45.8'	+30.8'	99.9°	17
18	45°52.2'	+22.0'	92.6°	45°49.0'	+23.4'	93.6°	45°44.6'	+24.7'	94.7°	45°39.2'	+26.1'	95.7°	45°32.8'	+27.4'	96.7°	45°25.2'	+28.8'	97.7°	45°16.7'	+30.1'	98.7°	18
19	46°14.2'	+21.0'	91.3°	46°12.3'	+22.4'	92.3°	46°09.4'	+23.8'	93.3°	46°05.3'	+25.2'	94.4°	46°00.2'	+26.6'	95.4°	45°54.0'	+27.9'	96.4°	45°46.7'	+29.2'	97.5°	19
20	46°35.2'	+20.0'	89.9°	46°34.8'	+21.5'	91.0°	46°33.2'	+22.9'	92.0°	46°30.6'	+24.3'	93.1°	46°26.8'	+25.7'	94.1°	46°21.9'	+27.1'	95.2°	46°16.0'	+28.4'	96.2°	20
21	46°55.3'	+19.0'																				

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°12.9'	+34.7'	112.9°	35°49.2'	+35.6'	113.6°	35°24.9'	+36.6'	114.2°	35°00.0'	+37.5'	114.9°	34°34.4'	+38.4'	115.5°	34°08.2'	+39.3'	116.1°	33°41.5'	+40.1'	116.7°	0
1	36°47.5'	+34.1'	111.9°	36°24.8'	+35.1'	112.6°	36°01.4'	+36.1'	113.3°	35°37.4'	+37.0'	113.9°	35°12.8'	+38.0'	114.6°	34°47.5'	+38.9'	115.2°	34°21.7'	+39.7'	115.8°	1
2	37°21.6'	+33.6'	110.9°	37°00.0'	+34.6'	111.6°	36°37.5'	+35.6'	112.3°	36°14.5'	+36.6'	113.0°	35°50.7'	+37.5'	113.6°	35°26.4'	+38.4'	114.3°	35°01.4'	+39.3'	114.9°	2
3	37°55.2'	+33.0'	109.8°	37°34.5'	+34.1'	110.5°	37°13.1'	+35.1'	111.3°	36°51.0'	+36.1'	112.0°	36°28.2'	+37.0'	112.7°	36°04.8'	+38.0'	113.3°	35°40.7'	+38.9'	114.0°	3
4	38°28.3'	+32.4'	108.8°	38°08.6'	+33.5'	109.5°	37°48.2'	+34.5'	110.2°	37°27.1'	+35.5'	111.0°	37°05.3'	+36.5'	111.7°	36°42.8'	+37.5'	112.4°	36°19.6'	+38.4'	113.0°	4
5	39°00.7'	+31.8'	107.7°	38°42.1'	+32.9'	108.4°	38°22.7'	+34.0'	109.2°	38°02.6'	+35.0'	109.9°	37°41.8'	+36.0'	110.7°	37°20.3'	+37.0'	111.4°	36°58.0'	+38.0'	112.1°	5
6	39°32.5'	+31.2'	106.6°	39°15.0'	+32.3'	107.4°	38°56.7'	+33.4'	108.1°	38°37.6'	+34.5'	108.9°	38°17.8'	+35.5'	109.7°	37°57.3'	+36.5'	110.4°	37°36.0'	+37.5'	111.1°	6
7	40°03.7'	+30.6'	105.5°	39°47.3'	+31.7'	106.3°	39°30.1'	+32.8'	107.1°	39°12.1'	+33.9'	107.9°	38°53.3'	+34.9'	108.6°	38°33.8'	+36.0'	109.4°	38°13.5'	+37.0'	110.1°	7
8	40°34.3'	+29.9'	104.3°	40°19.0'	+31.0'	105.2°	40°02.9'	+32.2'	106.0°	39°46.0'	+33.3'	106.8°	39°28.2'	+34.4'	107.6°	39°09.7'	+35.4'	108.4°	38°50.5'	+36.4'	109.1°	8
9	41°04.2'	+29.2'	103.2°	40°50.0'	+30.4'	104.0°	40°35.1'	+31.5'	104.9°	40°19.2'	+32.7'	105.7°	40°02.6'	+33.8'	106.5°	39°45.1'	+34.8'	107.3°	39°26.9'	+35.9'	108.1°	9
10	41°33.4'	+28.5'	102.0°	41°20.4'	+29.7'	102.9°	41°06.6'	+30.9'	103.8°	40°51.9'	+32.0'	104.6°	40°36.4'	+33.1'	105.4°	40°20.0'	+34.2'	106.2°	40°02.8'	+35.3'	107.1°	10
11	42°01.9'	+27.7'	100.9°	41°50.1'	+29.0'	101.7°	41°37.5'	+30.2'	102.6°	41°23.9'	+31.3'	103.5°	41°09.5'	+32.5'	104.3°	40°54.2'	+33.6'	105.2°	40°38.1'	+34.7'	106.0°	11
12	42°29.6'	+27.0'	99.7°	42°19.1'	+28.2'	100.6°	42°07.6'	+29.5'	101.4°	41°55.3'	+30.7'	102.3°	41°42.0'	+31.8'	103.2°	41°27.9'	+33.0'	104.1°	41°12.8'	+34.1'	104.9°	12
13	42°56.6'	+26.2'	98.4°	42°47.3'	+27.5'	99.4°	42°37.1'	+28.7'	100.3°	42°25.9'	+29.9'	101.2°	42°13.8'	+31.1'	102.1°	42°00.8'	+32.3'	102.9°	41°47.0'	+33.5'	103.8°	13
14	43°22.8'	+25.4'	97.2°	43°14.8'	+26.7'	98.1°	43°05.8'	+28.0'	99.1°	42°55.9'	+29.2'	100.0°	42°45.0'	+30.4'	100.9°	42°33.2'	+31.6'	101.8°	42°20.4'	+32.8'	102.7°	14
15	43°48.2'	+24.6'	96.0°	43°41.5'	+25.9'	96.9°	43°33.8'	+27.2'	97.9°	43°25.1'	+28.4'	98.8°	43°15.4'	+29.7'	99.7°	43°04.8'	+30.9'	100.6°	42°53.3'	+32.1'	101.6°	15
16	44°12.8'	+23.7'	94.7°	44°07.4'	+25.0'	95.7°	44°00.9'	+26.4'	96.6°	43°53.5'	+27.7'	97.6°	43°45.1'	+28.9'	98.5°	43°35.7'	+30.2'	99.5°	43°25.4'	+31.4'	100.4°	16
17	44°36.5'	+22.8'	93.4°	44°32.4'	+24.2'	94.4°	44°27.3'	+25.5'	95.4°	44°21.2'	+26.8'	96.3°	44°14.1'	+28.1'	97.3°	44°05.9'	+29.4'	98.3°	43°56.8'	+30.7'	99.2°	17
18	44°59.3'	+21.9'	92.1°	44°56.6'	+23.3'	93.1°	44°52.8'	+24.7'	94.1°	44°48.0'	+26.0'	95.1°	44°42.2'	+27.3'	96.1°	44°35.3'	+28.6'	97.1°	44°27.5'	+29.9'	98.0°	18
19	45°21.3'	+21.0'	90.8°	45°19.9'	+22.4'	91.8°	45°17.5'	+23.8'	92.8°	45°14.0'	+25.1'	93.8°	45°09.5'	+26.5'	94.8°	45°04.0'	+27.8'	95.8°	44°57.4'	+29.1'	96.8°	19
20	45°42.3'	+20.1'	89.4°	45°42.3'	+21.5'	90.5°	45°41.3'	+22.9'	91.5°	45°39.2'	+24.3'	92.5°	45°36.0'	+25.6'	93.5°	45°31.8'	+27.0'	94.6°	45°26.5'	+28.3'	95.6°	20
21	46°02.3'	+19.1'	88.1°	46°03.8'	+20.5'	89.1°	46°04.2'	+21.9'	90.2°	46°03.4'	+23.3'	91.2°	46°01.6'	+24.7'	92.2°	45°58.8'	+26.1'	93.3°	45°54.8'	+27.4'	94.3°	21
22	46°21.4'	+18.1'	86.7°	46°24.3'	+19.5'	87.8°	46°26.1'	+21.0'	88.8°	46°26.8'	+22.4'	89.9°	46°26.4'	+23.8'	90.9°	46°24.9'	+25.2'	92.0°	46°22.2'	+26.6'	93.0°	22
23	46°39.5'	+17.1'	85.3°	46°43.8'	+18.5'	86.4°	46°47.1'	+20.0'	87.5°	46°49.2'	+21.4'	88.5°	46°50.2'	+22.9'	89.6°	46°50.0'	+24.3'	90.7°	46°48.8'	+25.7'	91.7°	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°23.9'	+34.3'	112.2°	35°00.9'	+35.3'	112.9°	34°37.3'	+36.2'	113.5°	34°13.1'	+37.2'	114.1°	33°48.3'	+38.1'	114.7°	33°22.9'	+38.9'	115.3°	32°57.0'	+39.8'	115.9°	0
1	35°58.2'	+33.8'	111.2°	35°36.2'	+34.8'	111.9°	35°13.6'	+35.8'	112.5°	34°50.3'	+36.7'	113.2°	34°26.4'	+37.6'	113.8°	34°01.8'	+38.5'	114.4°	33°36.8'	+39.4'	115.0°	1
2	36°32.0'	+33.3'	110.2°	36°11.0'	+34.3'	110.9°	35°49.3'	+35.3'	111.5°	35°27.0'	+36.2'	112.2°	35°04.0'	+37.2'	112.9°	34°40.4'	+38.1'	113.5°	34°16.2'	+39.0'	114.1°	2
3	37°05.3'	+32.7'	109.1°	36°45.3'	+33.7'	109.8°	36°24.6'	+34.8'	110.5°	36°03.2'	+35.7'	111.2°	35°41.2'	+36.7'	111.9°	35°18.5'	+37.6'	112.5°	34°55.1'	+38.6'	113.2°	3
4	37°38.0'	+32.1'	108.1°	37°19.0'	+33.2'	108.8°	36°59.3'	+34.2'	109.5°	36°38.9'	+35.2'	110.2°	36°17.9'	+36.2'	110.9°	35°56.1'	+37.2'	111.6°	35°33.7'	+38.1'	112.3°	4
5	38°10.1'	+31.5'	107.0°	37°52.2'	+32.6'	107.7°	37°33.5'	+33.7'	108.5°	37°14.2'	+34.7'	109.2°	36°54.1'	+35.7'	109.9°	36°33.3'	+36.7'	110.6°	36°11.8'	+37.7'	111.3°	5
6	38°41.7'	+30.9'	105.9°	38°24.8'	+32.0'	106.7°	38°07.2'	+33.1'	107.4°	37°48.9'	+34.2'	108.2°	37°29.8'	+35.2'	108.9°	37°10.0'	+36.2'	109.6°	36°49.5'	+37.2'	110.3°	6
7	39°12.6'	+30.3'	104.8°	38°56.9'	+31.4'	105.6°	38°40.3'	+32.5'	106.4°	38°23.0'	+33.6'	107.1°	38°05.0'	+34.7'	107.9°	37°46.2'	+35.7'	108.6°	36°29.7'	+36.7'	109.4°	7
8	39°42.9'	+29.6'	103.7°	39°28.3'	+30.8'	104.5°	39°12.9'	+31.9'	105.3°	38°56.6'	+33.0'	106.1°	38°39.6'	+34.1'	106.8°	38°21.9'	+35.1'	107.6°	38°03.3'	+36.2'	108.4°	8
9	40°12.5'	+29.0'	102.6°	39°59.1'	+30.1'	103.4°	39°44.8'	+31.3'	104.2°	39°29.6'	+32.4'	105.0°	39°13.7'	+33.5'	105.8°	38°57.0'	+34.6'	106.6°	38°39.5'	+35.6'	107.3°	9
10	40°41.5'	+28.3'	101.4°	40°29.2'	+29.5'	102.2°	40°16.0'	+30.6'	103.1°	40°02.1'	+31.8'	103.9°	39°47.2'	+32.9'	104.7°	39°31.6'	+34.0'	105.5°	39°15.1'	+35.1'	106.3°	10
11	41°09.8'	+27.6'	100.2°	40°58.7'	+28.8'	101.1°	40°46.7'	+30.0'	101.9°	40°33.8'	+31.1'	102.8°	40°20.1'	+32.3'	103.6°	40°05.6'	+33.4'	104.4°	39°50.2'	+34.5'	105.2°	11
12	41°37.3'	+26.8'	99.1°	41°27.4'	+28.1'	99.9°	41°16.6'	+29.3'	100.8°	41°05.0'	+30.5'	101.7°	40°52.4'	+31.6'	102.5°	40°39.0'	+32.8'	103.3°	40°24.7'	+33.9'	104.2°	12
13	42°04.2'	+26.1'	97.9°	41°55.5'	+27.3'	98.7°	41°45.9'	+28.5'	99.6°	41°35.4'	+29.8'	100.5°	41°24.0'	+31.0'	101.4°	41°11.7'	+32.1'	102.2°	40°58.6'	+33.3'	103.1°	13
14	42°30.2'	+25.3'	96.6°	42°22.8'	+26.5'	97.5°	42°14.4'	+27.8'	98.4°	42°05.2'	+29.0'	99.3°	41°55.0'	+30.3'	100.2°	41°43.9'	+31.4'	101.1°	41°31.8'	+32.6'	102.0°	14
15	42°55.5'	+24.5'	95.4°	42°49.3'	+25.8'	96.3°	42°42.3'	+27.0'	97.2°	42°34.2'	+28.3'	98.2°	42°25.2'	+29.5'	99.1°	42°15.3'	+30.8'	100.0°	42°04.5'	+31.9'	100.9°	15
16	43°19.9'	+23.6'	94.2°	43°15.1'	+25.0'	95.1°	43°09.3'	+26.3'	96.0°	43°02.5'	+27.5'	97.0°	42°54.8'	+28.8'	97.9°	42°46.1'	+30.0'	98.8°	42°36.4'	+31.2'	99.7°	16
17	43°43.6'	+22.8'	92.9°	43°40.1'	+24.1'	93.8°	43°35.5'	+25.4'	94.8°	43°30.0'	+26.7'	95.7°	43°23.5'	+28.0'	96.7°	43°16.1'	+29.3'	97.6°	43°07.6'	+30.5'	98.5°	17
18	44°06.4'	+21.9'	91.6°	44°04.2'	+23.3'	92.6°	44°01.0'	+24.6'	93.5°	43°56.8'	+25.9'	94.5°	43°51.6'	+27.2'	95.5°	43°45.4'	+28.5'	96.4°	43°38.2'	+29.8'	97.4°	18
19	44°28.3'	+21.0'	90.3°	44°27.4'	+22.4'	91.3°	44°25.6'	+23.7'	92.3°	44°22.7'	+25.1'	93.2°	44°18.8'	+26.4'	94.2°	44°13.9'	+27.7'	95.2°	44°08.0'	+29.0'	96.2°	19
20	44°49.3'	+20.1'	89.0°	44°49.8'	+21.5'	90.0°	44°49.3'	+22.9'	91.0°	44°47.8'	+24.2'	92.0°	44°45.2'	+25.6'	93.0°	44°41.6'	+26.9'	93.9°	44°37.0'	+28.2'	94.9°	20
21	45°09.4'	+19.2'	87.7°	45°1																		

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

50° 310° LHA

Latitude SAME as 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°34.8'	+34.0'	111.5°	34°12.5'	+34.9'	112.1°	33°49.6'	+35.9'	112.8°	33°26.0'	+36.8'	113.4°	33°02.0'	+37.7'	114.0°	32°37.3'	+38.6'	114.6°	32°12.1'	+39.5'	115.1°	0
1	35°08.7'	+33.5'	110.5°	34°47.4'	+34.5'	111.2°	34°25.4'	+35.4'	111.8°	34°02.9'	+36.4'	112.4°	33°39.7'	+37.3'	113.0°	33°15.9'	+38.2'	113.6°	32°51.5'	+39.1'	114.2°	1
2	35°42.2'	+32.9'	109.5°	35°21.9'	+34.0'	110.1°	35°00.9'	+34.9'	110.8°	34°39.2'	+35.9'	111.5°	34°17.0'	+36.9'	112.1°	33°54.1'	+37.8'	112.7°	33°30.6'	+38.7'	113.3°	2
3	36°15.1'	+32.4'	108.4°	35°55.8'	+33.4'	109.1°	35°35.8'	+34.4'	109.8°	35°15.1'	+35.4'	110.5°	34°53.8'	+36.4'	111.1°	34°31.9'	+37.3'	111.8°	34°09.3'	+38.3'	112.4°	3
4	36°47.5'	+31.8'	107.4°	36°29.2'	+32.9'	108.1°	36°10.2'	+33.9'	108.8°	35°50.6'	+34.9'	109.5°	35°30.2'	+35.9'	110.2°	35°09.2'	+36.9'	110.8°	34°47.5'	+37.8'	111.5°	4
5	37°19.4'	+31.3'	106.3°	37°02.1'	+32.3'	107.1°	36°44.2'	+33.4'	107.8°	36°25.5'	+34.4'	108.5°	36°06.1'	+35.4'	109.2°	35°46.1'	+36.4'	109.9°	35°25.4'	+37.4'	110.5°	5
6	37°50.6'	+30.7'	105.3°	37°34.5'	+31.8'	106.0°	37°17.6'	+32.8'	106.7°	37°00.0'	+33.9'	107.5°	36°41.6'	+34.9'	108.2°	36°22.5'	+35.9'	108.9°	36°02.7'	+36.9'	109.6°	6
7	38°21.3'	+30.2'	104.2°	38°06.2'	+31.2'	104.9°	37°50.4'	+32.3'	105.7°	37°33.8'	+33.3'	106.4°	37°16.5'	+34.4'	107.2°	36°58.4'	+35.4'	107.9°	36°39.6'	+36.4'	108.6°	7
8	38°51.3'	+29.4'	103.1°	38°37.4'	+30.6'	103.8°	38°22.6'	+31.7'	104.6°	38°07.1'	+32.8'	105.4°	37°50.8'	+33.8'	106.1°	37°33.8'	+34.9'	106.9°	37°16.0'	+35.9'	107.6°	8
9	39°20.8'	+28.8'	101.9°	39°07.9'	+29.9'	102.7°	38°54.3'	+31.1'	103.5°	38°39.9'	+32.2'	104.3°	38°24.7'	+33.3'	105.1°	38°08.7'	+34.3'	105.8°	37°51.9'	+35.4'	106.6°	9
10	39°49.5'	+28.1'	100.8°	39°37.9'	+29.3'	101.6°	39°25.4'	+30.4'	102.4°	39°12.1'	+31.6'	103.2°	38°57.9'	+32.7'	104.0°	38°43.0'	+33.8'	104.8°	38°27.3'	+34.8'	105.6°	10
11	40°17.6'	+27.4'	99.6°	40°07.1'	+28.6'	100.5°	39°55.8'	+29.8'	101.3°	39°43.6'	+30.9'	102.1°	39°30.6'	+32.1'	102.9°	39°16.8'	+33.2'	103.7°	39°02.1'	+34.3'	104.5°	11
12	40°45.0'	+26.7'	98.5°	40°35.7'	+27.9'	99.3°	40°25.5'	+29.1'	100.2°	40°14.5'	+30.3'	101.0°	40°02.7'	+31.4'	101.8°	39°49.9'	+32.6'	102.6°	39°36.4'	+33.7'	103.5°	12
13	41°11.6'	+25.9'	97.3°	41°03.6'	+27.2'	98.2°	40°54.6'	+28.4'	99.0°	40°44.8'	+29.6'	99.9°	40°34.1'	+30.8'	100.7°	40°22.5'	+31.9'	101.5°	40°10.1'	+33.1'	102.4°	13
14	41°37.6'	+25.2'	96.1°	41°30.7'	+26.4'	97.0°	41°23.0'	+27.7'	97.8°	41°14.4'	+28.9'	98.7°	41°04.8'	+30.1'	99.6°	40°54.4'	+31.3'	100.4°	40°43.1'	+32.4'	101.3°	14
15	42°02.7'	+24.4'	94.9°	41°57.2'	+25.7'	95.8°	41°50.7'	+26.9'	96.7°	41°43.3'	+28.2'	97.5°	41°34.9'	+29.4'	98.4°	41°25.7'	+30.6'	99.3°	41°15.6'	+31.8'	100.2°	15
16	42°27.1'	+23.6'	93.6°	42°22.8'	+24.9'	94.5°	42°17.6'	+26.2'	95.4°	42°11.4'	+27.4'	96.4°	42°04.3'	+28.7'	97.2°	41°56.3'	+29.9'	98.1°	41°47.3'	+31.1'	99.0°	16
17	42°50.7'	+22.7'	92.4°	42°47.7'	+24.1'	93.3°	42°43.7'	+25.4'	94.2°	42°38.8'	+26.6'	95.1°	42°33.0'	+27.9'	96.1°	42°26.2'	+29.2'	97.0°	42°18.4'	+30.4'	97.9°	17
18	43°13.4'	+21.9'	91.1°	43°11.7'	+23.2'	92.1°	43°09.1'	+24.6'	93.0°	43°05.5'	+25.9'	93.9°	43°00.9'	+27.1'	94.9°	42°55.3'	+28.4'	95.8°	42°48.8'	+29.7'	96.7°	18
19	43°35.3'	+21.0'	89.8°	43°35.0'	+22.4'	90.8°	43°33.7'	+23.7'	91.7°	43°31.3'	+25.0'	92.7°	43°28.0'	+26.3'	93.6°	43°23.7'	+27.6'	94.6°	43°18.5'	+28.9'	95.5°	19
20	43°56.3'	+20.1'	88.5°	43°57.4'	+21.5'	89.5°	43°57.4'	+22.9'	90.5°	43°56.4'	+24.2'	91.4°	43°54.4'	+25.5'	92.4°	43°51.4'	+26.8'	93.3°	43°47.4'	+28.1'	94.3°	20
21	44°16.5'	+19.2'	87.2°	44°18.9'	+20.6'	88.2°	44°20.2'	+22.0'	89.2°	44°20.6'	+23.3'	90.2°	44°19.9'	+24.7'	91.1°	44°18.2'	+26.0'	92.1°	44°15.5'	+27.3'	93.1°	21
22	44°35.7'	+18.3'	85.9°	44°39.5'	+19.7'	86.9°	44°42.2'	+21.1'	87.9°	44°43.9'	+23.5'	88.9°	44°44.6'	+24.8'	89.8°	44°44.2'	+25.2'	90.8°	44°42.8'	+26.5'	91.8°	22
23	44°54.0'	+17.3'	84.6°	44°59.2'	+18.8'	85.5°	45°03.3'	+20.2'	86.5°	45°06.4'	+21.5'	87.5°	45°08.4'	+22.9'	88.6°	45°09.4'	+24.3'	89.6°	45°09.3'	+25.6'	90.6°	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

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°45.4'	+33.6'	110.8°	33°23.7'	+34.6'	111.4°	33°01.5'	+35.6'	112.0°	32°38.7'	+36.5'	112.6°	32°15.3'	+37.4'	113.2°	31°51.4'	+38.3'	113.8°	31°26.9'	+39.1'	114.4°	0
1	34°19.0'	+33.1'	109.8°	33°58.3'	+34.1'	110.5°	33°37.1'	+35.1'	111.1°	33°15.2'	+36.1'	111.7°	32°52.7'	+37.0'	112.3°	32°29.7'	+37.9'	112.9°	32°06.0'	+38.8'	113.5°	1
2	34°52.1'	+32.6'	108.8°	34°32.5'	+33.6'	109.5°	34°12.2'	+34.6'	110.1°	33°51.2'	+35.6'	110.7°	33°29.7'	+36.5'	111.4°	33°07.5'	+37.5'	112.0°	32°44.8'	+38.4'	112.6°	2
3	35°24.8'	+32.1'	107.8°	35°06.1'	+33.1'	108.4°	34°46.8'	+34.1'	109.1°	34°26.8'	+35.1'	109.8°	34°06.2'	+36.1'	110.4°	33°45.0'	+37.0'	111.0°	33°23.2'	+38.0'	111.6°	3
4	35°56.9'	+31.6'	106.7°	35°39.3'	+32.6'	107.4°	35°21.0'	+33.6'	108.1°	35°02.0'	+34.6'	108.8°	34°42.3'	+35.6'	109.4°	34°22.1'	+36.6'	110.1°	34°01.1'	+37.5'	110.7°	4
5	36°28.2'	+31.0'	105.7°	36°11.9'	+32.1'	106.4°	35°54.6'	+33.1'	107.1°	35°36.6'	+34.1'	107.8°	35°18.0'	+35.1'	108.5°	34°58.6'	+36.1'	109.1°	34°38.7'	+37.1'	109.8°	5
6	36°59.4'	+30.4'	104.6°	36°43.9'	+31.5'	105.3°	36°27.7'	+32.6'	106.1°	36°10.8'	+33.6'	106.8°	35°53.1'	+34.6'	107.5°	35°34.8'	+35.6'	108.1°	35°15.8'	+36.6'	108.8°	6
7	37°29.9'	+29.8'	103.5°	37°15.4'	+30.9'	104.3°	37°00.3'	+32.0'	105.0°	36°44.4'	+33.1'	105.7°	36°27.8'	+34.1'	106.4°	36°10.4'	+35.1'	107.1°	35°52.4'	+36.1'	107.8°	7
8	37°59.7'	+29.2'	102.4°	37°46.4'	+30.3'	103.2°	37°32.3'	+31.4'	103.9°	37°17.5'	+32.5'	104.7°	37°01.9'	+33.6'	105.4°	36°45.6'	+34.6'	106.1°	36°28.5'	+35.6'	106.9°	8
9	38°28.9'	+28.6'	101.3°	38°16.7'	+29.7'	102.1°	38°03.7'	+30.8'	102.9°	37°50.0'	+31.9'	103.6°	37°35.5'	+33.0'	104.4°	37°20.2'	+34.1'	105.1°	37°04.2'	+35.1'	105.8°	9
10	38°57.4'	+27.9'	100.2°	38°46.4'	+29.1'	101.0°	38°34.6'	+30.2'	101.8°	38°21.9'	+31.3'	102.5°	38°08.5'	+32.5'	103.3°	37°54.3'	+33.5'	104.1°	37°39.3'	+34.6'	104.8°	10
11	39°25.3'	+27.2'	99.1°	39°15.5'	+28.4'	99.9°	39°04.8'	+29.6'	100.7°	38°53.3'	+30.7'	101.5°	38°40.9'	+31.9'	102.2°	38°27.8'	+33.0'	103.0°	38°13.9'	+34.0'	103.8°	11
12	39°52.5'	+26.5'	97.9°	39°43.9'	+27.7'	98.7°	39°34.3'	+28.9'	99.5°	39°24.0'	+30.1'	100.3°	39°12.8'	+31.2'	101.2°	39°00.8'	+32.4'	102.0°	38°47.9'	+33.5'	102.7°	12
13	40°19.1'	+25.8'	96.7°	40°11.6'	+27.0'	97.6°	40°03.3'	+28.2'	98.4°	39°54.1'	+29.4'	99.2°	39°44.0'	+30.6'	100.0°	39°33.1'	+31.7'	100.9°	39°21.4'	+32.9'	101.7°	13
14	40°44.9'	+25.1'	95.5°	40°38.6'	+26.3'	96.4°	40°31.5'	+27.5'	97.2°	40°23.5'	+28.7'	98.1°	40°14.6'	+29.9'	98.9°	40°04.9'	+31.1'	99.8°	39°54.3'	+32.3'	100.6°	14
15	41°09.9'	+24.3'	94.3°	41°04.9'	+25.6'	95.2°	40°59.0'	+26.8'	96.1°	40°52.2'	+28.0'	96.9°	40°44.6'	+29.3'	97.8°	40°36.0'	+30.4'	98.6°	40°26.5'	+31.6'	99.5°	15
16	41°34.2'	+23.5'	93.1°	41°30.5'	+24.8'	94.0°	41°25.8'	+26.1'	94.9°	41°20.3'	+27.3'	95.8°	41°13.8'	+28.5'	96.6°	41°06.4'	+29.8'	97.5°	40°58.2'	+31.0'	98.4°	16
17	41°57.7'	+22.7'	91.9°	41°55.3'	+24.0'	92.8°	41°51.9'	+25.3'	93.7°	41°47.6'	+26.6'	94.6°	41°42.4'	+27.8'	95.5°	41°36.2'	+29.1'	96.3°	41°29.1'	+30.3'	97.2°	17
18	42°20.4'	+21.9'	90.6°	42°19.3'	+23.2'	91.5°	42°17.2'	+24.5'	92.5°	42°14.2'	+25.8'	93.4°	42°10.2'	+27.1'	94.3°	42°05.2'	+28.3'	95.2°	41°59.4'	+29.6'	96.1°	18
19	42°42.3'	+21.0'	89.4°	42°42.5'	+22.4'	90.3°	42°41.7'	+23.7'	91.2°	42°40.0'	+25.0'	92.1°	42°37.2'	+26.3'	93.1°	42°33.6'	+27.6'	94.0°	42°28.9'	+28.8'	94.9°	19
20	43°03.4'	+20.2'	88.1°	43°04.9'	+21.5'	89.0°	43°05.4'	+22.9'	90.0°	43°05.0'	+24.2'	90.9°	43°03.5'	+25.5'	91.8°	43°01.1'	+26.8'	92.8°	42°57.8'	+28.1'	93.7°	20
21	43°23.6'	+19.3'	86.8°	43°26.4'	+20.7'																	

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°55.7'	+33.3'	110.1°	32°34.8'	+34.3'	110.7°	32°13.2'	+35.2'	111.3°	31°51.1'	+36.2'	111.9°	31°28.4'	+37.1'	112.5°	31°05.2'	+38.0'	113.1°	30°41.5'	+38.8'	113.6°	0
1	33°29.1'	+32.8'	109.1°	33°09.1'	+33.8'	109.8°	32°48.5'	+34.8'	110.4°	32°27.3'	+35.7'	111.0°	32°05.5'	+36.7'	111.6°	31°43.2'	+37.6'	112.1°	31°20.3'	+38.5'	112.7°	1
2	34°01.9'	+32.3'	108.1°	33°42.9'	+33.4'	108.8°	33°23.3'	+34.3'	109.4°	33°03.0'	+35.3'	110.0°	32°42.2'	+36.2'	110.6°	32°20.8'	+37.2'	111.2°	31°58.8'	+38.1'	111.8°	2
3	34°34.2'	+31.8'	107.1°	34°16.2'	+32.9'	107.8°	33°57.6'	+33.9'	108.4°	33°38.3'	+34.8'	109.1°	33°18.4'	+35.8'	109.7°	32°57.9'	+36.7'	110.3°	32°36.8'	+37.7'	110.9°	3
4	35°06.1'	+31.3'	106.1°	34°49.1'	+32.3'	106.8°	34°31.5'	+33.4'	107.4°	34°13.2'	+34.4'	108.1°	33°54.2'	+35.4'	108.7°	33°34.7'	+36.3'	109.3°	33°14.5'	+37.3'	110.0°	4
5	35°37.4'	+30.7'	105.0°	35°21.4'	+31.8'	105.7°	35°04.8'	+32.9'	106.4°	34°47.5'	+33.9'	107.1°	34°29.6'	+34.9'	107.7°	34°11.0'	+35.9'	108.4°	33°51.7'	+36.8'	109.0°	5
6	36°08.1'	+30.2'	104.0°	35°53.3'	+31.3'	104.7°	35°37.7'	+32.3'	105.4°	35°21.4'	+33.4'	106.1°	35°04.5'	+34.4'	106.7°	34°46.9'	+35.4'	107.4°	34°28.6'	+36.4'	108.1°	6
7	36°38.3'	+29.6'	102.9°	36°24.5'	+30.7'	103.6°	36°10.0'	+31.8'	104.3°	35°54.8'	+32.8'	105.0°	35°38.9'	+33.9'	105.7°	35°22.2'	+34.9'	106.4°	35°04.9'	+35.9'	107.1°	7
8	37°07.9'	+29.0'	101.8°	36°55.2'	+30.1'	102.6°	36°41.8'	+31.2'	103.3°	36°27.6'	+32.3'	104.0°	36°12.7'	+33.4'	104.7°	35°57.1'	+34.4'	105.4°	35°40.8'	+35.4'	106.1°	8
9	37°36.9'	+28.4'	100.7°	37°25.3'	+29.5'	101.5°	37°13.0'	+30.6'	102.2°	37°00.0'	+31.7'	103.0°	36°46.1'	+32.8'	103.7°	36°31.5'	+33.9'	104.4°	36°16.2'	+34.9'	105.1°	9
10	38°05.2'	+27.7'	99.6°	37°54.8'	+28.9'	100.4°	37°43.6'	+30.0'	101.1°	37°31.7'	+31.1'	101.9°	37°18.9'	+32.2'	102.6°	37°05.4'	+33.3'	103.4°	36°51.1'	+34.4'	104.1°	10
11	38°33.0'	+27.1'	98.5°	38°23.7'	+28.2'	99.3°	38°13.7'	+29.4'	100.0°	38°02.8'	+30.5'	100.8°	37°51.2'	+31.7'	101.6°	37°38.7'	+32.8'	102.3°	37°25.5'	+33.8'	103.1°	11
12	39°00.0'	+26.4'	97.3°	38°52.0'	+27.6'	98.1°	38°43.1'	+28.8'	98.9°	38°33.3'	+29.9'	99.7°	38°22.8'	+31.1'	100.5°	38°11.5'	+32.2'	101.3°	37°59.4'	+33.3'	102.0°	12
13	39°26.4'	+25.7'	96.2°	39°19.5'	+26.9'	97.0°	39°11.8'	+28.1'	97.8°	39°03.3'	+29.3'	98.6°	38°53.9'	+30.4'	99.4°	38°43.7'	+31.6'	100.2°	38°32.6'	+32.7'	101.0°	13
14	39°52.1'	+25.0'	95.0°	39°46.4'	+26.2'	95.8°	39°39.9'	+27.4'	96.7°	39°32.5'	+28.6'	97.5°	39°24.3'	+29.8'	98.3°	39°15.2'	+31.0'	99.1°	39°05.3'	+32.1'	99.9°	14
15	40°17.1'	+24.2'	93.8°	40°12.6'	+25.5'	94.7°	40°07.3'	+26.7'	95.5°	40°01.2'	+27.9'	96.3°	39°54.1'	+29.1'	97.2°	39°46.2'	+30.3'	98.0°	39°37.4'	+31.5'	98.8°	15
16	40°41.3'	+23.5'	92.6°	40°38.1'	+24.7'	93.5°	40°34.0'	+26.0'	94.3°	40°29.1'	+27.2'	95.2°	40°23.2'	+28.4'	96.0°	40°16.5'	+29.6'	96.9°	40°08.9'	+30.8'	97.7°	16
17	41°04.8'	+22.7'	91.4°	41°02.9'	+24.0'	92.3°	41°00.0'	+25.2'	93.1°	40°56.3'	+26.5'	94.0°	40°51.7'	+27.7'	94.9°	40°46.1'	+29.0'	95.7°	40°39.7'	+30.2'	96.6°	17
18	41°27.5'	+21.9'	90.2°	41°26.8'	+23.2'	91.0°	41°25.3'	+24.5'	91.9°	41°22.8'	+25.8'	92.8°	41°19.4'	+27.0'	93.7°	41°15.1'	+28.2'	94.6°	41°09.9'	+29.5'	95.4°	18
19	41°49.4'	+21.1'	88.9°	41°50.0'	+22.4'	89.8°	41°49.8'	+23.7'	90.7°	41°48.6'	+25.0'	91.6°	41°46.4'	+26.3'	92.5°	41°43.3'	+27.5'	93.4°	41°39.3'	+28.8'	94.3°	19
20	42°10.4'	+20.2'	87.7°	42°12.4'	+21.6'	88.6°	42°13.5'	+22.9'	89.5°	42°13.5'	+24.2'	90.4°	42°12.7'	+25.5'	91.3°	42°10.9'	+26.8'	92.2°	42°08.1'	+28.0'	93.1°	20
21	42°30.7'	+19.4'	86.4°	42°34.0'	+20.7'	87.3°	42°36.3'	+22.1'	88.2°	42°37.7'	+23.4'	89.1°	42°38.2'	+24.7'	90.1°	42°37.6'	+26.0'	91.0°	42°36.1'	+27.3'	91.9°	21
22	42°50.1'	+18.5'	85.1°	42°54.7'	+19.9'	86.0°	42°58.4'	+21.2'	86.9°	43°01.1'	+22.5'	87.9°	43°02.8'	+23.9'	88.8°	43°03.6'	+25.2'	89.7°	43°03.4'	+26.5'	90.7°	22
23	43°08.6'	+17.6'	83.8°	43°14.6'	+19.0'	84.7°	43°19.6'	+20.3'	85.7°	43°23.7'	+21.7'	86.6°	43°26.7'	+23.0'	87.5°	43°28.8'	+24.4'	88.5°	43°29.9'	+25.7'	89.4°	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°05.9'	+33.0'	109.5°	31°45.6'	+34.0'	110.1°	31°24.7'	+34.9'	110.6°	31°03.3'	+35.9'	111.2°	30°41.3'	+36.8'	111.8°	30°18.8'	+37.7'	112.3°	29°55.7'	+38.5'	112.8°	0
1	32°38.9'	+32.6'	108.5°	32°19.6'	+33.5'	109.1°	31°59.7'	+34.5'	109.7°	31°39.2'	+35.5'	110.3°	31°18.1'	+36.4'	110.8°	30°56.5'	+37.3'	111.4°	30°34.3'	+38.2'	112.0°	1
2	33°11.5'	+32.1'	107.5°	32°53.1'	+33.1'	108.1°	32°34.2'	+34.1'	108.7°	32°14.6'	+35.0'	109.3°	31°54.5'	+36.0'	109.9°	31°33.7'	+36.9'	110.5°	31°12.4'	+37.8'	111.1°	2
3	33°43.5'	+31.6'	106.5°	33°26.2'	+32.6'	107.1°	33°08.2'	+33.6'	107.7°	32°49.6'	+34.6'	108.4°	32°30.4'	+35.5'	109.0°	32°10.6'	+36.5'	109.6°	31°50.2'	+37.4'	110.2°	3
4	34°15.1'	+31.0'	105.5°	33°58.8'	+32.1'	106.1°	33°41.8'	+33.1'	106.7°	33°24.2'	+34.1'	107.4°	33°06.0'	+35.1'	108.0°	32°47.1'	+36.0'	108.6°	32°27.6'	+37.0'	109.2°	4
5	34°46.1'	+30.5'	104.4°	34°30.9'	+31.6'	105.1°	34°14.9'	+32.6'	105.7°	33°58.3'	+33.6'	106.4°	33°41.0'	+34.6'	107.0°	33°23.1'	+35.6'	107.7°	33°04.6'	+36.6'	108.3°	5
6	35°16.6'	+30.0'	103.4°	35°02.4'	+31.0'	104.0°	34°47.5'	+32.1'	104.7°	34°31.9'	+33.1'	105.4°	34°15.7'	+34.1'	106.1°	33°58.7'	+35.1'	106.7°	33°41.2'	+36.1'	107.3°	6
7	35°46.6'	+29.4'	102.3°	35°33.4'	+30.5'	103.0°	35°19.6'	+31.6'	103.7°	35°05.0'	+32.6'	104.4°	34°49.8'	+33.6'	105.1°	34°33.9'	+34.7'	105.7°	34°17.3'	+35.7'	106.4°	7
8	36°16.0'	+28.8'	101.2°	36°03.9'	+29.9'	101.9°	35°51.2'	+31.0'	102.6°	35°37.7'	+32.1'	103.3°	35°23.5'	+33.1'	104.0°	35°08.5'	+34.2'	104.7°	34°53.0'	+35.2'	105.4°	8
9	36°44.8'	+28.2'	100.1°	36°33.8'	+29.3'	100.9°	36°22.2'	+30.4'	101.6°	36°09.7'	+31.5'	102.3°	35°56.6'	+32.6'	103.0°	35°42.7'	+33.7'	103.7°	35°28.1'	+34.7'	104.4°	9
10	37°13.0'	+27.6'	99.0°	37°03.2'	+28.7'	99.8°	36°52.6'	+29.8'	100.5°	36°41.3'	+31.0'	101.2°	36°29.2'	+32.1'	102.0°	36°16.4'	+33.1'	102.7°	36°02.8'	+34.2'	103.4°	10
11	37°40.5'	+26.9'	97.9°	37°31.9'	+28.1'	98.7°	37°22.4'	+29.2'	99.4°	37°12.2'	+30.4'	100.2°	37°01.2'	+31.5'	100.9°	36°49.5'	+32.6'	101.7°	36°37.0'	+33.6'	102.4°	11
12	38°07.5'	+26.3'	96.8°	38°00.0'	+27.4'	97.6°	37°51.7'	+28.6'	98.3°	37°42.6'	+29.8'	99.1°	37°32.7'	+30.9'	99.8°	37°22.1'	+32.0'	100.6°	37°10.7'	+33.1'	101.4°	12
13	38°33.7'	+25.6'	95.6°	38°27.4'	+26.8'	96.4°	38°20.3'	+28.0'	97.2°	38°12.4'	+29.1'	98.0°	38°03.6'	+30.3'	98.8°	37°54.1'	+31.4'	99.5°	37°43.8'	+32.5'	100.3°	13
14	38°59.3'	+24.9'	94.5°	38°54.2'	+26.1'	95.3°	38°48.3'	+27.3'	96.1°	38°41.5'	+28.5'	96.9°	38°33.9'	+29.7'	97.7°	38°25.5'	+30.8'	98.5°	38°16.3'	+31.9'	99.2°	14
15	39°24.2'	+24.2'	93.3°	39°20.3'	+25.4'	94.1°	39°15.6'	+26.6'	94.9°	39°10.0'	+27.8'	95.7°	39°03.6'	+29.0'	96.5°	38°56.3'	+30.2'	97.4°	38°48.2'	+31.3'	98.2°	15
16	39°48.4'	+23.4'	92.1°	39°45.7'	+24.7'	92.9°	39°42.2'	+25.9'	93.8°	39°37.8'	+27.1'	94.6°	39°32.6'	+28.4'	95.4°	39°26.5'	+29.5'	96.2°	39°19.6'	+30.7'	97.1°	16
17	40°11.8'	+22.7'	90.9°	40°10.4'	+23.9'	91.7°	40°08.1'	+25.2'	92.6°	40°05.0'	+26.4'	93.4°	40°01.0'	+27.7'	94.3°	39°56.1'	+28.9'	95.1°	39°50.3'	+30.1'	95.9°	17
18	40°34.5'	+21.9'	89.7°	40°34.4'	+23.2'	90.5°	40°33.3'	+24.5'	91.4°	40°31.4'	+25.7'	92.3°	40°28.6'	+27.0'	93.1°	40°24.9'	+28.2'	94.0°	40°20.3'	+29.4'	94.8°	18
19	40°56.4'	+21.1'	88.5°	40°57.6'	+22.4'	89.3°	40°57.6'	+23.7'	90.2°	40°57.1'	+25.0'	91.1°	40°55.6'	+26.2'	91.9°	40°53.1'	+27.5'	92.8°	40°49.7'	+28.7'	93.7°	19
20	41°17.5'	+20.3'	87.2°	41°20.0'	+21.6'	88.1°	41°21.5'	+22.9'	89.0°	41°22.1'	+24.2'	89.9°	41°21.8'	+25.5'	90.7°	41°20.6'	+26.7'	91.6°	41°18.4'	+28.0'	92.5°	20
21	41°37.8'	+19.5'	86.0°	41°41.6'	+20.8'	86.8°	41°44															

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

54° 306° LHA

Latitude SAME as Declination

54° 306° 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	31°15.8'	+32.7'	108.8°	30°56.2'	+33.7'	109.4°	30°36.0'	+34.6'	110.0°	30°15.2'	+35.6'	110.5°	29°53.9'	+36.5'	111.1°	29°32.1'	+37.4'	111.6°	29°09.8'	+38.2'	112.1°	0
1	31°48.6'	+32.3'	107.9°	31°29.9'	+33.3'	108.4°	31°10.6'	+34.2'	109.0°	30°50.8'	+35.2'	109.6°	30°30.4'	+36.1'	110.1°	30°09.5'	+37.0'	110.7°	29°48.0'	+37.9'	111.2°	1
2	32°20.8'	+31.8'	106.9°	32°03.1'	+32.8'	107.5°	31°44.8'	+33.8'	108.1°	31°26.0'	+34.7'	108.6°	31°06.5'	+35.7'	109.2°	30°46.5'	+36.6'	109.8°	30°25.9'	+37.5'	110.3°	2
3	32°52.6'	+31.3'	105.8°	32°35.9'	+32.3'	106.5°	32°18.6'	+33.3'	107.1°	32°00.7'	+34.3'	107.7°	31°42.2'	+35.3'	108.3°	31°23.1'	+36.2'	108.8°	31°03.4'	+37.1'	109.4°	3
4	33°23.9'	+30.8'	104.8°	33°08.3'	+31.8'	105.5°	32°52.0'	+32.9'	106.1°	32°35.0'	+33.9'	106.7°	32°17.5'	+34.8'	107.3°	31°59.3'	+35.8'	107.9°	31°40.6'	+36.7'	108.5°	4
5	33°54.7'	+30.3'	103.8°	33°40.1'	+31.3'	104.4°	33°24.8'	+32.4'	105.1°	33°08.9'	+33.4'	105.7°	32°52.3'	+34.4'	106.3°	32°35.1'	+35.4'	107.0°	32°17.3'	+36.3'	107.6°	5
6	34°25.0'	+29.7'	102.8°	34°11.4'	+30.8'	103.4°	33°57.2'	+31.9'	104.1°	33°42.3'	+32.9'	104.7°	33°26.7'	+33.9'	105.4°	33°10.5'	+34.9'	106.0°	32°53.6'	+35.9'	106.6°	6
7	34°54.8'	+29.2'	101.7°	34°42.3'	+30.3'	102.4°	34°29.0'	+31.3'	103.1°	34°15.2'	+32.4'	103.7°	34°00.6'	+33.4'	104.4°	33°45.4'	+34.4'	105.0°	33°29.5'	+35.4'	105.7°	7
8	35°24.0'	+28.6'	100.6°	35°12.5'	+29.7'	101.3°	35°00.4'	+30.8'	102.0°	34°47.6'	+31.9'	102.7°	34°34.0'	+32.9'	103.4°	34°19.8'	+34.0'	104.0°	34°04.9'	+35.0'	104.7°	8
9	35°52.6'	+28.0'	99.5°	35°42.2'	+29.1'	100.3°	35°31.2'	+30.3'	101.0°	35°19.4'	+31.3'	101.7°	35°06.9'	+32.4'	102.4°	34°53.8'	+33.5'	103.0°	34°39.9'	+34.5'	103.7°	9
10	36°20.6'	+27.4'	98.5°	36°11.4'	+28.6'	99.2°	36°01.5'	+29.7'	99.9°	35°50.8'	+30.8'	100.6°	35°39.4'	+31.9'	101.3°	35°27.2'	+32.9'	102.0°	35°14.4'	+34.0'	102.7°	10
11	36°48.0'	+26.8'	97.3°	36°40.0'	+28.0'	98.1°	36°31.1'	+29.1'	98.8°	36°21.6'	+30.2'	99.6°	36°11.2'	+31.3'	100.3°	36°00.2'	+32.4'	101.0°	35°48.4'	+33.5'	101.7°	11
12	37°14.8'	+26.2'	96.2°	37°07.9'	+27.3'	97.0°	37°00.2'	+28.5'	97.7°	36°51.8'	+29.6'	98.5°	36°42.6'	+30.7'	99.2°	36°32.6'	+31.9'	99.9°	36°21.8'	+32.9'	100.7°	12
13	37°41.0'	+25.5'	95.1°	37°35.2'	+26.7'	95.9°	37°28.7'	+27.9'	96.6°	37°21.4'	+29.0'	97.4°	37°13.3'	+30.2'	98.1°	37°04.4'	+31.3'	98.9°	36°54.8'	+32.4'	99.6°	13
14	38°06.5'	+24.8'	93.9°	38°01.9'	+26.0'	94.7°	37°56.6'	+27.2'	95.5°	37°50.4'	+28.4'	96.3°	37°43.5'	+29.5'	97.0°	37°35.7'	+30.7'	97.8°	37°27.1'	+31.8'	98.6°	14
15	38°31.3'	+24.1'	92.8°	38°28.0'	+25.3'	93.6°	38°23.8'	+26.6'	94.4°	38°18.8'	+27.7'	95.2°	38°13.0'	+28.9'	95.9°	38°06.4'	+30.1'	96.7°	37°59.0'	+31.2'	97.5°	15
16	38°55.4'	+23.4'	91.6°	38°53.3'	+24.6'	92.4°	38°50.3'	+25.9'	93.2°	38°46.6'	+27.1'	94.0°	38°41.9'	+28.3'	94.8°	38°36.5'	+29.4'	95.6°	38°30.2'	+30.6'	96.4°	16
17	39°18.8'	+22.7'	90.4°	39°18.0'	+23.9'	91.2°	39°16.2'	+25.2'	92.1°	39°13.6'	+26.4'	92.9°	39°10.2'	+27.6'	93.7°	39°05.9'	+28.8'	94.5°	39°00.8'	+30.0'	95.3°	17
18	39°41.5'	+21.9'	89.2°	39°41.9'	+23.2'	90.1°	39°41.4'	+24.4'	90.9°	39°40.0'	+25.7'	91.7°	39°37.8'	+26.9'	92.5°	39°34.7'	+28.1'	93.4°	39°30.7'	+29.3'	94.2°	18
19	40°03.4'	+21.2'	88.0°	40°05.1'	+22.4'	88.9°	40°05.8'	+23.7'	89.7°	40°05.7'	+25.0'	90.5°	40°04.7'	+26.2'	91.4°	40°02.8'	+27.4'	92.2°	40°00.1'	+28.6'	93.1°	19
20	40°24.6'	+20.4'	86.8°	40°27.5'	+21.7'	87.6°	40°29.5'	+23.0'	88.5°	40°30.7'	+24.2'	89.3°	40°30.9'	+25.5'	90.2°	40°30.3'	+26.7'	91.1°	40°28.7'	+28.0'	91.9°	20
21	40°45.0'	+19.6'	85.5°	40°49.2'	+20.9'	86.4°	40°52.5'	+22.2'	87.3°	40°54.9'	+23.5'	88.1°	40°56.4'	+24.7'	89.0°	40°57.0'	+26.0'	89.9°	40°56.7'	+27.2'	90.7°	21
22	41°04.6'	+18.8'	84.3°	41°10.1'	+20.1'	85.2°	41°14.7'	+21.4'	86.0°	41°18.4'	+22.7'	86.9°	41°21.1'	+24.0'	87.8°	41°23.0'	+25.2'	88.7°	41°23.9'	+26.5'	89.6°	22
23	41°23.3'	+17.9'	83.0°	41°30.1'	+19.2'	83.9°	41°36.0'	+20.6'	84.8°	41°41.0'	+21.9'	85.7°	41°45.1'	+23.2'	86.6°	41°48.2'	+24.5'	87.5°	41°50.4'	+25.7'	88.4°	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

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°25.6'	+32.4'	108.2°	30°06.6'	+33.4'	108.8°	29°47.0'	+34.4'	109.3°	29°26.9'	+35.3'	109.8°	29°06.3'	+36.2'	110.4°	28°45.2'	+37.1'	110.9°	28°23.6'	+38.0'	111.4°	0
1	30°58.1'	+32.0'	107.2°	30°40.0'	+33.0'	107.8°	30°21.4'	+33.9'	108.3°	30°02.2'	+34.9'	108.9°	29°42.5'	+35.8'	109.4°	29°22.3'	+36.7'	110.0°	29°01.5'	+37.6'	110.5°	1
2	31°30.1'	+31.5'	106.2°	31°13.0'	+32.5'	106.8°	30°55.4'	+33.5'	107.4°	30°37.1'	+34.5'	108.0°	30°18.4'	+35.4'	108.5°	29°59.0'	+36.3'	109.1°	29°39.2'	+37.3'	109.6°	2
3	32°01.6'	+31.1'	105.2°	31°45.5'	+32.1'	105.8°	31°28.9'	+33.1'	106.4°	31°11.6'	+34.1'	107.0°	30°53.8'	+35.0'	107.6°	30°35.4'	+36.0'	108.1°	30°16.4'	+36.9'	108.7°	3
4	32°32.7'	+30.6'	104.2°	32°17.6'	+31.6'	104.8°	32°01.9'	+32.6'	105.4°	31°45.7'	+33.6'	106.0°	31°28.8'	+34.6'	106.6°	31°11.3'	+35.5'	107.2°	30°53.3'	+36.5'	107.8°	4
5	33°03.2'	+30.1'	103.2°	32°49.2'	+31.1'	103.8°	32°34.6'	+32.1'	104.4°	32°19.3'	+33.2'	105.1°	32°03.4'	+34.1'	105.7°	31°46.9'	+35.1'	106.3°	31°29.8'	+36.1'	106.9°	5
6	33°33.3'	+29.5'	102.2°	33°20.3'	+30.6'	102.8°	33°06.7'	+31.7'	103.4°	32°52.4'	+32.7'	104.1°	32°37.5'	+33.7'	104.7°	32°22.0'	+34.7'	105.3°	32°05.9'	+35.7'	105.9°	6
7	34°02.8'	+29.0'	101.1°	33°50.9'	+30.1'	101.8°	33°38.4'	+31.1'	102.4°	33°25.1'	+32.2'	103.1°	33°11.2'	+33.2'	103.7°	32°56.7'	+34.2'	104.3°	32°41.5'	+35.2'	105.0°	7
8	34°31.8'	+28.4'	100.1°	34°21.0'	+29.5'	100.7°	34°09.5'	+30.6'	101.4°	33°57.3'	+31.7'	102.1°	33°44.4'	+32.7'	102.7°	33°30.9'	+33.8'	103.4°	33°16.7'	+34.8'	104.0°	8
9	35°00.3'	+27.9'	99.0°	34°50.6'	+29.0'	99.7°	34°40.1'	+30.1'	100.4°	34°29.0'	+31.2'	101.0°	34°17.2'	+32.2'	101.7°	34°04.7'	+33.3'	102.4°	33°51.5'	+34.3'	103.0°	9
10	35°28.2'	+27.3'	97.9°	35°19.6'	+28.4'	98.6°	35°10.2'	+29.5'	99.3°	35°00.2'	+30.6'	100.0°	34°49.4'	+31.7'	100.7°	34°37.9'	+32.8'	101.4°	34°25.8'	+33.8'	102.0°	10
11	35°55.4'	+26.7'	96.8°	35°48.0'	+27.8'	97.5°	35°39.8'	+29.0'	98.2°	35°30.8'	+30.1'	98.9°	35°21.1'	+31.2'	99.6°	35°10.7'	+32.2'	100.3°	34°59.6'	+33.3'	101.0°	11
12	36°22.1'	+26.1'	95.7°	36°15.8'	+27.2'	96.4°	36°08.7'	+28.4'	97.1°	36°00.9'	+29.5'	97.9°	35°52.3'	+30.6'	98.6°	35°43.0'	+31.7'	99.3°	35°32.9'	+32.8'	100.0°	12
13	36°48.2'	+25.4'	94.6°	36°43.0'	+26.6'	95.3°	36°37.1'	+27.8'	96.1°	36°30.4'	+28.9'	96.8°	36°22.9'	+30.0'	97.5°	36°14.7'	+31.1'	98.2°	36°05.7'	+32.2'	99.0°	13
14	37°13.6'	+24.8'	93.4°	37°09.6'	+26.0'	94.2°	37°04.8'	+27.1'	94.9°	36°59.3'	+28.3'	95.7°	36°52.9'	+29.4'	96.4°	36°45.8'	+30.6'	97.2°	36°37.9'	+31.7'	97.9°	14
15	37°38.4'	+24.1'	92.3°	37°35.6'	+25.3'	93.1°	37°32.0'	+26.5'	93.8°	37°27.6'	+27.7'	94.6°	37°22.4'	+28.8'	95.4°	37°16.4'	+30.0'	96.1°	37°09.6'	+31.1'	96.9°	15
16	38°02.5'	+23.4'	91.1°	38°00.9'	+24.6'	91.9°	37°58.5'	+25.8'	92.7°	37°55.2'	+27.0'	93.5°	37°51.2'	+28.2'	94.2°	37°46.4'	+29.4'	95.0°	37°40.7'	+30.5'	95.8°	16
17	38°25.8'	+22.7'	90.0°	38°25.5'	+23.9'	90.7°	38°24.3'	+25.1'	91.5°	38°22.3'	+26.4'	92.3°	38°19.4'	+27.6'	93.1°	38°15.7'	+28.7'	93.9°	38°11.2'	+29.9'	94.7°	17
18	38°48.5'	+22.0'	88.8°	38°49.4'	+23.2'	89.6°	38°49.4'	+24.4'	90.4°	38°48.6'	+25.7'	91.2°	38°47.0'	+26.9'	92.0°	38°44.5'	+28.1'	92.8°	38°41.1'	+29.3'	93.6°	18
19	39°10.5'	+21.2'	87.6°	39°12.6'	+22.5'	88.4°	39°13.9'	+23.7'	89.2°	39°14.3'	+25.0'	90.0°	39°13.8'	+26.2'	90.8°	39°12.5'	+27.4'	91.7°	39°10.4'	+28.6'	92.5°	19
20	39°31.7'	+20.5'	86.4°	39°35.1'	+21.7'	87.2°	39°37.6'	+23.0'	88.0°	39°39.3'	+24.2'	88.8°	39°40.0'	+25.5'	89.7°	39°39.9'	+26.7'	90.5°	39°39.0'	+27.9'	91.3°	20
21	39°52.2'	+19.7'	85.1°	39°56.8'	+21.0'	86.0°	40°00.6'	+22.2'														

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

56° 304° LHA

Latitude SAME as 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°35.2'	+32.2'	107.6°	29°16.8'	+33.1'	108.1°	28°57.9'	+34.1'	108.6°	28°38.5'	+35.0'	109.2°	28°18.5'	+35.9'	109.7°	27°58.1'	+36.8'	110.2°	27°37.1'	+37.7'	110.7°	0
1	30°07.4'	+31.7'	106.6°	29°50.0'	+32.7'	107.1°	29°32.0'	+33.7'	107.7°	29°13.5'	+34.6'	108.2°	28°54.5'	+35.6'	108.8°	28°34.9'	+36.5'	109.3°	28°14.8'	+37.4'	109.8°	1
2	30°39.1'	+31.3'	105.6°	30°22.7'	+32.3'	106.2°	30°05.7'	+33.3'	106.7°	29°48.1'	+34.2'	107.3°	29°30.0'	+35.2'	107.8°	29°11.4'	+36.1'	108.4°	28°52.2'	+37.0'	108.9°	2
3	31°10.4'	+30.8'	104.6°	30°55.0'	+31.8'	105.2°	30°38.9'	+32.8'	105.8°	30°22.4'	+33.8'	106.3°	30°05.2'	+34.8'	106.9°	29°47.5'	+35.7'	107.5°	29°29.2'	+36.6'	108.0°	3
4	31°41.2'	+30.4'	103.6°	31°26.8'	+31.4'	104.2°	31°11.8'	+32.4'	104.8°	30°56.2'	+33.4'	105.4°	30°40.0'	+34.4'	106.0°	30°23.2'	+35.3'	106.5°	30°05.8'	+36.2'	107.1°	4
5	32°11.6'	+29.9'	102.6°	31°58.2'	+30.9'	103.2°	31°44.2'	+31.9'	103.8°	31°29.5'	+32.9'	104.4°	31°14.3'	+33.9'	105.0°	30°58.5'	+34.9'	105.6°	30°42.1'	+35.9'	106.2°	5
6	32°41.5'	+29.4'	101.6°	32°29.1'	+30.4'	102.2°	32°16.1'	+31.5'	102.8°	32°02.5'	+32.5'	103.4°	31°48.2'	+33.5'	104.0°	31°33.4'	+34.5'	104.6°	31°17.9'	+35.4'	105.2°	6
7	33°10.8'	+28.8'	100.5°	32°59.5'	+29.9'	101.2°	32°47.6'	+31.0'	101.8°	32°35.0'	+32.0'	102.4°	32°21.7'	+33.0'	103.1°	32°07.9'	+34.0'	103.7°	31°53.4'	+35.0'	104.3°	7
8	33°39.6'	+28.3'	99.5°	33°29.4'	+29.4'	100.1°	33°18.5'	+30.5'	100.8°	33°07.0'	+31.5'	101.4°	32°54.8'	+32.5'	102.1°	32°41.9'	+33.6'	102.7°	32°28.4'	+34.6'	103.3°	8
9	34°07.9'	+27.7'	98.4°	33°58.8'	+28.8'	99.1°	33°49.0'	+29.9'	99.7°	33°38.5'	+31.0'	100.4°	33°27.3'	+32.1'	101.1°	33°15.5'	+33.1'	101.7°	33°03.0'	+34.1'	102.3°	9
10	34°35.6'	+27.2'	97.3°	34°27.6'	+28.3'	98.0°	34°18.9'	+29.4'	98.7°	34°09.5'	+30.5'	99.4°	33°59.4'	+31.5'	100.0°	33°48.6'	+32.6'	100.7°	33°37.1'	+33.6'	101.4°	10
11	35°02.8'	+26.6'	96.3°	34°55.9'	+27.7'	97.0°	34°48.3'	+28.8'	97.6°	34°40.0'	+29.9'	98.3°	34°30.9'	+31.0'	99.0°	34°21.2'	+32.1'	99.7°	34°10.7'	+33.1'	100.4°	11
12	35°29.4'	+26.0'	95.2°	35°23.6'	+27.1'	95.9°	35°17.1'	+28.3'	96.6°	35°09.9'	+29.4'	97.3°	35°01.9'	+30.5'	98.0°	34°53.3'	+31.6'	98.7°	34°43.9'	+32.6'	99.3°	12
13	35°55.4'	+25.4'	94.0°	35°50.7'	+26.5'	94.8°	35°45.4'	+27.7'	95.5°	35°39.3'	+28.8'	96.2°	35°32.4'	+29.9'	96.9°	35°24.8'	+31.0'	97.6°	35°16.5'	+32.1'	98.3°	13
14	36°20.7'	+24.7'	92.9°	36°17.3'	+25.9'	93.7°	36°13.0'	+27.1'	94.4°	36°08.1'	+28.2'	95.1°	36°02.3'	+29.3'	95.8°	35°55.8'	+30.5'	96.6°	35°48.6'	+31.6'	97.3°	14
15	36°45.4'	+24.1'	91.8°	36°43.2'	+25.3'	92.5°	36°40.1'	+26.4'	93.3°	36°36.3'	+27.6'	94.0°	36°31.7'	+28.8'	94.8°	36°26.3'	+29.9'	95.5°	36°20.2'	+31.0'	96.2°	15
16	37°09.5'	+23.4'	90.6°	37°08.4'	+24.6'	91.4°	37°06.5'	+25.8'	92.2°	37°03.9'	+27.0'	92.9°	37°00.4'	+28.1'	93.7°	36°56.2'	+29.3'	94.4°	36°51.2'	+30.4'	95.2°	16
17	37°32.9'	+22.7'	89.5°	37°33.0'	+23.9'	90.3°	37°32.3'	+25.1'	91.0°	37°30.9'	+26.3'	91.8°	37°28.6'	+27.5'	92.6°	37°25.5'	+28.7'	93.3°	37°21.6'	+29.8'	94.1°	17
18	37°55.6'	+22.0'	88.3°	37°56.9'	+23.2'	89.1°	37°57.5'	+24.5'	89.9°	37°57.2'	+25.7'	90.7°	37°56.1'	+26.9'	91.4°	37°54.2'	+28.0'	92.2°	37°51.5'	+29.2'	93.0°	18
19	38°17.6'	+21.3'	87.1°	38°20.2'	+22.5'	87.9°	38°21.9'	+23.8'	88.7°	38°22.9'	+25.0'	89.5°	38°23.0'	+26.2'	90.3°	38°22.2'	+27.4'	91.1°	38°20.7'	+28.6'	91.9°	19
20	38°38.9'	+20.5'	85.9°	38°42.7'	+21.8'	86.7°	38°45.7'	+23.0'	87.5°	38°47.8'	+24.3'	88.3°	38°49.2'	+25.5'	89.1°	38°49.6'	+26.7'	90.0°	38°49.3'	+27.9'	90.8°	20
21	38°59.4'	+19.8'	84.7°	39°04.5'	+21.1'	85.5°	39°08.7'	+22.3'	86.4°	39°12.1'	+23.6'	87.2°	39°14.7'	+24.8'	88.0°	39°16.4'	+26.0'	88.8°	39°17.2'	+27.2'	89.6°	21
22	39°19.2'	+19.0'	83.5°	39°25.6'	+20.3'	84.3°	39°31.1'	+21.6'	85.2°	39°35.7'	+22.8'	86.0°	39°39.5'	+24.1'	86.8°	39°42.4'	+25.3'	87.6°	39°44.4'	+26.6'	88.5°	22
23	39°38.2'	+18.2'	82.3°	39°45.9'	+19.5'	83.1°	39°52.6'	+20.8'	83.9°	39°58.5'	+22.1'	84.8°	40°03.6'	+23.3'	85.6°	40°07.7'	+24.6'	86.4°	40°11.0'	+25.8'	87.3°	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

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	28°44.6'	+31.9'	107.0°	28°26.8'	+32.9'	107.5°	28°08.6'	+33.8'	108.0°	27°49.8'	+34.8'	108.5°	27°30.5'	+35.7'	109.0°	27°10.7'	+36.6'	109.5°	26°50.5'	+37.4'	110.0°	0
1	29°16.5'	+31.5'	106.0°	28°59.7'	+32.5'	106.5°	28°42.4'	+33.4'	107.0°	28°24.5'	+34.4'	107.6°	28°06.2'	+35.3'	108.1°	27°47.3'	+36.2'	108.6°	27°27.9'	+37.1'	109.1°	1
2	29°48.0'	+31.1'	105.0°	29°32.2'	+32.1'	105.6°	29°15.8'	+33.0'	106.1°	28°58.9'	+34.0'	106.6°	28°41.5'	+34.9'	107.2°	28°23.5'	+35.9'	107.7°	28°05.0'	+36.8'	108.2°	2
3	30°19.1'	+30.6'	104.0°	30°04.3'	+31.6'	104.6°	29°48.9'	+32.6'	105.1°	29°32.9'	+33.6'	105.7°	29°16.4'	+34.5'	106.2°	28°59.4'	+35.5'	106.8°	28°41.8'	+36.4'	107.3°	3
4	30°49.7'	+30.1'	103.0°	30°35.9'	+31.2'	103.6°	30°21.5'	+32.2'	104.2°	30°06.5'	+33.2'	104.7°	29°51.0'	+34.1'	105.3°	29°34.9'	+35.1'	105.8°	29°18.2'	+36.0'	106.4°	4
5	31°19.8'	+29.7'	102.0°	31°07.0'	+30.7'	102.6°	30°53.7'	+31.7'	103.2°	30°39.7'	+32.7'	103.8°	30°25.1'	+33.7'	104.3°	30°09.9'	+34.7'	104.9°	29°54.2'	+35.6'	105.5°	5
6	31°49.5'	+29.2'	101.0°	31°37.7'	+30.2'	101.6°	31°25.4'	+31.3'	102.2°	31°12.4'	+32.3'	102.8°	30°58.8'	+33.3'	103.4°	30°44.6'	+34.3'	104.0°	30°29.9'	+35.2'	104.5°	6
7	32°18.7'	+28.7'	100.0°	32°08.0'	+29.7'	100.6°	31°56.6'	+30.8'	101.2°	31°44.7'	+31.8'	101.8°	31°32.1'	+32.8'	102.4°	31°18.9'	+33.8'	103.0°	31°05.1'	+34.8'	103.6°	7
8	32°47.3'	+28.1'	98.9°	32°37.7'	+29.2'	99.6°	32°27.4'	+30.3'	100.2°	32°16.5'	+31.3'	100.8°	32°04.9'	+32.4'	101.4°	31°52.7'	+33.4'	102.0°	31°39.9'	+34.4'	102.6°	8
9	33°15.5'	+27.6'	97.9°	33°06.9'	+28.7'	98.5°	32°57.7'	+29.8'	99.2°	32°47.8'	+30.8'	99.8°	32°37.3'	+31.9'	100.4°	32°26.1'	+32.9'	101.1°	32°14.3'	+33.9'	101.7°	9
10	33°43.1'	+27.0'	96.8°	33°35.6'	+28.2'	97.5°	33°27.5'	+29.3'	98.1°	33°18.7'	+30.3'	98.8°	33°09.2'	+31.4'	99.4°	32°59.1'	+32.5'	100.1°	32°48.3'	+33.5'	100.7°	10
11	34°10.1'	+26.5'	95.7°	34°03.8'	+27.6'	96.4°	33°56.8'	+28.7'	97.1°	33°49.0'	+29.8'	97.7°	33°40.6'	+30.9'	98.4°	33°31.5'	+32.0'	99.1°	33°21.7'	+33.0'	99.7°	11
12	34°36.6'	+25.9'	94.6°	34°31.4'	+27.0'	95.3°	34°25.5'	+28.2'	96.0°	34°18.8'	+29.3'	96.7°	34°11.5'	+30.4'	97.4°	34°03.5'	+31.4'	98.0°	33°54.7'	+32.5'	98.7°	12
13	35°02.5'	+25.3'	93.5°	34°58.4'	+26.4'	94.2°	34°53.6'	+27.6'	94.9°	34°48.1'	+28.7'	95.6°	34°41.9'	+29.8'	96.3°	34°34.9'	+30.9'	97.0°	34°27.2'	+32.0'	97.7°	13
14	35°27.8'	+24.7'	92.4°	35°24.9'	+25.8'	93.1°	35°21.2'	+27.0'	93.8°	35°16.8'	+28.1'	94.6°	35°11.7'	+29.3'	95.3°	35°05.8'	+30.4'	96.0°	34°59.2'	+31.5'	96.7°	14
15	35°52.5'	+24.0'	91.3°	35°50.7'	+25.2'	92.0°	35°48.2'	+26.4'	92.7°	35°45.0'	+27.5'	93.5°	35°41.0'	+28.7'	94.2°	35°36.2'	+29.8'	94.9°	35°30.7'	+30.9'	95.6°	15
16	36°16.5'	+23.4'	90.2°	36°15.9'	+24.6'	90.9°	36°14.6'	+25.8'	91.6°	36°12.5'	+26.9'	92.4°	36°09.6'	+28.1'	93.1°	36°06.0'	+29.2'	93.8°	36°01.6'	+30.4'	94.6°	16
17	36°39.9'	+22.7'	89.0°	36°40.5'	+23.9'	89.8°	36°40.4'	+25.1'	90.5°	36°39.5'	+26.3'	91.3°	36°37.7'	+27.5'	92.0°	36°35.3'	+28.6'	92.7°	36°32.0'	+29.8'	93.5°	17
18	37°02.6'	+22.1'	87.9°	37°04.5'	+23.3'	88.6°	37°05.5'	+24.5'	89.4°	37°05.8'	+25.7'	90.1°	37°05.2'	+26.9'	90.9°	37°03.9'	+28.0'	91.6°	37°01.8'	+29.2'	92.4°	18
19	37°24.7'	+21.4'	86.7°	37°27.7'	+22.6'	87.5°	37°30.0'	+23.8'	88.2°	37°31.4'	+25.0'	89.0°	37°31.4'	+26.2'	89.8°	37°32.1'	+27.4'	90.5°	37°31.0'	+28.6'	91.3°	19
20	37°46.0'	+20.6'	85.5°	37°50.3'	+21.9'	86.3°	37°53.8'	+23.1'	87.1°	37°56.4'	+24.3'	87.9°	37°58.3'	+25.5'	88.6°	37°59.3'	+26.7'	89.4°	37°59.5'	+27.9'	90.2°	20
21	38°06.7'	+19.9'	84.3°	38°12.2'	+21.2'	85.1°	38°16.9'	+22.4'	85.9°	38°20.												

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°53.8'	+31.7'	106.3°	27°36.7'	+32.6'	106.9°	27°19.1'	+33.6'	107.4°	27°00.9'	+34.5'	107.8°	26°42.3'	+35.4'	108.3°	26°23.2'	+36.3'	108.8°	26°03.6'	+37.2'	109.3°	0
1	28°25.5'	+31.3'	105.4°	28°09.3'	+32.2'	105.9°	27°52.6'	+33.2'	106.4°	27°35.4'	+34.1'	106.9°	27°17.7'	+35.1'	107.4°	26°59.5'	+36.0'	107.9°	26°40.8'	+36.9'	108.4°	1
2	28°56.8'	+30.8'	104.4°	28°41.6'	+31.8'	104.9°	28°25.8'	+32.8'	105.5°	28°09.6'	+33.8'	106.0°	27°52.8'	+34.7'	106.5°	27°35.5'	+35.6'	107.0°	27°17.7'	+36.5'	107.5°	2
3	29°27.6'	+30.4'	103.4°	29°13.4'	+31.4'	104.0°	28°58.6'	+32.4'	104.5°	28°43.3'	+33.4'	105.0°	28°27.5'	+34.3'	105.6°	28°11.1'	+35.3'	106.1°	27°54.2'	+36.2'	106.6°	3
4	29°58.0'	+29.9'	102.4°	29°44.8'	+31.0'	103.0°	29°31.0'	+32.0'	103.6°	29°16.7'	+33.0'	104.1°	29°01.8'	+33.9'	104.6°	28°46.4'	+34.9'	105.2°	28°30.4'	+35.8'	105.7°	4
5	30°28.0'	+29.5'	101.4°	30°15.8'	+30.5'	102.0°	30°03.0'	+31.5'	102.6°	29°49.6'	+32.5'	103.1°	29°35.7'	+33.5'	103.7°	29°21.2'	+34.5'	104.2°	29°06.2'	+35.4'	104.8°	5
6	30°57.4'	+29.0'	100.4°	30°46.3'	+30.1'	101.0°	30°34.5'	+31.1'	101.6°	30°22.2'	+32.1'	102.2°	30°09.2'	+33.1'	102.7°	29°55.7'	+34.1'	103.3°	29°41.6'	+35.0'	103.9°	6
7	31°26.4'	+28.9'	99.4°	31°16.3'	+29.6'	100.0°	31°05.6'	+30.6'	100.6°	30°54.3'	+31.6'	101.2°	30°42.3'	+32.7'	101.8°	30°29.8'	+33.7'	102.3°	30°16.7'	+34.6'	102.9°	7
8	31°55.0'	+28.0'	98.4°	31°45.9'	+29.1'	99.0°	31°36.2'	+30.1'	99.6°	31°25.9'	+31.2'	100.2°	31°15.0'	+32.2'	100.8°	31°03.5'	+33.2'	101.4°	30°51.3'	+34.2'	102.0°	8
9	32°23.0'	+27.5'	97.3°	32°15.0'	+28.6'	97.9°	32°06.4'	+29.6'	98.6°	31°57.1'	+30.7'	99.2°	31°47.2'	+31.7'	99.8°	31°36.7'	+32.8'	100.4°	31°25.5'	+33.8'	101.0°	9
10	32°50.4'	+26.9'	96.3°	32°43.6'	+28.0'	96.9°	32°36.0'	+29.1'	97.5°	32°27.8'	+30.2'	98.2°	32°19.0'	+31.3'	98.8°	32°09.5'	+32.3'	99.4°	31°59.3'	+33.3'	100.0°	10
11	33°17.4'	+26.4'	95.2°	33°11.6'	+27.5'	95.9°	33°05.2'	+28.6'	96.5°	32°58.0'	+29.7'	97.1°	32°50.2'	+30.8'	97.8°	32°41.8'	+31.8'	98.4°	32°32.7'	+32.9'	99.1°	11
12	33°43.8'	+25.8'	94.1°	33°39.1'	+27.0'	94.8°	33°33.8'	+28.1'	95.4°	33°27.7'	+29.2'	96.1°	33°21.0'	+30.3'	96.8°	33°13.6'	+31.3'	97.4°	33°05.5'	+32.4'	98.1°	12
13	34°09.6'	+25.2'	93.0°	34°06.1'	+26.4'	93.7°	34°01.8'	+27.5'	94.4°	33°56.9'	+28.6'	95.1°	33°51.3'	+29.7'	95.7°	33°44.9'	+30.8'	96.4°	33°37.9'	+31.9'	97.1°	13
14	34°34.8'	+24.6'	91.9°	34°32.5'	+25.8'	92.6°	34°29.4'	+26.9'	93.3°	34°25.5'	+28.1'	94.0°	34°21.0'	+29.2'	94.7°	34°15.8'	+30.3'	95.4°	34°09.8'	+31.4'	96.0°	14
15	34°59.5'	+24.0'	90.8°	34°58.3'	+25.2'	91.5°	34°56.3'	+26.4'	92.2°	34°53.6'	+27.5'	92.9°	34°50.2'	+28.6'	93.6°	34°46.0'	+29.7'	94.3°	34°41.2'	+30.8'	95.0°	15
16	35°23.5'	+23.4'	89.7°	35°23.5'	+24.6'	90.4°	35°22.7'	+25.8'	91.1°	35°21.1'	+26.9'	91.8°	35°18.8'	+28.1'	92.5°	35°15.8'	+29.2'	93.2°	35°12.0'	+30.3'	94.0°	16
17	35°46.9'	+22.8'	88.6°	35°48.1'	+24.0'	89.3°	35°48.4'	+25.1'	90.0°	35°48.0'	+26.3'	90.7°	35°46.9'	+27.5'	91.5°	35°45.0'	+28.6'	92.2°	35°42.3'	+29.7'	92.9°	17
18	36°09.7'	+22.1'	87.4°	36°12.0'	+23.3'	88.2°	36°13.6'	+24.5'	88.9°	36°14.3'	+25.7'	89.6°	36°14.3'	+26.9'	90.4°	36°13.6'	+28.0'	91.1°	36°12.1'	+29.2'	91.8°	18
19	36°31.8'	+21.4'	86.3°	36°35.3'	+22.6'	87.0°	36°38.1'	+23.8'	87.8°	36°40.0'	+25.0'	88.5°	36°41.2'	+26.2'	89.2°	36°41.6'	+27.4'	90.0°	36°41.2'	+28.6'	90.7°	19
20	36°53.2'	+20.7'	85.1°	36°58.0'	+22.0'	85.9°	37°01.9'	+23.2'	86.6°	37°05.1'	+24.4'	87.4°	37°07.4'	+25.6'	88.1°	37°09.0'	+26.8'	88.9°	37°09.8'	+27.9'	89.6°	20
21	37°14.0'	+20.0'	83.9°	37°19.9'	+21.3'	84.7°	37°25.1'	+22.5'	85.5°	37°29.4'	+23.7'	86.2°	37°33.0'	+24.9'	87.0°	37°35.8'	+26.1'	87.7°	37°37.7'	+27.3'	88.5°	21
22	37°34.0'	+19.3'	82.7°	37°41.2'	+20.6'	83.5°	37°47.6'	+21.8'	84.3°	37°53.2'	+23.0'	85.1°	37°57.9'	+24.2'	85.8°	38°01.9'	+25.4'	86.6°	38°05.0'	+26.6'	87.4°	22
23	37°53.3'	+18.6'	81.5°	38°01.8'	+19.8'	82.3°	38°09.4'	+21.1'	83.1°	38°16.2'	+22.3'	83.9°	38°22.2'	+23.5'	84.7°	38°27.3'	+24.8'	85.5°	38°31.7'	+26.0'	86.3°	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°02.9'	+31.4'	105.8°	26°46.4'	+32.4'	106.2°	26°29.4'	+33.3'	106.7°	26°11.9'	+34.3'	107.2°	25°53.9'	+35.2'	107.7°	25°35.5'	+36.1'	108.1°	25°16.6'	+36.9'	108.6°	0
1	27°34.4'	+31.0'	104.8°	27°18.8'	+32.0'	105.3°	27°02.7'	+33.0'	105.8°	26°46.1'	+33.9'	106.3°	26°29.1'	+34.8'	106.8°	26°11.5'	+35.7'	107.2°	25°53.5'	+36.6'	107.7°	1
2	28°05.4'	+30.6'	103.8°	27°50.8'	+31.6'	104.3°	27°35.7'	+32.6'	104.9°	27°20.1'	+33.5'	105.4°	27°03.9'	+34.5'	105.8°	26°47.3'	+35.4'	106.3°	26°30.2'	+36.3'	106.8°	2
3	28°36.0'	+30.2'	102.8°	28°22.4'	+31.2'	103.4°	28°08.3'	+32.2'	103.9°	27°53.6'	+33.2'	104.4°	27°38.4'	+34.1'	104.9°	27°22.7'	+35.0'	105.4°	27°06.5'	+36.0'	105.9°	3
4	29°06.2'	+29.8'	101.9°	28°53.6'	+30.8'	102.4°	28°40.4'	+31.8'	102.9°	28°26.7'	+32.8'	103.5°	28°12.5'	+33.7'	104.0°	27°57.7'	+34.7'	104.5°	27°42.4'	+35.6'	105.0°	4
5	29°36.0'	+29.3'	100.9°	29°24.4'	+30.3'	101.4°	29°12.2'	+31.4'	102.0°	28°59.5'	+32.3'	102.5°	28°46.2'	+33.3'	103.1°	28°32.4'	+34.3'	103.6°	28°18.0'	+35.2'	104.1°	5
6	30°05.3'	+28.8'	99.9°	29°54.7'	+29.9'	100.4°	29°43.6'	+30.9'	101.0°	29°31.8'	+31.9'	101.6°	29°19.6'	+32.9'	102.1°	29°06.7'	+33.9'	102.6°	28°53.3'	+34.9'	103.2°	6
7	30°34.1'	+28.4'	98.8°	30°24.6'	+29.4'	99.4°	30°14.5'	+30.5'	100.0°	30°03.8'	+31.5'	100.6°	29°52.5'	+32.5'	101.1°	29°40.6'	+33.5'	101.7°	29°28.1'	+34.5'	102.3°	7
8	31°02.5'	+27.9'	97.8°	30°54.0'	+28.9'	98.4°	30°45.0'	+30.0'	99.0°	30°35.3'	+31.0'	99.6°	30°25.0'	+32.1'	100.2°	30°14.1'	+33.1'	100.7°	30°02.6'	+34.1'	101.3°	8
9	31°30.4'	+27.4'	96.8°	31°23.0'	+28.5'	97.4°	31°15.0'	+29.5'	98.0°	31°06.3'	+30.6'	98.6°	30°57.0'	+31.6'	99.2°	30°47.1'	+32.6'	99.8°	30°36.7'	+33.6'	100.4°	9
10	31°57.8'	+26.9'	95.7°	31°51.4'	+27.9'	96.4°	31°44.5'	+29.0'	97.0°	31°36.9'	+30.1'	97.6°	31°28.6'	+31.1'	98.2°	31°19.8'	+32.2'	98.8°	31°10.3'	+33.2'	99.4°	10
11	32°24.6'	+26.3'	94.7°	32°19.4'	+27.4'	95.3°	32°13.5'	+28.5'	95.9°	32°07.0'	+29.6'	96.6°	31°59.8'	+30.7'	97.2°	31°52.0'	+31.7'	97.8°	31°43.5'	+32.7'	98.4°	11
12	32°50.9'	+25.8'	93.6°	32°46.8'	+26.9'	94.3°	32°42.0'	+28.0'	94.9°	32°36.6'	+29.1'	95.5°	32°30.4'	+30.2'	96.2°	32°23.7'	+31.2'	96.8°	32°16.2'	+32.3'	97.4°	12
13	33°16.7'	+25.2'	92.5°	33°13.7'	+26.3'	93.2°	33°10.0'	+27.5'	93.8°	33°05.7'	+28.6'	94.5°	33°00.6'	+29.7'	95.1°	32°54.9'	+30.7'	95.8°	32°48.5'	+31.8'	96.4°	13
14	33°41.9'	+24.6'	91.4°	33°40.0'	+25.8'	92.1°	33°37.5'	+26.9'	92.8°	33°34.2'	+28.0'	93.4°	33°30.3'	+29.1'	94.1°	33°25.6'	+30.2'	94.8°	33°20.3'	+31.3'	95.4°	14
15	34°06.5'	+24.0'	90.3°	34°05.8'	+25.2'	91.0°	34°04.4'	+26.3'	91.7°	34°02.2'	+27.5'	92.4°	33°59.4'	+28.6'	93.1°	33°55.9'	+29.7'	93.7°	33°51.6'	+30.8'	94.4°	15
16	34°30.6'	+23.4'	89.2°	34°31.0'	+24.6'	89.9°	34°30.7'	+25.8'	90.6°	34°29.7'	+26.9'	91.3°	34°28.0'	+28.0'	92.0°	34°25.5'	+29.1'	92.7°	34°22.4'	+30.3'	93.4°	16
17	34°54.0'	+22.8'	88.1°	34°55.6'	+24.0'	88.8°	34°56.5'	+25.2'	89.5°	34°56.6'	+26.3'	90.2°	34°56.0'	+27.5'	90.9°	34°54.7'	+28.6'	91.6°	34°52.6'	+29.7'	92.3°	17
18	35°16.8'	+22.2'	87.0°	35°19.6'	+23.4'	87.7°	35°21.6'	+24.5'	88.4°	35°22.9'	+25.7'	89.1°	35°23.5'	+26.9'	89.8°	35°23.3'	+28.0'	90.5°	35°22.3'	+29.1'	91.2°	18
19	35°39.0'	+21.5'	85.8°	35°42.9'	+22.7'	86.6°	35°46.1'	+23.9'	87.3°	35°48.6'	+25.1'	88.0°	35°50.3'	+26.3'	88.7°	35°51.3'	+27.4'	89.4°	35°51.5'	+28.6'	90.2°	19
20	36°00.5'	+20.8'	84.7°	36°05.6'	+22.1'	85.4°	36°10.0'	+23.3'	86.1°	36°13.7'	+24.4'	86.9°	36°16.6'	+25.6'	87.6°	36°18.7'	+26.8'	88.3°	36°20.0'	+28.0'	89.1°	20
21	36°21.3'	+20.2'	83.5°	36°27.7'	+21.4'	84.3°	36°33.3'	+22.6'	85.0°	36°38.1'	+23.8'	85										



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

60° 300° LHA

Latitude SAME as 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°11.9'	+31.2'	105.2°	25°55.9'	+32.2'	105.6°	25°39.5'	+33.1'	106.1°	25°22.7'	+34.0'	106.6°	25°05.3'	+34.9'	107.0°	24°47.6'	+35.8'	107.5°	24°29.3'	+36.7'	107.9°	0
1	26°43.1'	+30.8'	104.2°	26°28.1'	+31.8'	104.7°	26°12.6'	+32.7'	105.2°	25°56.7'	+33.7'	105.6°	25°40.3'	+34.6'	106.1°	25°23.4'	+35.5'	106.6°	25°06.1'	+36.4'	107.0°	1
2	27°13.9'	+30.4'	103.2°	26°59.9'	+31.4'	103.7°	26°45.4'	+32.4'	104.2°	26°30.4'	+33.3'	104.7°	26°14.9'	+34.3'	105.2°	25°58.9'	+35.2'	105.7°	25°42.5'	+36.1'	106.1°	2
3	27°44.3'	+30.0'	102.3°	27°31.3'	+31.0'	102.8°	27°17.8'	+32.0'	103.3°	27°03.7'	+33.0'	103.8°	26°49.2'	+33.9'	104.3°	26°34.1'	+34.8'	104.8°	26°18.6'	+35.8'	105.3°	3
4	28°14.3'	+29.6'	101.3°	28°02.3'	+30.6'	101.8°	27°49.7'	+31.6'	102.3°	27°36.7'	+32.6'	102.9°	27°23.1'	+33.5'	103.4°	27°08.9'	+34.5'	103.9°	26°54.3'	+35.4'	104.4°	4
5	28°43.9'	+29.1'	100.3°	28°32.9'	+30.2'	100.8°	28°21.3'	+31.2'	101.4°	28°09.2'	+32.2'	101.9°	27°56.6'	+33.2'	102.4°	27°43.4'	+34.1'	102.9°	27°29.7'	+35.1'	103.4°	5
6	29°13.1'	+28.7'	99.3°	29°03.1'	+29.7'	99.9°	28°52.5'	+30.8'	100.4°	28°41.4'	+31.8'	100.9°	28°29.7'	+32.8'	101.5°	28°17.5'	+33.7'	102.0°	28°04.8'	+34.7'	102.5°	6
7	29°41.8'	+28.2'	98.3°	29°32.8'	+29.3'	98.9°	29°23.3'	+30.3'	99.4°	29°13.2'	+31.3'	100.0°	29°02.5'	+32.3'	100.5°	28°51.3'	+33.3'	101.1°	28°39.5'	+34.3'	101.6°	7
8	30°10.0'	+27.8'	97.3°	30°02.1'	+28.8'	97.9°	29°53.6'	+29.9'	98.4°	29°44.5'	+30.9'	99.0°	29°34.8'	+31.9'	99.6°	29°24.6'	+32.9'	100.1°	29°13.8'	+33.9'	100.7°	8
9	30°37.8'	+27.3'	96.3°	30°30.9'	+28.3'	96.8°	30°23.5'	+29.4'	97.4°	30°15.4'	+30.5'	98.0°	30°06.8'	+31.5'	98.6°	29°57.5'	+32.5'	99.1°	29°47.7'	+33.5'	99.7°	9
10	31°05.0'	+26.8'	95.2°	30°59.3'	+27.9'	95.8°	30°52.9'	+28.9'	96.4°	30°45.9'	+30.0'	97.0°	30°38.2'	+31.0'	97.6°	30°30.0'	+32.1'	98.2°	30°21.2'	+33.1'	98.8°	10
11	31°31.8'	+26.2'	94.2°	31°27.1'	+27.3'	94.8°	31°21.8'	+28.4'	95.4°	31°15.8'	+29.5'	96.0°	31°09.3'	+30.6'	96.6°	31°02.1'	+31.6'	97.2°	30°54.2'	+32.6'	97.8°	11
12	31°58.0'	+25.7'	93.1°	31°54.5'	+26.8'	93.7°	31°50.2'	+27.9'	94.4°	31°45.4'	+29.0'	95.0°	31°39.8'	+30.1'	95.6°	31°33.7'	+31.1'	96.2°	31°26.9'	+32.2'	96.8°	12
13	32°23.8'	+25.2'	92.0°	32°21.3'	+26.3'	92.7°	32°18.2'	+27.4'	93.3°	32°14.4'	+28.5'	93.9°	32°09.9'	+29.6'	94.6°	32°04.8'	+30.7'	95.2°	31°59.1'	+31.7'	95.8°	13
14	32°48.9'	+24.6'	91.0°	32°47.6'	+25.7'	91.6°	32°45.6'	+26.9'	92.3°	32°42.9'	+28.0'	92.9°	32°39.5'	+29.1'	93.5°	32°35.5'	+30.2'	94.2°	32°30.8'	+31.2'	94.8°	14
15	33°13.5'	+24.0'	89.9°	33°13.3'	+25.2'	90.5°	33°12.4'	+26.3'	91.2°	33°10.8'	+27.4'	91.8°	33°08.6'	+28.5'	92.5°	33°05.6'	+29.6'	93.1°	33°02.0'	+30.7'	93.8°	15
16	33°37.6'	+23.5'	88.8°	33°38.5'	+24.6'	89.4°	33°38.7'	+25.8'	90.1°	33°38.3'	+26.9'	90.8°	33°37.1'	+28.0'	91.4°	33°35.3'	+29.1'	92.1°	33°32.7'	+30.2'	92.8°	16
17	34°01.0'	+22.9'	87.7°	34°03.1'	+24.0'	88.3°	34°04.5'	+25.2'	89.0°	34°05.2'	+26.3'	89.7°	34°05.1'	+27.5'	90.4°	34°04.4'	+28.6'	91.1°	34°02.9'	+29.7'	91.7°	17
18	34°23.9'	+22.2'	86.6°	34°27.1'	+23.4'	87.2°	34°29.7'	+24.6'	87.9°	34°31.5'	+25.7'	88.6°	34°32.6'	+26.9'	89.3°	34°33.0'	+28.0'	90.0°	34°32.6'	+29.1'	90.7°	18
19	34°46.1'	+21.6'	85.4°	34°50.6'	+22.8'	86.1°	34°54.3'	+24.0'	86.8°	34°57.2'	+25.1'	87.5°	34°59.5'	+26.3'	88.2°	35°01.0'	+27.4'	88.9°	35°01.7'	+28.6'	89.6°	19
20	35°07.7'	+21.0'	84.3°	35°13.3'	+22.2'	85.0°	35°18.2'	+23.3'	85.7°	35°22.4'	+24.5'	86.4°	35°25.7'	+25.7'	87.1°	35°28.4'	+26.8'	87.8°	35°30.3'	+28.0'	88.5°	20
21	35°28.7'	+20.3'	83.1°	35°35.5'	+21.5'	83.8°	35°41.6'	+22.7'	84.6°	35°46.9'	+23.9'	85.3°	35°51.4'	+25.1'	86.0°	35°55.2'	+26.2'	86.7°	35°58.3'	+27.4'	87.4°	21
22	35°49.0'	+19.6'	82.0°	35°57.0'	+20.8'	82.7°	36°04.3'	+22.0'	83.4°	36°10.8'	+23.2'	84.1°	36°16.5'	+24.4'	84.9°	36°21.5'	+25.6'	85.6°	36°25.7'	+26.8'	86.3°	22
23	36°08.6'	+18.9'	80.8°	36°17.8'	+20.2'	81.5°	36°26.3'	+21.4'	82.3°	36°34.0'	+22.6'	83.0°	36°40.9'	+23.8'	83.7°	36°47.1'	+25.0'	84.5°	36°52.5'	+26.1'	85.2°	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

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	25°20.7'	+31.0'	104.6°	25°05.3'	+31.9'	105.0°	24°49.5'	+32.9'	105.5°	24°33.3'	+33.8'	105.9°	24°16.6'	+34.7'	106.4°	23°59.5'	+35.6'	106.8°	23°41.9'	+36.5'	107.2°	0
1	25°51.7'	+30.6'	103.6°	25°37.3'	+31.6'	104.1°	25°22.4'	+32.5'	104.6°	25°07.1'	+33.5'	105.0°	24°51.3'	+34.4'	105.5°	24°35.1'	+35.3'	105.9°	24°18.4'	+36.2'	106.4°	1
2	26°22.3'	+30.2'	102.7°	26°08.9'	+31.2'	103.2°	25°55.0'	+32.2'	103.6°	25°40.6'	+33.1'	104.1°	25°25.7'	+34.1'	104.6°	25°10.4'	+35.0'	105.0°	24°54.6'	+35.9'	105.5°	2
3	26°52.5'	+29.8'	101.7°	26°40.1'	+30.8'	102.2°	26°27.1'	+31.8'	102.7°	26°13.7'	+32.8'	103.2°	25°59.8'	+33.7'	103.7°	25°45.4'	+34.6'	104.1°	25°30.5'	+35.6'	104.6°	3
4	27°22.3'	+29.4'	100.7°	27°10.9'	+30.4'	101.2°	26°58.9'	+31.4'	101.7°	26°46.5'	+32.4'	102.2°	26°33.5'	+33.4'	102.7°	26°20.0'	+34.3'	103.2°	26°06.1'	+35.2'	103.7°	4
5	27°51.7'	+29.0'	99.8°	27°41.3'	+30.0'	100.3°	27°30.3'	+31.0'	100.8°	27°18.9'	+32.0'	101.3°	27°06.8'	+33.0'	101.8°	26°54.3'	+33.9'	102.3°	26°41.3'	+34.9'	102.8°	5
6	28°20.7'	+28.6'	98.8°	28°11.3'	+29.6'	99.3°	28°01.4'	+30.6'	99.8°	27°50.9'	+31.6'	100.3°	27°39.8'	+32.6'	100.9°	27°28.3'	+33.6'	101.4°	27°16.2'	+34.5'	101.9°	6
7	28°49.3'	+28.1'	97.8°	28°40.9'	+29.2'	98.3°	28°32.0'	+30.2'	98.8°	28°22.5'	+31.2'	99.4°	28°12.4'	+32.2'	99.9°	28°01.8'	+33.2'	100.4°	27°50.7'	+34.2'	101.0°	7
8	29°17.4'	+27.7'	96.7°	29°10.1'	+28.7'	97.3°	29°02.2'	+29.7'	97.9°	28°53.7'	+30.8'	98.4°	28°44.6'	+31.8'	98.9°	28°35.0'	+32.8'	99.5°	28°24.8'	+33.8'	100.0°	8
9	29°45.1'	+27.2'	95.7°	29°38.8'	+28.2'	96.3°	29°31.9'	+29.3'	96.9°	29°24.4'	+30.3'	97.4°	29°16.4'	+31.4'	98.0°	29°07.8'	+32.4'	98.5°	28°58.6'	+33.4'	99.1°	9
10	30°12.2'	+26.7'	94.7°	30°07.0'	+27.8'	95.3°	30°01.2'	+28.8'	95.9°	29°54.8'	+29.9'	96.4°	29°47.8'	+30.9'	97.0°	29°40.2'	+31.9'	97.6°	29°32.0'	+33.0'	98.1°	10
11	30°38.9'	+26.2'	93.7°	30°34.8'	+27.3'	94.3°	30°30.0'	+28.4'	94.8°	30°24.7'	+29.4'	95.4°	30°18.7'	+30.5'	96.0°	30°12.1'	+31.5'	96.6°	30°04.9'	+32.5'	97.2°	11
12	31°05.1'	+25.7'	92.6°	31°02.1'	+26.8'	93.2°	30°58.4'	+27.9'	93.8°	30°54.1'	+28.9'	94.4°	30°49.2'	+30.0'	95.0°	30°43.6'	+31.1'	95.6°	30°37.5'	+32.1'	96.2°	12
13	31°30.8'	+25.2'	91.6°	31°28.9'	+26.3'	92.2°	31°26.3'	+27.4'	92.8°	31°23.0'	+28.5'	93.4°	31°19.2'	+29.5'	94.0°	31°14.7'	+30.6'	94.6°	31°09.5'	+31.6'	95.2°	13
14	31°56.0'	+24.6'	90.5°	31°55.1'	+25.7'	91.1°	31°53.6'	+26.8'	91.7°	31°51.5'	+27.9'	92.4°	31°48.7'	+29.0'	93.0°	31°45.3'	+30.1'	93.6°	31°41.2'	+31.2'	94.2°	14
15	32°20.6'	+24.1'	89.4°	32°20.9'	+25.2'	90.0°	32°20.5'	+26.3'	90.7°	32°19.4'	+27.4'	91.3°	32°17.7'	+28.5'	91.9°	32°15.4'	+29.6'	92.6°	32°12.3'	+30.7'	93.2°	15
16	32°44.6'	+23.5'	88.3°	32°46.0'	+24.6'	89.0°	32°46.8'	+25.8'	89.6°	32°46.9'	+26.9'	90.3°	32°46.3'	+28.0'	90.9°	32°45.0'	+29.1'	91.5°	32°43.0'	+30.2'	92.2°	16
17	33°08.1'	+22.9'	87.2°	33°10.7'	+24.1'	87.9°	33°12.6'	+25.2'	88.5°	33°13.7'	+26.3'	89.2°	33°14.2'	+27.5'	89.8°	33°14.1'	+28.6'	90.5°	33°13.2'	+29.7'	91.2°	17
18	33°31.0'	+22.3'	86.1°	33°34.7'	+23.5'	86.8°	33°37.8'	+24.6'	87.4°	33°40.1'	+25.8'	88.1°	33°41.7'	+26.9'	88.8°	33°42.6'	+28.0'	89.4°	33°42.9'	+29.1'	90.1°	18
19	33°53.3'	+21.7'	85.0°	33°58.2'	+22.9'	85.7°	34°02.4'	+24.0'	86.4°	34°05.8'	+25.2'	87.0°	34°08.6'	+26.3'	87.7°	34°10.7'	+27.5'	88.4°	34°12.0'	+28.6'	89.1°	19
20	34°15.0'	+21.1'	83.9°	34°21.1'	+22.3'	84.6°	34°26.4'	+23.4'	85.2°	34°31.0'	+24.6'	85.9°	34°34.9'	+25.7'	86.6°	34°38.1'	+26.9'	87.3°	34°40.6'	+28.0'	88.0°	20
21	34°36.1'	+20.4'	82.7°	34°43.3'	+21.6'	83.4°	34°49.8'	+22.8'	84.1°	34°55.6'	+24.0'	84.8°	35°00.7'									

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

62° 298° LHA

Latitude SAME as Declination

62° 298° 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	24°29.3'	+30.8'	104.0°	24°14.6'	+31.7'	104.5°	23°59.4'	+32.7'	104.9°	23°43.8'	+33.6'	105.3°	23°27.7'	+34.5'	105.7°	23°11.2'	+35.4'	106.2°	22°54.3'	+36.3'	106.6°	0
1	25°00.1'	+30.4'	103.1°	24°46.3'	+31.4'	103.5°	24°32.1'	+32.3'	104.0°	24°17.4'	+33.3'	104.4°	24°02.2'	+34.2'	104.8°	23°46.6'	+35.1'	105.3°	23°30.6'	+36.0'	105.7°	1
2	25°30.5'	+30.0'	102.1°	25°17.7'	+31.0'	102.6°	25°04.4'	+32.0'	103.0°	24°50.6'	+32.9'	103.5°	24°36.4'	+33.9'	103.9°	24°21.7'	+34.8'	104.4°	24°06.6'	+35.7'	104.8°	2
3	26°00.6'	+29.7'	101.2°	25°48.7'	+30.6'	101.6°	25°36.4'	+31.6'	102.1°	25°23.6'	+32.6'	102.6°	25°10.3'	+33.5'	103.0°	24°56.5'	+34.5'	103.5°	24°42.3'	+35.4'	103.9°	3
4	26°30.2'	+29.3'	100.2°	26°19.4'	+30.3'	100.7°	26°08.0'	+31.3'	101.2°	25°56.1'	+32.2'	101.6°	25°43.8'	+33.2'	102.1°	25°31.0'	+34.1'	102.6°	25°17.7'	+35.1'	103.0°	4
5	26°59.5'	+28.9'	99.2°	26°49.6'	+29.9'	99.7°	26°39.3'	+30.9'	100.2°	26°28.4'	+31.9'	100.7°	26°17.0'	+32.8'	101.2°	26°05.1'	+33.8'	101.7°	25°52.7'	+34.7'	102.1°	5
6	27°28.3'	+28.4'	98.2°	27°19.5'	+29.5'	98.7°	27°10.1'	+30.5'	99.2°	27°00.2'	+31.5'	99.7°	26°49.8'	+32.4'	100.2°	26°38.9'	+33.4'	100.7°	26°27.4'	+34.4'	101.2°	6
7	27°56.8'	+28.0'	97.2°	27°49.0'	+29.0'	97.8°	27°40.6'	+30.1'	98.3°	27°31.7'	+31.1'	98.8°	27°22.2'	+32.1'	99.3°	27°12.3'	+33.0'	99.8°	27°01.8'	+34.0'	100.3°	7
8	28°24.8'	+27.6'	96.2°	28°18.0'	+28.6'	96.8°	28°10.6'	+29.6'	97.3°	28°02.8'	+30.7'	97.8°	27°54.3'	+31.7'	98.4°	27°45.3'	+32.7'	98.9°	27°35.8'	+33.6'	99.4°	8
9	28°52.3'	+27.1'	95.2°	28°46.6'	+28.2'	95.8°	28°40.3'	+29.2'	96.3°	28°33.4'	+30.2'	96.8°	28°26.0'	+31.3'	97.4°	28°18.0'	+32.3'	97.9°	28°09.4'	+33.2'	98.5°	9
10	29°19.4'	+26.6'	94.2°	29°14.7'	+27.7'	94.8°	29°09.5'	+28.8'	95.3°	29°03.6'	+29.8'	95.9°	28°57.2'	+30.8'	96.4°	28°50.2'	+31.8'	97.0°	28°42.7'	+32.8'	97.5°	10
11	29°46.1'	+26.1'	93.2°	29°42.4'	+27.2'	93.7°	29°38.2'	+28.3'	94.3°	29°33.4'	+29.3'	94.9°	29°28.1'	+30.4'	95.4°	29°22.1'	+31.4'	96.0°	29°15.5'	+32.4'	96.5°	11
12	30°12.2'	+25.6'	92.1°	30°09.7'	+26.7'	92.7°	30°06.5'	+27.8'	93.3°	30°02.8'	+28.9'	93.9°	29°58.5'	+29.9'	94.4°	29°53.5'	+31.0'	95.0°	29°48.0'	+32.0'	95.6°	12
13	30°37.8'	+25.1'	91.1°	30°36.4'	+26.2'	91.7°	30°34.4'	+27.3'	92.3°	30°31.7'	+28.4'	92.8°	30°28.4'	+29.5'	93.4°	30°24.5'	+30.5'	94.0°	30°20.0'	+31.6'	94.6°	13
14	31°03.0'	+24.6'	90.0°	31°02.6'	+25.7'	90.6°	31°01.7'	+26.8'	91.2°	31°00.1'	+27.9'	91.8°	30°57.9'	+29.0'	92.4°	30°55.0'	+30.1'	93.0°	30°51.5'	+31.1'	93.6°	14
15	31°27.6'	+24.1'	89.0°	31°28.4'	+25.2'	89.6°	31°28.5'	+26.3'	90.2°	31°28.0'	+27.4'	90.8°	31°26.9'	+28.5'	91.4°	31°25.1'	+29.6'	92.0°	31°22.7'	+30.6'	92.6°	15
16	31°51.7'	+23.5'	87.9°	31°53.6'	+24.7'	88.5°	31°54.8'	+25.8'	89.1°	31°55.4'	+26.9'	89.7°	31°55.4'	+28.0'	90.4°	31°54.7'	+29.1'	91.0°	31°53.3'	+30.2'	91.6°	16
17	32°15.2'	+23.0'	86.8°	32°18.2'	+24.1'	87.4°	32°20.6'	+25.2'	88.1°	32°22.3'	+26.4'	88.7°	32°23.4'	+27.5'	89.3°	32°23.7'	+28.6'	90.0°	32°23.5'	+29.7'	90.6°	17
18	32°38.2'	+22.4'	85.7°	32°42.4'	+23.5'	86.3°	32°45.9'	+24.7'	87.0°	32°48.7'	+25.8'	87.6°	32°50.8'	+26.9'	88.3°	32°52.3'	+28.0'	88.9°	32°53.1'	+29.1'	89.6°	18
19	33°00.6'	+21.8'	84.6°	33°05.9'	+23.0'	85.2°	33°10.5'	+24.1'	85.9°	33°14.5'	+25.3'	86.5°	33°17.8'	+26.4'	87.2°	33°20.4'	+27.5'	87.9°	33°22.3'	+28.6'	88.5°	19
20	33°22.4'	+21.2'	83.5°	33°28.9'	+22.4'	84.1°	33°34.7'	+23.5'	84.8°	33°39.8'	+24.7'	85.5°	33°44.2'	+25.8'	86.1°	33°47.9'	+26.9'	86.8°	33°50.9'	+28.1'	87.5°	20
21	33°43.6'	+20.6'	82.4°	33°51.2'	+21.8'	83.0°	33°58.2'	+22.9'	83.7°	34°04.4'	+24.1'	84.4°	34°10.0'	+25.2'	85.0°	34°14.8'	+26.4'	85.7°	34°19.0'	+27.5'	86.4°	21
22	34°04.2'	+20.0'	81.2°	34°13.0'	+21.1'	81.9°	34°21.1'	+22.3'	82.6°	34°28.5'	+23.5'	83.2°	34°35.2'	+24.6'	83.9°	34°41.2'	+25.8'	84.6°	34°46.5'	+26.9'	85.3°	22
23	34°24.2'	+19.3'	80.1°	34°34.1'	+20.5'	80.8°	34°43.4'	+21.7'	81.4°	34°52.0'	+22.9'	82.1°	34°59.8'	+24.0'	82.8°	35°07.0'	+25.2'	83.5°	35°13.4'	+26.3'	84.2°	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

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°37.9'	+30.6'	103.5°	23°23.7'	+31.5'	103.9°	23°09.1'	+32.5'	104.3°	22°54.1'	+33.4'	104.7°	22°38.6'	+34.3'	105.1°	22°22.8'	+35.2'	105.5°	22°06.6'	+36.1'	105.9°	0
1	24°08.5'	+30.2'	102.5°	23°55.2'	+31.2'	102.9°	23°41.6'	+32.1'	103.4°	23°27.5'	+33.1'	103.8°	23°12.9'	+34.0'	104.2°	22°58.0'	+34.9'	104.6°	22°42.6'	+35.8'	105.0°	1
2	24°38.7'	+29.9'	101.6°	24°26.4'	+30.8'	102.0°	24°13.7'	+31.8'	102.5°	24°00.6'	+32.8'	102.9°	23°46.9'	+33.7'	103.3°	23°32.9'	+34.6'	103.7°	23°18.4'	+35.5'	104.2°	2
3	25°08.5'	+29.5'	100.6°	24°57.3'	+30.5'	101.1°	24°45.5'	+31.5'	101.5°	24°33.3'	+32.4'	102.0°	24°20.6'	+33.4'	102.4°	24°07.5'	+34.3'	102.9°	23°53.9'	+35.2'	103.3°	3
4	25°38.0'	+29.1'	99.6°	25°27.8'	+30.1'	100.1°	25°17.0'	+31.1'	100.6°	25°05.7'	+32.1'	101.0°	24°54.0'	+33.0'	101.5°	24°41.8'	+34.0'	102.0°	24°29.1'	+34.9'	102.4°	4
5	26°07.2'	+28.7'	98.7°	25°57.9'	+29.7'	99.2°	25°48.1'	+30.7'	99.6°	25°37.8'	+31.7'	100.1°	25°27.0'	+32.7'	100.6°	25°15.8'	+33.6'	101.0°	25°04.0'	+34.6'	101.5°	5
6	26°35.9'	+28.3'	97.7°	26°27.6'	+29.3'	98.2°	26°18.8'	+30.3'	98.7°	26°09.5'	+31.3'	99.2°	25°59.7'	+32.3'	99.6°	25°49.4'	+33.3'	100.1°	25°38.6'	+34.2'	100.6°	6
7	27°04.2'	+27.9'	96.7°	26°56.9'	+28.9'	97.2°	26°49.1'	+29.9'	97.7°	26°40.8'	+30.9'	98.2°	26°32.0'	+31.9'	98.7°	26°22.7'	+32.9'	99.2°	26°12.8'	+33.9'	99.7°	7
8	27°32.1'	+27.5'	95.7°	27°25.8'	+28.5'	96.2°	27°19.1'	+29.5'	96.7°	27°11.8'	+30.6'	97.3°	27°03.9'	+31.6'	97.8°	26°55.6'	+32.5'	98.3°	26°46.7'	+33.5'	98.8°	8
9	27°59.6'	+27.0'	94.7°	27°54.4'	+28.1'	95.2°	27°48.6'	+29.1'	95.8°	27°42.3'	+30.1'	96.3°	27°35.5'	+31.2'	96.8°	27°28.1'	+32.2'	97.3°	27°20.2'	+33.1'	97.8°	9
10	28°26.6'	+26.6'	93.7°	28°22.4'	+27.6'	94.2°	28°17.7'	+28.7'	94.8°	28°12.5'	+29.7'	95.3°	28°06.6'	+30.7'	95.8°	28°00.3'	+31.8'	96.4°	27°53.3'	+32.8'	96.9°	10
11	28°53.1'	+26.1'	92.7°	28°50.1'	+27.2'	93.2°	28°46.4'	+28.2'	93.8°	28°42.2'	+29.3'	94.3°	28°37.4'	+30.3'	94.9°	28°32.0'	+31.3'	95.4°	28°26.1'	+32.4'	95.9°	11
12	29°19.2'	+25.6'	91.6°	29°17.2'	+26.7'	92.2°	29°14.6'	+27.8'	92.8°	29°11.5'	+28.8'	93.3°	29°07.7'	+29.9'	93.9°	29°03.4'	+30.9'	94.4°	28°58.4'	+31.9'	95.0°	12
13	29°44.9'	+25.1'	90.6°	29°43.9'	+26.2'	91.2°	29°42.4'	+27.3'	91.7°	29°40.3'	+28.4'	92.3°	29°37.6'	+29.4'	92.9°	29°34.3'	+30.5'	93.4°	29°30.4'	+31.5'	94.0°	13
14	30°10.0'	+24.6'	89.5°	30°10.2'	+25.7'	90.1°	30°09.7'	+26.8'	90.7°	30°08.7'	+27.9'	91.3°	30°07.0'	+29.0'	91.9°	30°04.8'	+30.0'	92.5°	30°01.9'	+31.1'	93.0°	14
15	30°34.6'	+24.1'	88.5°	30°35.9'	+25.2'	89.1°	30°36.6'	+26.3'	89.7°	30°36.6'	+27.4'	90.3°	30°36.0'	+28.5'	90.9°	30°34.8'	+29.6'	91.4°	30°33.0'	+30.6'	92.0°	15
16	30°58.7'	+23.6'	87.4°	31°01.1'	+24.7'	88.0°	31°02.9'	+25.8'	88.6°	31°04.0'	+26.9'	89.2°	31°04.5'	+28.0'	89.8°	31°04.3'	+29.1'	90.4°	31°03.6'	+30.1'	91.0°	16
17	31°22.3'	+23.0'	86.4°	31°25.8'	+24.2'	87.0°	31°28.7'	+25.3'	87.6°	31°30.9'	+26.4'	88.2°	31°32.5'	+27.5'	88.8°	31°33.4'	+28.6'	89.4°	31°33.7'	+29.7'	90.0°	17
18	31°45.4'	+22.5'	85.3°	31°50.0'	+23.6'	85.9°	31°54.0'	+24.7'	86.5°	31°57.3'	+25.9'	87.1°	32°00.0'	+27.0'	87.8°	32°02.0'	+28.1'	88.4°	32°03.4'	+29.2'	89.0°	18
19	32°07.9'	+21.9'	84.2°	32°13.6'	+23.1'	84.8°	32°18.7'	+24.2'	85.4°	32°23.2'	+25.3'	86.1°	32°27.0'	+26.4'	86.7°	32°30.1'	+27.6'	87.3°	32°32.6'	+28.7'	88.0°	19
20	32°29.8'	+21.3'	83.1°	32°36.7'	+22.5'	83.7°	32°42.9'	+23.6'	84.3°	32°48.5'	+24.8'	85.0°	32°53.4'	+25.9'	85.6°	32°57.6'	+27.0'	86.3°	33°01.2'	+28.1'	86.9°	20
21	32°51.1'	+20.7'	82.0°	32°59.2'	+21.9'	82.6°	33°06.6'	+23.1'	83.3°	33°13.3'	+24.2'	83.9°	33°19.3'	+25.3'	84.6°</							

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

64° 296° LHA

Latitude SAME as 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°46.3'	+30.4'	102.9°	22°32.7'	+31.3'	103.3°	22°18.7'	+32.3'	103.7°	22°04.3'	+33.2'	104.1°	21°49.5'	+34.1'	104.5°	21°34.2'	+35.0'	104.9°	21°18.6'	+35.9'	105.3°	0
1	23°16.7'	+30.0'	102.0°	23°04.0'	+31.0'	102.4°	22°51.0'	+32.0'	102.8°	22°37.5'	+32.9'	103.2°	22°23.6'	+33.8'	103.6°	22°09.2'	+34.7'	104.0°	21°54.5'	+35.6'	104.4°	1
2	23°46.7'	+29.7'	101.0°	23°35.0'	+30.7'	101.4°	23°22.9'	+31.6'	101.9°	23°10.4'	+32.6'	102.3°	22°57.4'	+33.5'	102.7°	22°44.0'	+34.4'	103.1°	22°30.1'	+35.3'	103.5°	2
3	24°16.4'	+29.3'	100.1°	24°05.7'	+30.3'	100.5°	23°54.6'	+31.3'	100.9°	23°42.9'	+32.3'	101.4°	23°30.9'	+33.2'	101.8°	23°18.4'	+34.1'	102.2°	23°05.5'	+35.0'	102.6°	3
4	24°45.8'	+29.0'	99.1°	24°36.0'	+30.0'	99.6°	24°25.8'	+30.9'	100.0°	24°15.2'	+31.9'	100.5°	24°04.1'	+32.9'	100.9°	23°52.5'	+33.8'	101.3°	23°40.5'	+34.7'	101.8°	4
5	25°14.8'	+28.6'	98.1°	25°06.0'	+29.6'	98.6°	24°56.8'	+30.6'	99.1°	24°47.1'	+31.6'	99.5°	24°36.9'	+32.5'	100.0°	24°26.3'	+33.5'	100.4°	24°15.2'	+34.4'	100.9°	5
6	25°43.3'	+28.2'	97.2°	25°35.6'	+29.2'	97.6°	25°27.4'	+30.2'	98.1°	25°18.7'	+31.2'	98.6°	25°09.5'	+32.2'	99.1°	24°59.8'	+33.1'	99.5°	24°49.6'	+34.1'	100.0°	6
7	26°11.5'	+27.8'	96.2°	26°04.8'	+28.8'	96.7°	25°57.6'	+29.8'	97.2°	25°49.9'	+30.8'	97.6°	25°41.7'	+31.8'	98.1°	25°32.9'	+32.8'	98.6°	25°23.7'	+33.8'	99.1°	7
8	26°39.3'	+27.4'	95.2°	26°33.7'	+28.4'	95.7°	26°27.4'	+29.4'	96.2°	26°20.7'	+30.5'	96.7°	26°13.5'	+31.4'	97.2°	26°05.7'	+32.4'	97.7°	25°57.5'	+33.4'	98.1°	8
9	27°06.7'	+27.0'	94.2°	27°02.1'	+28.0'	94.7°	26°56.9'	+29.0'	95.2°	26°51.2'	+30.1'	95.7°	26°44.9'	+31.1'	96.2°	26°38.2'	+32.1'	96.7°	26°30.9'	+33.0'	97.2°	9
10	27°33.7'	+26.5'	93.2°	27°30.1'	+27.6'	93.7°	27°25.9'	+28.6'	94.2°	27°21.2'	+29.7'	94.7°	27°16.0'	+30.7'	95.3°	27°10.2'	+31.7'	95.8°	27°03.9'	+32.7'	96.3°	10
11	28°00.2'	+26.1'	92.2°	27°57.7'	+27.1'	92.7°	27°54.5'	+28.2'	93.2°	27°50.9'	+29.2'	93.8°	27°46.7'	+30.3'	94.3°	27°41.9'	+31.3'	94.8°	27°36.6'	+32.3'	95.3°	11
12	28°26.3'	+25.6'	91.2°	28°24.8'	+26.7'	91.7°	28°22.7'	+27.7'	92.2°	28°20.1'	+28.8'	92.8°	28°16.9'	+29.8'	93.3°	28°13.2'	+30.9'	93.9°	28°08.9'	+31.9'	94.4°	12
13	28°51.9'	+25.1'	90.1°	28°51.5'	+26.2'	90.7°	28°50.5'	+27.3'	91.2°	28°48.9'	+28.4'	91.8°	28°46.8'	+29.4'	92.3°	28°44.0'	+30.4'	92.9°	28°40.7'	+31.5'	93.4°	13
14	29°17.0'	+24.6'	89.1°	29°17.7'	+25.7'	89.6°	29°17.8'	+26.8'	90.2°	29°17.3'	+27.9'	90.8°	29°16.2'	+29.0'	91.3°	29°14.5'	+30.0'	91.9°	29°12.2'	+31.0'	92.4°	14
15	29°41.7'	+24.2'	88.0°	29°43.4'	+25.3'	88.6°	29°44.6'	+26.3'	89.2°	29°45.2'	+27.4'	89.8°	29°45.1'	+28.5'	90.3°	29°44.5'	+29.6'	90.9°	29°43.2'	+30.6'	91.5°	15
16	30°05.8'	+23.6'	87.0°	30°08.7'	+24.7'	87.6°	30°10.9'	+25.8'	88.1°	30°12.6'	+26.9'	88.7°	30°13.6'	+28.0'	89.3°	30°14.0'	+29.1'	89.9°	30°13.8'	+30.1'	90.5°	16
17	30°29.5'	+23.1'	85.9°	30°33.4'	+24.2'	86.5°	30°36.8'	+25.3'	87.1°	30°39.5'	+26.4'	87.7°	30°41.6'	+27.5'	88.3°	30°43.1'	+28.6'	88.9°	30°44.0'	+29.7'	89.5°	17
18	30°52.6'	+22.6'	84.8°	30°57.7'	+23.7'	85.4°	31°02.1'	+24.8'	86.0°	31°06.0'	+25.9'	86.6°	31°09.2'	+27.0'	87.2°	31°11.7'	+28.1'	87.8°	31°13.7'	+29.2'	88.5°	18
19	31°15.2'	+22.0'	83.8°	31°21.4'	+23.2'	84.4°	31°26.9'	+24.3'	85.0°	31°31.9'	+25.4'	85.6°	31°36.2'	+26.5'	86.2°	31°39.8'	+27.6'	86.8°	31°42.8'	+28.7'	87.4°	19
20	31°37.2'	+21.5'	82.7°	31°44.5'	+22.6'	83.3°	31°51.2'	+23.7'	83.9°	31°57.3'	+24.9'	84.5°	32°02.7'	+26.0'	85.1°	32°07.4'	+27.1'	85.8°	32°11.5'	+28.2'	86.4°	20
21	31°58.7'	+20.9'	81.6°	32°07.2'	+22.0'	82.2°	32°15.0'	+23.2'	82.8°	32°22.2'	+24.3'	83.4°	32°28.7'	+25.4'	84.1°	32°34.5'	+26.6'	84.7°	32°39.7'	+27.7'	85.4°	21
22	32°19.6'	+20.3'	80.5°	32°29.2'	+21.5'	81.1°	32°38.2'	+22.6'	81.7°	32°46.5'	+23.7'	82.4°	32°54.1'	+24.9'	83.0°	33°01.1'	+26.0'	83.6°	33°07.4'	+27.1'	84.3°	22
23	32°39.9'	+19.7'	79.4°	32°50.7'	+20.9'	80.0°	33°00.8'	+22.0'	80.6°	33°10.2'	+23.2'	81.3°	33°19.0'	+24.3'	81.9°	33°27.1'	+25.4'	82.6°	33°34.5'	+26.6'	83.2°	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

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°54.6'	+30.2'	102.3°	21°41.6'	+31.2'	102.7°	21°28.1'	+32.1'	103.1°	21°14.3'	+33.0'	103.5°	21°00.1'	+33.9'	103.9°	20°45.5'	+34.8'	104.3°	20°30.6'	+35.7'	104.6°	0
1	22°24.8'	+29.9'	101.4°	22°12.7'	+30.8'	101.8°	22°00.2'	+31.8'	102.2°	21°47.3'	+32.7'	102.6°	21°34.0'	+33.6'	103.0°	21°20.4'	+34.5'	103.4°	21°06.3'	+35.4'	103.8°	1
2	22°54.7'	+29.5'	100.5°	22°43.6'	+30.5'	100.9°	22°32.0'	+31.5'	101.3°	22°20.1'	+32.4'	101.7°	22°07.7'	+33.3'	102.1°	21°54.9'	+34.3'	102.5°	21°41.7'	+35.2'	102.9°	2
3	23°24.2'	+29.2'	99.5°	23°14.1'	+30.2'	100.0°	23°03.5'	+31.1'	100.4°	22°52.5'	+32.1'	100.8°	22°41.0'	+33.0'	101.2°	22°29.2'	+34.0'	101.6°	22°16.9'	+34.9'	102.0°	3
4	23°53.4'	+28.8'	98.6°	23°44.3'	+29.8'	99.0°	23°34.6'	+30.8'	99.4°	23°24.6'	+31.8'	99.9°	23°14.1'	+32.7'	100.3°	23°03.1'	+33.7'	100.7°	22°51.7'	+34.6'	101.1°	4
5	24°22.3'	+28.5'	97.6°	24°14.1'	+29.5'	98.1°	24°05.4'	+30.5'	98.5°	23°56.3'	+31.4'	98.9°	23°46.8'	+32.4'	99.4°	23°36.8'	+33.3'	99.8°	23°26.3'	+34.3'	100.2°	5
6	24°50.8'	+28.1'	96.6°	24°43.6'	+29.1'	97.1°	24°35.9'	+30.1'	97.6°	24°27.8'	+31.1'	98.0°	24°19.2'	+32.1'	98.5°	24°10.1'	+33.0'	98.9°	24°00.6'	+34.0'	99.3°	6
7	25°18.9'	+27.7'	95.7°	25°12.7'	+28.7'	96.1°	25°06.0'	+29.7'	96.6°	24°58.9'	+30.7'	97.1°	24°51.2'	+31.7'	97.5°	24°43.1'	+32.7'	98.0°	24°34.6'	+33.6'	98.4°	7
8	25°46.6'	+27.3'	94.7°	25°41.4'	+28.3'	95.2°	25°35.8'	+29.4'	95.6°	25°29.6'	+30.4'	96.1°	25°23.0'	+31.4'	96.6°	25°15.8'	+32.3'	97.1°	25°08.2'	+33.3'	97.5°	8
9	26°13.9'	+26.9'	93.7°	26°09.8'	+27.9'	94.2°	26°05.1'	+29.0'	94.7°	26°00.0'	+30.0'	95.2°	25°54.3'	+31.0'	95.6°	25°48.2'	+32.0'	96.1°	25°41.5'	+32.9'	96.6°	9
10	26°40.8'	+26.5'	92.7°	26°37.7'	+27.5'	93.2°	26°34.1'	+28.6'	93.7°	26°30.0'	+29.6'	94.2°	26°25.3'	+30.6'	94.7°	26°20.1'	+31.6'	95.2°	26°14.5'	+32.6'	95.7°	10
11	27°07.3'	+26.0'	91.7°	27°05.2'	+27.1'	92.2°	27°02.7'	+28.2'	92.7°	26°59.5'	+29.2'	93.2°	26°55.9'	+30.2'	93.7°	26°51.7'	+31.2'	94.2°	26°47.0'	+32.2'	94.7°	11
12	27°33.3'	+25.6'	90.7°	27°32.3'	+26.7'	91.2°	27°30.8'	+27.7'	91.7°	27°28.7'	+28.8'	92.2°	27°26.1'	+29.8'	92.8°	27°23.0'	+30.8'	93.3°	27°19.3'	+31.8'	93.8°	12
13	27°58.9'	+25.1'	89.7°	27°59.0'	+26.2'	90.2°	27°58.5'	+27.3'	90.7°	27°57.5'	+28.3'	91.2°	27°55.9'	+29.4'	91.8°	27°53.8'	+30.4'	92.3°	27°51.1'	+31.4'	92.8°	13
14	28°24.1'	+24.7'	88.6°	28°25.2'	+25.8'	89.2°	28°25.8'	+26.8'	89.7°	28°25.8'	+27.9'	90.2°	28°25.3'	+28.9'	90.8°	28°24.2'	+30.0'	91.3°	28°22.5'	+31.0'	91.9°	14
15	28°48.7'	+24.2'	87.6°	28°51.0'	+25.3'	88.1°	28°52.6'	+26.4'	88.7°	28°53.7'	+27.4'	89.2°	28°54.2'	+28.5'	89.8°	28°54.2'	+29.5'	90.3°	28°53.5'	+30.6'	90.9°	15
16	29°12.9'	+23.7'	86.5°	29°16.3'	+24.8'	87.1°	29°19.0'	+25.9'	87.7°	29°21.2'	+27.0'	88.2°	29°22.7'	+28.0'	88.8°	29°23.7'	+29.1'	89.3°	29°24.1'	+30.1'	89.9°	16
17	29°36.6'	+23.2'	85.5°	29°41.1'	+24.3'	86.1°	29°44.9'	+25.4'	86.6°	29°48.1'	+26.5'	87.2°	29°50.8'	+27.6'	87.8°	29°52.8'	+28.6'	88.3°	29°54.2'	+29.7'	88.9°	17
18	29°59.8'	+22.7'	84.4°	30°05.4'	+23.8'	85.0°	30°10.3'	+24.9'	85.6°	30°14.6'	+26.0'	86.2°	30°18.3'	+27.1'	86.7°	30°21.4'	+28.2'	87.3°	30°23.9'	+29.2'	87.9°	18
19	30°22.5'	+22.3'	83.4°	30°29.2'	+23.3'	83.9°	30°35.2'	+24.4'	84.5°	30°40.6'	+25.5'	85.1°	30°45.4'	+26.6'	85.7°	30°49.6'	+27.7'	86.3°	30°53.2'	+28.7'	86.9°	19
20	30°44.7'	+21.6'	82.3°	30°52.4'	+22.7'	82.9°	30°59.6'	+23.9'	83.5°	31°06.1'	+25.0'	84.1°	31°12.0'	+26.1'	84.7°	31°17.3'	+27.2'	85.3°	31°21.9'	+28.3'	85.9°	20
21	31°06.3'	+21.1'	81.2°	31°15.2'	+22.2'	81.8°	31°23.4'	+23.3'	82.4°	31°31.1'	+24.4'	83.0°	31°38.1'	+25.5'	83.6°	31°44.4'	+					

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

66° 294° LHA

Latitude SAME as 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°02.8'	+30.0'	101.8°	20°50.3'	+31.0'	102.2°	20°37.5'	+31.9'	102.6°	20°24.3'	+32.8'	102.9°	20°10.7'	+33.7'	103.3°	19°56.7'	+34.6'	103.6°	19°42.4'	+35.5'	104.0°	0			
1	21°32.8'	+29.7'	100.9°	21°21.3'	+30.7'	101.3°	21°09.4'	+31.6'	101.6°	20°57.1'	+32.6'	102.0°	20°44.4'	+33.5'	102.4°	20°31.3'	+34.4'	102.8°	20°17.9'	+35.3'	103.1°	1			
2	22°02.5'	+29.4'	99.9°	21°52.0'	+30.4'	100.3°	21°41.0'	+31.3'	100.7°	21°29.6'	+32.3'	101.1°	21°17.9'	+33.2'	101.5°	21°05.7'	+34.1'	101.9°	20°53.2'	+35.0'	102.3°	2			
3	22°31.9'	+29.1'	99.0°	22°22.3'	+30.0'	99.4°	22°12.3'	+31.0'	99.8°	22°01.9'	+32.0'	100.2°	21°51.1'	+32.9'	100.6°	21°39.8'	+33.8'	101.0°	21°28.2'	+34.7'	101.4°	3			
4	23°01.0'	+28.7'	98.1°	22°52.4'	+29.7'	98.5°	22°43.3'	+30.7'	98.9°	22°33.9'	+31.6'	99.3°	22°24.0'	+32.6'	99.7°	22°13.6'	+33.5'	100.1°	22°02.9'	+34.4'	100.5°	4			
5	23°29.7'	+28.4'	97.1°	23°22.1'	+29.4'	97.5°	23°14.0'	+30.4'	98.0°	23°05.5'	+31.3'	98.4°	22°56.5'	+32.3'	98.8°	22°47.2'	+33.2'	99.2°	22°37.3'	+34.2'	99.6°	5			
6	23°58.1'	+28.0'	96.1°	23°51.5'	+29.0'	96.6°	23°44.4'	+30.0'	97.0°	23°36.8'	+31.0'	97.4°	23°28.8'	+32.0'	97.9°	23°20.4'	+32.9'	98.3°	23°11.5'	+33.8'	98.7°	6			
7	24°26.1'	+27.6'	95.2°	24°20.5'	+28.6'	95.6°	24°14.4'	+29.7'	96.1°	24°07.8'	+30.6'	96.5°	24°00.8'	+31.6'	97.0°	23°53.3'	+32.6'	97.4°	23°45.3'	+33.5'	97.8°	7			
8	24°53.8'	+27.3'	94.2°	24°49.1'	+28.3'	94.6°	24°44.0'	+29.3'	95.1°	24°38.4'	+30.3'	95.6°	24°32.4'	+31.3'	96.0°	24°25.9'	+32.2'	96.5°	24°18.9'	+33.2'	96.9°	8			
9	25°21.0'	+26.9'	93.2°	25°17.4'	+27.9'	93.7°	25°13.3'	+28.9'	94.1°	25°08.7'	+29.9'	94.6°	25°03.7'	+30.9'	95.1°	24°58.1'	+31.9'	95.5°	24°52.1'	+32.9'	96.0°	9			
10	25°47.9'	+26.5'	92.2°	25°45.3'	+27.5'	92.7°	25°42.2'	+28.5'	93.2°	25°38.6'	+29.5'	93.7°	25°34.6'	+30.5'	94.1°	25°30.0'	+31.5'	94.6°	25°24.9'	+32.5'	95.1°	10			
11	26°14.3'	+26.0'	91.2°	26°12.8'	+27.1'	91.7°	26°10.7'	+28.1'	92.2°	26°08.2'	+29.1'	92.7°	26°05.1'	+30.2'	93.2°	26°01.5'	+31.2'	93.7°	25°57.4'	+32.2'	94.2°	11			
12	26°40.3'	+25.6'	90.2°	26°39.9'	+26.7'	90.7°	26°38.9'	+27.7'	91.2°	26°37.3'	+28.7'	91.7°	26°35.3'	+29.8'	92.2°	26°32.7'	+30.8'	92.7°	26°29.6'	+31.8'	93.2°	12			
13	27°05.9'	+25.2'	89.2°	27°06.5'	+26.2'	89.7°	27°06.6'	+27.3'	90.2°	27°06.1'	+28.3'	90.7°	27°05.0'	+29.4'	91.2°	27°03.5'	+30.4'	91.7°	27°01.4'	+31.4'	92.3°	13			
14	27°31.1'	+24.7'	88.2°	27°32.8'	+25.8'	88.7°	27°33.9'	+26.8'	89.2°	27°34.4'	+27.9'	89.7°	27°34.4'	+28.9'	90.3°	27°33.9'	+30.0'	90.8°	27°32.8'	+31.0'	91.3°	14			
15	27°55.8'	+24.3'	87.1°	27°58.5'	+25.3'	87.7°	28°00.7'	+26.4'	88.2°	28°02.3'	+27.5'	88.7°	28°03.4'	+28.5'	89.3°	28°03.8'	+29.6'	89.8°	28°03.8'	+30.6'	90.3°	15			
16	28°20.1'	+23.8'	86.1°	28°23.9'	+24.9'	86.6°	28°27.1'	+25.9'	87.2°	28°29.8'	+27.0'	87.7°	28°31.9'	+28.1'	88.3°	28°33.4'	+29.1'	88.8°	28°34.4'	+30.2'	89.4°	16			
17	28°43.8'	+23.3'	85.1°	28°48.7'	+24.4'	85.6°	28°53.0'	+25.5'	86.2°	28°56.8'	+26.5'	86.7°	29°00.0'	+27.6'	87.3°	29°02.5'	+28.7'	87.8°	29°04.5'	+29.7'	88.4°	17			
18	29°07.1'	+22.8'	84.0°	29°13.1'	+23.9'	84.6°	29°18.5'	+25.0'	85.1°	29°23.3'	+26.1'	85.7°	29°27.6'	+27.1'	86.2°	29°31.2'	+28.2'	86.8°	29°34.2'	+29.3'	87.4°	18			
19	29°29.9'	+22.3'	82.9°	29°37.0'	+23.4'	83.5°	29°43.5'	+24.5'	84.1°	29°49.4'	+25.6'	84.6°	29°54.7'	+26.7'	85.2°	29°59.4'	+27.7'	85.8°	30°03.5'	+28.8'	86.4°	19			
20	29°52.2'	+21.8'	81.9°	30°00.4'	+22.9'	82.4°	30°08.0'	+24.0'	83.0°	30°15.0'	+25.1'	83.6°	30°21.4'	+26.2'	84.2°	30°27.1'	+27.3'	84.8°	30°32.3'	+28.3'	85.4°	20			
21	30°14.0'	+21.2'	80.8°	30°23.3'	+22.3'	81.4°	30°32.0'	+23.5'	82.0°	30°40.1'	+24.6'	82.5°	30°47.5'	+25.7'	83.1°	30°54.4'	+26.8'	83.7°	31°00.6'	+27.8'	84.3°	21			
22	30°35.2'	+20.7'	79.7°	30°45.6'	+21.8'	80.3°	30°55.4'	+22.9'	80.9°	31°04.6'	+24.0'	81.5°	31°13.2'	+25.1'	82.1°	31°21.2'	+26.2'	82.7°	31°28.5'	+27.3'	83.3°	22			
23	30°55.9'	+20.1'	78.6°	31°07.4'	+21.3'	79.2°	31°18.4'	+22.4'	79.8°	31°28.7'	+23.5'	80.4°	31°38.3'	+24.6'	81.0°	31°47.4'	+25.7'	81.6°	31°55.8'	+26.8'	82.2°	23			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	28			29			30			31			32			33			34					Dec°	

66° 294° LHA

Latitude SAME as Declination

66° 294° LHA

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

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

67° 293° LHA

Latitude SAME as Declination

67° 293° LHA

Dec°	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°10.9'	+29.9'	101.3°	19°59.0'	+30.8'	101.6°	19°46.7'	+31.7'	102.0°	19°34.1'	+32.7'	102.3°	19°21.1'	+33.6'	102.7°	19°07.7'	+34.5'	103.0°	18°54.0'	+35.3'	103.4°	0
1	20°40.8'	+29.6'	100.3°	20°29.8'	+30.5'	100.7°	20°18.4'	+31.5'	101.1°	20°06.7'	+32.4'	101.4°	19°54.6'	+33.3'	101.8°	19°42.2'	+34.2'	102.1°	19°29.4'	+35.1'	102.5°	1
2	21°10.3'	+29.3'	99.4°	21°00.3'	+30.2'	99.8°	20°49.9'	+31.2'	100.2°	20°39.1'	+32.1'	100.5°	20°28.0'	+33.0'	100.9°	20°16.4'	+34.0'	101.3°	20°04.5'	+34.8'	101.6°	2
3	21°39.6'	+28.9'	98.5°	21°30.5'	+29.9'	98.9°	21°21.1'	+30.9'	99.3°	21°11.2'	+31.8'	99.6°	21°01.0'	+32.8'	100.0°	20°50.4'	+33.7'	100.4°	20°39.3'	+34.6'	100.8°	3
4	22°08.5'	+28.6'	97.5°	22°00.4'	+29.6'	97.9°	21°52.0'	+30.6'	98.3°	21°43.1'	+31.5'	98.7°	21°33.8'	+32.5'	99.1°	21°24.0'	+33.4'	99.5°	21°13.9'	+34.3'	99.9°	4
5	22°37.1'	+28.3'	96.6°	22°30.0'	+29.3'	97.0°	22°22.5'	+30.2'	97.4°	22°14.6'	+31.2'	97.8°	22°06.2'	+32.2'	98.2°	21°57.4'	+33.1'	98.6°	21°48.2'	+34.0'	99.0°	5
6	23°05.4'	+27.9'	95.6°	22°59.3'	+28.9'	96.0°	22°52.8'	+29.9'	96.5°	22°45.8'	+30.9'	96.9°	22°38.4'	+31.9'	97.3°	22°30.5'	+32.8'	97.7°	22°22.3'	+33.7'	98.1°	6
7	23°33.3'	+27.6'	94.7°	23°22.7'	+28.6'	95.1°	23°22.7'	+29.6'	95.5°	23°15.7'	+30.6'	96.0°	23°10.2'	+31.5'	96.4°	23°03.3'	+32.5'	96.8°	22°56.0'	+33.4'	97.2°	7
8	24°00.9'	+27.2'	93.7°	23°56.8'	+28.2'	94.1°	23°52.3'	+29.2'	94.6°	23°47.2'	+30.2'	95.0°	23°41.8'	+31.2'	95.5°	23°35.8'	+32.2'	95.9°	23°29.5'	+33.1'	96.3°	8
9	24°28.1'	+26.8'	92.7°	24°25.0'	+27.8'	93.2°	24°21.5'	+28.9'	93.6°	24°17.4'	+29.9'	94.1°	24°13.0'	+30.8'	94.5°	24°08.0'	+31.8'	95.0°	24°02.6'	+32.8'	95.4°	9
10	24°54.9'	+26.4'	91.7°	24°52.9'	+27.5'	92.2°	24°50.3'	+28.5'	92.7°	24°47.3'	+29.5'	93.1°	24°43.8'	+30.5'	93.6°	24°39.8'	+31.5'	94.0°	24°35.4'	+32.5'	94.5°	10
11	25°21.3'	+26.0'	90.7°	25°20.3'	+27.1'	91.2°	25°18.8'	+28.1'	91.7°	25°16.8'	+29.1'	92.2°	25°14.3'	+30.1'	92.6°	25°11.3'	+31.1'	93.1°	25°07.8'	+32.1'	93.6°	11
12	25°47.4'	+25.6'	89.7°	25°47.4'	+26.7'	90.2°	25°46.9'	+27.7'	90.7°	25°45.9'	+28.7'	91.2°	25°44.4'	+29.7'	91.7°	25°42.4'	+30.8'	92.1°	25°39.9'	+31.7'	92.6°	12
13	26°13.0'	+25.2'	88.7°	26°14.0'	+26.2'	89.2°	26°14.6'	+27.3'	89.7°	26°14.6'	+28.3'	90.2°	26°14.2'	+29.4'	90.7°	26°13.2'	+30.4'	91.2°	26°11.7'	+31.4'	91.7°	13
14	26°38.2'	+24.8'	87.7°	26°40.3'	+25.8'	88.2°	26°41.9'	+26.9'	88.7°	26°43.0'	+27.9'	89.2°	26°43.5'	+29.0'	89.7°	26°43.5'	+30.0'	90.2°	26°43.0'	+31.0'	90.7°	14
15	27°02.9'	+24.3'	86.7°	27°06.1'	+25.4'	87.2°	27°08.8'	+26.4'	87.7°	27°10.9'	+27.5'	88.2°	27°12.5'	+28.5'	88.7°	27°13.5'	+29.6'	89.3°	27°14.0'	+30.6'	89.8°	15
16	27°27.2'	+23.9'	85.7°	27°31.5'	+24.9'	86.2°	27°35.2'	+26.0'	86.7°	27°38.4'	+27.1'	87.2°	27°41.0'	+28.1'	87.8°	27°43.1'	+29.2'	88.3°	27°44.6'	+30.2'	88.8°	16
17	27°51.1'	+23.4'	84.6°	27°56.4'	+24.5'	85.2°	28°01.2'	+25.5'	85.7°	28°05.4'	+26.6'	86.2°	28°09.1'	+27.7'	86.8°	28°12.2'	+28.7'	87.3°	28°14.8'	+29.8'	87.8°	17
18	28°14.5'	+22.9'	83.6°	28°20.9'	+24.0'	84.1°	28°26.8'	+25.1'	84.7°	28°32.1'	+26.2'	85.2°	28°36.8'	+27.2'	85.7°	28°41.0'	+28.3'	86.3°	28°44.6'	+29.3'	86.8°	18
19	28°37.4'	+22.4'	82.5°	28°44.9'	+23.5'	83.1°	28°51.8'	+24.6'	83.6°	28°58.2'	+25.7'	84.2°	29°04.0'	+26.8'	84.7°	29°09.2'	+27.8'	85.3°	29°13.9'	+28.9'	85.8°	19
20	28°59.8'	+21.9'	81.5°	29°08.4'	+23.0'	82.0°	29°16.4'	+24.1'	82.6°	29°23.9'	+25.2'	83.1°	29°30.8'	+26.3'	83.7°	29°37.1'	+27.4'	84.3°	29°42.8'	+28.4'	84.8°	20
21	29°21.7'	+21.4'	80.4°	29°31.4'	+22.5'	81.0°	29°40.5'	+23.6'	81.5°	29°49.1'	+24.7'	82.1°	29°57.0'	+25.8'	82.7°							

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

68° 292° LHA

Latitude SAME as 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°18.9'	+29.7'	100.7°	19°07.5'	+30.7'	101.1°	18°55.8'	+31.6'	101.4°	18°43.8'	+32.5'	101.8°	18°31.4'	+33.4'	102.1°	18°18.6'	+34.3'	102.4°	18°05.6'	+35.2'	102.7°	0
1	19°48.6'	+29.4'	99.8°	19°38.2'	+30.4'	100.2°	19°27.4'	+31.3'	100.5°	19°16.3'	+32.2'	100.9°	19°04.8'	+33.2'	101.2°	18°53.0'	+34.1'	101.5°	18°40.8'	+35.0'	101.9°	1
2	20°18.0'	+29.1'	98.9°	20°08.6'	+30.1'	99.3°	19°58.7'	+31.0'	99.6°	19°48.5'	+32.0'	100.0°	19°37.9'	+32.9'	100.3°	19°27.0'	+33.8'	100.7°	19°15.7'	+34.7'	101.0°	2
3	20°47.1'	+28.8'	98.0°	20°38.6'	+29.8'	98.3°	20°29.8'	+30.8'	98.7°	20°20.5'	+31.7'	99.1°	20°10.8'	+32.6'	99.4°	20°00.8'	+33.5'	99.8°	19°50.4'	+34.5'	100.2°	3
4	21°16.0'	+28.5'	97.0°	21°08.4'	+29.5'	97.4°	21°00.5'	+30.5'	97.8°	20°52.2'	+31.4'	98.2°	20°43.5'	+32.3'	98.5°	20°34.4'	+33.3'	98.9°	20°24.9'	+34.2'	99.3°	4
5	21°44.5'	+28.2'	96.1°	21°37.9'	+29.2'	96.5°	21°31.0'	+30.1'	96.9°	21°23.6'	+31.1'	97.2°	21°15.8'	+32.1'	97.6°	21°07.6'	+33.0'	98.0°	20°59.1'	+33.9'	98.4°	5
6	22°12.7'	+27.8'	95.1°	22°07.1'	+28.8'	95.5°	22°01.1'	+29.8'	95.9°	21°54.7'	+30.8'	96.3°	21°47.9'	+31.8'	96.7°	21°40.6'	+32.7'	97.1°	21°33.0'	+33.6'	97.5°	6
7	22°40.5'	+27.5'	94.2°	22°35.9'	+28.5'	94.6°	22°30.9'	+29.5'	95.0°	22°25.5'	+30.5'	95.4°	22°19.6'	+31.4'	95.8°	22°13.4'	+32.4'	96.2°	22°06.6'	+33.3'	96.6°	7
8	23°08.0'	+27.2'	93.2°	23°04.4'	+28.2'	93.6°	23°00.4'	+29.2'	94.0°	22°56.0'	+30.1'	94.5°	22°51.1'	+31.1'	94.9°	22°45.8'	+32.1'	95.3°	22°40.0'	+33.0'	95.7°	8
9	23°35.2'	+26.8'	92.2°	23°32.6'	+27.8'	92.7°	23°29.6'	+28.8'	93.1°	23°26.1'	+29.8'	93.5°	23°22.2'	+30.8'	94.0°	23°17.8'	+31.8'	94.4°	23°13.0'	+32.7'	94.8°	9
10	24°02.0'	+26.4'	91.2°	24°00.4'	+27.4'	91.7°	23°58.4'	+28.5'	92.1°	23°55.9'	+29.5'	92.6°	23°53.0'	+30.5'	93.0°	23°49.6'	+31.4'	93.5°	23°45.8'	+32.4'	93.9°	10
11	24°28.4'	+26.0'	90.3°	24°27.9'	+27.1'	90.7°	24°26.9'	+28.1'	91.2°	24°25.4'	+29.1'	91.6°	24°23.5'	+30.1'	92.1°	24°21.0'	+31.1'	92.5°	24°18.2'	+32.1'	93.0°	11
12	24°54.4'	+25.6'	89.3°	24°54.9'	+26.7'	89.7°	24°54.9'	+27.7'	90.2°	24°54.5'	+28.7'	90.7°	24°53.6'	+29.7'	91.1°	24°52.1'	+30.7'	91.6°	24°50.2'	+31.7'	92.1°	12
13	25°20.0'	+25.2'	88.3°	25°21.6'	+26.3'	88.7°	25°22.6'	+27.3'	89.2°	25°23.2'	+28.3'	89.7°	25°23.3'	+29.4'	90.2°	25°22.9'	+30.4'	90.6°	25°21.9'	+31.4'	91.1°	13
14	25°45.2'	+24.8'	87.3°	25°47.9'	+25.9'	87.7°	25°50.0'	+26.9'	88.2°	25°51.6'	+27.9'	88.7°	25°52.6'	+29.0'	89.2°	25°53.2'	+30.0'	89.7°	25°53.3'	+31.0'	90.2°	14
15	26°10.0'	+24.4'	86.3°	26°13.7'	+25.4'	86.7°	26°16.9'	+26.5'	87.2°	26°19.5'	+27.5'	87.7°	26°21.6'	+28.6'	88.2°	26°23.2'	+29.6'	88.7°	26°24.3'	+30.6'	89.2°	15
16	26°34.4'	+23.9'	85.2°	26°39.1'	+25.0'	85.7°	26°43.4'	+26.1'	86.2°	26°47.0'	+27.1'	86.7°	26°50.2'	+28.2'	87.2°	26°52.8'	+29.2'	87.7°	26°54.9'	+30.2'	88.3°	16
17	26°58.4'	+23.5'	84.2°	27°04.2'	+24.6'	84.7°	27°09.4'	+25.6'	85.2°	27°14.1'	+26.7'	85.7°	27°18.3'	+27.7'	86.3°	27°22.0'	+28.8'	86.8°	27°25.1'	+29.8'	87.3°	17
18	27°21.8'	+23.0'	83.2°	27°28.7'	+24.1'	83.7°	27°35.0'	+25.2'	84.2°	27°40.8'	+26.2'	84.7°	27°46.1'	+27.3'	85.3°	27°50.8'	+28.3'	85.8°	27°54.9'	+29.4'	86.3°	18
19	27°44.9'	+22.6'	82.1°	27°52.8'	+23.6'	82.7°	28°00.2'	+24.7'	83.2°	28°07.1'	+25.8'	83.7°	28°13.4'	+26.9'	84.2°	28°19.1'	+27.9'	84.8°	28°24.3'	+29.0'	85.3°	19
20	28°07.4'	+22.1'	81.1°	28°16.5'	+23.2'	81.6°	28°24.9'	+24.2'	82.1°	28°32.9'	+25.3'	82.7°	28°40.2'	+26.4'	83.2°	28°47.0'	+27.5'	83.8°	28°53.2'	+28.5'	84.3°	20
21	28°29.5'	+21.6'	80.0°	28°39.6'	+22.7'	80.6°	28°49.2'	+23.8'	81.1°	28°58.2'	+24.8'	81.6°	29°06.6'	+25.9'	82.2°	29°14.5'	+27.0'	82.8°	29°21.7'	+28.0'	83.3°	21
22	28°51.1'	+21.1'	79.0°	29°02.3'	+22.2'	79.5°	29°12.9'	+23.3'	80.1°	29°23.0'	+24.4'	80.6°	29°32.5'	+25.4'	81.2°	29°41.5'	+26.5'	81.7°	29°49.8'	+27.6'	82.3°	22
23	29°12.2'	+20.6'	77.9°	29°24.5'	+21.7'	78.4°	29°36.2'	+22.8'	79.0°	29°47.4'	+23.8'	79.6°	29°58.0'	+24.9'	80.1°	30°08.0'	+26.0'	80.7°	30°17.4'	+27.1'	81.3°	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

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	18°26.8'	+29.6'	100.2°	18°16.0'	+30.5'	100.5°	18°04.8'	+31.4'	100.9°	17°53.4'	+32.4'	101.2°	17°41.6'	+33.3'	101.5°	17°29.4'	+34.1'	101.8°	17°17.0'	+35.0'	102.1°	0
1	18°56.4'	+29.3'	99.3°	18°46.5'	+30.2'	99.6°	18°36.3'	+31.2'	100.0°	18°25.7'	+32.1'	100.3°	18°14.8'	+33.0'	100.6°	18°03.6'	+33.9'	100.9°	17°52.0'	+34.8'	101.3°	1
2	19°25.6'	+29.0'	98.4°	19°16.7'	+30.0'	98.7°	19°07.4'	+30.9'	99.1°	18°57.8'	+31.8'	99.4°	18°47.8'	+32.8'	99.7°	18°37.5'	+33.7'	100.1°	18°26.8'	+34.6'	100.4°	2
3	19°54.6'	+28.7'	97.4°	19°46.7'	+29.7'	97.8°	19°38.4'	+30.6'	98.2°	19°29.7'	+31.6'	98.5°	19°20.6'	+32.5'	98.9°	19°11.2'	+33.4'	99.2°	19°01.4'	+34.3'	99.5°	3
4	20°23.4'	+28.4'	96.5°	20°16.4'	+29.4'	96.9°	20°09.0'	+30.4'	97.2°	20°01.2'	+31.3'	97.6°	19°53.1'	+32.2'	98.0°	19°44.6'	+33.2'	98.3°	19°35.8'	+34.1'	98.7°	4
5	20°51.8'	+28.1'	95.6°	20°45.8'	+29.1'	95.9°	20°39.3'	+30.1'	96.3°	20°32.5'	+31.0'	96.7°	20°25.4'	+32.0'	97.1°	20°17.8'	+32.9'	97.4°	20°09.8'	+33.8'	97.8°	5
6	21°19.9'	+27.8'	94.6°	21°14.8'	+28.8'	95.0°	21°09.4'	+29.8'	95.4°	21°03.6'	+30.7'	95.8°	20°57.3'	+31.7'	96.2°	20°50.7'	+32.6'	96.5°	20°43.7'	+33.5'	96.9°	6
7	21°47.7'	+27.5'	93.7°	21°43.6'	+28.4'	94.1°	21°39.2'	+29.4'	94.5°	21°34.3'	+30.4'	94.9°	21°29.0'	+31.4'	95.2°	21°23.3'	+32.3'	95.6°	21°17.2'	+33.3'	96.0°	7
8	22°15.1'	+27.1'	92.7°	22°12.1'	+28.1'	93.1°	22°08.6'	+29.1'	93.5°	22°04.7'	+30.1'	93.9°	22°00.4'	+31.1'	94.3°	21°55.6'	+32.0'	94.7°	21°50.5'	+33.0'	95.1°	8
9	22°42.2'	+26.8'	91.7°	22°40.2'	+27.8'	92.2°	22°37.7'	+28.8'	92.6°	22°34.8'	+29.8'	93.0°	22°31.4'	+30.7'	93.4°	22°27.7'	+31.7'	93.8°	22°23.4'	+32.7'	94.2°	9
10	23°09.0'	+26.4'	90.8°	23°08.0'	+27.4'	91.2°	23°06.5'	+28.4'	91.6°	23°04.6'	+29.4'	92.1°	23°02.2'	+30.4'	92.5°	22°59.4'	+31.4'	92.9°	22°56.1'	+32.4'	93.3°	10
11	23°35.4'	+26.0'	89.8°	23°35.4'	+27.1'	90.2°	23°34.9'	+28.1'	90.7°	23°34.0'	+29.1'	91.1°	23°32.6'	+30.1'	91.5°	23°30.8'	+31.1'	92.0°	23°28.5'	+32.0'	92.4°	11
12	24°01.4'	+25.7'	88.8°	24°02.4'	+26.7'	89.3°	24°03.0'	+27.7'	89.7°	24°03.1'	+28.7'	90.1°	24°02.7'	+29.7'	90.6°	24°01.8'	+30.7'	91.0°	24°00.5'	+31.7'	91.5°	12
13	24°27.1'	+25.3'	87.8°	24°29.1'	+26.3'	88.3°	24°30.7'	+27.3'	88.7°	24°31.8'	+28.4'	89.2°	24°32.4'	+29.4'	89.6°	24°32.5'	+30.4'	90.1°	24°32.2'	+31.4'	90.6°	13
14	24°52.3'	+24.9'	86.8°	24°55.4'	+25.9'	87.3°	24°58.0'	+26.9'	87.7°	25°00.1'	+28.0'	88.2°	25°01.8'	+29.0'	88.7°	25°02.9'	+30.0'	89.1°	25°03.6'	+31.0'	89.6°	14
15	25°17.2'	+24.5'	85.8°	25°21.3'	+25.5'	86.3°	25°25.0'	+26.5'	86.8°	25°28.1'	+27.6'	87.2°	25°30.8'	+28.6'	87.7°	25°32.9'	+29.6'	88.2°	25°34.6'	+30.6'	88.7°	15
16	25°41.6'	+24.0'	84.8°	25°46.8'	+25.1'	85.3°	25°51.5'	+26.1'	85.8°	25°55.7'	+27.2'	86.2°	25°59.4'	+28.2'	86.7°	26°02.5'	+29.2'	87.2°	26°05.2'	+30.2'	87.7°	16
17	26°05.7'	+23.6'	83.8°	26°11.9'	+24.7'	84.3°	26°17.7'	+25.7'	84.8°	26°22.9'	+26.8'	85.3°	26°27.6'	+27.8'	85.8°	26°31.8'	+28.8'	86.2°	26°35.4'	+29.9'	86.7°	17
18	26°29.3'	+23.2'	82.8°	26°36.6'	+24.2'	83.3°	26°43.4'	+25.3'	83.8°	26°49.6'	+26.3'	84.3°	26°55.4'	+27.4'	84.8°	27°00.6'	+28.4'	85.3°	27°05.3'	+29.4'	85.8°	18
19	26°52.4'	+22.7'	81.7°	27°00.8'	+23.8'	82.2°	27°08.7'	+24.8'	82.7°	27°16.0'	+25.9'	83.2°	27°22.8'	+27.0'	83.8°	27°29.0'	+28.0'	84.3°	27°34.7'	+29.0'	84.8°	19
20	27°15.1'	+22.2'	80.7°	27°24.6'	+23.3'	81.2°	27°33.5'	+24.4'	81.7°	27°41.9'	+25.5'	82.2°	27°49.7'	+26.5'	82.8°	27°57.0'	+27.6'	83.3°	28°03.8'	+28.6'	83.8°	20
21	27°37.4'	+21.8'	79.6°	27°47.9'	+22.8'	80.2°	27°57.9'	+23.9'	80.7°	28°07.3'	+25.0'	81.2°	28°16.2'	+26.1'	81.7°	28°24.6'	+27.1'	82.3°	28°32.4'	+28.2'</		

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

70° 290° LHA

Latitude SAME as Declination

70° 290° 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	17°34.6'	+29.4'	99.7°	17°24.3'	+30.4'	100.0°	17°13.8'	+31.3'	100.3°	17°02.9'	+32.2'	100.6°	16°51.7'	+33.1'	100.9°	16°40.1'	+34.0'	101.2°	16°28.3'	+34.9'	101.5°	0
1	18°04.0'	+29.2'	98.8°	17°54.7'	+30.1'	99.1°	17°45.1'	+31.0'	99.4°	17°35.1'	+32.0'	99.7°	17°24.8'	+32.9'	100.0°	17°14.1'	+33.8'	100.4°	17°03.2'	+34.7'	100.7°	1
2	18°33.2'	+28.9'	97.9°	18°24.8'	+29.8'	98.2°	18°16.1'	+30.8'	98.5°	18°07.0'	+31.7'	98.8°	17°57.6'	+32.6'	99.2°	17°47.9'	+33.6'	99.5°	17°37.9'	+34.4'	99.8°	2
3	19°02.1'	+28.6'	96.9°	18°54.7'	+29.6'	97.3°	18°46.9'	+30.5'	97.6°	18°38.8'	+31.5'	98.0°	18°30.3'	+32.4'	98.3°	18°21.5'	+33.3'	98.6°	18°12.3'	+34.2'	98.9°	3
4	19°30.7'	+28.3'	96.0°	19°24.2'	+29.3'	96.4°	19°17.4'	+30.3'	96.7°	19°10.2'	+31.2'	97.1°	19°02.7'	+32.1'	97.4°	18°54.8'	+33.1'	97.7°	18°46.5'	+34.0'	98.1°	4
5	19°59.0'	+28.0'	95.1°	19°53.5'	+29.0'	95.4°	19°47.7'	+30.0'	95.8°	19°41.4'	+30.9'	96.1°	19°34.8'	+31.9'	96.5°	19°27.9'	+32.8'	96.9°	19°20.5'	+33.7'	97.2°	5
6	20°27.1'	+27.7'	94.1°	20°22.5'	+28.7'	94.5°	20°17.6'	+29.7'	94.9°	20°12.4'	+30.6'	95.2°	20°06.7'	+31.6'	95.6°	20°00.7'	+32.5'	96.0°	19°54.2'	+33.5'	96.3°	6
7	20°54.8'	+27.4'	93.2°	20°51.3'	+28.4'	93.6°	20°47.3'	+29.4'	93.9°	20°43.0'	+30.4'	94.3°	20°38.3'	+31.3'	94.7°	20°33.2'	+32.3'	95.1°	20°27.7'	+33.2'	95.4°	7
8	21°22.2'	+27.1'	92.2°	21°19.7'	+28.1'	92.6°	21°16.7'	+29.1'	93.0°	21°13.4'	+30.0'	93.4°	21°09.6'	+31.0'	93.8°	21°05.5'	+32.0'	94.2°	21°00.9'	+32.9'	94.5°	8
9	21°49.3'	+26.7'	91.3°	21°47.7'	+27.8'	91.7°	21°45.8'	+28.7'	92.1°	21°43.4'	+29.7'	92.5°	21°40.6'	+30.7'	92.9°	21°37.4'	+31.7'	93.3°	21°33.8'	+32.6'	93.7°	9
10	22°16.0'	+26.4'	90.3°	22°15.5'	+27.4'	90.7°	22°14.5'	+28.4'	91.1°	22°13.1'	+29.4'	91.5°	22°11.3'	+30.4'	91.9°	22°09.1'	+31.4'	92.3°	22°06.4'	+32.3'	92.7°	10
11	22°42.4'	+26.0'	89.3°	22°42.9'	+27.1'	89.7°	22°42.9'	+28.1'	90.2°	22°42.6'	+29.1'	90.6°	22°41.7'	+30.1'	91.0°	22°40.5'	+31.0'	91.4°	22°38.8'	+32.0'	91.8°	11
12	23°08.5'	+25.7'	88.3°	23°10.0'	+26.7'	88.8°	23°11.0'	+27.7'	89.2°	23°11.6'	+28.7'	89.6°	23°11.8'	+29.7'	90.1°	23°11.5'	+30.7'	90.5°	23°10.8'	+31.7'	90.9°	12
13	23°34.1'	+25.3'	87.4°	23°36.7'	+26.3'	87.8°	23°38.8'	+27.4'	88.2°	23°40.4'	+28.4'	88.7°	23°41.5'	+29.4'	89.1°	23°42.2'	+30.4'	89.6°	23°42.5'	+31.4'	90.0°	13
14	23°59.5'	+24.9'	86.4°	24°03.0'	+26.0'	86.8°	24°06.1'	+27.0'	87.3°	24°08.7'	+28.0'	87.7°	24°10.9'	+29.0'	88.2°	24°12.6'	+30.0'	88.6°	24°13.8'	+31.0'	89.1°	14
15	24°24.4'	+24.5'	85.4°	24°29.0'	+25.6'	85.8°	24°33.1'	+26.6'	86.3°	24°36.8'	+27.6'	86.7°	24°39.9'	+28.7'	87.2°	24°42.6'	+29.7'	87.7°	24°44.8'	+30.7'	88.1°	15
16	24°48.9'	+24.1'	84.4°	24°54.6'	+25.2'	84.8°	24°59.7'	+26.2'	85.3°	25°04.4'	+27.2'	85.8°	25°08.6'	+28.3'	86.2°	25°12.3'	+29.3'	86.7°	25°15.5'	+30.3'	87.2°	16
17	25°13.0'	+23.7'	83.4°	25°19.7'	+24.8'	83.8°	25°25.9'	+25.8'	84.3°	25°31.6'	+26.8'	84.8°	25°36.9'	+27.9'	85.3°	25°41.6'	+28.9'	85.7°	25°45.8'	+29.9'	86.2°	17
18	25°36.7'	+23.3'	82.3°	25°44.5'	+24.3'	82.8°	25°51.7'	+25.4'	83.3°	25°58.5'	+26.4'	83.8°	26°04.7'	+27.5'	84.3°	26°10.5'	+28.5'	84.8°	26°15.7'	+29.5'	85.2°	18
19	26°00.0'	+22.9'	81.3°	26°08.8'	+23.9'	81.8°	26°17.1'	+25.0'	82.3°	26°24.9'	+26.0'	82.8°	26°32.2'	+27.1'	83.3°	26°39.0'	+28.1'	83.8°	26°45.2'	+29.1'	84.3°	19
20	26°22.9'	+22.4'	80.3°	26°32.7'	+23.5'	80.8°	26°42.1'	+24.5'	81.3°	26°50.9'	+25.6'	81.8°	26°59.3'	+26.6'	82.3°	27°07.1'	+27.7'	82.8°	27°14.3'	+28.7'	83.3°	20
21	26°45.3'	+21.9'	79.3°	26°56.2'	+23.0'	79.8°	27°06.6'	+24.1'	80.3°	27°16.5'	+25.1'	80.8°	27°25.9'	+26.2'	81.3°	27°34.7'	+27.2'	81.8°	27°43.0'	+28.3'	82.3°	21
22	27°07.2'	+21.5'	78.2°	27°19.2'	+22.6'	78.7°	27°30.7'	+23.6'	79.2°	27°41.7'	+24.7'	79.7°	27°52.1'	+25.7'	80.3°	28°02.0'	+26.8'	80.8°	28°11.3'	+27.8'	81.3°	22
23	27°28.7'	+21.0'	77.2°	27°41.8'	+22.1'	77.7°	27°54.3'	+23.2'	78.2°	28°06.4'	+24.2'	78.7°	28°17.8'	+25.3'	79.2°	28°28.8'	+26.3'	79.8°	28°39.2'	+27.4'	80.3°	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

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°42.4'	+29.3'	99.2°	16°32.6'	+30.2'	99.5°	16°22.6'	+31.2'	99.8°	16°12.3'	+32.1'	100.1°	16°01.6'	+33.0'	100.3°	15°50.7'	+33.9'	100.6°	15°39.5'	+34.7'	100.9°	0
1	17°11.6'	+29.0'	98.3°	17°02.9'	+30.0'	98.6°	16°53.8'	+30.9'	98.9°	16°44.3'	+31.8'	99.2°	16°34.6'	+32.8'	99.5°	16°24.6'	+33.7'	99.8°	16°14.3'	+34.5'	100.1°	1
2	17°40.7'	+28.8'	97.4°	17°32.8'	+29.7'	97.7°	17°24.7'	+30.7'	98.0°	17°16.2'	+31.6'	98.3°	17°07.4'	+32.5'	98.6°	16°58.3'	+33.4'	98.9°	16°48.8'	+34.3'	99.2°	2
3	18°09.5'	+28.5'	96.4°	18°02.6'	+29.5'	96.8°	17°55.4'	+30.4'	97.1°	17°47.8'	+31.4'	97.4°	17°39.9'	+32.3'	97.7°	17°31.7'	+33.2'	98.0°	17°23.1'	+34.1'	98.3°	3
4	18°38.0'	+28.2'	95.5°	18°32.1'	+29.2'	95.8°	18°25.8'	+30.2'	96.2°	18°19.2'	+31.1'	96.5°	18°12.2'	+32.0'	96.8°	18°04.9'	+33.0'	97.2°	17°57.3'	+33.9'	97.5°	4
5	19°06.2'	+28.0'	94.6°	19°01.3'	+28.9'	94.9°	18°56.0'	+29.9'	95.3°	18°50.3'	+30.9'	95.6°	18°44.2'	+31.8'	95.9°	18°37.9'	+32.7'	96.3°	18°31.1'	+33.6'	96.6°	5
6	19°34.2'	+27.7'	93.6°	19°30.2'	+28.7'	94.0°	19°25.9'	+29.6'	94.3°	19°21.1'	+30.6'	94.7°	19°16.0'	+31.5'	95.0°	19°10.6'	+32.5'	95.4°	19°04.8'	+33.4'	95.7°	6
7	20°01.9'	+27.4'	92.7°	19°58.9'	+28.4'	93.1°	19°55.5'	+29.3'	93.4°	19°51.7'	+30.3'	93.8°	19°47.6'	+31.3'	94.1°	19°43.1'	+32.2'	94.5°	19°38.2'	+33.1'	94.9°	7
8	20°29.2'	+27.1'	91.7°	20°27.2'	+28.1'	92.1°	20°24.8'	+29.0'	92.5°	20°22.0'	+30.0'	92.9°	20°18.8'	+31.0'	93.2°	20°15.3'	+31.9'	93.6°	20°11.3'	+32.9'	94.0°	8
9	20°56.3'	+26.7'	90.8°	20°55.3'	+27.7'	91.2°	20°53.8'	+28.7'	91.6°	20°52.0'	+29.7'	91.9°	20°49.8'	+30.7'	92.3°	20°47.2'	+31.6'	92.7°	20°44.2'	+32.6'	93.1°	9
10	21°23.0'	+26.4'	89.8°	21°23.0'	+27.4'	90.2°	21°22.6'	+28.4'	90.6°	21°21.7'	+29.4'	91.0°	21°20.5'	+30.4'	91.4°	21°18.8'	+31.3'	91.8°	21°16.7'	+32.3'	92.2°	10
11	21°49.4'	+26.1'	88.9°	21°50.4'	+27.1'	89.3°	21°51.0'	+28.1'	89.7°	21°51.1'	+29.1'	90.1°	21°50.9'	+30.1'	90.5°	21°50.2'	+31.0'	90.9°	21°49.0'	+32.0'	91.3°	11
12	22°15.5'	+25.7'	87.9°	22°17.5'	+26.7'	88.3°	22°19.1'	+27.7'	88.7°	22°20.2'	+28.7'	89.1°	22°20.9'	+29.7'	89.5°	22°21.2'	+30.7'	89.9°	22°21.0'	+31.7'	90.4°	12
13	22°41.2'	+25.4'	86.9°	22°44.2'	+26.4'	87.3°	22°46.8'	+27.4'	87.7°	22°49.0'	+28.4'	88.2°	22°50.7'	+29.4'	88.6°	22°51.9'	+30.4'	89.0°	22°52.7'	+31.4'	89.4°	13
14	23°06.6'	+25.0'	85.9°	23°10.6'	+26.0'	86.4°	23°14.2'	+27.0'	86.8°	23°17.4'	+28.1'	87.2°	23°20.1'	+29.1'	87.6°	23°22.3'	+30.1'	88.1°	23°24.1'	+31.0'	88.5°	14
15	23°31.6'	+24.6'	84.9°	23°36.7'	+25.7'	85.4°	23°41.3'	+26.7'	85.8°	23°45.4'	+27.7'	86.2°	23°49.1'	+28.7'	86.7°	23°52.4'	+29.7'	87.1°	23°55.1'	+30.7'	87.6°	15
16	23°56.2'	+24.2'	83.9°	24°02.3'	+25.3'	84.4°	24°07.9'	+26.3'	84.8°	24°13.1'	+27.3'	85.3°	24°17.8'	+28.3'	85.7°	24°22.1'	+29.3'	86.2°	24°25.8'	+30.3'	86.6°	16
17	24°20.4'	+23.8'	82.9°	24°27.6'	+24.9'	83.4°	24°34.2'	+25.9'	83.8°	24°40.4'	+26.9'	84.3°	24°46.2'	+28.0'	84.8°	24°51.4'	+29.0'	85.2°	24°56.2'	+30.0'	85.7°	17
18	24°44.3'	+23.4'	81.9°	24°52.4'	+24.5'	82.4°	25°00.2'	+25.5'	82.9°	25°07.4'	+26.5'	83.3°	25°14.1'	+27.6'	83.8°	25°20.4'	+28.6'	84.3°	25°26.1'	+29.6'	84.7°	18
19	25°07.7'	+23.0'	80.9°	25°16.9'	+24.1'	81.4°	25°25.7'	+25.1'	81.8°	25°33.9'	+26.1'	82.3°	25°41.7'	+27.2'	82.8°	25°49.0'	+28.2'	83.3°	25°55.7'	+29.2'	83.8°	19
20	25°30.7'	+22.6'	79.9°	25°41.0'	+23.6'	80.4°	25°50.8'	+24.7'	80.8°	26°00.1'	+25.7'	81.3°	26°08.9'	+26.8'	81.8°	26°17.2'	+27.8'	82.3°	26°25.0'	+28.8'	82.8°	20
21	25°53.3'	+22.1'	78.9°	26°04.6'	+23.2'	79.3°	26°15.5'	+24.3'	79.8°	26°25.8'	+25.3'	80.3°	26°35.6'	+26.3'	80.8°	26°45.0'	+27.4'	81.3°	26°53.8'	+28.4'	81.8°	21

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

72° 288° LHA

Latitude SAME as 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°50.0'	+29.2'	98.7°	15°40.8'	+30.1'	99.0°	15°31.3'	+31.0'	99.2°	15°21.6'	+31.9'	99.5°	15°11.5'	+32.8'	99.8°	15°01.2'	+33.7'	100.0°	14°50.6'	+34.6'	100.3°	0
1	16°19.2'	+28.9'	97.8°	16°10.9'	+29.9'	98.1°	16°02.4'	+30.8'	98.3°	15°53.5'	+31.7'	98.6°	15°44.4'	+32.6'	98.9°	15°35.0'	+33.5'	99.2°	15°25.3'	+34.4'	99.5°	1
2	16°48.1'	+28.7'	96.8°	16°40.8'	+29.6'	97.1°	16°33.2'	+30.6'	97.4°	16°25.3'	+31.5'	97.7°	16°17.0'	+32.4'	98.0°	16°08.5'	+33.3'	98.3°	15°59.7'	+34.2'	98.6°	2
3	17°16.8'	+28.4'	95.9°	17°10.4'	+29.4'	96.2°	17°03.8'	+30.3'	96.5°	16°56.8'	+31.3'	96.8°	16°49.5'	+32.2'	97.2°	16°41.8'	+33.1'	97.4°	16°33.9'	+34.0'	97.7°	3
4	17°45.2'	+28.2'	95.0°	17°39.8'	+29.1'	95.3°	17°34.1'	+30.1'	95.6°	17°28.0'	+31.0'	96.0°	17°21.6'	+32.0'	96.3°	17°14.9'	+32.9'	96.6°	17°07.9'	+33.8'	96.9°	4
5	18°13.4'	+27.9'	94.1°	18°09.0'	+28.9'	94.4°	18°04.2'	+29.8'	94.7°	17°59.1'	+30.8'	95.1°	17°53.6'	+31.7'	95.4°	17°47.8'	+32.6'	95.7°	17°41.7'	+33.6'	96.0°	5
6	18°41.3'	+27.6'	93.1°	18°37.8'	+28.6'	93.5°	18°34.0'	+29.6'	93.8°	18°29.9'	+30.5'	94.2°	18°25.3'	+31.5'	94.5°	18°20.5'	+32.4'	94.8°	18°15.3'	+33.3'	95.1°	6
7	19°08.9'	+27.3'	92.2°	19°06.4'	+28.3'	92.6°	19°03.6'	+29.3'	92.9°	19°00.4'	+30.3'	93.2°	18°56.8'	+31.2'	93.6°	18°52.9'	+32.1'	93.9°	18°48.6'	+33.1'	94.3°	7
8	19°36.3'	+27.0'	91.3°	19°34.8'	+28.0'	91.6°	19°32.9'	+29.0'	92.0°	19°30.6'	+30.0'	92.3°	19°28.0'	+30.9'	92.7°	19°25.0'	+31.9'	93.0°	19°21.7'	+32.8'	93.4°	8
9	20°03.3'	+26.7'	90.3°	20°02.8'	+27.7'	90.7°	20°01.9'	+28.7'	91.0°	20°00.6'	+29.7'	91.4°	19°58.9'	+30.7'	91.8°	19°56.9'	+31.6'	92.1°	19°54.5'	+32.6'	92.5°	9
10	20°30.1'	+26.4'	89.4°	20°30.5'	+27.4'	89.7°	20°30.6'	+28.4'	90.1°	20°30.3'	+29.4'	90.5°	20°29.6'	+30.4'	90.9°	20°28.5'	+31.3'	91.2°	20°27.0'	+32.3'	91.6°	10
11	20°56.5'	+26.1'	88.4°	20°58.0'	+27.1'	88.8°	20°59.0'	+28.1'	89.2°	20°59.7'	+29.1'	89.6°	21°00.0'	+30.1'	89.9°	20°59.8'	+31.0'	90.3°	20°59.3'	+32.0'	90.7°	11
12	21°22.6'	+25.8'	87.4°	21°25.1'	+26.8'	87.8°	21°27.1'	+27.8'	88.2°	21°28.8'	+28.8'	88.6°	21°30.0'	+29.8'	89.0°	21°30.9'	+30.7'	89.4°	21°31.3'	+31.7'	89.8°	12
13	21°48.3'	+25.4'	86.5°	21°51.8'	+26.4'	86.9°	21°54.9'	+27.4'	87.3°	21°57.6'	+28.4'	87.7°	21°59.8'	+29.4'	88.1°	22°01.6'	+30.4'	88.5°	22°03.0'	+31.4'	88.9°	13
14	22°13.8'	+25.1'	85.5°	22°18.3'	+26.1'	85.9°	22°22.4'	+27.1'	86.3°	22°26.0'	+28.1'	86.7°	22°29.2'	+29.1'	87.1°	22°32.0'	+30.1'	87.5°	22°34.4'	+31.1'	88.0°	14
15	22°38.8'	+24.7'	84.5°	22°44.4'	+25.7'	84.9°	22°49.5'	+26.8'	85.3°	22°54.1'	+27.8'	85.8°	22°58.3'	+28.8'	86.2°	23°02.1'	+29.8'	86.6°	23°05.4'	+30.7'	87.0°	15
16	23°03.5'	+24.3'	83.5°	23°10.1'	+25.4'	83.9°	23°16.2'	+26.4'	84.4°	23°21.9'	+27.4'	84.8°	23°27.1'	+28.4'	85.2°	23°31.9'	+29.4'	85.7°	23°36.2'	+30.4'	86.1°	16
17	23°27.9'	+24.0'	82.5°	23°35.5'	+25.0'	83.0°	23°42.6'	+26.0'	83.4°	23°49.3'	+27.0'	83.8°	23°55.5'	+28.1'	84.3°	24°01.3'	+29.1'	84.7°	24°06.6'	+30.1'	85.2°	17
18	23°51.8'	+23.6'	81.5°	24°00.5'	+24.6'	82.0°	24°08.6'	+25.6'	82.4°	24°16.3'	+26.7'	82.8°	24°23.6'	+27.7'	83.3°	24°30.3'	+28.7'	83.7°	24°36.6'	+29.7'	84.2°	18
19	24°15.4'	+23.2'	80.5°	24°25.1'	+24.2'	81.0°	24°34.3'	+25.2'	81.4°	24°43.0'	+26.3'	81.9°	24°51.2'	+27.3'	82.3°	24°59.0'	+28.3'	82.8°	25°06.3'	+29.3'	83.2°	19
20	24°38.6'	+22.8'	79.5°	24°49.3'	+23.8'	80.0°	24°59.5'	+24.8'	80.4°	25°09.3'	+25.9'	80.9°	25°18.5'	+26.9'	81.3°	25°27.3'	+27.9'	81.8°	25°35.6'	+28.9'	82.3°	20
21	25°01.3'	+22.3'	78.5°	25°13.1'	+23.4'	78.9°	25°24.3'	+24.4'	79.4°	25°35.1'	+25.5'	79.9°	25°45.4'	+26.5'	80.3°	25°55.3'	+27.5'	80.8°	26°04.6'	+28.5'	81.3°	21
22	25°23.7'	+21.9'	77.5°	25°36.5'	+23.0'	77.9°	25°48.8'	+24.0'	78.4°	26°00.6'	+25.0'	78.9°	26°11.9'	+26.1'	79.3°	26°22.8'	+27.1'	79.8°	26°33.1'	+28.1'	80.3°	22
23	25°45.6'	+21.5'	76.4°	25°59.4'	+22.5'	76.9°	26°12.8'	+23.6'	77.4°	26°25.6'	+24.6'	77.9°	26°38.0'	+25.7'	78.3°	26°49.9'	+26.7'	78.8°	27°01.3'	+27.7'	79.3°	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

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	14°57.6'	+29.0'	98.2°	14°49.0'	+30.0'	98.4°	14°40.0'	+30.9'	98.7°	14°30.8'	+31.8'	98.9°	14°21.4'	+32.7'	99.2°	14°11.6'	+33.6'	99.5°	14°01.6'	+34.5'	99.7°	0
1	15°26.7'	+28.8'	97.3°	15°18.9'	+29.8'	97.5°	15°10.9'	+30.7'	97.8°	15°02.6'	+31.6'	98.1°	14°54.1'	+32.5'	98.3°	14°45.2'	+33.4'	98.6°	14°36.1'	+34.3'	98.9°	1
2	15°55.5'	+28.6'	96.4°	15°48.7'	+29.5'	96.6°	15°41.6'	+30.5'	96.9°	15°34.3'	+31.4'	97.2°	15°26.6'	+32.3'	97.5°	15°18.7'	+33.2'	97.7°	15°10.5'	+34.1'	98.0°	2
3	16°24.1'	+28.4'	95.4°	16°18.3'	+29.3'	95.7°	16°12.1'	+30.3'	96.0°	16°05.7'	+31.2'	96.3°	15°58.9'	+32.1'	96.6°	15°51.9'	+33.0'	96.9°	15°44.6'	+33.9'	97.2°	3
4	16°52.4'	+28.1'	94.5°	16°47.6'	+29.1'	94.8°	16°42.4'	+30.0'	95.1°	16°36.9'	+31.0'	95.4°	16°31.0'	+31.9'	95.7°	16°24.9'	+32.8'	96.0°	16°18.5'	+33.7'	96.3°	4
5	17°20.6'	+27.9'	93.6°	17°16.6'	+28.8'	93.9°	17°12.4'	+29.8'	94.2°	17°07.8'	+30.7'	94.5°	17°02.9'	+31.7'	94.8°	16°57.7'	+32.6'	95.1°	16°52.2'	+33.5'	95.4°	5
6	17°48.4'	+27.6'	92.7°	17°45.5'	+28.6'	93.0°	17°42.2'	+29.5'	93.3°	17°38.5'	+30.5'	93.6°	17°34.6'	+31.4'	93.9°	17°30.3'	+32.3'	94.3°	17°25.7'	+33.3'	94.6°	6
7	18°16.0'	+27.3'	91.7°	18°14.0'	+28.3'	92.1°	18°11.7'	+29.3'	92.4°	18°09.0'	+30.2'	92.7°	18°06.0'	+31.2'	93.0°	18°02.7'	+32.1'	93.4°	17°59.0'	+33.0'	93.7°	7
8	18°43.3'	+27.0'	90.8°	18°42.3'	+28.0'	91.1°	18°41.0'	+29.0'	91.5°	18°39.2'	+30.0'	91.8°	18°37.2'	+30.9'	92.1°	18°34.8'	+31.9'	92.5°	18°32.0'	+32.8'	92.8°	8
9	19°10.3'	+26.7'	89.8°	19°10.3'	+27.7'	90.2°	19°09.9'	+28.7'	90.5°	19°09.2'	+29.7'	90.9°	19°08.1'	+30.6'	91.2°	19°06.6'	+31.6'	91.6°	19°04.8'	+32.5'	91.9°	9
10	19°37.1'	+26.4'	88.9°	19°38.1'	+27.4'	89.3°	19°38.7'	+28.4'	89.6°	19°38.9'	+29.4'	90.0°	19°38.7'	+30.4'	90.3°	19°38.2'	+31.3'	90.7°	19°37.3'	+32.3'	91.0°	10
11	20°03.5'	+26.1'	87.9°	20°05.5'	+27.1'	88.3°	20°07.1'	+28.1'	88.7°	20°08.3'	+29.1'	89.0°	20°09.1'	+30.1'	89.4°	20°09.5'	+31.0'	89.8°	20°09.6'	+32.0'	90.1°	11
12	20°29.7'	+25.8'	87.0°	20°32.6'	+26.8'	87.4°	20°35.2'	+27.8'	87.7°	20°37.4'	+28.8'	88.1°	20°39.2'	+29.8'	88.5°	20°40.6'	+30.7'	88.9°	20°41.6'	+31.7'	89.2°	12
13	20°55.5'	+25.5'	86.0°	20°59.4'	+26.5'	86.4°	21°03.0'	+27.5'	86.8°	21°06.2'	+28.5'	87.2°	21°08.9'	+29.5'	87.6°	21°11.3'	+30.4'	87.9°	21°13.3'	+31.4'	88.3°	13
14	21°21.0'	+25.2'	85.0°	21°25.9'	+26.2'	85.4°	21°30.5'	+27.2'	85.8°	21°34.7'	+28.2'	86.2°	21°38.4'	+29.2'	86.6°	21°41.8'	+30.1'	87.0°	21°44.7'	+31.1'	87.4°	14
15	21°46.1'	+24.8'	84.1°	21°52.1'	+25.8'	84.5°	21°57.7'	+26.8'	84.9°	22°02.8'	+27.8'	85.3°	22°07.6'	+28.8'	85.7°	22°11.9'	+29.8'	86.1°	22°15.8'	+30.8'	86.5°	15
16	22°10.9'	+24.5'	83.1°	22°17.9'	+25.5'	83.5°	22°24.5'	+26.5'	83.9°	22°30.7'	+27.5'	84.3°	22°36.4'	+28.5'	84.7°	22°41.7'	+29.5'	85.1°	22°46.6'	+30.5'	85.6°	16
17	22°35.4'	+24.1'	82.1°	22°43.4'	+25.1'	82.5°	22°51.0'	+26.1'	82.9°	22°58.2'	+27.1'	83.4°	23°04.9'	+28.1'	83.8°	23°11.2'	+29.1'	84.2°	23°17.0'	+30.1'	84.6°	17
18	22°59.5'	+23.7'	81.1°	23°08.5'	+24.7'	81.5°	23°17.1'	+25.8'	82.0°	23°25.3'	+26.8'	82.4°	23°33.1'	+27.8'	82.8°	23°40.3'	+28.8'	83.2°	23°47.2'	+29.8'	83.7°	18
19	23°23.2'	+23.3'	80.1°	23°33.3'	+24.4'	80.5°	23°42.9'	+25.4'	81.0°	23°52.1'	+26.4'	81.4°	24°00.8'	+27.4'	81.8°	24°09.1'	+28.4'	82.3°	24°17.0'	+29.4'	82.7°	19
20	23°46.5'	+22.9'	79.1°	23°57.6'	+24.0'	79.5°	24°08.3'	+25.0'	80.0°	24°18.5'	+26.0'	80.4°	24°28.3'	+27.0'	80.9°	24°37.6'	+28.1'	81.3°	24°46.4'	+29.1'	81.8°	20
21	24°09.4'	+22.5'	78.1°	24°21.6'	+23.6'	78.5°	24°33.3'	+24.6'	79.0°	24°44.5'	+25.6'	79.4°	24°55.3'	+26.7'	79.9°	25°05.6'	+27.7'	80.3°	25°15.4'	+28.7'	80.8°	21
22																						

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

74° 286° LHA

Latitude SAME as Declination

74° 286° 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	14°05.1'	+28.9'	97.7°	13°57.0'	+29.9'	97.9°	13°48.6'	+30.8'	98.2°	13°40.0'	+31.7'	98.4°	13°31.1'	+32.6'	98.6°	13°22.0'	+33.5'	98.9°	13°12.6'	+34.4'	99.1°	0
1	14°34.1'	+28.7'	96.8°	14°26.9'	+29.7'	97.0°	14°19.4'	+30.6'	97.3°	14°11.7'	+31.5'	97.5°	14°03.7'	+32.4'	97.8°	13°55.5'	+33.3'	98.0°	13°47.0'	+34.2'	98.3°	1
2	15°02.8'	+28.5'	95.9°	14°56.6'	+29.5'	96.1°	14°50.0'	+30.4'	96.4°	14°43.2'	+31.3'	96.6°	14°36.1'	+32.2'	96.9°	14°28.8'	+33.1'	97.2°	14°21.2'	+34.0'	97.4°	2
3	15°31.3'	+28.3'	94.9°	15°26.0'	+29.2'	95.2°	15°20.4'	+30.2'	95.5°	15°14.5'	+31.1'	95.8°	15°08.4'	+32.0'	96.0°	15°01.9'	+32.9'	96.3°	14°55.2'	+33.8'	96.6°	3
4	15°59.6'	+28.1'	94.0°	15°55.3'	+29.0'	94.3°	15°50.6'	+30.0'	94.6°	15°45.6'	+30.9'	94.9°	15°40.4'	+31.8'	95.2°	15°34.9'	+32.7'	95.4°	15°29.0'	+33.6'	95.7°	4
5	16°27.7'	+27.8'	93.1°	16°24.3'	+28.8'	93.4°	16°20.5'	+29.7'	93.7°	16°16.5'	+30.7'	94.0°	16°12.2'	+31.6'	94.3°	16°07.6'	+32.5'	94.6°	16°02.7'	+33.4'	94.9°	5
6	16°55.5'	+27.6'	92.2°	16°53.0'	+28.5'	92.5°	16°50.3'	+29.5'	92.8°	16°47.2'	+30.4'	93.1°	16°43.8'	+31.4'	93.4°	16°40.1'	+32.3'	93.7°	16°36.1'	+33.2'	94.0°	6
7	17°23.0'	+27.3'	91.3°	17°21.6'	+28.3'	91.6°	17°19.8'	+29.2'	91.9°	17°17.6'	+30.2'	92.2°	17°15.2'	+31.1'	92.5°	17°12.4'	+32.1'	92.8°	17°09.3'	+33.0'	93.1°	7
8	17°50.3'	+27.0'	90.3°	17°49.8'	+28.0'	90.6°	17°49.0'	+29.0'	91.0°	17°47.8'	+29.9'	91.3°	17°46.3'	+30.9'	91.6°	17°44.5'	+31.8'	91.9°	17°42.3'	+32.8'	92.2°	8
9	18°17.4'	+26.8'	89.4°	18°17.8'	+27.7'	89.7°	18°18.0'	+28.7'	90.0°	18°17.8'	+29.7'	90.4°	18°17.2'	+30.6'	90.7°	18°16.3'	+31.6'	91.0°	18°15.0'	+32.5'	91.4°	9
10	18°44.1'	+26.5'	88.4°	18°45.6'	+27.5'	88.8°	18°46.7'	+28.4'	89.1°	18°47.4'	+29.4'	89.5°	18°47.8'	+30.4'	89.8°	18°47.9'	+31.3'	90.1°	18°47.6'	+32.3'	90.5°	10
11	19°10.6'	+26.2'	87.5°	19°13.0'	+27.2'	87.8°	19°15.1'	+28.2'	88.2°	19°16.9'	+29.1'	88.5°	19°18.2'	+30.1'	88.9°	19°19.2'	+31.1'	89.2°	19°19.8'	+32.0'	89.6°	11
12	19°36.8'	+25.9'	86.5°	19°40.2'	+26.9'	86.9°	19°43.3'	+27.9'	87.2°	19°46.0'	+28.8'	87.6°	19°48.3'	+29.8'	88.0°	19°50.3'	+30.8'	88.3°	19°51.8'	+31.7'	88.7°	12
13	20°02.6'	+25.6'	85.6°	20°07.1'	+26.6'	85.9°	20°11.2'	+27.6'	86.3°	20°14.8'	+28.5'	86.7°	20°18.1'	+29.5'	87.0°	20°21.0'	+30.5'	87.4°	20°23.5'	+31.4'	87.8°	13
14	20°28.2'	+25.2'	84.6°	20°33.7'	+26.2'	85.0°	20°38.7'	+27.2'	85.4°	20°43.4'	+28.2'	85.7°	20°47.6'	+29.2'	86.1°	20°51.5'	+30.2'	86.5°	20°55.0'	+31.2'	86.9°	14
15	20°53.5'	+24.9'	83.6°	21°00.0'	+25.9'	84.0°	21°06.0'	+26.9'	84.4°	21°11.6'	+27.9'	84.8°	21°16.9'	+28.9'	85.2°	21°21.7'	+29.9'	85.6°	21°26.1'	+30.9'	86.0°	15
16	21°18.4'	+24.6'	82.7°	21°25.8'	+25.6'	83.1°	21°32.9'	+26.6'	83.4°	21°39.5'	+27.6'	83.8°	21°45.8'	+28.6'	84.2°	21°51.6'	+29.6'	84.6°	21°57.0'	+30.5'	85.0°	16
17	21°42.9'	+24.2'	81.7°	21°51.4'	+25.2'	82.1°	21°59.5'	+26.3'	82.5°	22°07.1'	+27.3'	82.9°	22°14.3'	+28.3'	83.3°	22°21.2'	+29.2'	83.7°	22°27.5'	+30.2'	84.1°	17
18	22°07.2'	+23.9'	80.7°	22°16.7'	+24.9'	81.1°	22°25.7'	+25.9'	81.5°	22°34.4'	+26.9'	81.9°	22°42.6'	+27.9'	82.3°	22°50.4'	+28.9'	82.7°	22°57.8'	+29.9'	83.2°	18
19	22°31.0'	+23.5'	79.7°	22°41.5'	+24.5'	80.1°	22°51.6'	+25.5'	80.5°	23°01.3'	+26.6'	80.9°	23°10.5'	+27.6'	81.4°	23°19.3'	+28.6'	81.8°	23°27.6'	+29.5'	82.2°	19
20	22°54.5'	+23.1'	78.7°	23°06.1'	+24.2'	79.1°	23°17.2'	+25.2'	79.5°	23°27.8'	+26.2'	80.0°	23°38.1'	+27.2'	80.4°	23°47.8'	+28.2'	80.8°	23°57.2'	+29.2'	81.3°	20
21	23°17.7'	+22.7'	77.7°	23°30.2'	+23.8'	78.1°	23°42.3'	+24.8'	78.6°	23°54.0'	+25.8'	79.0°	24°05.3'	+26.8'	79.4°	24°16.0'	+27.8'	79.9°	24°26.4'	+28.8'	80.3°	21
22	23°40.4'	+22.3'	76.7°	23°54.0'	+23.4'	77.1°	24°07.1'	+24.4'	77.6°	24°19.8'	+25.4'	78.0°	24°32.1'	+26.4'	78.4°	24°43.9'	+27.4'	78.9°	24°55.2'	+28.4'	79.3°	22
23	24°02.7'	+21.9'	75.7°	24°17.4'	+23.0'	76.1°	24°31.5'	+24.0'	76.6°	24°45.3'	+25.0'	77.0°	24°58.5'	+26.0'	77.5°	25°11.3'	+27.1'	77.9°	25°23.6'	+28.1'	78.4°	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

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°12.6'	+28.8'	97.2°	13°05.0'	+29.8'	97.4°	12°57.2'	+30.7'	97.6°	12°49.1'	+31.6'	97.9°	12°40.7'	+32.5'	98.1°	12°32.2'	+33.4'	98.3°	12°23.4'	+34.3'	98.5°	0
1	13°41.4'	+28.6'	96.3°	13°34.8'	+29.6'	96.5°	13°27.8'	+30.5'	96.7°	13°20.7'	+31.4'	97.0°	13°13.3'	+32.3'	97.2°	13°05.6'	+33.2'	97.5°	12°57.7'	+34.1'	97.7°	1
2	14°10.1'	+28.4'	95.4°	14°04.4'	+29.4'	95.6°	13°58.4'	+30.3'	95.9°	13°52.1'	+31.2'	96.1°	13°45.6'	+32.1'	96.4°	13°38.8'	+33.0'	96.6°	13°31.8'	+33.9'	96.8°	2
3	14°38.5'	+28.2'	94.5°	14°33.7'	+29.2'	94.7°	14°28.7'	+30.1'	95.0°	14°23.3'	+31.0'	95.2°	14°17.7'	+32.0'	95.5°	14°11.9'	+32.9'	95.7°	14°05.7'	+33.8'	96.0°	3
4	15°06.8'	+28.0'	93.5°	15°02.9'	+29.0'	93.8°	14°58.8'	+29.9'	94.1°	14°54.4'	+30.8'	94.3°	14°49.7'	+31.8'	94.6°	14°44.7'	+32.7'	94.9°	14°39.5'	+33.6'	95.1°	4
5	15°34.8'	+27.8'	92.6°	15°31.9'	+28.7'	92.9°	15°28.7'	+29.7'	93.2°	15°25.2'	+30.6'	93.5°	15°21.5'	+31.6'	93.7°	15°17.4'	+32.5'	94.0°	15°13.1'	+33.4'	94.3°	5
6	16°02.5'	+27.5'	91.7°	16°00.6'	+28.5'	92.0°	15°58.4'	+29.5'	92.3°	15°55.8'	+30.4'	92.6°	15°53.0'	+31.3'	92.8°	15°49.9'	+32.3'	93.1°	15°46.5'	+33.2'	93.4°	6
7	16°30.1'	+27.3'	90.8°	16°29.1'	+28.3'	91.1°	16°27.8'	+29.2'	91.4°	16°26.2'	+30.2'	91.7°	16°24.3'	+31.1'	92.0°	16°22.1'	+32.0'	92.3°	16°19.6'	+33.0'	92.5°	7
8	16°57.4'	+27.0'	89.8°	16°57.4'	+28.0'	90.2°	16°57.0'	+29.0'	90.5°	16°56.4'	+29.9'	90.8°	16°55.4'	+30.9'	91.1°	16°54.2'	+31.8'	91.4°	16°52.6'	+32.7'	91.7°	8
9	17°24.4'	+26.8'	88.9°	17°25.4'	+27.8'	89.2°	17°26.0'	+28.7'	89.5°	17°26.3'	+29.7'	89.9°	17°26.3'	+30.6'	90.2°	17°26.0'	+31.6'	90.5°	17°25.3'	+32.5'	90.8°	9
10	17°51.2'	+26.5'	88.0°	17°53.1'	+27.5'	88.3°	17°54.7'	+28.5'	88.6°	17°56.0'	+29.4'	88.9°	17°57.0'	+30.4'	89.3°	17°57.6'	+31.3'	89.6°	17°57.8'	+32.3'	89.9°	10
11	18°17.7'	+26.2'	87.0°	18°20.6'	+27.2'	87.4°	18°23.2'	+28.2'	87.7°	18°25.4'	+29.2'	88.0°	18°27.3'	+30.1'	88.4°	18°28.9'	+31.1'	88.7°	18°30.1'	+32.0'	89.0°	11
12	18°43.9'	+25.9'	86.1°	18°47.8'	+26.9'	86.4°	18°51.4'	+27.9'	86.8°	18°54.6'	+28.9'	87.1°	18°57.5'	+29.9'	87.4°	19°00.0'	+30.8'	87.8°	19°02.1'	+31.8'	88.1°	12
13	19°09.8'	+25.6'	85.1°	19°14.8'	+26.6'	85.5°	19°19.3'	+27.6'	85.8°	19°23.5'	+28.6'	86.2°	19°27.3'	+29.6'	86.5°	19°30.8'	+30.5'	86.9°	19°33.8'	+31.5'	87.2°	13
14	19°35.5'	+25.3'	84.2°	19°41.4'	+26.3'	84.5°	19°46.9'	+27.3'	84.9°	19°52.1'	+28.3'	85.2°	19°56.9'	+29.3'	85.6°	20°01.3'	+30.3'	86.0°	20°05.3'	+31.2'	86.3°	14
15	20°00.8'	+25.0'	83.2°	20°07.7'	+26.0'	83.6°	20°14.3'	+27.0'	83.9°	20°20.4'	+28.0'	84.3°	20°26.2'	+29.0'	84.7°	20°31.6'	+30.0'	85.0°	20°36.5'	+30.9'	85.4°	15
16	20°25.8'	+24.7'	82.2°	20°33.8'	+25.7'	82.6°	20°41.3'	+26.7'	83.0°	20°48.4'	+27.7'	83.4°	20°55.2'	+28.7'	83.7°	21°01.5'	+29.7'	84.1°	21°07.5'	+30.6'	84.5°	16
17	20°50.5'	+24.4'	81.3°	20°59.5'	+25.4'	81.6°	21°08.0'	+26.4'	82.0°	21°16.1'	+27.4'	82.4°	21°23.8'	+28.4'	82.8°	21°31.2'	+29.3'	83.2°	21°38.1'	+30.3'	83.6°	17
18	21°14.9'	+24.0'	80.3°	21°24.8'	+25.0'	80.7°	21°34.4'	+26.0'	81.1°	21°43.5'	+27.0'	81.5°	21°52.2'	+28.0'	81.8°	22°00.5'	+29.0'	82.2°	22°08.4'	+30.0'	82.6°	18
19	21°38.9'	+23.7'	79.3°	21°49.9'	+24.7'	79.7°	22°00.4'	+25.7'	80.1°	22°10.5'	+26.7'	80.5°	22°20.2'	+27.7'	80.9°	22°29.5'	+28.7'	81.3°	22°38.4'	+29.7'	81.7°	19
20	22°02.6'	+23.3'	78.3°	22°14.6'	+24.3'	78.7°	22°26.1'	+25.3'	79.1°	22°37.2'	+26.3'	79.5°	22°47.9'	+27.3'	79.9°	22°58.2'	+28.3'	80.3°	23°08.1'	+29.3'	80.8°	20
21	22°25.9'	+22.9'	77.3°	22°38.9'	+24.0'	77.7°	22°51.4'	+25.0'	78.1°	23°03.6'	+26.0'	78.5°	23°15.3'	+27.0'	79.0°	23°26.5'	+28.0'	79.4°	23°37.4'	+29.0'	79.8°	21
22																						



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

76° 284° LHA

Latitude SAME as 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°20.0'	+28.7'	96.7°	12°12.9'	+29.7'	96.9°	12°05.6'	+30.6'	97.1°	11°58.1'	+31.5'	97.3°	11°50.3'	+32.4'	97.5°	11°42.4'	+33.3'	97.7°	11°34.2'	+34.2'	97.9°	0
1	12°48.8'	+28.6'	95.8°	12°42.6'	+29.5'	96.0°	12°36.2'	+30.4'	96.2°	12°29.6'	+31.3'	96.4°	12°22.7'	+32.2'	96.7°	12°15.7'	+33.1'	96.9°	12°08.4'	+34.0'	97.1°	1
2	13°17.3'	+28.4'	94.9°	13°12.1'	+29.3'	95.1°	13°06.6'	+30.2'	95.3°	13°00.9'	+31.2'	95.6°	12°55.0'	+32.1'	95.8°	12°48.8'	+33.0'	96.0°	12°42.4'	+33.9'	96.3°	2
3	13°45.7'	+28.2'	94.0°	13°41.4'	+29.1'	94.2°	13°36.9'	+30.1'	94.5°	13°32.1'	+31.0'	94.7°	13°27.1'	+31.9'	94.9°	13°21.8'	+32.8'	95.2°	13°16.2'	+33.7'	95.4°	3
4	14°13.9'	+28.0'	93.1°	14°10.5'	+28.9'	93.3°	14°06.9'	+29.9'	93.6°	14°03.1'	+30.8'	93.8°	13°59.0'	+31.7'	94.1°	13°54.6'	+32.6'	94.3°	13°49.9'	+33.5'	94.6°	4
5	14°41.8'	+27.7'	92.1°	14°39.4'	+28.7'	92.4°	14°36.8'	+29.6'	92.7°	14°33.9'	+30.6'	92.9°	14°30.7'	+31.5'	93.2°	14°27.2'	+32.4'	93.4°	14°23.5'	+33.3'	93.7°	5
6	15°09.6'	+27.5'	91.2°	15°08.1'	+28.5'	91.5°	15°06.4'	+29.4'	91.8°	15°04.4'	+30.4'	92.0°	15°02.2'	+31.3'	92.3°	14°59.6'	+32.2'	92.6°	14°56.8'	+33.1'	92.8°	6
7	15°37.1'	+27.3'	90.3°	15°36.6'	+28.3'	90.6°	15°35.9'	+29.2'	90.9°	15°34.8'	+30.2'	91.1°	15°33.5'	+31.1'	91.4°	15°31.8'	+32.0'	91.7°	15°29.9'	+32.9'	92.0°	7
8	16°04.4'	+27.1'	89.4°	16°04.9'	+28.0'	89.7°	16°05.1'	+29.0'	90.0°	16°05.0'	+29.9'	90.2°	16°04.6'	+30.9'	90.5°	16°03.9'	+31.8'	90.8°	16°02.9'	+32.7'	91.1°	8
9	16°31.4'	+26.8'	88.4°	16°32.9'	+27.8'	88.7°	16°34.1'	+28.7'	89.0°	16°34.9'	+29.7'	89.3°	16°35.4'	+30.6'	89.6°	16°35.7'	+31.6'	89.9°	16°35.6'	+32.5'	90.2°	9
10	16°58.2'	+26.5'	87.5°	17°00.7'	+27.5'	87.8°	17°02.8'	+28.5'	88.1°	17°04.6'	+29.5'	88.4°	17°06.1'	+30.4'	88.7°	17°07.2'	+31.3'	89.0°	17°08.1'	+32.3'	89.4°	10
11	17°24.8'	+26.3'	86.6°	17°28.2'	+27.3'	86.9°	17°31.3'	+28.2'	87.2°	17°34.1'	+29.2'	87.5°	17°36.5'	+30.2'	87.8°	17°38.6'	+31.1'	88.2°	17°40.4'	+32.0'	88.5°	11
12	17°51.1'	+26.0'	85.6°	17°55.5'	+27.0'	86.0°	17°59.5'	+28.0'	86.3°	18°03.3'	+28.9'	86.6°	18°06.6'	+29.9'	86.9°	18°09.7'	+30.8'	87.3°	18°12.4'	+31.8'	87.6°	12
13	18°17.1'	+25.7'	84.7°	18°22.5'	+26.7'	85.0°	18°27.5'	+27.7'	85.3°	18°32.2'	+28.7'	85.7°	18°36.5'	+29.6'	86.0°	18°40.5'	+30.6'	86.4°	18°44.2'	+31.5'	86.7°	13
14	18°42.8'	+25.4'	83.7°	18°49.2'	+26.4'	84.1°	18°55.2'	+27.4'	84.4°	19°00.9'	+28.4'	84.8°	19°06.2'	+29.4'	85.1°	19°11.1'	+30.3'	85.4°	19°15.7'	+31.3'	85.8°	14
15	19°08.2'	+25.1'	82.8°	19°15.6'	+26.1'	83.1°	19°22.6'	+27.1'	83.5°	19°29.3'	+28.1'	83.8°	19°35.5'	+29.1'	84.2°	19°41.4'	+30.0'	84.5°	19°47.0'	+31.0'	84.9°	15
16	19°33.4'	+24.8'	81.8°	19°41.7'	+25.8'	82.2°	19°49.7'	+26.8'	82.5°	19°57.4'	+27.8'	82.9°	20°04.6'	+28.8'	83.2°	20°11.5'	+29.7'	83.6°	20°18.0'	+30.7'	84.0°	16
17	19°58.2'	+24.5'	80.8°	20°07.6'	+25.5'	81.2°	20°16.6'	+26.5'	81.6°	20°25.2'	+27.5'	81.9°	20°33.4'	+28.5'	82.3°	20°41.2'	+29.4'	82.7°	20°48.7'	+30.4'	83.1°	17
18	20°22.7'	+24.2'	79.9°	20°33.1'	+25.2'	80.2°	20°43.1'	+26.2'	80.6°	20°52.7'	+27.2'	81.0°	21°01.9'	+28.2'	81.4°	21°10.7'	+29.1'	81.7°	21°19.1'	+30.1'	82.1°	18
19	20°46.9'	+23.9'	78.9°	20°58.3'	+24.9'	79.3°	21°09.3'	+25.9'	79.6°	21°19.8'	+26.9'	80.0°	21°30.0'	+27.8'	80.4°	21°39.8'	+28.8'	80.8°	21°49.2'	+29.8'	81.2°	19
20	21°10.8'	+23.5'	77.9°	21°23.1'	+24.5'	78.3°	21°35.1'	+25.5'	78.7°	21°46.7'	+26.5'	79.1°	21°57.9'	+27.5'	79.5°	22°08.6'	+28.5'	79.9°	22°19.0'	+29.5'	80.3°	20
21	21°34.3'	+23.2'	76.9°	21°47.7'	+24.2'	77.3°	22°00.6'	+25.2'	77.7°	22°13.2'	+26.2'	78.1°	22°25.4'	+27.2'	78.5°	22°37.1'	+28.2'	78.9°	22°48.5'	+29.1'	79.3°	21
22	21°57.4'	+22.8'	75.9°	22°11.8'	+23.8'	76.3°	22°25.8'	+24.8'	76.7°	22°39.4'	+25.8'	77.1°	22°52.5'	+26.8'	77.5°	23°05.3'	+27.8'	78.0°	23°17.6'	+28.8'	78.4°	22
23	22°20.2'	+22.4'	74.9°	22°35.6'	+23.4'	75.3°	22°50.6'	+24.5'	75.7°	23°05.2'	+25.5'	76.1°	23°19.4'	+26.5'	76.6°	23°33.1'	+27.4'	77.0°	23°46.4'	+28.4'	77.4°	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

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	11°27.4'	+28.7'	96.2°	11°20.8'	+29.6'	96.4°	11°14.0'	+30.5'	96.6°	11°07.0'	+31.4'	96.8°	10°59.9'	+32.3'	97.0°	10°52.5'	+33.2'	97.2°	10°44.9'	+34.1'	97.4°	0
1	11°56.0'	+28.5'	95.3°	11°50.4'	+29.4'	95.5°	11°44.5'	+30.3'	95.7°	11°38.5'	+31.3'	95.9°	11°32.2'	+32.2'	96.1°	11°25.7'	+33.1'	96.3°	11°19.0'	+33.9'	96.5°	1
2	12°24.5'	+28.3'	94.4°	12°19.8'	+29.2'	94.6°	12°14.9'	+30.2'	94.8°	12°09.7'	+31.1'	95.0°	12°04.3'	+32.0'	95.3°	11°58.7'	+32.9'	95.5°	11°52.9'	+33.8'	95.7°	2
3	12°52.8'	+28.1'	93.5°	12°49.1'	+29.1'	93.7°	12°45.1'	+30.0'	93.9°	12°40.8'	+30.9'	94.2°	12°36.3'	+31.8'	94.4°	12°31.6'	+32.7'	94.6°	12°26.7'	+33.6'	94.8°	3
4	13°21.0'	+27.9'	92.6°	13°18.1'	+28.9'	92.8°	13°15.1'	+29.8'	93.0°	13°11.7'	+30.7'	93.3°	13°08.2'	+31.7'	93.5°	13°04.4'	+32.6'	93.8°	13°00.3'	+33.5'	94.0°	4
5	13°48.9'	+27.7'	91.7°	13°47.0'	+28.7'	91.9°	13°44.9'	+29.6'	92.2°	13°42.5'	+30.6'	92.4°	13°39.8'	+31.5'	92.6°	13°36.9'	+32.4'	92.9°	13°33.8'	+33.3'	93.1°	5
6	14°16.6'	+27.5'	90.8°	14°15.7'	+28.5'	91.0°	14°14.5'	+29.4'	91.3°	14°13.0'	+30.4'	91.5°	14°11.3'	+31.3'	91.8°	14°09.3'	+32.2'	92.0°	14°07.1'	+33.1'	92.3°	6
7	14°44.1'	+27.3'	89.8°	14°44.2'	+28.3'	90.1°	14°43.9'	+29.2'	90.4°	14°43.4'	+30.2'	90.6°	14°42.6'	+31.1'	90.9°	14°41.5'	+32.0'	91.1°	14°40.2'	+32.9'	91.4°	7
8	15°11.4'	+27.1'	88.9°	15°12.4'	+28.0'	89.2°	15°13.1'	+29.0'	89.5°	15°13.5'	+29.9'	89.7°	15°13.7'	+30.9'	90.0°	15°13.5'	+31.8'	90.3°	15°13.1'	+32.7'	90.5°	8
9	15°38.5'	+26.8'	88.0°	15°40.4'	+27.8'	88.3°	15°42.1'	+28.8'	88.5°	15°43.5'	+29.7'	88.8°	15°44.6'	+30.7'	89.1°	15°45.3'	+31.6'	89.4°	15°45.8'	+32.5'	89.7°	9
10	16°05.3'	+26.6'	87.1°	16°08.3'	+27.6'	87.3°	16°10.9'	+28.5'	87.6°	16°13.2'	+29.5'	87.9°	16°15.2'	+30.4'	88.2°	16°16.9'	+31.4'	88.5°	16°18.3'	+32.3'	88.8°	10
11	16°31.9'	+26.3'	86.1°	16°35.8'	+27.3'	86.4°	16°39.4'	+28.3'	86.7°	16°42.7'	+29.2'	87.0°	16°45.7'	+30.2'	87.3°	16°48.3'	+31.1'	87.6°	16°50.6'	+32.1'	87.9°	11
12	16°58.3'	+26.1'	85.2°	17°03.1'	+27.1'	85.5°	17°07.7'	+28.0'	85.8°	17°11.9'	+29.0'	86.1°	17°15.8'	+30.0'	86.4°	17°19.4'	+30.9'	86.7°	17°22.7'	+31.8'	87.0°	12
13	17°24.3'	+25.8'	84.2°	17°30.2'	+26.8'	84.6°	17°35.7'	+27.8'	84.9°	17°40.9'	+28.7'	85.2°	17°45.8'	+29.7'	85.5°	17°50.3'	+30.6'	85.8°	17°54.5'	+31.6'	86.1°	13
14	17°50.2'	+25.5'	83.3°	17°57.0'	+26.5'	83.6°	18°03.5'	+27.5'	83.9°	18°09.7'	+28.5'	84.3°	18°15.5'	+29.4'	84.6°	18°21.0'	+30.4'	84.9°	18°26.1'	+31.3'	85.3°	14
15	18°15.7'	+25.3'	82.3°	18°23.5'	+26.2'	82.7°	18°31.0'	+27.2'	83.0°	18°38.2'	+28.2'	83.3°	18°44.9'	+29.2'	83.7°	18°51.4'	+30.1'	84.0°	18°57.5'	+31.1'	84.4°	15
16	18°41.0'	+25.0'	81.4°	18°49.8'	+26.0'	81.7°	18°58.2'	+26.9'	82.1°	19°06.4'	+27.9'	82.4°	19°14.1'	+28.9'	82.7°	19°21.5'	+29.8'	83.1°	19°28.5'	+30.8'	83.4°	16
17	19°05.9'	+24.7'	80.4°	19°15.7'	+25.7'	80.8°	19°25.2'	+26.6'	81.1°	19°34.3'	+27.6'	81.5°	19°43.0'	+28.6'	81.8°	19°51.3'	+29.6'	82.2°	19°59.3'	+30.5'	82.5°	17
18	19°30.6'	+24.4'	79.5°	19°41.4'	+25.4'	79.8°	19°51.8'	+26.3'	80.2°	20°01.9'	+27.3'	80.5°	20°11.6'	+28.3'	80.9°	20°20.9'	+29.3'	81.2°	20°29.8'	+30.2'	81.6°	18
19	19°55.0'	+24.0'	78.5°	20°06.8'	+25.0'	78.8°	20°18.2'	+26.0'	79.2°	20°29.2'	+27.0'	79.6°	20°39.9'	+28.0'	79.9°	20°50.2'	+29.0'	80.3°	21°00.1'	+29.9'	80.7°	19
20	20°19.0'	+23.7'	77.5°	20°31.8'	+24.7'	77.9°	20°44.2'	+25.7'	78.2°	20°56.2'	+26.7'	78.6°	21°07.9'	+27.7'	79.0°	21°19.1'	+28.6'	79.4°	21°30.0'	+29.6'	79.8°	20
21	20°42.7'	+23.4'	76.5°	20°56.5'	+24.4'	76.9°	21°09.9'	+25.4'	77.3°	21°22.9'	+26.4'	77.7°	21°35.6'	+27.3'	78.0°	21°47.8'	+28.3'	78.4°	21°59.6'	+29.3'	78.8°	21
22																						

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°34.7'	+28.6'	95.7°	10°28.6'	+29.5'	95.9°	10°22.4'	+30.4'	96.1°	10°15.9'	+31.3'	96.2°	10°09.3'	+32.2'	96.4°	10°02.5'	+33.1'	96.6°	9°55.5'	+34.0'	96.8°	0
1	11°03.3'	+28.4'	94.8°	10°58.1'	+29.4'	95.0°	10°52.8'	+30.3'	95.2°	10°47.3'	+31.2'	95.4°	10°41.6'	+32.1'	95.6°	10°35.6'	+33.0'	95.8°	10°29.5'	+33.9'	95.9°	1
2	11°31.7'	+28.3'	93.9°	11°27.5'	+29.2'	94.1°	11°23.1'	+30.1'	94.3°	11°18.5'	+31.0'	94.5°	11°13.7'	+31.9'	94.7°	11°08.6'	+32.8'	94.9°	11°03.4'	+33.7'	95.1°	2
3	12°00.0'	+28.1'	93.0°	11°56.7'	+29.0'	93.2°	11°53.2'	+30.0'	93.4°	11°49.5'	+30.9'	93.6°	11°45.6'	+31.8'	93.8°	11°41.5'	+32.7'	94.1°	11°37.1'	+33.6'	94.3°	3
4	12°28.0'	+27.9'	92.1°	12°25.7'	+28.8'	92.3°	12°23.2'	+29.8'	92.5°	12°20.4'	+30.7'	92.8°	12°17.4'	+31.6'	93.0°	12°14.2'	+32.5'	93.2°	12°10.7'	+33.4'	93.4°	4
5	12°55.9'	+27.7'	91.2°	12°54.5'	+28.7'	91.4°	12°52.9'	+29.6'	91.7°	12°51.1'	+30.5'	91.9°	12°49.0'	+31.5'	92.1°	12°46.7'	+32.4'	92.3°	12°44.1'	+33.3'	92.6°	5
6	13°23.6'	+27.5'	90.3°	13°23.2'	+28.5'	90.5°	13°22.5'	+29.4'	90.8°	13°21.6'	+30.3'	91.0°	13°20.5'	+31.3'	91.2°	13°19.0'	+32.2'	91.5°	13°17.4'	+33.1'	91.7°	6
7	13°51.1'	+27.3'	89.4°	13°51.7'	+28.3'	89.6°	13°52.0'	+29.2'	89.9°	13°52.0'	+30.2'	90.1°	13°51.7'	+31.1'	90.4°	13°51.2'	+32.0'	90.6°	13°50.5'	+32.9'	90.8°	7
8	14°18.5'	+27.1'	88.4°	14°19.9'	+28.1'	88.7°	14°21.2'	+29.0'	89.0°	14°22.1'	+30.0'	89.2°	14°22.8'	+30.9'	89.5°	14°23.2'	+31.8'	89.7°	14°23.4'	+32.7'	90.0°	8
9	14°45.5'	+26.9'	87.5°	14°48.0'	+27.8'	87.8°	14°50.2'	+28.8'	88.1°	14°52.1'	+29.7'	88.3°	14°53.7'	+30.7'	88.6°	14°55.0'	+31.6'	88.9°	14°56.1'	+32.5'	89.1°	9
10	15°12.4'	+26.6'	86.6°	15°15.8'	+27.6'	86.9°	15°19.0'	+28.6'	87.1°	15°21.8'	+29.5'	87.4°	15°24.4'	+30.5'	87.7°	15°26.6'	+31.4'	88.0°	15°28.6'	+32.3'	88.2°	10
11	15°39.1'	+26.4'	85.7°	15°43.5'	+27.4'	86.0°	15°47.5'	+28.3'	86.2°	15°51.3'	+29.3'	86.5°	15°54.8'	+30.2'	86.8°	15°58.0'	+31.2'	87.1°	16°00.9'	+32.1'	87.4°	11
12	16°05.5'	+26.2'	84.7°	16°10.8'	+27.1'	85.0°	16°15.9'	+28.1'	85.3°	16°20.6'	+29.1'	85.6°	16°25.1'	+30.0'	85.9°	16°29.2'	+31.0'	86.2°	16°33.0'	+31.9'	86.5°	12
13	16°31.7'	+25.9'	83.8°	16°38.0'	+26.9'	84.1°	16°44.0'	+27.9'	84.4°	16°49.7'	+28.8'	84.7°	16°55.1'	+29.8'	85.0°	17°00.2'	+30.7'	85.3°	17°04.9'	+31.6'	85.6°	13
14	16°57.6'	+25.7'	82.9°	17°04.9'	+26.6'	83.2°	17°11.9'	+27.6'	83.5°	17°18.5'	+28.6'	83.8°	17°24.9'	+29.5'	84.1°	17°30.9'	+30.5'	84.4°	17°36.6'	+31.4'	84.7°	14
15	17°23.2'	+25.4'	81.9°	17°31.5'	+26.4'	82.2°	17°39.5'	+27.3'	82.5°	17°47.1'	+28.3'	82.9°	17°54.4'	+29.3'	83.2°	18°01.4'	+30.2'	83.5°	18°08.0'	+31.2'	83.8°	15
16	17°48.6'	+25.1'	81.0°	17°57.9'	+26.1'	81.3°	18°06.8'	+27.1'	81.6°	18°15.4'	+28.0'	81.9°	18°23.7'	+29.0'	82.3°	18°31.6'	+30.0'	82.6°	18°39.1'	+30.9'	82.9°	16
17	18°13.7'	+24.8'	80.0°	18°24.0'	+25.8'	80.3°	18°33.9'	+26.8'	80.7°	18°43.4'	+27.8'	81.0°	18°52.7'	+28.7'	81.3°	19°01.5'	+29.7'	81.7°	19°10.0'	+30.6'	82.0°	17
18	18°38.6'	+24.5'	79.0°	18°49.8'	+25.5'	79.4°	19°00.7'	+26.5'	79.7°	19°11.2'	+27.5'	80.1°	19°21.4'	+28.4'	80.4°	19°31.2'	+29.4'	80.8°	19°40.7'	+30.4'	81.1°	18
19	19°03.1'	+24.2'	78.1°	19°15.3'	+25.2'	78.4°	19°27.2'	+26.2'	78.8°	19°38.7'	+27.2'	79.1°	19°49.8'	+28.1'	79.5°	20°00.6'	+29.1'	79.8°	20°11.0'	+30.1'	80.2°	19
20	19°27.3'	+23.9'	77.1°	19°40.5'	+24.9'	77.5°	19°53.4'	+25.9'	77.8°	20°05.9'	+26.9'	78.2°	20°18.0'	+27.8'	78.5°	20°29.7'	+28.8'	78.9°	20°41.1'	+29.8'	79.3°	20
21	19°51.2'	+23.6'	76.1°	20°05.4'	+24.6'	76.5°	20°19.3'	+25.6'	76.9°	20°32.7'	+26.6'	77.2°	20°45.8'	+27.5'	77.6°	20°58.5'	+28.5'	78.0°	21°10.9'	+29.5'	78.3°	21
22	20°14.8'	+23.3'	75.2°	20°30.0'	+24.3'	75.5°	20°44.8'	+25.3'	75.9°	20°59.3'	+26.2'	76.3°	21°13.4'	+27.2'	76.6°	21°27.0'	+28.2'	77.0°	21°40.3'	+29.1'	77.4°	22
23	20°38.1'	+23.0'	74.2°	20°54.3'	+23.9'	74.5°	21°10.1'	+24.9'	74.9°	21°25.5'	+25.9'	75.3°	21°40.6'	+26.9'	75.7°	21°55.2'	+27.9'	76.1°	22°09.5'	+28.8'	76.5°	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°41.9'	+28.5'	95.2°	9°36.4'	+29.4'	95.4°	9°30.7'	+30.4'	95.6°	9°24.8'	+31.3'	95.7°	9°18.7'	+32.2'	95.9°	9°12.5'	+33.0'	96.0°	9°06.1'	+33.9'	96.2°	0
1	10°10.5'	+28.4'	94.3°	10°05.8'	+29.3'	94.5°	10°01.0'	+30.2'	94.7°	9°56.1'	+31.1'	94.9°	9°50.9'	+32.0'	95.0°	9°45.5'	+32.9'	95.2°	9°40.0'	+33.8'	95.4°	1
2	10°38.8'	+28.2'	93.4°	10°35.1'	+29.1'	93.6°	10°31.3'	+30.1'	93.8°	10°27.2'	+31.0'	94.0°	10°22.9'	+31.9'	94.2°	10°18.5'	+32.8'	94.3°	10°13.8'	+33.7'	94.5°	2
3	11°07.0'	+28.0'	92.5°	11°04.3'	+29.0'	92.7°	11°01.3'	+29.9'	92.9°	10°58.2'	+30.8'	93.1°	10°54.8'	+31.7'	93.3°	10°51.3'	+32.6'	93.5°	10°47.5'	+33.5'	93.7°	3
4	11°35.1'	+27.9'	91.6°	11°33.3'	+28.8'	91.8°	11°31.2'	+29.8'	92.0°	11°29.0'	+30.7'	92.2°	11°26.6'	+31.6'	92.4°	11°23.9'	+32.5'	92.6°	11°21.0'	+33.4'	92.8°	4
5	12°02.9'	+27.7'	90.7°	12°02.1'	+28.6'	90.9°	12°01.0'	+29.6'	91.1°	11°59.7'	+30.5'	91.4°	11°58.1'	+31.4'	91.6°	11°56.4'	+32.3'	91.8°	11°54.4'	+33.2'	92.0°	5
6	12°30.7'	+27.5'	89.8°	12°30.7'	+28.5'	90.0°	12°30.6'	+29.4'	90.3°	12°30.2'	+30.3'	90.5°	12°29.6'	+31.3'	90.7°	12°28.7'	+32.2'	90.9°	12°27.7'	+33.1'	91.1°	6
7	12°58.2'	+27.3'	88.9°	12°59.2'	+28.3'	89.1°	13°00.0'	+29.2'	89.4°	13°00.5'	+30.2'	89.6°	13°00.8'	+31.1'	89.8°	13°00.9'	+32.0'	90.1°	13°00.7'	+32.9'	90.3°	7
8	13°25.5'	+27.1'	88.0°	13°27.5'	+28.1'	88.2°	13°29.2'	+29.0'	88.5°	13°30.7'	+30.0'	88.7°	13°31.9'	+30.9'	88.9°	13°32.9'	+31.8'	89.2°	13°33.6'	+32.7'	89.4°	8
9	13°52.6'	+26.9'	87.1°	13°55.6'	+27.9'	87.3°	13°58.3'	+28.8'	87.6°	14°00.7'	+29.8'	87.8°	14°02.8'	+30.7'	88.1°	14°04.7'	+31.6'	88.3°	14°06.4'	+32.5'	88.6°	9
10	14°19.6'	+26.6'	86.1°	14°23.5'	+27.7'	86.4°	14°27.1'	+28.6'	86.7°	14°30.4'	+29.6'	86.9°	14°33.5'	+30.5'	87.2°	14°36.4'	+31.4'	87.4°	14°38.9'	+32.4'	87.7°	10
11	14°46.3'	+26.5'	85.2°	14°51.1'	+27.5'	85.5°	14°55.7'	+28.4'	85.8°	15°00.0'	+29.4'	86.0°	15°04.0'	+30.3'	86.3°	15°07.8'	+31.2'	86.6°	15°11.3'	+32.1'	86.8°	11
12	15°12.8'	+26.3'	84.3°	15°18.6'	+27.2'	84.6°	15°24.1'	+28.2'	84.8°	15°29.4'	+29.1'	85.1°	15°34.3'	+30.1'	85.4°	15°39.0'	+31.0'	85.7°	15°43.4'	+31.9'	85.9°	12
13	15°39.0'	+26.0'	83.4°	15°45.8'	+27.0'	83.6°	15°52.3'	+28.0'	83.9°	15°58.5'	+28.9'	84.2°	16°04.4'	+29.9'	84.5°	16°10.0'	+30.8'	84.8°	16°15.3'	+31.7'	85.1°	13
14	16°05.0'	+25.8'	82.4°	16°12.8'	+26.7'	82.7°	16°20.3'	+27.7'	83.0°	16°27.4'	+28.7'	83.3°	16°34.3'	+29.6'	83.6°	16°40.8'	+30.6'	83.9°	16°47.1'	+31.5'	84.2°	14
15	16°30.8'	+25.5'	81.5°	16°39.5'	+26.5'	81.8°	16°48.0'	+27.5'	82.1°	16°56.1'	+28.4'	82.4°	17°03.9'	+29.4'	82.7°	17°11.4'	+30.3'	83.0°	17°18.5'	+31.3'	83.3°	15
16	16°56.3'	+25.3'	80.5°	17°06.0'	+26.2'	80.8°	17°15.4'	+27.2'	81.1°	17°24.5'	+28.2'	81.5°	17°33.3'	+29.1'	81.8°	17°41.7'	+30.1'	82.1°	17°49.8'	+31.0'	82.4°	16
17	17°21.6'	+25.0'	79.6°	17°32.3'	+26.0'	79.9°	17°42.6'	+26.9'	80.2°	17°52.7'	+27.9'	80.5°	18°02.4'	+28.9'	80.8°	18°11.8'	+29.8'	81.2°	18°20.8'	+30.8'	81.5°	17
18	17°46.6'	+24.7'	78.6°	17°58.2'	+25.7'	79.0°	18°09.6'	+26.7'	79.3°	18°20.6'	+27.6'	79.6°	18°31.3'	+28.6'	79.9°	18°41.6'	+29.5'	80.3°	18°51.6'	+30.5'	80.6°	18
19	18°11.3'	+24.4'	77.7°	18°23.9'	+25.4'	78.0°	18°36.2'	+26.4'	78.3°	18°48.2'	+27.3'	78.7°	18°59.8'	+28.3'	79.0°	19°11.1'	+29.3'	79.3°	19°22.0'	+30.2'	79.7°	19
20	18°35.7'	+24.1'	76.7°	18°49.3'	+25.1'	77.0°	19°02.6'	+26.1'	77.4°	19°15.6'	+27.1'	77.7°	19°28.2'	+28.0'	78.1°	19°40.4'	+29.0'	78.4°	19°52.3'	+29.9'	78.8°	20
21	18°59.9'	+23.8'	75.7°	19°14.5'	+24.8'	76.1°	19°28.7'	+25.8'	76.4°	19°42.6'	+26.8'	76.8°	19°56.2'	+27.7'	77.1°	20°09.4'	+28.7'	77.5°	20°22.2'	+29.6'	77.8°	21
22	19°23.7'																					

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

80° 280° LHA

Latitude SAME as Declination

80° 280° 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	8°49.2'	+28.4'	94.7°	8°44.1'	+29.4'	94.9°	8°38.9'	+30.3'	95.0°	8°33.6'	+31.2'	95.2°	8°28.1'	+32.1'	95.3°	8°22.4'	+33.0'	95.5°	8°16.6'	+33.9'	95.6°	0
1	9°17.6'	+28.3'	93.8°	9°13.5'	+29.2'	94.0°	9°09.2'	+30.2'	94.2°	9°04.8'	+31.1'	94.3°	9°00.2'	+32.0'	94.5°	8°55.4'	+32.9'	94.6°	8°50.5'	+33.7'	94.8°	1
2	9°45.9'	+28.2'	92.9°	9°42.7'	+29.1'	93.1°	9°39.4'	+30.0'	93.3°	9°35.9'	+30.9'	93.5°	9°32.2'	+31.8'	93.6°	9°28.3'	+32.7'	93.8°	9°24.2'	+33.6'	94.0°	2
3	10°14.1'	+28.0'	92.0°	10°11.8'	+29.0'	92.2°	10°09.4'	+29.9'	92.4°	10°06.8'	+30.8'	92.6°	10°04.0'	+31.7'	92.8°	10°01.0'	+32.6'	92.9°	9°57.8'	+33.5'	93.1°	3
4	10°42.1'	+27.9'	91.2°	10°40.8'	+28.8'	91.3°	10°39.3'	+29.7'	91.5°	10°37.6'	+30.7'	91.7°	10°35.7'	+31.6'	91.9°	10°33.6'	+32.5'	92.1°	10°31.3'	+33.4'	92.3°	4
5	11°10.0'	+27.7'	90.2°	11°09.6'	+28.6'	90.4°	11°09.0'	+29.6'	90.6°	11°08.3'	+30.5'	90.8°	11°07.3'	+31.4'	91.0°	11°06.1'	+32.3'	91.2°	11°04.7'	+33.2'	91.4°	5
6	11°37.7'	+27.5'	89.3°	11°38.3'	+28.5'	89.5°	11°38.6'	+29.4'	89.8°	11°38.8'	+30.3'	90.0°	11°38.7'	+31.3'	90.2°	11°38.4'	+32.2'	90.4°	11°37.9'	+33.1'	90.6°	6
7	12°05.2'	+27.4'	88.4°	12°06.7'	+28.3'	88.7°	12°08.0'	+29.2'	88.9°	12°09.1'	+30.2'	89.1°	12°10.0'	+31.1'	89.3°	12°10.6'	+32.0'	89.5°	12°11.0'	+32.9'	89.7°	7
8	12°32.6'	+27.2'	87.5°	12°35.0'	+28.1'	87.7°	12°37.3'	+29.1'	88.0°	12°39.3'	+30.0'	88.2°	12°41.1'	+30.9'	88.4°	12°42.6'	+31.8'	88.6°	12°43.9'	+32.7'	88.9°	8
9	12°59.7'	+27.0'	86.6°	13°03.2'	+27.9'	86.8°	13°06.3'	+28.9'	87.1°	13°09.3'	+29.8'	87.3°	13°12.0'	+30.7'	87.5°	13°14.4'	+31.7'	87.8°	13°16.6'	+32.6'	88.0°	9
10	13°26.7'	+26.8'	85.7°	13°31.1'	+27.7'	85.9°	13°35.2'	+28.7'	86.2°	13°39.1'	+29.6'	86.4°	13°42.7'	+30.6'	86.7°	13°46.1'	+31.5'	86.9°	13°49.2'	+32.4'	87.1°	10
11	13°53.5'	+26.6'	84.8°	13°58.8'	+27.5'	85.0°	14°03.9'	+28.5'	85.3°	14°08.7'	+29.4'	85.5°	14°13.3'	+30.4'	85.8°	14°17.6'	+31.3'	86.0°	14°21.6'	+32.2'	86.3°	11
12	14°20.1'	+26.4'	83.8°	14°26.4'	+27.3'	84.1°	14°32.4'	+28.3'	84.4°	14°38.2'	+29.2'	84.6°	14°43.6'	+30.2'	84.9°	14°48.9'	+31.1'	85.1°	14°53.8'	+32.0'	85.4°	12
13	14°46.4'	+26.1'	82.9°	14°53.7'	+27.1'	83.2°	15°00.7'	+28.1'	83.4°	15°07.4'	+29.0'	83.7°	15°13.8'	+29.9'	84.0°	15°19.9'	+30.9'	84.3°	15°25.8'	+31.8'	84.5°	13
14	15°12.5'	+25.9'	82.0°	15°20.8'	+26.9'	82.3°	15°28.7'	+27.8'	82.5°	15°36.4'	+28.8'	82.8°	15°43.7'	+29.7'	83.1°	15°50.8'	+30.7'	83.4°	15°57.6'	+31.6'	83.6°	14
15	15°38.4'	+25.7'	81.1°	15°47.6'	+26.6'	81.3°	15°56.5'	+27.6'	81.6°	16°05.1'	+28.5'	81.9°	16°13.5'	+29.5'	82.2°	16°21.5'	+30.4'	82.5°	16°29.2'	+31.4'	82.8°	15
16	16°04.1'	+25.4'	80.1°	16°14.3'	+26.4'	80.4°	16°24.1'	+27.3'	80.7°	16°33.7'	+28.3'	81.0°	16°42.9'	+29.2'	81.3°	16°51.9'	+30.2'	81.6°	17°00.5'	+31.1'	81.9°	16
17	16°29.5'	+25.2'	79.2°	16°40.7'	+26.1'	79.5°	16°51.5'	+27.1'	79.8°	17°02.0'	+28.1'	80.1°	17°12.2'	+29.0'	80.4°	17°22.1'	+29.9'	80.7°	17°31.6'	+30.9'	81.0°	17
18	16°54.7'	+24.9'	78.2°	17°06.8'	+25.9'	78.5°	17°18.6'	+26.8'	78.8°	17°30.0'	+27.8'	79.1°	17°41.2'	+28.7'	79.4°	17°52.0'	+29.7'	79.8°	18°02.5'	+30.6'	80.1°	18
19	17°19.6'	+24.6'	77.3°	17°32.6'	+25.6'	77.6°	17°45.4'	+26.6'	77.9°	17°57.8'	+27.5'	78.2°	18°09.9'	+28.5'	78.5°	18°21.7'	+29.4'	78.8°	18°33.1'	+30.4'	79.2°	19
20	17°44.2'	+24.3'	76.3°	17°58.2'	+25.3'	76.6°	18°12.0'	+26.3'	76.9°	18°25.4'	+27.2'	77.3°	18°38.4'	+28.2'	77.6°	18°51.1'	+29.2'	77.9°	19°03.5'	+30.1'	78.3°	20
21	18°08.6'	+24.1'	75.4°	18°23.6'	+25.0'	75.7°	18°38.2'	+26.0'	76.0°	18°52.6'	+27.0'	76.3°	19°06.6'	+27.9'	76.7°	19°20.3'	+28.9'	77.0°	19°33.6'	+29.8'	77.3°	21
22	18°32.6'	+23.8'	74.4°	18°48.6'	+24.7'	74.7°	19°04.2'	+25.7'	75.0°	19°19.6'	+26.7'	75.4°	19°34.5'	+27.6'	75.7°	19°49.2'	+28.6'	76.1°	20°03.4'	+29.5'	76.4°	22
23	18°56.4'	+23.5'	73.4°	19°13.3'	+24.4'	73.7°	19°30.0'	+25.4'	74.1°	19°46.2'	+26.4'	74.4°	20°02.2'	+27.3'	74.8°	20°17.7'	+28.3'	75.1°	20°32.9'	+29.2'	75.5°	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

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°56.4'	+28.4'	94.3°	7°51.8'	+29.3'	94.4°	7°47.2'	+30.2'	94.5°	7°42.4'	+31.1'	94.7°	7°37.4'	+32.0'	94.8°	7°32.3'	+32.9'	94.9°	7°27.1'	+33.8'	95.1°	0
1	8°24.7'	+28.3'	93.4°	8°21.1'	+29.2'	93.5°	8°17.4'	+30.1'	93.7°	8°13.5'	+31.0'	93.8°	8°09.4'	+31.9'	93.9°	8°05.2'	+32.8'	94.1°	8°00.9'	+33.7'	94.2°	1
2	8°53.0'	+28.1'	92.5°	8°50.3'	+29.1'	92.6°	8°47.5'	+30.0'	92.8°	8°44.5'	+30.9'	92.9°	8°41.4'	+31.8'	93.1°	8°38.0'	+32.7'	93.2°	8°34.6'	+33.6'	93.4°	2
3	9°21.1'	+28.0'	91.6°	9°19.4'	+28.9'	91.7°	9°17.5'	+29.9'	91.9°	9°15.4'	+30.8'	92.1°	9°13.2'	+31.7'	92.2°	9°10.7'	+32.6'	92.4°	9°08.2'	+33.5'	92.6°	3
4	9°49.1'	+27.9'	90.7°	9°48.3'	+28.8'	90.9°	9°47.4'	+29.7'	91.0°	9°46.2'	+30.6'	91.2°	9°44.8'	+31.6'	91.4°	9°43.3'	+32.5'	91.5°	9°41.6'	+33.3'	91.7°	4
5	10°17.0'	+27.7'	89.8°	10°17.1'	+28.6'	90.0°	10°17.1'	+29.6'	90.1°	10°16.8'	+30.5'	90.3°	10°16.4'	+31.4'	90.5°	10°15.8'	+32.3'	90.7°	10°15.0'	+33.2'	90.9°	5
6	10°44.7'	+27.6'	88.9°	10°45.8'	+28.5'	89.1°	10°46.7'	+29.4'	89.3°	10°47.3'	+30.4'	89.4°	10°47.8'	+31.3'	89.6°	10°48.1'	+32.2'	89.8°	10°48.2'	+33.1'	90.0°	6
7	11°12.3'	+27.4'	88.0°	11°14.3'	+28.3'	88.2°	11°16.1'	+29.3'	88.4°	11°17.7'	+30.2'	88.6°	11°19.1'	+31.1'	88.8°	11°20.3'	+32.0'	89.0°	11°21.2'	+32.9'	89.2°	7
8	11°39.6'	+27.2'	87.1°	11°42.6'	+28.2'	87.3°	11°45.4'	+29.1'	87.5°	11°47.9'	+30.0'	87.7°	11°50.2'	+31.0'	87.9°	11°52.3'	+31.9'	88.1°	11°54.2'	+32.8'	88.3°	8
9	12°06.9'	+27.0'	86.2°	12°10.8'	+28.0'	86.4°	12°14.5'	+28.9'	86.6°	12°17.9'	+29.9'	86.8°	12°21.2'	+30.8'	87.0°	12°24.2'	+31.7'	87.2°	12°26.9'	+32.6'	87.5°	9
10	12°33.9'	+26.9'	85.2°	12°38.8'	+27.8'	85.5°	12°43.4'	+28.7'	85.7°	12°47.8'	+29.7'	85.9°	12°51.9'	+30.6'	86.1°	12°55.9'	+31.5'	86.4°	12°59.5'	+32.4'	86.6°	10
11	13°00.8'	+26.7'	84.3°	13°06.6'	+27.6'	84.6°	13°12.1'	+28.6'	84.8°	13°17.5'	+29.5'	85.0°	13°22.6'	+30.4'	85.3°	13°27.4'	+31.3'	85.5°	13°32.0'	+32.3'	85.7°	11
12	13°27.4'	+26.5'	83.4°	13°34.2'	+27.4'	83.6°	13°40.7'	+28.4'	83.9°	13°47.0'	+29.3'	84.1°	13°53.0'	+30.2'	84.4°	13°58.7'	+31.2'	84.6°	14°04.2'	+32.1'	84.9°	12
13	13°53.9'	+26.2'	82.5°	14°01.6'	+27.2'	82.7°	14°09.1'	+28.2'	83.0°	14°16.3'	+29.1'	83.2°	14°23.2'	+30.0'	83.5°	14°29.9'	+31.0'	83.7°	14°36.3'	+31.9'	84.0°	13
14	14°20.1'	+26.0'	81.6°	14°28.8'	+27.0'	81.8°	14°37.2'	+27.9'	82.1°	14°45.4'	+28.9'	82.3°	14°53.3'	+29.8'	82.6°	15°00.9'	+30.8'	82.8°	15°08.2'	+31.7'	83.1°	14
15	14°46.1'	+25.8'	80.6°	14°55.8'	+26.8'	80.9°	15°05.2'	+27.7'	81.1°	15°14.3'	+28.7'	81.4°	15°23.1'	+29.6'	81.7°	15°31.6'	+30.5'	82.0°	15°39.9'	+31.5'	82.2°	15
16	15°12.0'	+25.6'	79.7°	15°22.6'	+26.5'	80.0°	15°32.9'	+27.5'	80.2°	15°42.9'	+28.4'	80.5°	15°52.7'	+29.4'	80.8°	16°02.1'	+30.3'	81.1°	16°11.3'	+31.2'	81.4°	16
17	15°37.5'	+25.3'	78.7°	15°49.1'	+26.3'	79.0°	16°00.4'	+27.3'	79.3°	16°11.4'	+28.2'	79.6°	16°22.1'	+29.1'	79.9°	16°32.5'	+30.1'	80.2°	16°42.6'	+31.0'	80.5°	17
18	16°02.9'	+25.1'	77.8°	16°15.4'	+26.0'	78.1°	16°27.6'	+27.0'	78.4°	16°39.6'	+28.0'	78.7°	16°51.2'	+28.9'	79.0°	17°02.5'	+29.8'	79.3°	17°13.6'	+30.8'	79.6°	18
19	16°27.9'	+24.8'	76.9°	16°41.4'	+25.8'	77.1°	16°54.6'	+26.8'	77.4°	17°07.5'	+27.7'	77.7°	17°20.1'	+28.7'	78.0°	17°32.4'	+29.6'	78.4°	17°44.3'	+30.5'	78.7°	19
20	16°52.8'	+24.6'	75.9°	17°07.2'	+25.5'	76.2°	17°21.4'	+26.5'	76.5°	17°35.2'	+27.4'	76.8°	17°48.8'	+28.4'	77.1°	18°02.0'	+29.3'	77.4°	18°14.9'	+30.3'	77.8°	20
21	17°17.3'	+24.3'	75.0°	17°32.8'	+25.3'	75.3°	17°47.9'	+26.2'	75.6°	18°02.7'	+27.2'	75.9°	18°17.2'	+28.1'	76.2°	18°31.3'	+29.1'	76.5°	18°45.1'	+30.0'	76.8°	21
22	17°41.6'	+24.0'	74.0°	17°58.0'	+25.0'	74.3																

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

82° 278° LHA

Latitude SAME as 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°03.5'	+28.3'	93.8°	6°59.5'	+29.3'	93.9°	6°55.4'	+30.2'	94.0°	6°51.1'	+31.1'	94.1°	6°46.7'	+32.0'	94.3°	6°42.2'	+32.9'	94.4°	6°37.5'	+33.7'	94.5°	0
1	7°31.8'	+28.2'	92.9°	7°28.8'	+29.2'	93.0°	7°25.5'	+30.1'	93.1°	7°22.2'	+31.0'	93.3°	7°18.7'	+31.9'	93.4°	7°15.0'	+32.8'	93.5°	7°11.3'	+33.6'	93.7°	1
2	8°00.1'	+28.1'	92.0°	7°57.9'	+29.0'	92.1°	7°55.6'	+30.0'	92.3°	7°53.1'	+30.9'	92.4°	7°50.5'	+31.8'	92.6°	7°47.8'	+32.7'	92.7°	7°44.9'	+33.5'	92.8°	2
3	8°28.2'	+28.0'	91.1°	8°26.9'	+28.9'	91.3°	8°25.6'	+29.8'	91.4°	8°24.0'	+30.8'	91.5°	8°22.3'	+31.7'	91.7°	8°20.5'	+32.6'	91.8°	8°18.5'	+33.4'	92.0°	3
4	8°56.2'	+27.9'	90.2°	8°55.9'	+28.8'	90.4°	8°55.4'	+29.7'	90.5°	8°54.8'	+30.6'	90.7°	8°54.0'	+31.5'	90.8°	8°53.0'	+32.4'	91.0°	8°51.9'	+33.3'	91.1°	4
5	9°24.0'	+27.7'	89.3°	9°24.7'	+28.7'	89.5°	9°25.1'	+29.6'	89.6°	9°25.4'	+30.5'	89.8°	9°25.5'	+31.4'	90.0°	9°25.5'	+32.3'	90.1°	9°25.2'	+33.2'	90.3°	5
6	9°51.7'	+27.6'	88.4°	9°53.3'	+28.5'	88.6°	9°54.7'	+29.4'	88.8°	9°55.9'	+30.4'	88.9°	9°56.9'	+31.3'	89.1°	9°57.8'	+32.2'	89.3°	9°58.4'	+33.1'	89.5°	6
7	10°19.3'	+27.4'	87.5°	10°21.8'	+28.4'	87.7°	10°24.2'	+29.3'	87.9°	10°26.3'	+30.2'	88.1°	10°28.2'	+31.1'	88.2°	10°30.0'	+32.0'	88.4°	10°31.5'	+32.9'	88.6°	7
8	10°46.8'	+27.3'	86.6°	10°50.2'	+28.2'	86.8°	10°53.5'	+29.1'	87.0°	10°56.5'	+30.1'	87.2°	10°59.4'	+31.0'	87.4°	11°02.0'	+31.9'	87.6°	11°04.5'	+32.8'	87.8°	8
9	11°14.0'	+27.1'	85.7°	11°18.4'	+28.1'	85.9°	11°22.6'	+29.0'	86.1°	11°26.6'	+29.9'	86.3°	11°30.4'	+30.8'	86.5°	11°33.9'	+31.7'	86.7°	11°37.3'	+32.6'	86.9°	9
10	11°41.1'	+26.9'	84.8°	11°46.5'	+27.9'	85.0°	11°51.6'	+28.8'	85.2°	11°56.5'	+29.8'	85.4°	12°01.2'	+30.7'	85.6°	12°05.7'	+31.6'	85.8°	12°09.9'	+32.5'	86.1°	10
11	12°08.1'	+26.8'	83.9°	12°14.4'	+27.7'	84.1°	12°20.4'	+28.6'	84.3°	12°26.3'	+29.6'	84.5°	12°31.9'	+30.5'	84.7°	12°37.2'	+31.4'	85.0°	12°42.4'	+32.3'	85.2°	11
12	12°34.8'	+26.6'	83.0°	12°42.1'	+27.5'	83.2°	12°49.1'	+28.5'	83.4°	12°55.8'	+29.4'	83.6°	13°02.4'	+30.3'	83.9°	13°08.7'	+31.2'	84.1°	13°14.7'	+32.1'	84.3°	12
13	13°01.4'	+26.4'	82.0°	13°09.6'	+27.3'	82.3°	13°17.5'	+28.3'	82.5°	13°25.2'	+29.2'	82.7°	13°32.7'	+30.1'	83.0°	13°39.9'	+31.1'	83.2°	13°46.9'	+32.0'	83.5°	13
14	13°27.7'	+26.2'	81.1°	13°36.9'	+27.1'	81.4°	13°45.8'	+28.1'	81.6°	13°54.4'	+29.0'	81.8°	14°02.8'	+29.9'	82.1°	14°11.0'	+30.9'	82.3°	14°18.8'	+31.8'	82.6°	14
15	13°53.9'	+26.0'	80.2°	14°04.0'	+26.9'	80.4°	14°13.9'	+27.9'	80.7°	14°23.4'	+28.8'	80.9°	14°32.8'	+29.7'	81.2°	14°41.8'	+30.7'	81.4°	14°50.6'	+31.6'	81.7°	15
16	14°19.9'	+25.7'	79.3°	14°30.9'	+26.7'	79.5°	14°41.7'	+27.6'	79.8°	14°52.2'	+28.6'	80.0°	15°02.5'	+29.5'	80.3°	15°12.5'	+30.4'	80.6°	15°22.2'	+31.4'	80.8°	16
17	14°45.6'	+25.5'	78.3°	14°57.6'	+26.5'	78.6°	15°09.4'	+27.4'	78.8°	15°20.8'	+28.4'	79.1°	15°32.0'	+29.3'	79.4°	15°42.9'	+30.2'	79.7°	15°53.5'	+31.1'	79.9°	17
18	15°11.1'	+25.3'	77.4°	15°24.1'	+26.2'	77.7°	15°36.8'	+27.2'	77.9°	15°49.2'	+28.1'	78.2°	16°01.3'	+29.1'	78.5°	16°13.1'	+30.0'	78.8°	16°24.7'	+30.9'	79.1°	18
19	15°36.4'	+25.0'	76.4°	15°50.3'	+26.0'	76.7°	16°04.0'	+26.9'	77.0°	16°17.3'	+27.9'	77.3°	16°30.4'	+28.8'	77.6°	16°43.1'	+29.8'	77.9°	16°55.6'	+30.7'	78.2°	19
20	16°01.4'	+24.8'	75.5°	16°16.3'	+25.7'	75.8°	16°30.9'	+26.7'	76.1°	16°45.2'	+27.6'	76.4°	16°59.2'	+28.6'	76.7°	17°12.9'	+29.5'	77.0°	17°26.3'	+30.4'	77.3°	20
21	16°26.2'	+24.5'	74.6°	16°42.1'	+25.5'	74.8°	16°57.6'	+26.4'	75.1°	17°12.9'	+27.4'	75.4°	17°27.8'	+28.3'	75.7°	17°42.4'	+29.3'	76.0°	17°56.7'	+30.2'	76.4°	21
22	16°50.8'	+24.3'	73.6°	17°07.6'	+25.2'	73.9°	17°24.0'	+26.2'	74.2°	17°40.2'	+27.1'	74.5°	17°56.1'	+28.1'	74.8°	18°11.7'	+29.0'	75.1°	18°26.9'	+29.9'	75.4°	22
23	17°15.0'	+24.0'	72.6°	17°32.8'	+25.0'	72.9°	17°50.2'	+25.9'	73.3°	18°07.4'	+26.8'	73.6°	18°24.2'	+27.8'	73.9°	18°40.7'	+28.7'	74.2°	18°56.9'	+29.7'	74.5°	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

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	6°10.6'	+28.3'	93.3°	6°07.1'	+29.2'	93.4°	6°03.5'	+30.1'	93.5°	5°59.8'	+31.0'	93.6°	5°55.9'	+31.9'	93.7°	5°52.0'	+32.8'	93.8°	5°47.9'	+33.7'	93.9°	0
1	6°38.9'	+28.2'	92.4°	6°36.3'	+29.1'	92.5°	6°33.6'	+30.0'	92.6°	6°30.8'	+30.9'	92.8°	6°27.9'	+31.8'	92.9°	6°24.8'	+32.7'	93.0°	6°21.6'	+33.6'	93.1°	1
2	7°07.1'	+28.1'	91.5°	7°05.5'	+29.0'	91.6°	7°03.7'	+29.9'	91.8°	7°01.7'	+30.8'	91.9°	6°59.7'	+31.7'	92.0°	6°57.5'	+32.6'	92.1°	6°55.2'	+33.5'	92.3°	2
3	7°35.2'	+28.0'	90.6°	7°34.5'	+28.9'	90.8°	7°33.6'	+29.8'	90.9°	7°32.6'	+30.7'	91.0°	7°31.4'	+31.6'	91.2°	7°30.2'	+32.5'	91.3°	7°28.7'	+33.4'	91.4°	3
4	8°03.2'	+27.9'	89.7°	8°03.4'	+28.8'	89.9°	8°03.4'	+29.7'	90.0°	8°03.3'	+30.6'	90.2°	8°03.1'	+31.5'	90.3°	8°02.7'	+32.4'	90.4°	8°02.2'	+33.3'	90.6°	4
5	8°31.1'	+27.7'	88.8°	8°32.2'	+28.7'	89.0°	8°33.2'	+29.6'	89.1°	8°34.0'	+30.5'	89.3°	8°34.6'	+31.4'	89.4°	8°35.1'	+32.3'	89.6°	8°35.5'	+33.2'	89.7°	5
6	8°58.8'	+27.6'	87.9°	9°00.9'	+28.5'	88.1°	9°02.8'	+29.5'	88.3°	9°04.5'	+30.4'	88.4°	9°06.1'	+31.3'	88.6°	9°07.5'	+32.2'	88.7°	9°08.7'	+33.1'	88.9°	6
7	9°26.4'	+27.5'	87.0°	9°29.4'	+28.4'	87.2°	9°32.2'	+29.3'	87.4°	9°34.9'	+30.3'	87.5°	9°37.4'	+31.2'	87.7°	9°39.7'	+32.1'	87.9°	9°41.8'	+33.0'	88.1°	7
8	9°53.9'	+27.3'	86.1°	9°57.8'	+28.3'	86.3°	10°01.6'	+29.2'	86.5°	10°05.2'	+30.1'	86.7°	10°08.5'	+31.0'	86.9°	10°11.7'	+31.9'	87.0°	10°14.8'	+32.8'	87.2°	8
9	10°21.2'	+27.2'	85.2°	10°26.1'	+28.1'	85.4°	10°30.8'	+29.1'	85.6°	10°35.3'	+30.0'	85.8°	10°39.6'	+30.9'	86.0°	10°43.7'	+31.8'	86.2°	10°47.6'	+32.7'	86.4°	9
10	10°48.4'	+27.0'	84.3°	10°54.2'	+28.0'	84.5°	10°59.8'	+28.9'	84.7°	11°05.3'	+29.8'	84.9°	11°10.5'	+30.7'	85.1°	11°15.5'	+31.6'	85.3°	11°20.3'	+32.6'	85.5°	10
11	11°15.4'	+26.9'	83.4°	11°22.2'	+27.8'	83.6°	11°28.7'	+28.7'	83.8°	11°35.1'	+29.7'	84.0°	11°41.2'	+30.6'	84.2°	11°47.1'	+31.5'	84.4°	11°52.9'	+32.4'	84.6°	11
12	11°42.3'	+26.7'	82.5°	11°50.0'	+27.6'	82.7°	11°57.5'	+28.6'	82.9°	12°04.7'	+29.5'	83.1°	12°11.8'	+30.4'	83.4°	12°18.6'	+31.3'	83.6°	12°25.2'	+32.2'	83.8°	12
13	12°08.9'	+26.5'	81.6°	12°17.6'	+27.4'	81.8°	12°26.0'	+28.4'	82.0°	12°34.2'	+29.3'	82.2°	12°42.2'	+30.2'	82.5°	12°50.0'	+31.2'	82.7°	12°57.5'	+32.1'	82.9°	13
14	12°35.4'	+26.3'	80.7°	12°45.0'	+27.3'	80.9°	12°54.4'	+28.2'	81.1°	13°03.6'	+29.1'	81.4°	13°12.5'	+30.1'	81.6°	13°21.1'	+31.0'	81.8°	13°29.5'	+31.9'	82.1°	14
15	13°01.7'	+26.1'	79.8°	13°12.3'	+27.1'	80.0°	13°22.6'	+28.0'	80.2°	13°32.7'	+28.9'	80.5°	13°42.5'	+29.9'	80.7°	13°52.1'	+30.8'	80.9°	14°01.4'	+31.7'	81.2°	15
16	13°27.9'	+25.9'	78.8°	13°39.4'	+26.9'	79.1°	13°50.6'	+27.8'	79.3°	14°01.6'	+28.7'	79.6°	14°12.4'	+29.7'	79.8°	14°22.9'	+30.6'	80.1°	14°33.1'	+31.5'	80.3°	16
17	13°53.8'	+25.7'	77.9°	14°06.2'	+26.6'	78.1°	14°18.4'	+27.6'	78.4°	14°30.4'	+28.5'	78.6°	14°42.0'	+29.5'	78.9°	14°53.5'	+30.4'	79.2°	15°04.6'	+31.3'	79.4°	17
18	14°19.5'	+25.5'	77.0°	14°32.9'	+26.4'	77.2°	14°46.0'	+27.4'	77.5°	14°58.9'	+28.3'	77.7°	15°11.5'	+29.2'	78.0°	15°23.8'	+30.2'	78.3°	15°35.9'	+31.1'	78.5°	18
19	14°44.9'	+25.3'	76.0°	14°59.3'	+26.2'	76.3°	15°13.4'	+27.1'	76.6°	15°27.2'	+28.1'	76.8°	15°40.7'	+29.0'	77.1°	15°54.0'	+29.9'	77.4°	16°07.0'	+30.9'	77.7°	19
20	15°10.2'	+25.0'	75.1°	15°25.5'	+26.0'	75.4°	15°40.5'	+26.9'	75.6°	15°55.3'	+27.8'	75.9°	16°09.7'	+28.8'	76.2°	16°23.9'	+29.7'	76.5°	16°37.8'	+30.6'	76.8°	20
21	15°35.2'	+24.8'	74.2°	15°51.5'	+25.7'	74.4°	16°07.4'	+26.7'	74.7°	16°23.1'	+27.6'	75.0°	16°38.5'	+28.5'	75.3°	16°53.6'	+29.5'	75.6°	17°08.4'	+30.4'	75.9°	21
22	16°00.0'	+24.5'	73.2°	16°17.2'	+25.5'	73.5°	16°34.1'	+26.4'	73.8°	16°50.7'	+2											

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

84° 276° LHA

Latitude SAME as Declination

84° 276° 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	5°17.7'	+28.3'	92.8°	5°14.7'	+29.2'	92.9°	5°11.6'	+30.1'	93.0°	5°08.4'	+31.0'	93.1°	5°05.1'	+31.9'	93.2°	5°01.8'	+32.8'	93.3°	4°58.3'	+33.6'	93.4°	0
1	5°46.0'	+28.2'	91.9°	5°43.9'	+29.1'	92.0°	5°41.7'	+30.0'	92.1°	5°39.4'	+30.9'	92.2°	5°37.0'	+31.8'	92.3°	5°34.5'	+32.7'	92.4°	5°31.9'	+33.6'	92.5°	1
2	6°14.2'	+28.1'	91.1°	6°13.0'	+29.0'	91.2°	6°11.7'	+29.9'	91.3°	6°10.3'	+30.8'	91.4°	6°08.8'	+31.7'	91.5°	6°07.2'	+32.6'	91.6°	6°05.5'	+33.5'	91.7°	2
3	6°42.2'	+28.0'	90.2°	6°42.0'	+28.9'	90.3°	6°41.6'	+29.8'	90.4°	6°41.2'	+30.7'	90.5°	6°40.6'	+31.6'	90.6°	6°39.8'	+32.5'	90.7°	6°39.0'	+33.4'	90.9°	3
4	7°10.2'	+27.9'	89.3°	7°10.9'	+28.8'	89.4°	7°11.5'	+29.7'	89.5°	7°11.9'	+30.6'	89.6°	7°12.2'	+31.5'	89.8°	7°12.4'	+32.4'	89.9°	7°12.4'	+33.3'	90.0°	4
5	7°38.1'	+27.8'	88.4°	7°39.7'	+28.7'	88.5°	7°41.2'	+29.6'	88.6°	7°42.6'	+30.5'	88.8°	7°43.8'	+31.4'	88.9°	7°44.8'	+32.3'	89.1°	7°45.7'	+33.2'	89.2°	5
6	8°05.9'	+27.7'	87.5°	8°08.4'	+28.6'	87.6°	8°10.8'	+29.5'	87.8°	8°13.1'	+30.4'	87.9°	8°15.2'	+31.3'	88.1°	8°17.2'	+32.2'	88.2°	8°19.0'	+33.1'	88.3°	6
7	8°33.5'	+27.5'	86.6°	8°37.0'	+28.5'	86.7°	8°40.3'	+29.4'	86.9°	8°43.5'	+30.3'	87.0°	8°46.5'	+31.2'	87.2°	8°49.4'	+32.1'	87.3°	8°52.1'	+33.0'	87.5°	7
8	9°01.0'	+27.4'	85.7°	9°05.5'	+28.3'	85.8°	9°09.7'	+29.3'	86.0°	9°13.8'	+30.2'	86.2°	9°17.8'	+31.1'	86.3°	9°21.5'	+32.0'	86.5°	9°25.1'	+32.9'	86.7°	8
9	9°28.4'	+27.3'	84.8°	9°33.8'	+28.2'	85.0°	9°39.0'	+29.1'	85.1°	9°44.0'	+30.0'	85.3°	9°48.8'	+31.0'	85.5°	9°53.5'	+31.9'	85.6°	9°58.0'	+32.8'	85.8°	9
10	9°55.7'	+27.1'	83.9°	10°02.0'	+28.1'	84.1°	10°08.1'	+29.0'	84.2°	10°14.1'	+29.9'	84.4°	10°19.8'	+30.8'	84.6°	10°25.4'	+31.7'	84.8°	10°30.7'	+32.6'	85.0°	10
11	10°22.8'	+27.0'	83.0°	10°30.0'	+27.9'	83.2°	10°37.1'	+28.8'	83.3°	10°44.0'	+29.8'	83.5°	10°50.6'	+30.7'	83.7°	10°57.1'	+31.6'	83.9°	11°03.3'	+32.5'	84.1°	11
12	10°49.8'	+26.8'	82.1°	10°57.9'	+27.7'	82.3°	11°05.9'	+28.7'	82.4°	11°13.7'	+29.6'	82.6°	11°21.3'	+30.5'	82.8°	11°28.7'	+31.4'	83.0°	11°35.8'	+32.3'	83.2°	12
13	11°16.6'	+26.6'	81.2°	11°25.7'	+27.6'	81.4°	11°34.6'	+28.5'	81.6°	11°43.3'	+29.4'	81.8°	11°51.8'	+30.4'	82.0°	12°00.1'	+31.3'	82.2°	12°08.1'	+32.2'	82.4°	13
14	11°43.2'	+26.5'	80.2°	11°53.3'	+27.4'	80.4°	12°03.1'	+28.3'	80.7°	12°12.7'	+29.3'	80.9°	12°22.2'	+30.2'	81.1°	12°31.3'	+31.1'	81.3°	12°40.3'	+32.0'	81.5°	14
15	12°09.6'	+26.3'	79.3°	12°20.7'	+27.2'	79.5°	12°31.4'	+28.2'	79.8°	12°42.0'	+29.1'	80.0°	12°52.3'	+30.0'	80.2°	13°02.4'	+30.9'	80.4°	13°12.3'	+31.8'	80.7°	15
16	12°35.9'	+26.1'	78.4°	12°47.9'	+27.0'	78.6°	12°59.6'	+28.0'	78.8°	13°11.1'	+28.9'	79.1°	13°22.3'	+29.8'	79.3°	13°33.3'	+30.7'	79.5°	13°44.1'	+31.6'	79.8°	16
17	13°02.0'	+25.9'	77.5°	13°14.9'	+26.8'	77.7°	13°27.6'	+27.8'	77.9°	13°40.0'	+28.7'	78.2°	13°52.1'	+29.6'	78.4°	14°04.1'	+30.5'	78.7°	14°15.7'	+31.4'	78.9°	17
18	13°27.9'	+25.7'	76.6°	13°41.7'	+26.6'	76.8°	13°55.3'	+27.6'	77.0°	14°08.7'	+28.5'	77.3°	14°21.8'	+29.4'	77.5°	14°34.6'	+30.3'	77.8°	14°47.2'	+31.2'	78.0°	18
19	13°53.6'	+25.5'	75.6°	14°08.4'	+26.4'	75.9°	14°22.9'	+27.4'	76.1°	14°37.2'	+28.3'	76.4°	14°51.2'	+29.2'	76.6°	15°04.9'	+30.1'	76.9°	15°18.4'	+31.0'	77.1°	19
20	14°19.1'	+25.3'	74.7°	14°34.8'	+26.2'	74.9°	14°50.2'	+27.1'	75.2°	15°05.4'	+28.1'	75.4°	15°20.4'	+29.0'	75.7°	15°35.1'	+29.9'	76.0°	15°49.5'	+30.8'	76.3°	20
21	14°44.3'	+25.0'	73.8°	15°01.0'	+26.0'	74.0°	15°17.4'	+26.9'	74.3°	15°33.5'	+27.8'	74.5°	15°49.4'	+28.8'	74.8°	16°05.0'	+29.7'	75.1°	16°20.3'	+30.6'	75.4°	21
22	15°09.3'	+24.8'	72.8°	15°26.9'	+25.7'	73.1°	15°44.3'	+26.7'	73.3°	16°01.3'	+27.6'	73.6°	16°18.1'	+28.5'	73.9°	16°34.6'	+29.4'	74.2°	16°50.8'	+30.3'	74.5°	22
23	15°34.1'	+24.5'	71.9°	15°52.7'	+25.5'	72.1°	16°10.9'	+26.4'	72.4°	16°28.9'	+27.4'	72.7°	16°46.6'	+28.3'	73.0°	17°04.1'	+29.2'	73.3°	17°21.2'	+30.1'	73.6°	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

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	4°24.8'	+28.2'	92.4°	4°22.3'	+29.1'	92.4°	4°19.7'	+30.1'	92.5°	4°17.1'	+31.0'	92.6°	4°14.3'	+31.9'	92.7°	4°11.5'	+32.7'	92.7°	4°08.6'	+33.6'	92.8°	0
1	4°53.0'	+28.1'	91.5°	4°51.4'	+29.1'	91.6°	4°49.8'	+30.0'	91.6°	4°48.0'	+30.9'	91.7°	4°46.2'	+31.8'	91.8°	4°44.2'	+32.7'	91.9°	4°42.2'	+33.6'	92.0°	1
2	5°21.2'	+28.1'	90.6°	5°20.5'	+29.0'	90.7°	5°19.8'	+29.9'	90.8°	5°18.9'	+30.8'	90.9°	5°18.0'	+31.7'	91.0°	5°16.9'	+32.6'	91.0°	5°15.8'	+33.5'	91.1°	2
3	5°49.3'	+28.0'	89.7°	5°49.5'	+28.9'	89.8°	5°49.7'	+29.8'	89.9°	5°49.7'	+30.7'	90.0°	5°49.7'	+31.6'	90.1°	5°49.5'	+32.5'	90.2°	5°49.3'	+33.4'	90.3°	3
4	6°17.2'	+27.9'	88.8°	6°18.4'	+28.8'	88.9°	6°19.5'	+29.7'	89.0°	6°20.5'	+30.6'	89.1°	6°21.3'	+31.5'	89.2°	6°22.1'	+32.4'	89.4°	6°22.7'	+33.3'	89.5°	4
5	6°45.1'	+27.8'	87.9°	6°47.3'	+28.7'	88.0°	6°49.3'	+29.6'	88.1°	6°51.1'	+30.5'	88.3°	6°52.9'	+31.4'	88.4°	6°54.5'	+32.3'	88.5°	6°56.0'	+33.2'	88.6°	5
6	7°12.9'	+27.7'	87.0°	7°16.0'	+28.6'	87.1°	7°18.9'	+29.5'	87.3°	7°21.7'	+30.4'	87.4°	7°24.4'	+31.3'	87.5°	7°26.9'	+32.2'	87.7°	7°29.3'	+33.1'	87.8°	6
7	7°40.6'	+27.6'	86.1°	7°44.6'	+28.5'	86.3°	7°48.5'	+29.4'	86.4°	7°52.2'	+30.3'	86.5°	7°55.7'	+31.2'	86.7°	7°59.1'	+32.1'	86.8°	8°02.4'	+33.0'	87.0°	7
8	8°08.2'	+27.5'	85.2°	8°13.1'	+28.4'	85.4°	8°17.9'	+29.3'	85.5°	8°22.5'	+30.2'	85.7°	8°27.0'	+31.1'	85.8°	8°31.3'	+32.0'	86.0°	8°35.4'	+32.9'	86.1°	8
9	8°35.7'	+27.3'	84.3°	8°41.5'	+28.3'	84.5°	8°47.2'	+29.2'	84.6°	8°52.8'	+30.1'	84.8°	8°58.1'	+31.0'	84.9°	9°03.3'	+31.9'	85.1°	9°08.4'	+32.8'	85.3°	9
10	9°03.0'	+27.2'	83.4°	9°09.8'	+28.1'	83.6°	9°16.4'	+29.1'	83.7°	9°22.9'	+30.0'	83.9°	9°29.2'	+30.9'	84.1°	9°35.3'	+31.8'	84.2°	9°41.2'	+32.7'	84.4°	10
11	9°30.3'	+27.1'	82.5°	9°38.0'	+28.0'	82.7°	9°45.5'	+28.9'	82.9°	9°52.9'	+29.9'	83.0°	10°00.1'	+30.8'	83.2°	10°07.1'	+31.7'	83.4°	10°13.9'	+32.6'	83.6°	11
12	9°57.3'	+26.9'	81.6°	10°06.0'	+27.9'	81.8°	10°14.4'	+28.8'	82.0°	10°22.7'	+29.7'	82.2°	10°30.8'	+30.6'	82.3°	10°38.7'	+31.5'	82.5°	10°46.5'	+32.4'	82.7°	12
13	10°24.2'	+26.8'	80.7°	10°33.8'	+27.7'	80.9°	10°43.2'	+28.6'	81.1°	10°52.4'	+29.6'	81.3°	11°01.5'	+30.5'	81.5°	11°10.3'	+31.4'	81.7°	11°18.9'	+32.3'	81.9°	13
14	10°51.0'	+26.6'	79.8°	11°01.5'	+27.5'	80.0°	11°11.9'	+28.5'	80.2°	11°22.0'	+29.4'	80.4°	11°31.9'	+30.3'	80.6°	11°41.6'	+31.2'	80.8°	11°51.1'	+32.1'	81.0°	14
15	11°17.6'	+26.4'	78.9°	11°29.1'	+27.4'	79.1°	11°40.3'	+28.3'	79.3°	11°51.4'	+29.2'	79.5°	12°02.2'	+30.1'	79.7°	12°12.9'	+31.1'	79.9°	12°23.3'	+31.9'	80.1°	15
16	11°44.1'	+26.3'	78.0°	11°56.5'	+27.2'	78.2°	12°08.7'	+28.1'	78.4°	12°20.6'	+29.1'	78.6°	12°32.4'	+30.0'	78.8°	12°43.9'	+30.9'	79.0°	12°55.2'	+31.8'	79.3°	16
17	12°10.3'	+26.1'	77.1°	12°23.7'	+27.0'	77.3°	12°36.8'	+27.9'	77.5°	12°49.7'	+28.9'	77.7°	13°02.3'	+29.8'	77.9°	13°14.8'	+30.7'	78.2°	13°27.0'	+31.6'	78.4°	17
18	12°36.4'	+25.9'	76.1°	12°50.7'	+26.8'	76.3°	13°04.7'	+27.8'	76.6°	13°18.6'	+28.7'	76.8°	13°32.1'	+29.6'	77.0°	13°45.5'	+30.5'	77.3°	13°58.6'	+31.4'	77.5°	18
19	13°02.3'	+25.7'	75.2°	13°17.5'	+26.6'	75.4°	13°32.5'	+27.6'	75.7°	13°47.2'	+28.5'	75.9°	14°01.7'	+29.4'	76.1°	14°16.0'	+30.3'	76.4°	14°30.0'	+31.2'	76.6°	19
20	13°28.0'	+25.5'	74.3°	13°44.1'	+26.4'	74.5°	14°00.1'	+27.4'	74.7°	14°15.7'	+28.3'	75.0°	14°31.1'	+29.2'	75.2°	14°46.3'	+30.1'	75.5°	15°01.2'	+31.0'	75.7°	20
21	13°53.5'	+25.3'	73.3°	14°10.6'	+26.2'	73.6°	14°27.4'	+27.1'	73.8°	14°44.0'	+28.1'	74.1°	15°00.3'	+29.0'	74.3°	15°16.4'	+29.9'	74.6°	15°32.2'	+30.8'	74.9°	21
22	14°18.8'	+25.1'	72.4°	14°36.8'	+26.0'	72.7°	14°54.5'	+26.9'	72.9°	15°12.1'	+27.8'	73.2°	15°29.3'	+28.8'	73.4°							

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

86° 274° LHA

Latitude SAME as Declination

86° 274° 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	3°31.9'+28.2'	91.9°		3°29.9'+29.1'	91.9°		3°27.8'+30.0'	92.0°		3°25.7'+30.9'	92.1°		3°23.5'+31.8'	92.1°		3°21.2'+32.7'	92.2°		3°18.9'+33.6'	92.2°	0	
1	4°00.1'+28.1'	91.0°		3°59.0'+29.1'	91.1°		3°57.8'+30.0'	91.1°		3°56.6'+30.9'	91.2°		3°55.3'+31.8'	91.3°		3°53.9'+32.7'	91.3°		3°52.5'+33.5'	91.4°	1	
2	4°28.2'+28.1'	90.1°		4°28.0'+29.0'	90.2°		4°27.8'+29.9'	90.3°		4°27.5'+30.8'	90.3°		4°27.1'+31.7'	90.4°		4°26.6'+32.6'	90.5°		4°26.0'+33.5'	90.6°	2	
3	4°56.3'+28.0'	89.2°		4°57.0'+28.9'	89.3°		4°57.7'+29.8'	89.4°		4°58.3'+30.8'	89.5°		4°58.8'+31.7'	89.6°		4°59.2'+32.5'	89.7°		4°59.5'+33.4'	89.7°	3	
4	5°24.3'+27.9'	88.3°		5°26.0'+28.9'	88.4°		5°27.6'+29.8'	88.5°		5°29.1'+30.7'	88.6°		5°30.5'+31.6'	88.7°		5°31.7'+32.5'	88.8°		5°32.9'+33.3'	88.9°	4	
5	5°52.2'+27.8'	87.4°		5°54.8'+28.8'	87.5°		5°57.3'+29.7'	87.7°		5°59.7'+30.6'	87.8°		6°02.0'+31.5'	87.9°		6°04.2'+32.4'	88.0°		6°06.3'+33.3'	88.1°	5	
6	6°20.1'+27.8'	86.6°		6°23.6'+28.7'	86.7°		6°27.0'+29.6'	86.8°		6°30.3'+30.5'	86.9°		6°33.5'+31.4'	87.0°		6°36.6'+32.3'	87.1°		6°39.6'+33.2'	87.2°	6	
7	6°47.8'+27.7'	85.7°		6°52.3'+28.6'	85.8°		6°56.6'+29.5'	85.9°		7°00.8'+30.4'	86.0°		7°04.9'+31.3'	86.1°		7°08.9'+32.2'	86.3°		7°12.7'+33.1'	86.4°	7	
8	7°15.5'+27.5'	84.8°		7°20.9'+28.5'	84.9°		7°26.1'+29.4'	85.0°		7°31.3'+30.3'	85.2°		7°36.3'+31.2'	85.3°		7°41.1'+32.1'	85.4°		7°45.8'+33.0'	85.6°	8	
9	7°43.0'+27.4'	83.9°		7°49.3'+28.4'	84.0°		7°55.5'+29.3'	84.1°		8°01.6'+30.2'	84.3°		8°07.5'+31.1'	84.4°		8°13.2'+32.0'	84.6°		8°18.8'+32.9'	84.7°	9	
10	8°10.4'+27.3'	83.0°		8°17.7'+28.2'	83.1°		8°24.8'+29.2'	83.3°		8°31.8'+30.1'	83.4°		8°38.6'+31.0'	83.6°		8°45.2'+31.9'	83.7°		8°51.7'+32.8'	83.9°	10	
11	8°37.8'+27.2'	82.1°		8°45.9'+28.1'	82.2°		8°54.0'+29.0'	82.4°		9°01.9'+30.0'	82.5°		9°09.6'+30.9'	82.7°		9°17.1'+31.8'	82.9°		9°24.5'+32.7'	83.0°	11	
12	9°04.9'+27.1'	81.2°		9°14.1'+28.0'	81.3°		9°23.0'+28.9'	81.5°		9°31.8'+29.8'	81.7°		9°40.4'+30.7'	81.8°		9°48.9'+31.6'	82.0°		9°57.1'+32.5'	82.2°	12	
13	9°32.0'+26.9'	80.3°		9°42.1'+27.8'	80.4°		9°51.9'+28.8'	80.6°		10°01.6'+29.7'	80.8°		10°11.2'+30.6'	81.0°		10°20.5'+31.5'	81.1°		10°29.7'+32.4'	81.3°	13	
14	9°58.9'+26.8'	79.4°		10°09.9'+27.7'	79.5°		10°20.7'+28.6'	79.7°		10°31.3'+29.5'	79.9°		10°41.8'+30.4'	80.1°		10°52.0'+31.3'	80.3°		11°02.0'+32.2'	80.5°	14	
15	10°25.7'+26.6'	78.5°		10°37.6'+27.5'	78.6°		10°49.3'+28.5'	78.8°		11°00.9'+29.4'	79.0°		11°12.2'+30.3'	79.2°		11°23.4'+31.2'	79.4°		11°34.3'+32.1'	79.6°	15	
16	10°52.3'+26.5'	77.5°		11°05.1'+27.4'	77.7°		11°17.8'+28.3'	77.9°		11°30.3'+29.2'	78.1°		11°42.5'+30.1'	78.3°		11°54.5'+31.0'	78.5°		12°06.4'+31.9'	78.7°	16	
17	11°18.8'+26.3'	76.6°		11°32.5'+27.2'	76.8°		11°46.1'+28.1'	77.0°		11°59.5'+29.1'	77.2°		12°12.6'+30.0'	77.4°		12°25.6'+30.9'	77.7°		12°38.3'+31.8'	77.9°	17	
18	11°45.0'+26.1'	75.7°		11°59.7'+27.0'	75.9°		12°14.2'+28.0'	76.1°		12°28.5'+28.9'	76.3°		12°42.6'+29.8'	76.5°		12°56.4'+30.7'	76.8°		13°10.1'+31.6'	77.0°	18	
19	12°11.1'+25.9'	74.8°		12°26.8'+26.9'	75.0°		12°42.2'+27.8'	75.2°		12°57.4'+28.7'	75.4°		13°12.4'+29.6'	75.7°		13°27.1'+30.5'	75.9°		13°41.6'+31.4'	76.1°	19	
20	12°37.1'+25.7'	73.9°		12°53.6'+26.7'	74.1°		13°10.0'+27.6'	74.3°		13°26.1'+28.5'	74.5°		13°42.0'+29.4'	74.8°		13°57.6'+30.3'	75.0°		14°13.0'+31.2'	75.2°	20	
21	13°02.8'+25.5'	72.9°		13°20.3'+26.5'	73.2°		13°37.6'+27.4'	73.4°		13°54.6'+28.3'	73.6°		14°11.4'+29.2'	73.9°		14°27.9'+30.1'	74.1°		14°44.2'+31.0'	74.4°	21	
22	13°28.3'+25.3'	72.0°		13°46.8'+26.3'	72.2°		14°04.9'+27.2'	72.5°		14°22.9'+28.1'	72.7°		14°40.6'+29.0'	73.0°		14°58.0'+29.9'	73.2°		15°15.2'+30.8'	73.5°	22	
23	13°53.7'+25.1'	71.1°		14°13.0'+26.0'	71.3°		14°32.1'+27.0'	71.6°		14°51.0'+27.9'	71.8°		15°09.6'+28.8'	72.1°		15°27.9'+29.7'	72.3°		15°46.0'+30.6'	72.6°	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			Dec°

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

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°38.9'+28.2'	91.4°		2°37.4'+29.1'	91.5°		2°35.9'+30.0'	91.5°		2°34.3'+30.9'	91.5°		2°32.6'+31.8'	91.6°		2°30.9'+32.7'	91.6°		2°29.2'+33.6'	91.7°	0	
1	3°07.1'+28.1'	90.5°		3°06.5'+29.1'	90.6°		3°05.9'+30.0'	90.6°		3°05.2'+30.9'	90.7°		3°04.4'+31.8'	90.7°		3°03.6'+32.7'	90.8°		3°02.8'+33.5'	90.8°	1	
2	3°35.2'+28.1'	89.6°		3°35.6'+29.0'	89.7°		3°35.8'+29.9'	89.8°		3°36.1'+30.8'	89.8°		3°36.2'+31.7'	89.9°		3°36.3'+32.6'	90.0°		3°36.3'+33.5'	90.0°	2	
3	4°03.3'+28.0'	88.8°		4°04.6'+28.9'	88.8°		4°05.8'+29.9'	88.9°		4°06.9'+30.8'	89.0°		4°07.9'+31.7'	89.0°		4°08.9'+32.6'	89.1°		4°09.8'+33.4'	89.2°	3	
4	4°31.3'+28.0'	87.9°		4°33.5'+28.9'	87.9°		4°35.6'+29.8'	88.0°		4°37.7'+30.7'	88.1°		4°39.6'+31.6'	88.2°		4°41.4'+32.5'	88.3°		4°43.2'+33.4'	88.4°	4	
5	4°59.3'+27.9'	87.0°		5°02.4'+28.8'	87.1°		5°05.4'+29.7'	87.2°		5°08.4'+30.6'	87.2°		5°11.2'+31.5'	87.3°		5°13.9'+32.4'	87.4°		5°16.6'+33.3'	87.5°	5	
6	5°27.2'+27.8'	86.1°		5°31.2'+28.7'	86.2°		5°35.2'+29.7'	86.3°		5°39.0'+30.6'	86.4°		5°42.7'+31.5'	86.5°		5°46.4'+32.3'	86.6°		5°49.9'+33.2'	86.7°	6	
7	5°55.0'+27.7'	85.2°		6°00.0'+28.7'	85.3°		6°04.8'+29.6'	85.4°		6°09.6'+30.5'	85.5°		6°14.2'+31.4'	85.6°		6°18.7'+32.3'	85.7°		6°23.1'+33.1'	85.8°	7	
8	6°22.7'+27.6'	84.3°		6°28.6'+28.6'	84.4°		6°34.4'+29.5'	84.5°		6°40.0'+30.4'	84.7°		6°45.6'+31.3'	84.8°		6°51.0'+32.2'	84.9°		6°56.3'+33.1'	85.0°	8	
9	6°50.3'+27.5'	83.4°		6°57.2'+28.5'	83.5°		7°03.9'+29.4'	83.7°		7°10.4'+30.3'	83.8°		7°16.9'+31.2'	83.9°		7°23.2'+32.1'	84.0°		7°29.3'+33.0'	84.2°	9	
10	7°17.9'+27.4'	82.5°		7°25.6'+28.4'	82.6°		7°33.2'+29.3'	82.8°		7°40.7'+30.2'	82.9°		7°48.0'+31.1'	83.0°		7°55.2'+32.0'	83.2°		8°02.3'+32.9'	83.3°	10	
11	7°45.3'+27.3'	81.6°		7°54.0'+28.2'	81.8°		8°02.5'+29.2'	81.9°		8°10.9'+30.1'	82.0°		8°19.1'+31.0'	82.2°		8°27.2'+31.9'	82.3°		8°35.1'+32.7'	82.5°	11	
12	8°12.6'+27.2'	80.7°		8°22.2'+28.1'	80.9°		8°31.7'+29.0'	81.0°		8°41.0'+30.0'	81.2°		8°50.1'+30.9'	81.3°		8°59.1'+31.7'	81.5°		9°07.9'+32.6'	81.6°	12	
13	8°39.8'+27.1'	79.8°		8°50.3'+28.0'	80.0°		9°00.7'+28.9'	80.1°		9°10.9'+29.8'	80.3°		9°21.0'+30.7'	80.4°		9°30.8'+31.6'	80.6°		9°40.5'+32.5'	80.8°	13	
14	9°06.9'+26.9'	78.9°		9°18.3'+27.9'	79.1°		9°29.6'+28.8'	79.2°		9°40.7'+29.7'	79.4°		9°51.7'+30.6'	79.6°		10°02.4'+31.5'	79.7°		10°13.0'+32.4'	79.9°	14	
15	9°33.8'+26.8'	78.0°		9°46.2'+27.7'	78.2°		9°58.4'+28.6'	78.4°		10°10.4'+29.5'	78.5°		10°22.3'+30.4'	78.7°		10°33.9'+31.3'	78.9°		10°45.4'+32.2'	79.1°	15	
16	10°00.6'+26.6'	77.1°		10°13.9'+27.6'	77.3°		10°27.0'+28.5'	77.5°		10°40.0'+29.4'	77.6°		10°52.7'+30.3'	77.8°		11°05.3'+31.2'	78.0°		11°17.6'+32.1'	78.2°	16	
17	10°27.3'+26.5'	76.2°		10°41.5'+27.4'	76.4°		10°55.5'+28.3'	76.6°		11°09.4'+29.2'	76.8°		11°23.0'+30.1'	76.9°		11°36.5'+31.0'	77.1°		11°49.7'+31.9'	77.3°	17	
18	10°53.7'+26.3'	75.3°		11°08.9'+27.2'	75.5°		11°23.8'+28.2'	75.7°		11°38.6'+29.1'	75.9°		11°53.2'+30.0'	76.1°		12°07.5'+30.9'	76.3°		12°21.6'+31.8'	76.5°	18	
19	11°20.1'+26.2'	74.4°		11°36.1'+27.1'	74.6°		11°52.0'+28.0'	74.8°		12°07.7'+28.9'	75.0°		12°23.1'+29.8'	75.2°		12°38.4'+30.7'	75.4°		12°53.4'+31.6'	75.6°	19	
20	11°46.2'+26.0'	73.4°		12°03.2'+26.9'	73.7°		12°20.0'+27.8'	73.9°		12°36.6'+28.7'	74.1°		12°52.9'+29.6'	74.3°		13°09.1'+30.5'	74.5°		13°25.0'+31.4'	74.7°	20	
21	12°12.2'+25.8'	72.5°		12°30.1'+26.7'	72.7°		12°47.8'+27.6'	72.9°		13°05.3'+28.5'	73.2°		13°22.6'+29.4'	73.4°		13°39.6'+30.3'	73.6°		13°56.4'+31.2'	73.9°	21	
22	12°38.0'+25.6'	71.6°		12°56.8'+26.5'	71.8°		13°15.4'+27.4'	72.0°		13°33.8'+28.3'	72.3°		13°52.0'+29.2'	72.5°		14°09.9'+30.1'	72.7°		14°27.6'+31.0'	73.0°	22	
23	13°03.6'+25.4'	70.7°		13°23.4'+26.3'	70.9°		13°42.9'+27.2'	71.1°		14°02.2'+28.1'	71.4°		14°21.2'+29.0'	71.6°								

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

88° 272° LHA

Latitude SAME as 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°45.9'	+28.2'	90.9°	1°44.9'	+29.1'	91.0°	1°43.9'	+30.0'	91.0°	1°42.9'	+30.9'	91.0°	1°41.8'	+31.8'	91.1°	1°40.6'	+32.7'	91.1°	1°39.5'	+33.6'	91.1°	0
1	2°14.1'	+28.1'	90.1°	2°14.0'	+29.1'	90.1°	2°13.9'	+30.0'	90.1°	2°13.8'	+30.9'	90.2°	2°13.6'	+31.8'	90.2°	2°13.3'	+32.7'	90.3°	2°13.0'	+33.5'	90.3°	1
2	2°42.3'	+28.1'	89.2°	2°43.1'	+29.0'	89.2°	2°43.9'	+29.9'	89.3°	2°44.6'	+30.8'	89.3°	2°45.3'	+31.7'	89.4°	2°46.0'	+32.6'	89.4°	2°46.6'	+33.5'	89.5°	2
3	3°10.4'	+28.1'	88.3°	3°12.1'	+29.0'	88.3°	3°13.8'	+29.9'	88.4°	3°15.5'	+30.8'	88.5°	3°17.1'	+31.7'	88.5°	3°18.6'	+32.6'	88.6°	3°20.0'	+33.4'	88.6°	3
4	3°38.4'	+28.0'	87.4°	3°41.1'	+28.9'	87.5°	3°43.7'	+29.8'	87.5°	3°46.3'	+30.7'	87.6°	3°48.7'	+31.6'	87.7°	3°51.2'	+32.5'	87.7°	3°53.5'	+33.4'	87.8°	4
5	4°06.4'	+27.9'	86.5°	4°10.0'	+28.9'	86.6°	4°13.5'	+29.8'	86.7°	4°17.0'	+30.7'	86.7°	4°20.4'	+31.6'	86.8°	4°23.7'	+32.5'	86.9°	4°26.9'	+33.3'	87.0°	5
6	4°34.3'	+27.9'	85.6°	4°38.9'	+28.8'	85.7°	4°43.3'	+29.7'	85.8°	4°47.7'	+30.6'	85.9°	4°52.0'	+31.5'	86.0°	4°56.1'	+32.4'	86.0°	5°00.2'	+33.3'	86.1°	6
7	5°02.2'	+27.8'	84.7°	5°07.7'	+28.7'	84.8°	5°13.0'	+29.6'	84.9°	5°18.3'	+30.5'	85.0°	5°23.5'	+31.4'	85.1°	5°28.5'	+32.3'	85.2°	5°33.5'	+33.2'	85.3°	7
8	5°30.0'	+27.8'	83.8°	5°36.4'	+28.6'	83.9°	5°42.7'	+29.6'	84.0°	5°48.9'	+30.5'	84.1°	5°54.9'	+31.4'	84.2°	6°00.9'	+32.3'	84.4°	6°06.7'	+33.1'	84.5°	8
9	5°57.7'	+27.6'	83.0°	6°05.0'	+28.6'	83.1°	6°12.2'	+29.5'	83.2°	6°19.3'	+30.4'	83.3°	6°26.3'	+31.3'	83.4°	6°33.1'	+32.2'	83.5°	6°39.9'	+33.0'	83.6°	9
10	6°25.4'	+27.5'	82.1°	6°33.6'	+28.5'	82.2°	6°41.7'	+29.4'	82.3°	6°49.7'	+30.3'	82.4°	6°57.6'	+31.2'	82.5°	7°05.3'	+32.1'	82.7°	7°12.9'	+33.0'	82.8°	10
11	6°52.9'	+27.4'	81.2°	7°02.1'	+28.4'	81.3°	7°11.1'	+29.3'	81.4°	7°20.0'	+30.2'	81.5°	7°28.8'	+31.1'	81.7°	7°37.4'	+32.0'	81.8°	7°45.9'	+32.9'	81.9°	11
12	7°20.4'	+27.3'	80.3°	7°30.4'	+28.3'	80.4°	7°40.4'	+29.2'	80.5°	7°50.2'	+30.1'	80.7°	7°59.8'	+31.0'	80.8°	8°09.4'	+31.9'	80.9°	8°18.7'	+32.7'	81.1°	12
13	7°47.7'	+27.2'	79.4°	7°58.7'	+28.1'	79.5°	8°09.6'	+29.1'	79.7°	8°20.3'	+30.0'	79.8°	8°30.8'	+30.9'	79.9°	8°41.2'	+31.8'	80.1°	8°51.5'	+32.6'	80.2°	13
14	8°14.9'	+27.1'	78.5°	8°26.9'	+28.0'	78.6°	8°38.6'	+28.9'	78.8°	8°50.2'	+29.8'	78.9°	9°01.7'	+30.7'	79.1°	9°13.0'	+31.6'	79.2°	9°24.1'	+32.5'	79.4°	14
15	8°42.0'	+27.0'	77.6°	8°54.9'	+27.9'	77.7°	9°07.6'	+28.8'	77.9°	9°20.1'	+29.7'	78.0°	9°32.4'	+30.6'	78.2°	9°44.6'	+31.5'	78.4°	9°56.6'	+32.4'	78.5°	15
16	9°09.0'	+26.8'	76.7°	9°22.8'	+27.8'	76.8°	9°36.4'	+28.7'	77.0°	9°49.8'	+29.6'	77.2°	10°03.0'	+30.5'	77.3°	10°16.1'	+31.4'	77.5°	10°29.0'	+32.2'	77.7°	16
17	9°35.9'	+26.7'	75.8°	9°50.5'	+27.6'	75.9°	10°05.0'	+28.5'	76.1°	10°19.4'	+29.4'	76.3°	10°33.5'	+30.3'	76.5°	10°47.5'	+31.2'	76.6°	11°01.2'	+32.1'	76.8°	17
18	10°02.6'	+26.6'	74.9°	10°18.1'	+27.5'	75.0°	10°33.6'	+28.4'	75.2°	10°48.8'	+29.3'	75.4°	11°03.8'	+30.2'	75.6°	11°18.7'	+31.1'	75.8°	11°33.3'	+31.9'	76.0°	18
19	10°29.1'	+26.4'	73.9°	10°45.6'	+27.3'	74.1°	11°01.9'	+28.2'	74.3°	11°18.1'	+29.1'	74.5°	11°34.0'	+30.0'	74.7°	11°49.7'	+30.9'	74.9°	12°05.3'	+31.8'	75.1°	19
20	10°55.5'	+26.2'	73.0°	11°12.9'	+27.1'	73.2°	11°30.2'	+28.1'	73.4°	11°47.2'	+29.0'	73.6°	12°04.0'	+29.8'	73.8°	12°20.6'	+30.7'	74.0°	12°37.1'	+31.6'	74.2°	20
21	11°21.7'	+26.1'	72.1°	11°40.1'	+27.0'	72.3°	11°58.2'	+27.9'	72.5°	12°16.1'	+28.8'	72.7°	12°33.9'	+29.7'	72.9°	12°51.4'	+30.6'	73.1°	13°08.7'	+31.4'	73.4°	21
22	11°47.8'	+25.9'	71.2°	12°07.0'	+26.8'	71.4°	12°26.1'	+27.7'	71.6°	12°44.9'	+28.6'	71.8°	13°03.5'	+29.5'	72.0°	13°21.9'	+30.4'	72.3°	13°40.1'	+31.3'	72.5°	22
23	12°13.7'	+25.7'	70.3°	12°33.8'	+26.6'	70.5°	12°53.8'	+27.5'	70.7°	13°13.5'	+28.4'	70.9°	13°33.0'	+29.3'	71.1°	13°52.3'	+30.2'	71.4°	14°11.4'	+31.1'	71.6°	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

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	0°53.0'	+28.2'	90.5°	0°52.5'	+29.1'	90.5°	0°52.0'	+30.0'	90.5°	0°51.4'	+30.9'	90.5°	0°50.9'	+31.8'	90.5°	0°50.3'	+32.7'	90.5°	0°49.7'	+33.5'	90.6°	0
1	1°21.1'	+28.1'	89.6°	1°21.6'	+29.1'	89.6°	1°22.0'	+30.0'	89.6°	1°22.3'	+30.9'	89.7°	1°22.7'	+31.8'	89.7°	1°23.0'	+32.7'	89.7°	1°23.3'	+33.5'	89.7°	1
2	1°49.3'	+28.1'	88.7°	1°50.6'	+29.0'	88.7°	1°51.9'	+30.0'	88.8°	1°53.2'	+30.9'	88.8°	1°54.4'	+31.7'	88.8°	1°55.7'	+32.6'	88.9°	1°56.8'	+33.5'	88.9°	2
3	2°17.4'	+28.1'	87.8°	2°19.7'	+29.0'	87.9°	2°21.9'	+29.9'	87.9°	2°24.1'	+30.8'	87.9°	2°26.2'	+31.7'	88.0°	2°28.3'	+32.6'	88.0°	2°30.3'	+33.5'	88.1°	3
4	2°45.5'	+28.0'	86.9°	2°48.7'	+29.0'	87.0°	2°51.8'	+29.9'	87.0°	2°54.9'	+30.8'	87.1°	2°57.9'	+31.7'	87.1°	3°00.9'	+32.6'	87.2°	3°03.8'	+33.4'	87.2°	4
5	3°13.5'	+28.0'	86.0°	3°17.6'	+28.9'	86.1°	3°21.7'	+29.8'	86.2°	3°25.7'	+30.7'	86.2°	3°29.6'	+31.6'	86.3°	3°33.4'	+32.5'	86.3°	3°37.2'	+33.4'	86.4°	5
6	3°41.5'	+27.9'	85.2°	3°46.6'	+28.9'	85.2°	3°51.5'	+29.8'	85.3°	3°56.4'	+30.7'	85.4°	4°01.2'	+31.6'	85.4°	4°06.0'	+32.5'	85.5°	4°10.6'	+33.3'	85.6°	6
7	4°09.5'	+27.9'	84.3°	4°15.4'	+28.8'	84.3°	4°21.3'	+29.7'	84.4°	4°27.1'	+30.6'	84.5°	4°32.8'	+31.5'	84.6°	4°38.4'	+32.4'	84.7°	4°44.0'	+33.3'	84.7°	7
8	4°37.4'	+27.8'	83.4°	4°44.2'	+28.7'	83.5°	4°51.0'	+29.7'	83.6°	4°57.7'	+30.6'	83.6°	5°04.3'	+31.5'	83.7°	5°10.8'	+32.3'	83.8°	5°17.2'	+33.2'	83.9°	8
9	5°05.2'	+27.7'	82.5°	5°13.0'	+28.7'	82.6°	5°20.7'	+29.6'	82.7°	5°28.3'	+30.5'	82.8°	5°35.8'	+31.4'	82.9°	5°43.2'	+32.3'	83.0°	5°50.5'	+33.1'	83.1°	9
10	5°32.9'	+27.7'	81.6°	5°41.7'	+28.6'	81.7°	5°50.3'	+29.5'	81.8°	5°58.8'	+30.4'	81.9°	6°07.1'	+31.3'	82.0°	6°15.4'	+32.2'	82.1°	6°23.6'	+33.1'	82.2°	10
11	6°00.6'	+27.6'	80.7°	6°10.2'	+28.5'	80.8°	6°19.8'	+29.4'	80.9°	6°29.2'	+30.3'	81.0°	6°38.4'	+31.2'	81.2°	6°47.6'	+32.1'	81.3°	6°56.6'	+33.0'	81.4°	11
12	6°28.2'	+27.5'	79.8°	6°38.7'	+28.4'	79.9°	6°49.2'	+29.3'	80.1°	6°59.5'	+30.2'	80.2°	7°09.6'	+31.1'	80.3°	7°19.7'	+32.0'	80.4°	7°29.6'	+32.9'	80.5°	12
13	6°55.7'	+27.4'	78.9°	7°07.1'	+28.3'	79.0°	7°18.5'	+29.2'	79.2°	7°29.7'	+30.1'	79.3°	7°40.8'	+31.0'	79.4°	7°51.7'	+31.9'	79.6°	8°02.5'	+32.8'	79.7°	13
14	7°23.1'	+27.3'	78.0°	7°35.4'	+28.2'	78.2°	7°47.7'	+29.1'	78.3°	7°59.8'	+30.0'	78.4°	8°11.8'	+30.9'	78.6°	8°23.6'	+31.8'	78.7°	8°35.3'	+32.7'	78.9°	14
15	7°50.3'	+27.2'	77.1°	8°03.6'	+28.1'	77.3°	8°16.8'	+29.0'	77.4°	8°29.8'	+29.9'	77.6°	8°42.7'	+30.8'	77.7°	8°55.4'	+31.7'	77.9°	9°07.9'	+32.5'	78.0°	15
16	8°17.5'	+27.0'	76.2°	8°31.7'	+28.0'	76.4°	8°45.8'	+28.9'	76.5°	8°59.7'	+29.8'	76.7°	9°13.4'	+30.7'	76.8°	9°27.0'	+31.5'	77.0°	9°40.4'	+32.4'	77.2°	16
17	8°44.6'	+26.9'	75.3°	8°59.7'	+27.8'	75.5°	9°14.6'	+28.7'	75.6°	9°29.4'	+29.6'	75.8°	9°44.1'	+30.5'	76.0°	9°58.6'	+31.4'	76.1°	10°12.9'	+32.3'	76.3°	17
18	9°11.5'	+26.8'	74.4°	9°27.5'	+27.7'	74.6°	9°43.4'	+28.6'	74.7°	9°59.1'	+29.5'	74.9°	10°14.6'	+30.4'	75.1°	10°30.0'	+31.3'	75.3°	10°45.1'	+32.1'	75.4°	18
19	9°38.3'	+26.6'	73.5°	9°55.2'	+27.5'	73.7°	10°12.0'	+28.4'	73.9°	10°28.6'	+29.3'	74.0°	10°45.0'	+30.2'	74.2°	11°01.2'	+31.1'	74.4°	11°17.3'	+32.0'	74.6°	19
20	10°04.9'	+26.5'	72.6°	10°22.7'	+27.4'	72.8°	10°40.4'	+28.3'	73.0°	10°57.9'	+29.2'	73.1°	11°15.2'	+30.1'	73.3°	11°32.3'	+31.0'	73.5°	11°49.2'	+31.8'	73.7°	20
21	10°31.4'	+26.3'	71.7°	10°50.1'	+27.2'	71.9°	11°08.7'	+28.1'	72.1°	11°27.1'	+29.0'	72.3°	11°45.3'	+29.9'	72.4°	12°03.3'	+30.8'	72.6°	12°21.1'	+31.7'	72.9°	21
22	10°57.7'	+26.2'	70.8°	11°17.4'	+27.1'	71.0°	11°36.8'	+28.0'	71.2°	11°56.1'	+28.9'	71.4°	12°15.2'	+29.7'	71.6°	12°34.1'	+30.6'	71.8°	12°52.7'	+31.5'	72.0°	22
23	11°23.9'	+26.0'																				

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

90° 270° LHA

**Latitude CONTRARY or SAME as Declination**

90° 270° 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	0°00.0'	+28.2'	90.0°	0°00.0'	+29.1'	90.0°	0°00.0'	+30.0'	90.0°	0°00.0'	+30.9'	90.0°	0°00.0'	+31.8'	90.0°	0°00.0'	+32.7'	90.0°	0°00.0'	+33.6'	90.0°	0
1	0°28.2'	+28.2'	89.1°	0°29.1'	+29.1'	89.1°	0°30.0'	+30.0'	89.1°	0°30.9'	+30.9'	89.1°	0°31.8'	+31.8'	89.2°	0°32.7'	+32.7'	89.2°	0°33.6'	+33.5'	89.2°	1
2	0°56.3'	+28.1'	88.2°	0°58.2'	+29.1'	88.3°	1°00.0'	+30.0'	88.3°	1°01.8'	+30.9'	88.3°	1°03.6'	+31.8'	88.3°	1°05.3'	+32.7'	88.3°	1°07.1'	+33.5'	88.3°	2
3	1°24.5'	+28.1'	87.4°	1°27.2'	+29.0'	87.4°	1°30.0'	+30.0'	87.4°	1°32.7'	+30.9'	87.4°	1°35.4'	+31.8'	87.5°	1°38.0'	+32.6'	87.5°	1°40.6'	+33.5'	87.5°	3
4	1°52.6'	+28.1'	86.5°	1°56.3'	+29.0'	86.5°	2°00.0'	+29.9'	86.5°	2°03.5'	+30.8'	86.6°	2°07.1'	+31.7'	86.6°	2°10.6'	+32.6'	86.6°	2°14.1'	+33.5'	86.7°	4
5	2°20.7'	+28.1'	85.6°	2°25.3'	+29.0'	85.6°	2°29.9'	+29.9'	85.7°	2°34.4'	+30.8'	85.7°	2°38.8'	+31.7'	85.8°	2°43.2'	+32.6'	85.8°	2°47.6'	+33.4'	85.9°	5
6	2°48.8'	+28.0'	84.7°	2°54.3'	+28.9'	84.7°	2°59.8'	+29.9'	84.8°	3°05.2'	+30.8'	84.9°	3°10.5'	+31.6'	84.9°	3°15.8'	+32.5'	85.0°	3°21.1'	+33.4'	85.0°	6
7	3°16.8'	+28.0'	83.8°	3°23.2'	+28.9'	83.9°	3°29.6'	+29.8'	83.9°	3°35.9'	+30.7'	84.0°	3°42.2'	+31.6'	84.1°	3°48.3'	+32.5'	84.1°	3°54.5'	+33.4'	84.2°	7
8	3°44.8'	+27.9'	82.9°	3°52.1'	+28.8'	83.0°	3°59.4'	+29.8'	83.1°	4°06.6'	+30.7'	83.1°	4°13.8'	+31.5'	83.2°	4°20.8'	+32.4'	83.3°	4°27.8'	+33.3'	83.4°	8
9	4°12.7'	+27.9'	82.0°	4°21.0'	+28.8'	82.1°	4°29.2'	+29.7'	82.2°	4°37.3'	+30.6'	82.3°	4°45.3'	+31.5'	82.3°	4°53.3'	+32.4'	82.4°	5°01.1'	+33.2'	82.5°	9
10	4°40.6'	+27.8'	81.2°	4°49.8'	+28.7'	81.2°	4°58.9'	+29.6'	81.3°	5°07.9'	+30.5'	81.4°	5°16.8'	+31.4'	81.5°	5°25.6'	+32.3'	81.6°	5°34.3'	+33.2'	81.7°	10
11	5°08.4'	+27.7'	80.3°	5°18.5'	+28.6'	80.4°	5°28.5'	+29.5'	80.4°	5°38.4'	+30.4'	80.5°	5°48.2'	+31.3'	80.6°	5°57.9'	+32.2'	80.7°	6°07.5'	+33.1'	80.8°	11
12	5°36.1'	+27.6'	79.4°	5°47.1'	+28.6'	79.5°	5°58.0'	+29.5'	79.6°	6°08.8'	+30.4'	79.7°	6°19.5'	+31.2'	79.8°	6°30.1'	+32.1'	79.9°	6°40.6'	+33.0'	80.0°	12
13	6°03.7'	+27.6'	78.5°	6°15.7'	+28.5'	78.6°	6°27.5'	+29.4'	78.7°	6°39.2'	+30.3'	78.8°	6°50.8'	+31.2'	78.9°	7°02.2'	+32.0'	79.0°	7°13.6'	+32.9'	79.2°	13
14	6°31.3'	+27.5'	77.6°	6°44.1'	+28.4'	77.7°	6°56.9'	+29.3'	77.8°	7°09.5'	+30.2'	77.9°	7°21.9'	+31.1'	78.1°	7°34.3'	+31.9'	78.2°	7°46.5'	+32.8'	78.3°	14
15	6°58.7'	+27.4'	76.7°	7°12.5'	+28.3'	76.8°	7°26.1'	+29.2'	76.9°	7°39.6'	+30.1'	77.1°	7°53.0'	+31.0'	77.2°	8°06.2'	+31.8'	77.3°	8°19.3'	+32.7'	77.5°	15
16	7°26.1'	+27.3'	75.8°	7°40.8'	+28.2'	75.9°	7°55.3'	+29.1'	76.1°	8°09.7'	+30.0'	76.2°	8°23.9'	+30.8'	76.3°	8°38.0'	+31.7'	76.5°	8°52.0'	+32.6'	76.6°	16
17	7°53.4'	+27.1'	74.9°	8°08.9'	+28.0'	75.0°	8°24.4'	+28.9'	75.2°	8°39.6'	+29.8'	75.3°	8°54.8'	+30.7'	75.5°	9°09.8'	+31.6'	75.6°	9°24.6'	+32.5'	75.8°	17
18	8°20.5'	+27.0'	74.0°	8°37.0'	+27.9'	74.1°	8°53.3'	+28.8'	74.3°	9°09.5'	+29.7'	74.4°	9°25.5'	+30.6'	74.6°	9°41.3'	+31.5'	74.8°	9°57.0'	+32.3'	74.9°	18
19	8°47.5'	+26.9'	73.1°	9°04.9'	+27.8'	73.2°	9°22.1'	+28.7'	73.4°	9°39.2'	+29.6'	73.6°	9°56.1'	+30.5'	73.7°	10°12.8'	+31.3'	73.9°	10°29.4'	+32.2'	74.1°	19
20	9°14.4'	+26.7'	72.2°	9°32.7'	+27.6'	72.3°	9°50.8'	+28.5'	72.5°	10°08.7'	+29.4'	72.7°	10°26.5'	+30.3'	72.8°	10°44.1'	+31.2'	73.0°	11°01.6'	+32.0'	73.2°	20
21	9°41.1'	+26.6'	71.3°	10°00.3'	+27.5'	71.4°	10°19.3'	+28.4'	71.6°	10°38.2'	+29.3'	71.8°	10°56.8'	+30.2'	72.0°	11°15.3'	+31.0'	72.2°	11°33.6'	+31.9'	72.3°	21
22	10°07.7'	+26.5'	70.4°	10°27.8'	+27.3'	70.5°	10°47.7'	+28.2'	70.7°	11°07.5'	+29.1'	70.9°	11°27.0'	+30.0'	71.1°	11°46.3'	+30.9'	71.3°	12°05.5'	+31.7'	71.5°	22
23	10°34.2'	+26.3'	69.5°	10°55.2'	+27.2'	69.6°	11°16.0'	+28.1'	69.8°	11°36.6'	+29.0'	70.0°	11°57.0'	+29.8'	70.2°	12°17.2'	+30.7'	70.4°	12°37.2'	+31.6'	70.6°	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

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	0°53.0'	-28.2'	90.5°	0°52.5'	-29.1'	90.5°	0°52.0'	-30.0'	90.5°	0°51.4'	-30.9'	90.5°	0°50.9'	-31.8'	90.5°	0°50.3'	-32.7'	90.5°	0°49.7'	-33.6'	90.6°	0	
1	<u>0°24.8'</u>	-28.2'	91.4°	<u>0°23.4'</u>	-29.1'	91.4°	<u>0°22.0'</u>	-30.0'	91.4°	<u>0°20.5'</u>	-30.9'	91.4°	<u>0°19.1'</u>	-31.8'	91.4°	<u>0°17.6'</u>	-32.7'	91.4°	<u>0°16.2'</u>	-33.6'	91.4°		1
2	0°03.4'	+28.2'	87.8°	0°05.7'	+29.1'	87.8°	0°08.1'	+30.0'	87.8°	0°10.4'	+30.9'	87.8°	0°12.7'	+31.8'	87.8°	0°15.1'	+32.7'	87.8°	0°17.4'	+33.6'	87.8°	2	
3	0°31.6'	+28.2'	86.9°	0°34.8'	+29.1'	86.9°	0°38.1'	+30.0'	86.9°	0°41.3'	+30.9'	86.9°	0°44.5'	+31.8'	86.9°	0°47.7'	+32.7'	86.9°	0°50.9'	+33.5'	87.0°	3	
4	0°59.7'	+28.2'	86.0°	1°03.9'	+29.1'	86.0°	1°08.1'	+30.0'	86.0°	1°12.2'	+30.9'	86.1°	1°16.3'	+31.8'	86.1°	1°20.4'	+32.7'	86.1°	1°24.5'	+33.5'	86.1°	4	
5	1°27.9'	+28.1'	85.1°	1°33.0'	+29.1'	85.1°	1°38.1'	+30.0'	85.2°	1°43.1'	+30.9'	85.2°	1°48.1'	+31.8'	85.2°	1°53.1'	+32.6'	85.3°	1°58.0'	+33.5'	85.3°	5	
6	1°56.0'	+28.1'	84.2°	2°02.1'	+29.0'	84.3°	2°08.0'	+29.9'	84.3°	2°14.0'	+30.8'	84.3°	2°19.9'	+31.7'	84.4°	2°25.7'	+32.6'	84.4°	2°31.5'	+33.5'	84.5°	6	
7	2°24.2'	+28.1'	83.3°	2°31.1'	+29.0'	83.4°	2°38.0'	+29.9'	83.4°	2°44.8'	+30.8'	83.5°	2°51.6'	+31.7'	83.5°	2°58.3'	+32.6'	83.6°	3°05.0'	+33.4'	83.6°	7	
8	2°52.2'	+28.0'	82.5°	3°00.1'	+29.0'	82.5°	3°07.9'	+29.9'	82.6°	3°15.6'	+30.8'	82.6°	3°23.3'	+31.6'	82.7°	3°30.9'	+32.5'	82.7°	3°38.4'	+33.4'	82.8°	8	
9	3°20.3'	+28.0'	81.6°	3°29.0'	+28.9'	81.6°	3°37.7'	+29.8'	81.7°	3°46.3'	+30.7'	81.8°	3°54.9'	+31.6'	81.8°	4°03.4'	+32.5'	81.9°	4°11.8'	+33.3'	82.0°	9	
10	3°48.3'	+27.9'	80.7°	3°57.9'	+28.8'	80.8°	4°07.5'	+29.7'	80.8°	4°17.0'	+30.6'	80.9°	4°26.5'	+31.5'	81.0°	4°35.9'	+32.4'	81.1°	4°45.2'	+33.3'	81.1°	10	
11	4°16.2'	+27.9'	79.8°	4°26.8'	+28.8'	79.9°	4°37.3'	+29.7'	80.0°	4°47.7'	+30.6'	80.0°	4°58.0'	+31.5'	80.1°	5°08.3'	+32.3'	80.2°	5°18.4'	+33.2'	80.3°	11	
12	4°44.1'	+27.8'	78.9°	4°55.6'	+28.7'	79.0°	5°07.0'	+29.6'	79.1°	5°18.3'	+30.5'	79.2°	5°29.5'	+31.4'	79.3°	5°40.6'	+32.3'	79.4°	5°51.6'	+33.1'	79.5°	12	
13	5°11.9'	+27.7'	78.0°	5°24.3'	+28.6'	78.1°	5°36.6'	+29.5'	78.2°	5°48.8'	+30.4'	78.3°	6°00.9'	+31.3'	78.4°	6°12.9'	+32.2'	78.5°	6°24.8'	+33.1'	78.6°	13	
14	5°39.6'	+27.6'	77.1°	5°52.9'	+28.6'	77.2°	6°06.1'	+29.5'	77.3°	6°19.2'	+30.3'	77.4°	6°32.2'	+31.2'	77.6°	6°45.1'	+32.1'	77.7°	6°57.8'	+33.0'	77.8°	14	
15	6°07.2'	+27.6'	76.2°	6°21.5'	+28.5'	76.3°	6°35.6'	+29.4'	76.5°	6°49.6'	+30.2'	76.6°	7°03.4'	+31.1'	76.7°	7°17.2'	+32.0'	76.8°	7°30.8'	+32.9'	76.9°	15	
16	6°34.8'	+27.5'	75.3°	6°49.9'	+28.4'	75.5°	7°04.9'	+29.3'	75.6°	7°19.8'	+30.1'	75.7°	7°34.6'	+31.0'	75.8°	7°49.2'	+31.9'	76.0°	8°03.7'	+32.8'	76.1°	16	
17	7°02.3'	+27.4'	74.5°	7°18.3'	+28.3'	74.6°	7°34.2'	+29.2'	74.7°	7°49.9'	+30.0'	74.8°	8°05.6'	+30.9'	75.0°	8°21.1'	+31.8'	75.1°	8°36.4'	+32.7'	75.3°	17	
18	7°29.6'	+27.3'	73.6°	7°46.5'	+28.2'	73.7°	8°03.3'	+29.0'	73.8°	8°20.0'	+29.9'	74.0°	8°36.5'	+30.8'	74.1°	8°52.9'	+31.7'	74.2°	9°09.1'	+32.5'	74.4°	18	
19	7°56.9'	+27.1'	72.7°	8°14.7'	+28.0'	72.8°	8°32.4'	+28.9'	72.9°	8°49.9'	+29.8'	73.1°	9°07.3'	+30.7'	73.2°	9°24.5'	+31.5'	73.4°	9°41.6'	+32.4'	73.5°	19	
20	8°24.0'	+27.0'	71.8°	8°42.7'	+27.9'	71.9°	9°01.3'	+28.8'	72.0°	9°19.7'	+29.7'	72.2°	9°38.0'	+30.5'	72.4°	9°56.1'	+31.4'	72.5°	10°14.0'	+32.3'	72.7°	20	
21	8°51.0'	+26.9'	70.9°	9°10.6'	+27.8'	71.0°	9°30.1'	+28.7'	71.2°	9°49.4'	+29.5'	71.3°	10°08.5'	+30.4'	71.5°	10°27.5'	+31.3'	71.7°	10°46.3'	+32.1'	71.8°	21	
22	9°17.9'	+26.7'	69.9°	9°38.4'	+27.6'	70.1°	9°58.7'	+28.5'	70.3°	10°18.9'	+29.4'	70.4°	10°38.9'	+30.3'	70.6°	10°58.8'	+31.1'	70.8°	11°18.4'	+32.0'	71.0°	22	
23	9°44.7'</																						



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°45.9'	-28.2'	90.9°	1°44.9'	-29.1'	91.0°	1°43.9'	-30.0'	91.0°	1°42.9'	-30.9'	91.0°	1°41.8'	-31.8'	91.1°	1°40.6'	-32.7'	91.1°	1°39.5'	-33.6'	91.1°	0
1	1°17.7'	-28.2'	91.8°	1°15.8'	-29.1'	91.8°	1°13.9'	-30.0'	91.9°	1°11.9'	-30.9'	91.9°	1°09.9'	-31.8'	91.9°	1°07.9'	-32.7'	91.9°	1°05.9'	-33.6'	91.9°	1
2	0°49.5'	-28.2'	92.7°	0°46.7'	-29.1'	92.7°	0°43.9'	-30.1'	92.7°	0°41.0'	-31.0'	92.7°	0°38.1'	-31.8'	92.8°	0°35.2'	-32.7'	92.8°	0°32.3'	-33.6'	92.8°	2
3	0°21.3'	-28.2'	93.6°	0°17.6'	-29.1'	93.6°	0°13.8'	-30.1'	93.6°	0°10.0'	-31.0'	93.6°	0°06.3'	-31.8'	93.6°	0°02.5'	-32.7'	93.6°	0°01.3'	+33.6'	86.4°	3
4	0°06.9'	+28.2'	85.5°	0°11.6'	+29.1'	85.5°	0°16.3'	+30.1'	85.5°	0°20.9'	+30.9'	85.5°	0°25.6'	+31.8'	85.5°	0°30.2'	+32.7'	85.6°	0°34.9'	+33.6'	85.6°	4
5	0°35.1'	+28.2'	84.6°	0°40.7'	+29.1'	84.7°	0°46.3'	+30.0'	84.7°	0°51.9'	+30.9'	84.7°	0°57.4'	+31.8'	84.7°	1°03.0'	+32.7'	84.7°	1°08.5'	+33.6'	84.7°	5
6	1°03.4'	+28.2'	83.8°	1°09.9'	+29.1'	83.8°	1°16.3'	+30.0'	83.8°	1°22.8'	+30.9'	83.8°	1°29.2'	+31.8'	83.9°	1°35.7'	+32.7'	83.9°	1°42.0'	+33.6'	83.9°	6
7	1°31.6'	+28.2'	82.9°	1°39.0'	+29.1'	82.9°	1°46.4'	+30.0'	82.9°	1°53.7'	+30.9'	83.0°	2°01.1'	+31.8'	83.0°	2°08.3'	+32.7'	83.0°	2°15.6'	+33.5'	83.1°	7
8	1°59.7'	+28.2'	82.0°	2°08.1'	+29.1'	82.0°	2°16.4'	+30.0'	82.1°	2°24.6'	+30.9'	82.1°	2°32.8'	+31.7'	82.2°	2°41.0'	+32.6'	82.2°	2°49.1'	+33.5'	82.2°	8
9	2°27.9'	+28.1'	81.1°	2°37.1'	+29.0'	81.2°	2°46.3'	+29.9'	81.2°	2°55.5'	+30.8'	81.3°	3°04.6'	+31.7'	81.3°	3°13.6'	+32.6'	81.4°	3°22.6'	+33.4'	81.4°	9
10	2°56.0'	+28.1'	80.2°	3°06.2'	+29.0'	80.3°	3°16.3'	+29.9'	80.3°	3°26.3'	+30.8'	80.4°	3°36.3'	+31.7'	80.5°	3°46.2'	+32.5'	80.5°	3°56.0'	+33.4'	80.6°	10
11	3°24.1'	+28.0'	79.3°	3°35.1'	+28.9'	79.4°	3°46.1'	+29.8'	79.5°	3°57.1'	+30.7'	79.5°	4°07.9'	+31.6'	79.6°	4°18.7'	+32.5'	79.7°	4°29.4'	+33.3'	79.8°	11
12	3°52.1'	+28.0'	78.5°	4°04.1'	+28.9'	78.5°	4°16.0'	+29.8'	78.6°	4°27.8'	+30.7'	78.7°	4°39.5'	+31.5'	78.8°	4°51.2'	+32.4'	78.8°	5°02.8'	+33.3'	78.9°	12
13	4°20.1'	+27.9'	77.6°	4°33.0'	+28.8'	77.6°	4°45.8'	+29.7'	77.7°	4°58.5'	+30.6'	77.8°	5°11.1'	+31.5'	77.9°	5°23.6'	+32.3'	78.0°	5°36.1'	+33.2'	78.1°	13
14	4°48.0'	+27.8'	76.8°	5°01.8'	+28.7'	76.8°	5°15.5'	+29.6'	76.9°	5°29.1'	+30.5'	76.9°	5°42.6'	+31.4'	77.0°	5°56.0'	+32.3'	77.1°	6°09.3'	+33.1'	77.2°	14
15	5°15.8'	+27.8'	75.8°	5°30.5'	+28.7'	75.9°	5°45.1'	+29.6'	76.0°	5°59.6'	+30.4'	76.1°	6°14.0'	+31.3'	76.2°	6°28.2'	+32.2'	76.3°	6°42.4'	+33.0'	76.4°	15
16	5°43.6'	+27.7'	74.9°	5°59.2'	+28.6'	75.0°	6°14.6'	+29.5'	75.1°	6°30.0'	+30.3'	75.2°	6°45.3'	+31.2'	75.3°	7°00.4'	+32.1'	75.4°	7°15.4'	+32.9'	75.6°	16
17	6°11.3'	+27.6'	74.0°	6°27.8'	+28.5'	74.1°	6°44.1'	+29.4'	74.2°	7°00.4'	+30.3'	74.3°	7°16.5'	+31.1'	74.5°	7°32.5'	+32.0'	74.6°	7°48.4'	+32.8'	74.7°	17
18	6°38.9'	+27.5'	73.1°	6°56.2'	+28.4'	73.2°	7°13.5'	+29.3'	73.4°	7°30.6'	+30.2'	73.5°	7°47.6'	+31.0'	73.6°	8°04.5'	+31.9'	73.7°	8°21.2'	+32.7'	73.9°	18
19	7°06.4'	+27.4'	72.2°	7°24.6'	+28.3'	72.3°	7°42.8'	+29.2'	72.5°	8°00.8'	+30.0'	72.6°	8°18.6'	+30.9'	72.7°	8°36.4'	+31.8'	72.9°	8°54.0'	+32.6'	73.0°	19
20	7°33.8'	+27.3'	71.3°	7°52.9'	+28.2'	71.5°	8°11.9'	+29.0'	71.6°	8°30.8'	+29.9'	71.7°	8°49.6'	+30.8'	71.9°	9°08.1'	+31.6'	72.0°	9°26.6'	+32.5'	72.2°	20
21	8°01.1'	+27.2'	70.4°	8°21.1'	+28.0'	70.6°	8°41.0'	+28.9'	70.7°	9°00.7'	+29.8'	70.9°	9°20.3'	+30.7'	71.0°	9°39.8'	+31.5'	71.2°	9°59.1'	+32.4'	71.3°	21
22	8°28.2'	+27.0'	69.5°	8°49.1'	+27.9'	69.7°	9°09.9'	+28.8'	69.8°	9°30.5'	+29.7'	70.0°	9°51.0'	+30.5'	70.1°	10°11.3'	+31.4'	70.3°	10°31.5'	+32.2'	70.5°	22
23	8°55.3'	+26.9'	68.6°	9°17.1'	+27.8'	68.8°	9°38.7'	+28.7'	68.9°	10°00.2'	+29.5'	69.1°	10°21.5'	+30.4'	69.3°	10°42.7'	+31.2'	69.4°	11°03.7'	+32.1'	69.6°	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°38.9'	-28.2'	91.4°	2°37.4'	-29.1'	91.5°	2°35.9'	-30.0'	91.5°	2°34.3'	-30.9'	91.5°	2°32.6'	-31.8'	91.6°	2°30.9'	-32.7'	91.6°	2°29.2'	-33.6'	91.7°	0			
1	2°10.6'	-28.2'	92.3°	2°08.3'	-29.2'	92.3°	2°05.8'	-30.1'	92.4°	2°03.3'	-31.0'	92.4°	2°00.8'	-31.9'	92.4°	1°58.2'	-32.8'	92.5°	1°55.6'	-33.6'	92.5°	1			
2	1°42.4'	-28.3'	93.2°	1°39.1'	-29.2'	93.2°	1°35.7'	-30.1'	93.2°	1°32.3'	-31.0'	93.3°	1°28.9'	-31.9'	93.3°	1°25.5'	-32.8'	93.3°	1°22.0'	-33.6'	93.3°	2			
3	1°14.2'	-28.3'	94.1°	1°09.9'	-29.2'	94.1°	1°05.6'	-30.1'	94.1°	1°01.3'	-31.0'	94.1°	0°57.0'	-31.9'	94.1°	0°52.7'	-32.8'	94.1°	0°48.3'	-33.6'	94.2°	3			
4	0°45.9'	-28.3'	94.9°	0°40.7'	-29.2'	95.0°	0°35.5'	-30.1'	95.0°	<u>0°30.3'</u>	-31.0'	95.0°	<u>0°25.1'</u>	-31.9'	95.0°	<u>0°19.9'</u>	-32.8'	95.0°	<u>0°14.7'</u>	-33.7'	95.0°	<u>0°09.5'</u>	-34.6'	95.0°	4
5	0°17.6'	-28.3'	95.8°	0°11.5'	-29.2'	95.8°	0°05.4'	-30.1'	95.8°	0°00.0'	+31.0'	84.2°	0°06.8'	+31.9'	84.2°	0°12.9'	+32.8'	84.2°	0°19.0'	+33.6'	84.2°	5			
6	0°10.7'	+28.3'	83.3°	0°17.7'	+29.2'	83.3°	0°24.7'	+30.1'	83.3°	0°31.7'	+31.0'	83.3°	0°38.7'	+31.9'	83.3°	0°45.6'	+32.8'	83.3°	0°52.6'	+33.6'	83.4°	6			
7	0°39.0'	+28.3'	82.4°	0°46.9'	+29.2'	82.4°	0°54.8'	+30.1'	82.4°	1°02.7'	+31.0'	82.5°	1°10.6'	+31.9'	82.5°	1°18.4'	+32.8'	82.5°	1°26.2'	+33.6'	82.5°	7			
8	1°07.3'	+28.3'	81.5°	1°16.1'	+29.2'	81.6°	1°24.9'	+30.1'	81.6°	1°33.7'	+31.0'	81.6°	1°42.5'	+31.9'	81.6°	1°51.2'	+32.7'	81.7°	1°59.9'	+33.6'	81.7°	8			
9	1°35.6'	+28.3'	80.7°	1°45.3'	+29.2'	80.7°	1°55.0'	+30.1'	80.7°	2°04.7'	+30.9'	80.7°	2°14.3'	+31.8'	80.8°	2°23.9'	+32.7'	80.8°	2°33.5'	+33.6'	80.9°	9			
10	2°03.8'	+28.2'	79.8°	2°14.5'	+29.1'	79.8°	2°25.1'	+30.0'	79.8°	2°35.6'	+30.9'	79.9°	2°46.1'	+31.8'	79.9°	2°56.6'	+32.7'	80.0°	3°07.0'	+33.5'	80.0°	10			
11	2°32.1'	+28.2'	78.9°	2°43.6'	+29.1'	78.9°	2°55.1'	+30.0'	79.0°	3°06.5'	+30.9'	79.0°	3°17.9'	+31.7'	79.1°	3°29.3'	+32.6'	79.1°	3°40.5'	+33.5'	79.2°	11			
12	3°00.2'	+28.1'	78.0°	3°12.7'	+29.0'	78.1°	3°25.1'	+29.9'	78.1°	3°37.4'	+30.8'	78.2°	3°49.7'	+31.7'	78.2°	4°01.9'	+32.6'	78.3°	4°14.0'	+33.4'	78.4°	12			
13	3°28.4'	+28.1'	77.1°	3°41.7'	+29.0'	77.2°	3°55.0'	+29.9'	77.2°	4°08.2'	+30.8'	77.3°	4°21.4'	+31.6'	77.4°	4°34.4'	+32.5'	77.5°	4°47.4'	+33.4'	77.5°	13			
14	3°56.5'	+28.0'	76.2°	4°10.7'	+28.9'	76.3°	4°24.9'	+29.8'	76.4°	4°39.0'	+30.7'	76.5°	4°53.0'	+31.6'	76.5°	5°07.0'	+32.4'	76.6°	5°20.8'	+33.3'	76.7°	14			
15	4°24.5'	+28.0'	75.3°	4°39.7'	+28.9'	75.4°	4°54.7'	+29.8'	75.5°	5°09.7'	+30.6'	75.6°	5°24.6'	+31.5'	75.7°	5°39.4'	+32.4'	75.8°	5°54.1'	+33.2'	75.9°	15			
16	4°52.5'	+27.9'	74.5°	5°08.5'	+28.8'	74.5°	5°24.5'	+29.7'	74.6°	5°40.3'	+30.6'	74.7°	5°56.1'	+31.4'	74.8°	6°11.8'	+32.3'	74.9°	6°27.3'	+33.1'	75.0°	16			
17	5°20.4'	+27.8'	73.6°	5°37.3'	+28.7'	73.7°	5°54.2'	+29.6'	73.8°	6°10.9'	+30.5'	73.9°	6°27.5'	+31.3'	74.0°	6°44.0'	+32.2'	74.1°	7°00.5'	+33.0'	74.2°	17			
18	5°48.2'	+27.7'	72.7°	6°06.1'	+28.6'	72.8°	6°23.8'	+29.5'	72.9°	6°41.4'	+30.4'	73.0°	6°58.9'	+31.2'	73.1°	7°16.2'	+32.1'	73.2°	7°33.5'	+33.0'	73.4°	18			
19	6°16.0'	+27.7'	71.8°	6°34.7'	+28.5'	71.9°	6°53.3'	+29.4'	72.0°	7°11.8'	+30.3'	72.1°	7°30.1'	+31.1'	72.2°	7°48.3'	+32.0'	72.4°	8°06.4'	+32.8'	72.5°	19			
20	6°43.6'	+27.6'	70.9°	7°03.2'	+28.4'	71.0°	7°22.7'	+29.3'	71.1°	7°42.0'	+30.2'	71.3°	8°01.3'	+31.0'	71.4°	8°20.3'	+31.9'	71.5°	8°39.3'	+32.7'	71.7°	20			
21	7°11.2'	+27.5'	70.0°	7°31.7'	+28.3'	70.1°	7°52.0'	+29.2'	70.2°	8°12.2'	+30.1'	70.4°	8°32.3'	+30.9'	70.5°	8°52.2'	+31.8'	70.7°	9°12.0'	+32.6'	70.8°	21			
22	7°38.7'	+27.3'	69.1°	7°60.0'	+28.2'	69.2°	8°21.2'	+29.1'	69.4°	8°42.3'	+29.9'	69.5°	9°03.2'	+30.8'	69.7°	9°24.0'	+31.6'	69.8°	9°44.6'	+32.5'	70.0°	22			
23	8°06.0'	+27.2'	68.2°	8°28																					

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

86° 274° LHA

Latitude CONTRARY to Declination

86° 274° 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	3°31.8'	-28.2'	91.9°	3°29.9'	-29.2'	91.9°	3°27.8'	-30.1'	92.0°	3°25.7'	-31.0'	92.1°	3°23.5'	-31.9'	92.1°	3°21.2'	-32.8'	92.2°	3°18.9'	-33.6'	92.2°	0
1	3°03.6'	-28.3'	92.8°	3°00.7'	-29.2'	92.8°	2°57.7'	-30.1'	92.9°	2°54.7'	-31.0'	92.9°	2°51.6'	-31.9'	93.0°	2°48.5'	-32.8'	93.0°	2°45.3'	-33.7'	93.1°	1
2	2°35.3'	-28.3'	93.6°	2°31.5'	-29.2'	93.7°	2°27.6'	-30.2'	93.7°	2°23.7'	-31.1'	93.8°	2°19.7'	-31.9'	93.8°	2°15.7'	-32.8'	93.9°	2°11.6'	-33.7'	93.9°	2
3	2°07.0'	-28.4'	94.5°	2°02.3'	-29.3'	94.6°	1°57.5'	-30.2'	94.6°	1°52.6'	-31.1'	94.6°	1°47.8'	-32.0'	94.7°	1°42.9'	-32.8'	94.7°	1°37.9'	-33.7'	94.7°	3
4	1°38.7'	-28.4'	95.4°	1°33.0'	-29.3'	95.4°	1°27.3'	-30.2'	95.5°	1°21.6'	-31.1'	95.5°	1°15.8'	-32.0'	95.5°	1°10.0'	-32.9'	95.5°	1°04.2'	-33.7'	95.6°	4
5	1°10.3'	-28.4'	96.3°	1°03.7'	-29.3'	96.3°	0°57.1'	-30.2'	96.3°	0°50.5'	-31.1'	96.3°	0°43.8'	-32.0'	96.4°	0°37.2'	-32.9'	96.4°	0°30.5'	-33.7'	96.4°	5
6	0°41.9'	-28.4'	97.2°	0°34.4'	-29.3'	97.2°	0°26.9'	-30.2'	97.2°	0°19.4'	-31.1'	97.2°	0°11.8'	-32.0'	97.2°	0°04.3'	-32.9'	97.2°	0°03.2'	+33.7'	82.8°	6
7	<u>0°13.5'</u>	-28.4'	<u>98.1°</u>	<u>0°05.1'</u>	-29.3'	<u>98.1°</u>	0°03.3'	+30.2'	81.9°	0°11.8'	+31.1'	81.9°	0°20.2'	+32.0'	81.9°	0°28.6'	+32.9'	82.0°	0°37.0'	+33.7'	82.0°	7
8	0°14.9'	+28.4'	81.1°	0°24.3'	+29.3'	81.1°	0°33.6'	+30.2'	81.1°	0°42.9'	+31.1'	81.1°	0°52.2'	+32.0'	81.1°	1°01.4'	+32.8'	81.1°	1°10.7'	+33.7'	81.1°	8
9	0°43.3'	+28.4'	80.2°	0°53.6'	+29.3'	80.2°	1°03.8'	+30.2'	80.2°	1°14.0'	+31.1'	80.2°	1°24.1'	+32.0'	80.3°	1°34.3'	+32.8'	80.3°	1°44.4'	+33.7'	80.3°	9
10	1°11.7'	+28.4'	79.3°	1°22.9'	+29.3'	79.3°	1°34.0'	+30.2'	79.4°	1°45.0'	+31.1'	79.4°	1°56.1'	+31.9'	79.4°	2°07.1'	+32.8'	79.4°	2°18.1'	+33.7'	79.5°	10
11	1°40.1'	+28.4'	78.4°	1°52.1'	+29.3'	78.5°	2°04.1'	+30.1'	78.5°	2°16.1'	+31.0'	78.5°	2°28.0'	+31.9'	78.6°	2°39.9'	+32.8'	78.6°	2°51.7'	+33.6'	78.7°	11
12	2°08.5'	+28.3'	77.5°	2°21.4'	+29.2'	77.6°	2°34.3'	+30.1'	77.6°	2°47.1'	+31.0'	77.7°	2°59.9'	+31.9'	77.7°	3°12.7'	+32.7'	77.8°	3°25.3'	+33.6'	77.8°	12
13	2°36.8'	+28.3'	76.7°	2°50.6'	+29.2'	76.7°	3°04.4'	+30.1'	76.8°	3°18.1'	+30.9'	76.8°	3°31.8'	+31.8'	76.9°	3°45.4'	+32.7'	76.9°	3°58.9'	+33.5'	77.0°	13
14	3°05.1'	+28.2'	75.8°	3°19.8'	+29.1'	75.8°	3°34.5'	+30.0'	75.9°	3°49.1'	+30.9'	76.0°	4°03.6'	+31.8'	76.0°	4°18.1'	+32.6'	76.1°	4°32.4'	+33.5'	76.2°	14
15	3°33.3'	+28.2'	74.9°	3°48.9'	+29.1'	75.0°	4°04.5'	+30.0'	75.0°	4°20.0'	+30.8'	75.1°	4°35.4'	+31.7'	75.2°	4°50.7'	+32.6'	75.2°	5°05.9'	+33.4'	75.3°	15
16	4°01.5'	+28.1'	74.0°	4°18.0'	+29.0'	74.1°	4°34.4'	+29.9'	74.2°	4°50.8'	+30.8'	74.2°	5°07.1'	+31.6'	74.3°	5°23.2'	+32.5'	74.4°	5°39.3'	+33.3'	74.5°	16
17	4°29.7'	+28.1'	73.1°	4°47.0'	+29.0'	73.2°	5°04.3'	+29.8'	73.3°	5°21.6'	+30.7'	73.4°	5°38.7'	+31.6'	73.5°	5°55.7'	+32.4'	73.6°	6°12.7'	+33.3'	73.7°	17
18	4°57.7'	+28.0'	72.2°	5°16.0'	+28.9'	72.3°	5°34.2'	+29.8'	72.4°	5°52.3'	+30.6'	72.5°	6°10.2'	+31.5'	72.6°	6°28.1'	+32.3'	72.7°	6°45.9'	+33.2'	72.8°	18
19	5°25.7'	+27.9'	71.3°	5°44.9'	+28.8'	71.4°	6°03.9'	+29.7'	71.5°	6°22.9'	+30.5'	71.6°	6°41.7'	+31.4'	71.7°	7°00.5'	+32.2'	71.9°	7°19.1'	+33.1'	72.0°	19
20	5°53.7'	+27.8'	70.5°	6°13.7'	+28.7'	70.6°	6°33.6'	+29.6'	70.7°	6°53.4'	+30.4'	70.8°	7°13.1'	+31.3'	70.9°	7°32.7'	+32.1'	71.0°	7°52.2'	+33.0'	71.1°	20
21	6°21.5'	+27.7'	69.6°	6°42.4'	+28.6'	69.7°	7°03.2'	+29.5'	69.8°	7°23.8'	+30.3'	69.9°	7°44.4'	+31.2'	70.0°	8°04.8'	+32.0'	70.2°	8°25.1'	+32.9'	70.3°	21
22	6°49.2'	+27.6'	68.7°	7°11.0'	+28.5'	68.8°	7°32.7'	+29.4'	68.9°	7°54.2'	+30.2'	69.0°	8°15.6'	+31.1'	69.2°	8°36.9'	+31.9'	69.3°	8°58.0'	+32.8'	69.5°	22
23	7°16.9'	+27.5'	67.8°	7°39.5'	+28.4'	67.9°	8°02.0'	+29.3'	68.0°	8°24.4'	+30.1'	68.2°	8°46.7'	+31.0'	68.3°	9°08.8'	+31.8'	68.4°	9°30.7'	+32.6'	68.6°	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

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	4°24.8'	-28.3'	92.4°	4°22.3'	-29.2'	92.4°	4°19.7'	-30.1'	92.5°	4°17.1'	-31.0'	92.6°	4°14.3'	-31.9'	92.7°	4°11.5'	-32.8'	92.7°	4°08.6'	-33.7'	92.8°	0
1	3°56.5'	-28.3'	93.2°	3°53.1'	-29.3'	93.3°	3°49.6'	-30.2'	93.4°	3°46.0'	-31.1'	93.4°	3°42.4'	-32.0'	93.5°	3°38.7'	-32.8'	93.6°	3°34.9'	-33.7'	93.6°	1
2	3°28.1'	-28.4'	94.1°	3°23.8'	-29.3'	94.2°	3°19.4'	-30.2'	94.2°	3°15.0'	-31.1'	94.3°	3°10.5'	-32.0'	94.4°	3°05.9'	-32.9'	94.4°	3°01.2'	-33.7'	94.5°	2
3	2°59.8'	-28.4'	95.0°	2°54.5'	-29.3'	95.1°	2°49.2'	-30.3'	95.1°	2°43.9'	-31.1'	95.2°	2°38.5'	-32.0'	95.2°	2°33.0'	-32.9'	95.2°	2°27.5'	-33.8'	95.3°	3
4	2°31.4'	-28.5'	95.9°	2°25.2'	-29.4'	95.9°	2°19.0'	-30.3'	96.0°	2°12.7'	-31.2'	96.0°	2°06.4'	-32.1'	96.0°	2°00.1'	-32.9'	96.1°	1°53.7'	-33.8'	96.1°	4
5	2°02.9'	-28.5'	96.8°	1°55.8'	-29.4'	96.8°	1°48.7'	-30.3'	96.8°	1°41.5'	-31.2'	96.9°	1°34.4'	-32.1'	96.9°	1°27.2'	-33.0'	96.9°	1°19.9'	-33.8'	96.9°	5
6	1°34.4'	-28.5'	97.6°	1°26.4'	-29.4'	97.7°	1°18.4'	-30.3'	97.7°	1°10.3'	-31.2'	97.7°	1°02.3'	-32.1'	97.7°	0°54.2'	-33.0'	97.8°	0°46.1'	-33.8'	97.8°	6
7	1°05.9'	-28.5'	98.5°	0°57.0'	-29.4'	98.5°	0°48.1'	-30.3'	98.6°	0°39.1'	-31.2'	98.6°	0°30.2'	-32.1'	98.6°	0°21.2'	-33.0'	98.6°	0°12.3'	-33.8'	98.6°	7
8	0°37.4'	-28.5'	99.4°	<u>0°27.5'</u>	-29.4'	<u>99.4°</u>	<u>0°17.7'</u>	-30.3'	<u>99.4°</u>	<u>0°07.9'</u>	-31.2'	<u>99.4°</u>	0°01.9'	+32.1'	80.6°	0°11.7'	+33.0'	80.6°	0°21.6'	+33.8'	80.6°	8
9	<u>0°08.8'</u>	-28.5'	<u>100.3°</u>	0°01.9'	+29.4'	79.7°	0°12.6'	+30.3'	79.7°	0°23.3'	+31.2'	79.7°	0°34.0'	+32.1'	79.7°	0°44.7'	+33.0'	79.7°	0°55.4'	+33.8'	79.8°	9
10	0°19.7'	+28.5'	78.8°	0°31.3'	+29.4'	78.8°	0°42.9'	+30.3'	78.9°	0°54.5'	+31.2'	78.9°	1°06.1'	+32.1'	78.9°	1°17.7'	+32.9'	78.9°	1°29.2'	+33.8'	78.9°	10
11	0°48.3'	+28.5'	78.0°	1°00.8'	+29.4'	78.0°	1°13.3'	+30.3'	78.0°	1°25.7'	+31.2'	78.0°	1°38.2'	+32.1'	78.0°	1°50.6'	+32.9'	78.1°	2°03.0'	+33.8'	78.1°	11
12	1°16.8'	+28.5'	77.1°	1°30.2'	+29.4'	77.1°	1°43.6'	+30.3'	77.1°	1°56.9'	+31.2'	77.2°	2°10.3'	+32.0'	77.2°	2°23.5'	+32.9'	77.2°	2°36.8'	+33.7'	77.3°	12
13	1°45.3'	+28.5'	76.2°	1°59.6'	+29.4'	76.2°	2°13.9'	+30.3'	76.3°	2°28.1'	+31.1'	76.3°	2°42.3'	+32.0'	76.3°	2°56.4'	+32.9'	76.4°	3°10.5'	+33.7'	76.4°	13
14	2°13.8'	+28.5'	75.3°	2°29.0'	+29.3'	75.4°	2°44.1'	+30.2'	75.4°	2°59.2'	+31.1'	75.4°	3°14.3'	+32.0'	75.5°	3°29.3'	+32.8'	75.6°	3°44.2'	+33.7'	75.6°	14
15	2°42.2'	+28.4'	74.4°	2°58.3'	+29.3'	74.5°	3°14.3'	+30.2'	74.5°	3°30.3'	+31.0'	74.6°	3°46.2'	+31.9'	74.7°	4°02.1'	+32.8'	74.7°	4°17.9'	+33.6'	74.8°	15
16	3°10.7'	+28.4'	73.6°	3°27.6'	+29.3'	73.6°	3°44.5'	+30.1'	73.7°	4°01.4'	+31.0'	73.7°	4°18.1'	+31.8'	73.8°	4°34.8'	+32.7'	73.9°	4°51.5'	+33.5'	74.0°	16
17	3°39.0'	+28.3'	72.7°	3°56.9'	+29.2'	72.7°	4°14.6'	+30.1'	72.8°	4°32.3'	+30.9'	72.9°	4°50.0'	+31.8'	73.0°	5°07.5'	+32.6'	73.0°	5°25.0'	+33.5'	73.1°	17
18	4°07.3'	+28.3'	71.8°	4°26.1'	+29.1'	71.9°	4°44.7'	+30.0'	71.9°	5°03.3'	+30.9'	72.0°	5°21.8'	+31.7'	72.1°	5°40.2'	+32.6'	72.2°	5°58.5'	+33.4'	72.3°	18
19	4°35.6'	+28.2'	70.9°	4°55.2'	+29.1'	71.0°	5°14.7'	+29.9'	71.1°	5°34.1'	+30.8'	71.2°	5°53.5'	+31.6'	71.2°	6°12.7'	+32.5'	71.3°	6°31.8'	+33.3'	71.5°	19
20	5°03.8'	+28.1'	70.0°	5°24.3'	+29.0'	70.1°	5°44.6'	+29.8'	70.2°	6°04.9'	+30.7'	70.3°	6°25.1'	+31.5'	70.4°	6°45.2'	+32.4'	70.5°	7°05.2'	+33.2'	70.6°	20
21	5°31.9'	+28.0'	69.1°	5°53.2'	+28.9'	69.2°	6°14.5'	+29.8'	69.3°	6°35.6'	+30.6'	69.4°	6°56.7'	+31.5'	69.5°	7°17.6'	+32.3'	69.7°	7°38.4'	+33.1'	69.8°	21
22	6°00.0'	+28.0'	68.2°	6°22.2'	+28.8'	68.3°	6°44.2'	+29.7'	68.4°	7°06.2'	+30.5'	68.6°	7°28.1'	+31.4'	68.7°	7°49.9'	+32.2'	68.8°	8°11.5'	+33.0'	68.9°	22
23	6°27.9'	+27.9'	67.3°	6°51.0'	+28.7'	67.																

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

84° 276° LHA

Latitude CONTRARY to Declination

84° 276° 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	5°17.7'	-28.3'	92.8°	5°14.7'	-29.2'	92.9°	5°11.6'	-30.2'	93.0°	5°08.4'	-31.1'	93.1°	5°05.1'	-32.0'	93.2°	5°01.8'	-32.8'	93.3°	4°58.3'	-33.7'	93.4°	0
1	4°49.4'	-28.4'	93.7°	4°45.5'	-29.3'	93.8°	4°41.5'	-30.2'	93.9°	4°37.4'	-31.1'	94.0°	4°33.2'	-32.0'	94.0°	4°28.9'	-32.9'	94.1°	4°24.6'	-33.8'	94.2°	1
2	4°21.0'	-28.5'	94.6°	4°16.2'	-29.4'	94.7°	4°11.2'	-30.3'	94.7°	4°06.2'	-31.2'	94.8°	4°01.2'	-32.1'	94.9°	3°56.0'	-32.9'	95.0°	3°50.8'	-33.8'	95.0°	2
3	3°52.6'	-28.5'	95.5°	3°46.8'	-29.4'	95.5°	3°41.0'	-30.3'	95.6°	3°35.1'	-31.2'	95.7°	3°29.1'	-32.1'	95.7°	3°23.1'	-33.0'	95.8°	3°17.0'	-33.9'	95.9°	3
4	3°24.0'	-28.6'	96.4°	3°17.4'	-29.5'	96.4°	3°10.6'	-30.4'	96.5°	3°03.8'	-31.3'	96.5°	2°57.0'	-32.1'	96.6°	2°50.1'	-33.0'	96.6°	2°43.1'	-33.9'	96.7°	4
5	2°55.5'	-28.6'	97.2°	2°47.9'	-29.5'	97.3°	2°40.3'	-30.4'	97.3°	2°32.6'	-31.3'	97.4°	2°24.8'	-32.2'	97.4°	2°17.1'	-33.1'	97.5°	2°09.3'	-33.9'	97.5°	5
6	2°26.9'	-28.7'	98.1°	2°18.4'	-29.5'	98.2°	2°09.9'	-30.4'	98.2°	2°01.3'	-31.3'	98.2°	1°52.7'	-32.2'	98.3°	1°44.0'	-33.1'	98.3°	1°35.3'	-33.9'	98.3°	6
7	1°58.3'	-28.7'	99.0°	1°48.8'	-29.6'	99.0°	1°39.4'	-30.5'	99.1°	1°30.0'	-31.3'	99.1°	1°20.5'	-32.2'	99.1°	1°10.9'	-33.1'	99.1°	1°01.4'	-33.9'	99.2°	7
8	1°29.6'	-28.7'	99.9°	1°19.3'	-29.6'	99.9°	1°09.0'	-30.5'	99.9°	0°58.6'	-31.4'	99.9°	0°48.2'	-32.2'	100.0°	0°37.9'	-33.1'	100.0°	0°27.5'	-34.0'	100.0°	8
9	1°00.9'	-28.7'	100.8°	0°49.7'	-29.6'	100.8°	0°38.5'	-30.5'	100.8°	0°27.2'	-31.4'	100.8°	0°16.0'	-32.2'	100.8°	0°04.8'	-33.1'	100.8°	0°06.5'	+34.0'	79.2°	9
10	0°32.2'	-28.7'	101.6°	0°20.1'	-29.6'	101.6°	0°08.0'	-30.5'	101.6°	0°04.1'	+31.4'	78.4°	0°16.2'	+32.2'	78.4°	0°28.3'	+33.1'	78.4°	0°40.4'	+33.9'	78.4°	10
11	0°03.5'	-28.7'	102.5°	0°09.5'	+29.6'	77.5°	0°22.5'	+30.5'	77.5°	0°35.5'	+31.4'	77.5°	0°48.5'	+32.2'	77.5°	1°01.4'	+33.1'	77.5°	1°14.4'	+33.9'	77.5°	11
12	0°25.2'	+28.7'	76.6°	0°39.1'	+29.6'	76.6°	0°53.0'	+30.5'	76.6°	1°06.8'	+31.3'	76.6°	1°20.7'	+32.2'	76.7°	1°34.5'	+33.1'	76.7°	1°48.3'	+33.9'	76.7°	12
13	0°53.9'	+28.7'	75.7°	1°08.7'	+29.6'	75.7°	1°23.4'	+30.5'	75.8°	1°38.2'	+31.3'	75.8°	1°52.9'	+32.2'	75.8°	2°07.6'	+33.0'	75.9°	2°22.2'	+33.9'	75.9°	13
14	1°22.6'	+28.7'	74.9°	1°38.3'	+29.6'	74.9°	1°53.9'	+30.4'	74.9°	2°09.5'	+31.3'	74.9°	2°25.1'	+32.1'	75.0°	2°40.6'	+33.0'	75.0°	2°56.1'	+33.8'	75.1°	14
15	1°51.3'	+28.6'	74.0°	2°07.8'	+29.5'	74.0°	2°24.3'	+30.4'	74.0°	2°40.8'	+31.3'	74.1°	2°57.2'	+32.1'	74.1°	3°13.6'	+33.0'	74.2°	3°29.9'	+33.8'	74.2°	15
16	2°19.9'	+28.6'	73.1°	2°37.3'	+29.5'	73.1°	2°54.7'	+30.4'	73.2°	3°12.1'	+31.2'	73.2°	3°29.3'	+32.1'	73.3°	3°46.6'	+32.9'	73.4°	4°03.7'	+33.7'	73.4°	16
17	2°48.5'	+28.6'	72.2°	3°06.8'	+29.4'	72.3°	3°25.1'	+30.3'	72.3°	3°43.3'	+31.2'	72.4°	4°01.4'	+32.0'	72.4°	4°19.5'	+32.9'	72.5°	4°37.5'	+33.7'	72.6°	17
18	3°17.1'	+28.5'	71.3°	3°36.3'	+29.4'	71.4°	3°55.4'	+30.3'	71.5°	4°14.4'	+31.1'	71.5°	4°33.4'	+32.0'	71.6°	4°52.3'	+32.8'	71.7°	5°11.1'	+33.6'	71.8°	18
19	3°45.6'	+28.5'	70.5°	4°05.7'	+29.3'	70.5°	4°25.6'	+30.2'	70.6°	4°45.5'	+31.0'	70.7°	5°05.4'	+31.9'	70.7°	5°25.1'	+32.7'	70.8°	5°44.8'	+33.5'	70.9°	19
20	4°14.1'	+28.4'	69.6°	4°35.0'	+29.3'	69.6°	4°55.8'	+30.1'	69.7°	5°16.6'	+31.0'	69.8°	5°37.2'	+31.8'	69.9°	5°57.8'	+32.6'	70.0°	6°18.3'	+33.5'	70.1°	20
21	4°42.5'	+28.3'	68.7°	5°04.3'	+29.2'	68.8°	5°25.9'	+30.1'	68.9°	5°47.5'	+30.9'	68.9°	6°09.1'	+31.7'	69.0°	6°30.5'	+32.6'	69.1°	6°51.8'	+33.4'	69.3°	21
22	5°10.8'	+28.3'	67.8°	5°33.5'	+29.1'	67.9°	5°56.0'	+30.0'	68.0°	6°18.4'	+30.8'	68.1°	6°40.8'	+31.6'	68.2°	7°03.0'	+32.5'	68.3°	7°25.2'	+33.3'	68.4°	22
23	5°39.1'	+28.2'	66.9°	6°02.6'	+29.0'	67.0°	6°26.0'	+29.9'	67.1°	6°49.3'	+30.7'	67.2°	7°12.4'	+31.5'	67.3°	7°35.5'	+32.4'	67.5°	7°58.4'	+33.2'	67.6°	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

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	6°10.6'	-28.4'	93.3°	6°07.1'	-29.3'	93.4°	6°03.5'	-30.2'	93.5°	5°59.8'	-31.1'	93.6°	5°55.9'	-32.0'	93.7°	5°52.0'	-32.9'	93.8°	5°47.9'	-33.8'	93.9°	0
1	5°42.2'	-28.5'	94.2°	5°37.8'	-29.4'	94.3°	5°33.3'	-30.3'	94.4°	5°28.7'	-31.2'	94.5°	5°23.9'	-32.1'	94.6°	5°19.1'	-33.0'	94.7°	5°14.2'	-33.8'	94.8°	1
2	5°13.8'	-28.5'	95.1°	5°08.5'	-29.4'	95.2°	5°03.0'	-30.4'	95.2°	4°57.5'	-31.3'	95.3°	4°51.9'	-32.1'	95.4°	4°46.1'	-33.0'	95.5°	4°40.3'	-33.9'	95.6°	2
3	4°45.3'	-28.6'	96.0°	4°39.0'	-29.5'	96.0°	4°32.7'	-30.4'	96.1°	4°26.2'	-31.3'	96.2°	4°19.7'	-32.2'	96.3°	4°13.1'	-33.1'	96.3°	4°06.5'	-33.9'	96.4°	3
4	4°16.7'	-28.7'	96.8°	4°09.5'	-29.6'	96.9°	4°02.2'	-30.5'	97.0°	3°54.9'	-31.4'	97.0°	3°47.5'	-32.2'	97.1°	3°40.1'	-33.1'	97.2°	3°32.5'	-34.0'	97.2°	4
5	3°48.0'	-28.7'	97.7°	3°39.9'	-29.6'	97.8°	3°31.8'	-30.5'	97.8°	3°23.6'	-31.4'	97.9°	3°15.3'	-32.3'	98.0°	3°06.9'	-33.2'	98.0°	2°58.5'	-34.0'	98.1°	5
6	3°19.3'	-28.8'	98.6°	3°10.3'	-29.7'	98.7°	3°01.3'	-30.6'	98.7°	2°52.1'	-31.4'	98.8°	2°43.0'	-32.3'	98.8°	2°33.8'	-33.2'	98.8°	2°24.5'	-34.0'	98.9°	6
7	2°50.5'	-28.8'	99.5°	2°40.6'	-29.7'	99.5°	2°30.7'	-30.6'	99.6°	2°20.7'	-31.5'	99.6°	2°10.7'	-32.4'	99.6°	2°00.6'	-33.2'	99.7°	1°50.5'	-34.1'	99.7°	7
8	2°21.7'	-28.8'	100.4°	2°10.9'	-29.7'	100.4°	2°00.1'	-30.6'	100.4°	1°49.2'	-31.5'	100.5°	1°38.3'	-32.4'	100.5°	1°27.4'	-33.2'	100.5°	1°16.4'	-34.1'	100.5°	8
9	1°52.9'	-28.9'	101.2°	1°41.2'	-29.8'	101.3°	1°29.5'	-30.6'	101.3°	1°17.7'	-31.5'	101.3°	1°05.9'	-32.4'	101.3°	0°54.1'	-33.2'	101.3°	0°42.3'	-34.1'	101.4°	9
10	1°24.0'	-28.9'	102.1°	1°11.5'	-29.8'	102.1°	0°58.8'	-30.7'	102.1°	0°46.2'	-31.5'	102.2°	0°33.6'	-32.4'	102.2°	0°20.9'	-33.2'	102.2°	0°08.2'	-34.1'	102.2°	10
11	0°55.2'	-28.9'	103.0°	0°41.7'	-29.8'	103.0°	0°28.2'	-30.7'	103.0°	0°14.7'	-31.5'	103.0°	0°01.2'	-32.4'	103.0°	0°12.3'	+33.2'	77.0°	0°25.9'	+34.1'	77.0°	11
12	0°26.3'	-28.9'	103.9°	0°11.9'	-29.8'	103.9°	0°02.5'	+30.7'	76.1°	0°16.9'	+31.5'	76.1°	0°31.2'	+32.4'	76.1°	0°45.6'	+33.2'	76.2°	0°59.9'	+34.1'	76.2°	12
13	0°02.6'	+28.9'	75.3°	0°17.9'	+29.8'	75.3°	0°33.1'	+30.7'	75.3°	0°48.4'	+31.5'	75.3°	1°03.6'	+32.4'	75.3°	1°18.8'	+33.2'	75.3°	1°34.0'	+34.1'	75.3°	13
14	0°31.5'	+28.9'	74.4°	0°47.7'	+29.8'	74.4°	1°03.8'	+30.6'	74.4°	1°19.9'	+31.5'	74.4°	1°36.0'	+32.4'	74.5°	1°52.0'	+33.2'	74.5°	2°08.1'	+34.0'	74.5°	14
15	1°00.4'	+28.9'	73.5°	1°17.4'	+29.8'	73.5°	1°34.4'	+30.6'	73.6°	1°51.4'	+31.5'	73.6°	2°08.3'	+32.3'	73.6°	2°25.2'	+33.2'	73.7°	2°42.1'	+34.0'	73.7°	15
16	1°29.3'	+28.9'	72.6°	1°47.2'	+29.7'	72.7°	2°05.0'	+30.6'	72.7°	2°22.9'	+31.4'	72.7°	2°40.7'	+32.3'	72.8°	2°58.4'	+33.1'	72.8°	3°16.1'	+34.0'	72.9°	16
17	1°58.1'	+28.8'	71.8°	2°16.9'	+29.7'	71.8°	2°35.6'	+30.6'	71.8°	2°54.3'	+31.4'	71.9°	3°13.0'	+32.2'	71.9°	3°31.5'	+33.1'	72.0°	3°50.1'	+33.9'	72.0°	17
18	2°27.0'	+28.8'	70.9°	2°46.6'	+29.7'	70.9°	3°06.2'	+30.5'	71.0°	3°25.7'	+31.4'	71.0°	3°45.2'	+32.1'	71.1°	4°04.6'	+33.0'	71.1°	4°24.0'	+33.9'	71.2°	18
19	2°55.8'	+28.7'	70.0°	3°16.3'	+29.6'	70.1°	3°36.7'	+30.5'	70.1°	3°57.1'	+31.3'	70.2°	4°17.4'	+32.1'	70.2°	4°37.7'	+33.0'	70.3°	4°57.8'	+33.8'	70.4°	19
20	3°24.5'	+28.7'	69.1°	3°45.9'	+29.6'	69.2°	4°07.2'	+30.4'	69.2°	4°28.4'	+31.2'	69.3°	4°49.5'	+32.1'	69.4°	5°10.6'	+32.9'	69.5°	5°31.6'	+33.7'	69.6°	20
21	3°53.2'	+28.6'	68.2°	4°15.4'	+29.5'	68.3°	4°37.6'	+30.3'	68.4°	4°59.6'	+31.2'	68.5°	5°21.6'	+32.0'	68.5°	5°43.5'	+32.8'	68.6°	6°05.3'	+33.6'	68.7°	21
22	4°21.9'	+28.6'	67.4°	4°44.9'	+29.4'	67.4°	5°07.9'	+30.3'	67.5°	5°30.8'	+31.1'	67.6°	5°53.6'	+31.9'	67.7°	6°16.4'	+32.8'	67.8°	6°39.0'	+33.6'	67.9°	22
23	4°50.4'	+28.5'	66.5°	5°14.4'	+29.4'																	

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°03.5'	-28.4'	93.8°	6°59.5'	-29.4'	93.9°	6°55.4'	-30.3'	94.0°	6°51.1'	-31.2'	94.1°	6°46.7'	-32.1'	94.3°	6°42.2'	-32.9'	94.4°	6°37.5'	-33.8'	94.5°	0
1	6°35.0'	-28.5'	94.7°	6°30.1'	-29.4'	94.8°	6°25.1'	-30.4'	94.9°	6°19.9'	-31.3'	95.0°	6°14.6'	-32.1'	95.1°	6°09.2'	-33.0'	95.2°	6°03.7'	-33.9'	95.3°	1
2	6°06.5'	-28.6'	95.5°	6°00.7'	-29.5'	95.7°	5°54.7'	-30.4'	95.8°	5°48.7'	-31.3'	95.9°	5°42.5'	-32.2'	96.0°	5°36.2'	-33.1'	96.1°	5°29.8'	-34.0'	96.2°	2
3	5°37.9'	-28.7'	96.4°	5°31.2'	-29.6'	96.5°	5°24.3'	-30.5'	96.6°	5°17.3'	-31.4'	96.7°	5°10.3'	-32.3'	96.8°	5°03.1'	-33.2'	96.9°	4°55.9'	-34.0'	97.0°	3
4	5°09.2'	-28.8'	97.3°	5°01.6'	-29.7'	97.4°	4°53.8'	-30.6'	97.5°	4°45.9'	-31.5'	97.6°	4°38.0'	-32.3'	97.7°	4°29.9'	-33.2'	97.7°	4°21.8'	-34.1'	97.8°	4
5	4°40.5'	-28.8'	98.2°	4°31.9'	-29.7'	98.3°	4°23.2'	-30.6'	98.4°	4°14.5'	-31.5'	98.4°	4°05.6'	-32.4'	98.5°	3°56.7'	-33.3'	98.6°	3°47.8'	-34.1'	98.6°	5
6	4°11.6'	-28.9'	99.1°	4°02.1'	-29.8'	99.1°	3°52.6'	-30.7'	99.2°	3°42.9'	-31.6'	99.3°	3°33.2'	-32.4'	99.3°	3°23.5'	-33.3'	99.4°	3°13.6'	-34.2'	99.5°	6
7	3°42.8'	-28.9'	100.0°	3°32.4'	-29.8'	100.0°	3°21.9'	-30.7'	100.1°	3°11.4'	-31.6'	100.1°	3°00.8'	-32.5'	100.2°	2°50.2'	-33.3'	100.2°	2°39.5'	-34.2'	100.3°	7
8	3°13.8'	-29.0'	100.8°	3°02.5'	-29.9'	100.9°	2°51.2'	-30.8'	100.9°	2°39.8'	-31.6'	101.0°	2°28.3'	-32.5'	101.0°	2°16.8'	-33.4'	101.1°	2°05.3'	-34.2'	101.1°	8
9	2°44.8'	-29.0'	101.7°	2°32.6'	-29.9'	101.8°	2°20.4'	-30.8'	101.8°	2°08.1'	-31.7'	101.8°	1°55.8'	-32.5'	101.9°	1°43.4'	-33.4'	101.9°	1°31.0'	-34.2'	101.9°	9
10	2°15.8'	-29.1'	102.6°	2°02.7'	-29.9'	102.6°	1°49.6'	-30.8'	102.7°	1°36.4'	-31.7'	102.7°	1°23.2'	-32.6'	102.7°	1°10.0'	-33.4'	102.7°	0°56.8'	-34.3'	102.7°	10
11	1°46.7'	-29.1'	103.5°	1°32.8'	-30.0'	103.5°	1°18.8'	-30.8'	103.5°	1°04.7'	-31.7'	103.5°	0°50.7'	-32.6'	103.5°	0°36.6'	-33.4'	103.6°	<u>0°22.6'</u>	<u>-34.3'</u>	<u>103.6°</u>	11
12	1°17.7'	-29.1'	104.3°	1°02.8'	-30.0'	104.4°	0°47.9'	-30.9'	104.4°	0°33.0'	-31.7'	104.4°	<u>0°18.1'</u>	<u>-32.6'</u>	<u>104.4°</u>	<u>0°03.2'</u>	<u>-33.4'</u>	<u>104.4°</u>	0°11.7'	+34.3'	75.6°	12
13	0°48.6'	-29.1'	105.2°	0°32.8'	-30.0'	105.2°	<u>0°17.1'</u>	<u>-30.9'</u>	<u>105.2°</u>	<u>0°01.3'</u>	<u>-31.7'</u>	<u>105.2°</u>	0°14.5'	+32.6'	74.8°	0°30.2'	+33.4'	74.8°	0°46.0'	+34.2'	74.8°	13
14	<u>0°19.4'</u>	<u>-29.1'</u>	<u>106.1°</u>	<u>0°02.8'</u>	<u>-30.0'</u>	<u>106.1°</u>	0°13.8'	+30.9'	73.9°	0°30.4'	+31.7'	73.9°	0°47.0'	+32.6'	73.9°	1°03.6'	+33.4'	73.9°	1°20.2'	+34.2'	74.0°	14
15	0°09.7'	+29.1'	73.0°	0°27.2'	+30.0'	73.0°	0°44.7'	+30.8'	73.1°	1°02.1'	+31.7'	73.1°	1°19.6'	+32.5'	73.1°	1°37.0'	+33.4'	73.1°	1°54.4'	+34.2'	73.1°	15
16	0°38.8'	+29.1'	72.2°	0°57.1'	+30.0'	72.2°	1°15.5'	+30.8'	72.2°	1°33.8'	+31.7'	72.2°	1°52.1'	+32.5'	72.3°	2°10.4'	+33.4'	72.3°	2°28.6'	+34.2'	72.3°	16
17	1°07.9'	+29.1'	71.3°	1°27.1'	+30.0'	71.3°	1°46.3'	+30.8'	71.3°	2°05.5'	+31.7'	71.4°	2°24.7'	+32.5'	71.4°	2°43.8'	+33.3'	71.5°	3°02.8'	+34.1'	71.5°	17
18	1°37.0'	+29.1'	70.4°	1°57.1'	+29.9'	70.4°	2°17.1'	+30.8'	70.5°	2°37.2'	+31.6'	70.5°	2°57.1'	+32.5'	70.6°	3°17.1'	+33.3'	70.6°	3°37.0'	+34.1'	70.7°	18
19	2°06.0'	+29.0'	69.5°	2°27.0'	+29.9'	69.6°	2°47.9'	+30.7'	69.6°	3°08.8'	+31.6'	69.7°	3°29.6'	+32.4'	69.7°	3°50.3'	+33.2'	69.8°	4°11.0'	+34.0'	69.9°	19
20	2°35.1'	+29.0'	68.7°	2°56.9'	+29.9'	68.7°	3°18.6'	+30.7'	68.8°	3°40.3'	+31.5'	68.8°	4°02.0'	+32.4'	68.9°	4°23.6'	+33.2'	69.0°	4°45.1'	+34.0'	69.0°	20
21	3°04.1'	+29.0'	67.8°	3°26.7'	+29.8'	67.8°	3°49.3'	+30.6'	67.9°	4°11.9'	+31.5'	68.0°	4°34.3'	+32.3'	68.0°	4°56.7'	+33.1'	68.1°	5°19.1'	+33.9'	68.2°	21
22	3°33.0'	+28.9'	66.9°	3°56.5'	+29.7'	67.0°	4°20.0'	+30.6'	67.0°	4°43.3'	+31.4'	67.1°	5°06.6'	+32.2'	67.2°	5°29.9'	+33.0'	67.3°	5°53.0'	+33.8'	67.4°	22
23	4°02.0'	+28.9'	66.0°	4°26.3'	+29.7'	66.1°	4°50.6'	+30.5'	66.2°	5°14.8'	+31.3'	66.3°	5°38.9'	+32.2'	66.3°	6°02.9'	+33.0'	66.4°	6°26.8'	+33.8'	66.5°	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°56.3'	-28.5'	94.3°	7°51.8'	-29.4'	94.4°	7°47.2'	-30.3'	94.5°	7°42.4'	-31.2'	94.7°	7°37.4'	-32.1'	94.8°	7°32.3'	-33.0'	94.9°	7°27.1'	-33.9'	95.1°	0
1	7°27.8'	-28.6'	95.1°	7°22.4'	-29.5'	95.3°	7°16.8'	-30.4'	95.4°	7°11.1'	-31.3'	95.5°	7°05.3'	-32.2'	95.6°	6°59.3'	-33.1'	95.8°	6°53.2'	-34.0'	95.9°	1
2	6°59.2'	-28.7'	96.0°	6°52.9'	-29.6'	96.1°	6°46.4'	-30.5'	96.3°	6°39.8'	-31.4'	96.4°	6°33.1'	-32.3'	96.5°	6°26.2'	-33.2'	96.6°	6°19.2'	-34.0'	96.7°	2
3	6°30.6'	-28.8'	96.9°	6°23.3'	-29.7'	97.0°	6°15.9'	-30.6'	97.1°	6°08.4'	-31.5'	97.2°	6°00.8'	-32.4'	97.3°	5°53.0'	-33.3'	97.4°	5°45.2'	-34.1'	97.6°	3
4	6°01.8'	-28.9'	97.8°	5°53.6'	-29.8'	97.9°	5°45.3'	-30.7'	98.0°	5°36.9'	-31.6'	98.1°	5°28.4'	-32.5'	98.2°	5°19.8'	-33.3'	98.3°	5°11.1'	-34.2'	98.4°	4
5	5°32.9'	-29.0'	98.7°	5°23.8'	-29.9'	98.8°	5°14.6'	-30.8'	98.9°	5°05.3'	-31.6'	99.0°	4°55.9'	-32.5'	99.0°	4°46.5'	-33.4'	99.1°	4°36.9'	-34.2'	99.2°	5
6	5°03.9'	-29.0'	99.6°	4°53.9'	-29.9'	99.6°	4°43.8'	-30.8'	99.7°	4°33.7'	-31.7'	99.8°	4°23.4'	-32.6'	99.9°	4°13.1'	-33.4'	100.0°	4°02.7'	-34.3'	100.0°	6
7	4°34.9'	-29.1'	100.4°	4°24.0'	-30.0'	100.5°	4°13.0'	-30.9'	100.6°	4°02.0'	-31.8'	100.7°	3°50.8'	-32.6'	100.7°	3°39.6'	-33.5'	100.8°	3°28.4'	-34.3'	100.8°	7
8	4°05.8'	-29.1'	101.3°	3°54.0'	-30.0'	101.4°	3°42.1'	-30.9'	101.4°	3°30.2'	-31.8'	101.5°	3°18.2'	-32.7'	101.6°	3°06.1'	-33.5'	101.6°	2°54.0'	-34.4'	101.7°	8
9	3°36.7'	-29.2'	102.2°	3°24.0'	-30.1'	102.2°	3°11.2'	-31.0'	102.3°	2°58.4'	-31.8'	102.4°	2°45.5'	-32.7'	102.4°	2°32.6'	-33.6'	102.4°	2°19.7'	-34.4'	102.5°	9
10	3°07.5'	-29.2'	103.1°	2°53.9'	-30.1'	103.1°	2°40.2'	-31.0'	103.2°	2°26.6'	-31.9'	103.2°	2°12.8'	-32.7'	103.2°	1°59.1'	-33.6'	103.3°	1°45.3'	-34.4'	103.3°	10
11	2°38.2'	-29.3'	103.9°	2°23.7'	-30.2'	104.0°	2°09.2'	-31.0'	104.0°	1°54.7'	-31.9'	104.1°	1°40.1'	-32.8'	104.1°	1°25.5'	-33.6'	104.1°	1°10.9'	-34.4'	104.1°	11
12	2°08.9'	-29.3'	104.8°	1°53.6'	-30.2'	104.8°	1°38.2'	-31.1'	104.9°	1°22.8'	-31.9'	104.9°	1°07.3'	-32.8'	104.9°	0°51.9'	-33.6'	104.9°	0°36.4'	-34.4'	104.9°	12
13	1°39.6'	-29.3'	105.7°	1°23.4'	-30.2'	105.7°	1°07.1'	-31.1'	105.7°	0°50.9'	-31.9'	105.7°	0°34.6'	-32.8'	105.8°	<u>0°18.3'</u>	<u>-33.6'</u>	<u>105.8°</u>	<u>0°02.0'</u>	<u>-34.4'</u>	<u>105.8°</u>	13
14	1°10.3'	-29.3'	106.6°	0°53.2'	-30.2'	106.6°	0°36.1'	-31.1'	106.6°	<u>0°18.9'</u>	<u>-31.9'</u>	<u>106.6°</u>	<u>0°01.8'</u>	<u>-32.8'</u>	<u>106.6°</u>	0°15.3'	+33.6'	73.4°	0°32.5'	+34.4'	73.4°	14
15	0°40.9'	-29.4'	107.4°	<u>0°23.0'</u>	<u>-30.2'</u>	<u>107.4°</u>	<u>0°05.0'</u>	<u>-31.1'</u>	<u>107.4°</u>	0°13.0'	+31.9'	72.6°	0°31.0'	+32.8'	72.6°	0°48.9'	+33.6'	72.6°	1°06.9'	+34.4'	72.6°	15
16	<u>0°11.6'</u>	<u>-29.4'</u>	<u>108.3°</u>	0°07.3'	+30.2'	71.7°	0°26.1'	+31.1'	71.7°	0°44.9'	+31.9'	71.7°	1°03.7'	+32.8'	71.7°	1°22.5'	+33.6'	71.8°	1°41.3'	+34.4'	71.8°	16
17	0°17.8'	+29.4'	70.8°	0°37.5'	+30.2'	70.8°	0°57.2'	+31.1'	70.8°	1°16.8'	+31.9'	70.9°	1°36.5'	+32.7'	70.9°	1°56.1'	+33.6'	70.9°	2°15.7'	+34.4'	71.0°	17
18	0°47.1'	+29.3'	70.0°	1°07.7'	+30.2'	70.0°	1°28.2'	+31.0'	70.0°	1°48.7'	+31.9'	70.0°	2°09.2'	+32.7'	70.1°	2°29.7'	+33.5'	70.1°	2°50.1'	+34.3'	70.1°	18
19	1°16.5'	+29.3'	69.1°	1°37.9'	+30.2'	69.1°	1°59.3'	+31.0'	69.1°	2°20.6'	+31.8'	69.2°	2°41.9'	+32.6'	69.2°	3°03.2'	+33.5'	69.3°	3°24.4'	+34.3'	69.3°	19
20	1°45.8'	+29.3'	68.2°	2°08.1'	+30.1'	68.2°	2°30.3'	+31.0'	68.3°	2°52.5'	+31.8'	68.3°	3°14.6'	+32.6'	68.4°	3°36.7'	+33.4'	68.4°	3°58.7'	+34.2'	68.5°	20
21	2°15.1'	+29.3'	67.3°	2°38.2'	+30.1'	67.4°	3°01.3'	+30.9'	67.4°	3°24.3'	+31.8'	67.5°	3°47.2'	+32.6'	67.5°	4°10.1'	+33.4'	67.6°	4°33.0'	+34.2'	67.7°	21
22	2°44.4'	+29.2'	66.5°	3°08.3'	+30.1'	66																

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

80° 280° LHA

Latitude CONTRARY to Declination

80° 280° 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	8°49.1'	-28.6'	94.7°	8°44.1'	-29.5'	94.9°	8°38.9'	-30.4'	95.0°	8°33.6'	-31.3'	95.2°	8°28.1'	-32.2'	95.3°	8°22.4'	-33.1'	95.5°	8°16.6'	-34.0'	95.6°	0
1	8°20.6'	-28.7'	95.6°	8°14.7'	-29.6'	95.8°	8°08.5'	-30.5'	95.9°	8°02.3'	-31.4'	96.1°	7°55.9'	-32.3'	96.2°	7°49.4'	-33.2'	96.3°	7°42.7'	-34.1'	96.5°	1
2	7°51.9'	-28.8'	96.5°	7°45.0'	-29.7'	96.6°	7°38.0'	-30.6'	96.8°	7°30.9'	-31.5'	96.9°	7°23.6'	-32.4'	97.0°	7°16.2'	-33.3'	97.2°	7°08.6'	-34.1'	97.3°	2
3	7°23.1'	-28.9'	97.4°	7°15.3'	-29.8'	97.5°	7°07.4'	-30.7'	97.6°	6°59.4'	-31.6'	97.8°	6°51.2'	-32.5'	97.9°	6°42.9'	-33.4'	98.0°	6°34.5'	-34.2'	98.1°	3
4	6°54.2'	-29.0'	98.3°	6°45.5'	-29.9'	98.4°	6°36.7'	-30.8'	98.5°	6°27.8'	-31.7'	98.6°	6°18.7'	-32.6'	98.7°	6°09.5'	-33.4'	98.8°	6°00.3'	-34.3'	98.9°	4
5	6°25.2'	-29.1'	99.2°	6°15.6'	-30.0'	99.3°	6°05.9'	-30.9'	99.4°	5°56.1'	-31.8'	99.5°	5°46.1'	-32.6'	99.6°	5°36.1'	-33.5'	99.7°	5°26.0'	-34.4'	99.8°	5
6	5°56.1'	-29.2'	100.0°	5°45.6'	-30.1'	100.1°	5°35.0'	-31.0'	100.2°	5°24.3'	-31.8'	100.3°	5°13.5'	-32.7'	100.4°	5°02.6'	-33.6'	100.5°	4°51.6'	-34.4'	100.6°	6
7	5°27.0'	-29.3'	100.9°	5°15.5'	-30.1'	101.0°	5°04.0'	-31.0'	101.1°	4°52.5'	-31.9'	101.2°	4°40.8'	-32.8'	101.3°	4°29.0'	-33.6'	101.3°	4°17.2'	-34.5'	101.4°	7
8	4°57.7'	-29.3'	101.8°	4°45.4'	-30.2'	101.9°	4°33.0'	-31.1'	102.0°	4°20.5'	-32.0'	102.0°	4°08.0'	-32.8'	102.1°	3°55.4'	-33.7'	102.2°	3°42.7'	-34.5'	102.2°	8
9	4°28.4'	-29.4'	102.7°	4°15.2'	-30.3'	102.7°	4°01.9'	-31.1'	102.8°	3°48.6'	-32.0'	102.9°	3°35.2'	-32.9'	102.9°	3°21.7'	-33.7'	103.0°	3°08.2'	-34.6'	103.1°	9
10	3°59.0'	-29.4'	103.5°	3°44.9'	-30.3'	103.6°	3°30.8'	-31.2'	103.7°	3°16.6'	-32.1'	103.7°	3°02.3'	-32.9'	103.8°	2°48.0'	-33.8'	103.8°	2°33.6'	-34.6'	103.9°	10
11	3°29.6'	-29.5'	104.4°	3°14.6'	-30.4'	104.5°	2°59.6'	-31.2'	104.5°	2°44.5'	-32.1'	104.6°	2°29.4'	-32.9'	104.6°	2°14.2'	-33.8'	104.7°	1°59.0'	-34.6'	104.7°	11
12	3°00.1'	-29.5'	105.3°	2°44.2'	-30.4'	105.3°	2°28.4'	-31.3'	105.4°	2°12.4'	-32.1'	105.4°	1°56.5'	-33.0'	105.5°	1°40.4'	-33.8'	105.5°	1°24.4'	-34.6'	105.5°	12
13	2°30.6'	-29.6'	106.2°	2°13.8'	-30.4'	106.2°	1°57.1'	-31.3'	106.2°	1°40.3'	-32.1'	106.3°	1°23.5'	-33.0'	106.3°	1°06.6'	-33.8'	106.3°	0°49.8'	-34.6'	106.3°	13
14	2°01.0'	-29.6'	107.0°	1°43.4'	-30.5'	107.1°	1°25.8'	-31.3'	107.1°	1°08.2'	-32.2'	107.1°	0°50.5'	-33.0'	107.1°	<u>0°32.8'</u>	-33.8'	107.1°	<u>0°15.1'</u>	-34.6'	107.1°	14
15	1°31.4'	-29.6'	107.9°	1°13.0'	-30.5'	107.9°	0°54.5'	-31.3'	107.9°	0°36.0'	-32.2'	108.0°	0°17.5'	-33.0'	108.0°	0°01.0'	+33.8'	72.0°	0°19.5'	+34.6'	72.0°	15
16	1°01.8'	-29.6'	108.8°	0°42.5'	-30.5'	108.8°	<u>0°23.2'</u>	-31.3'	108.8°	<u>0°03.8'</u>	-32.2'	108.8°	0°15.5'	+33.0'	71.2°	0°34.8'	+33.8'	71.2°	0°54.1'	+34.6'	71.2°	16
17	0°32.2'	-29.6'	109.6°	<u>0°12.0'</u>	-30.5'	109.6°	0°08.2'	+31.3'	70.4°	0°28.3'	+32.2'	70.4°	0°48.5'	+33.0'	70.4°	1°08.6'	+33.8'	70.4°	1°28.8'	+34.6'	70.4°	17
18	<u>0°02.6'</u>	-29.6'	110.5°	0°18.5'	+30.5'	69.5°	0°39.5'	+31.3'	69.5°	1°00.5'	+32.1'	69.5°	1°21.5'	+33.0'	69.5°	1°42.4'	+33.8'	69.6°	2°03.4'	+34.6'	69.6°	18
19	0°27.1'	+29.6'	68.6°	0°48.9'	+30.5'	68.6°	1°10.8'	+31.3'	68.6°	1°32.6'	+32.1'	68.7°	1°54.4'	+32.9'	68.7°	2°16.2'	+33.8'	68.7°	2°38.0'	+34.6'	68.8°	19
20	0°56.7'	+29.6'	67.8°	1°19.4'	+30.4'	67.8°	1°42.1'	+31.3'	67.8°	2°04.8'	+32.1'	67.8°	2°27.4'	+32.9'	67.9°	2°50.0'	+33.7'	67.9°	3°12.5'	+34.5'	68.0°	20
21	1°26.3'	+29.6'	66.9°	1°49.9'	+30.4'	66.9°	2°13.4'	+31.2'	66.9°	2°36.9'	+32.1'	67.0°	3°00.3'	+32.9'	67.0°	3°23.7'	+33.7'	67.1°	3°47.0'	+34.5'	67.1°	21
22	1°55.9'	+29.6'	66.0°	2°20.3'	+30.4'	66.0°	2°44.6'	+31.2'	66.1°	3°08.9'	+32.0'	66.1°	3°33.2'	+32.8'	66.2°	3°57.4'	+33.6'	66.2°	4°21.5'	+34.4'	66.3°	22
23	2°25.5'	+29.5'	65.1°	2°50.7'	+30.4'	65.2°	3°15.8'	+31.2'	65.2°	3°41.0'	+32.0'	65.3°	4°06.0'	+32.8'	65.3°	4°31.0'	+33.6'	65.4°	4°55.9'	+34.4'	65.5°	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

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°41.9'	-28.6'	95.2°	9°36.4'	-29.6'	95.4°	9°30.7'	-30.5'	95.6°	9°24.8'	-31.4'	95.7°	9°18.7'	-32.3'	95.9°	9°12.5'	-33.2'	96.0°	9°06.1'	-34.0'	96.2°	0
1	9°13.3'	-28.8'	96.1°	9°06.8'	-29.7'	96.3°	9°00.2'	-30.6'	96.4°	8°53.4'	-31.5'	96.6°	8°46.5'	-32.4'	96.7°	8°39.3'	-33.3'	96.9°	8°32.1'	-34.1'	97.0°	1
2	8°44.5'	-28.9'	97.0°	8°37.1'	-29.8'	97.1°	8°29.6'	-30.7'	97.3°	8°21.9'	-31.6'	97.4°	8°14.1'	-32.5'	97.6°	8°06.1'	-33.4'	97.7°	7°57.9'	-34.2'	97.9°	2
3	8°15.6'	-29.0'	97.9°	8°07.3'	-29.9'	98.0°	7°58.9'	-30.8'	98.2°	7°50.3'	-31.7'	98.3°	7°41.6'	-32.6'	98.4°	7°32.7'	-33.5'	98.6°	7°23.7'	-34.3'	98.7°	3
4	7°46.6'	-29.1'	98.8°	7°37.4'	-30.0'	98.9°	7°28.1'	-30.9'	99.0°	7°18.6'	-31.8'	99.2°	7°09.0'	-32.7'	99.3°	6°59.2'	-33.6'	99.4°	6°49.4'	-34.4'	99.5°	4
5	7°17.5'	-29.2'	99.6°	7°07.4'	-30.1'	99.8°	6°57.1'	-31.0'	99.9°	6°46.8'	-31.9'	100.0°	6°36.3'	-32.8'	100.1°	6°25.3'	-33.6'	100.2°	6°14.9'	-34.5'	100.3°	5
6	6°48.3'	-29.3'	100.5°	6°37.2'	-30.2'	100.6°	6°26.1'	-31.1'	100.8°	6°14.8'	-32.0'	100.9°	6°03.5'	-32.9'	101.0°	5°52.0'	-33.7'	101.1°	5°40.4'	-34.6'	101.2°	6
7	6°18.9'	-29.4'	101.4°	6°07.0'	-30.3'	101.5°	5°55.0'	-31.2'	101.6°	5°42.9'	-32.1'	101.7°	5°30.6'	-32.9'	101.8°	5°18.3'	-33.8'	101.9°	5°05.9'	-34.6'	102.0°	7
8	5°49.5'	-29.5'	102.3°	5°36.7'	-30.4'	102.4°	5°23.8'	-31.3'	102.5°	5°10.8'	-32.1'	102.6°	4°57.7'	-33.0'	102.6°	4°44.5'	-33.8'	102.7°	4°31.3'	-34.7'	102.8°	8
9	5°20.0'	-29.6'	103.2°	5°06.3'	-30.5'	103.2°	4°52.5'	-31.3'	103.3°	4°38.7'	-32.2'	103.4°	4°24.7'	-33.0'	103.5°	4°10.7'	-33.9'	103.6°	3°56.6'	-34.7'	103.6°	9
10	4°50.5'	-29.6'	104.0°	4°35.9'	-30.5'	104.1°	4°21.2'	-31.4'	104.2°	4°06.5'	-32.2'	104.3°	3°51.7'	-33.1'	104.3°	3°36.8'	-33.9'	104.4°	3°21.8'	-34.8'	104.4°	10
11	4°20.8'	-29.7'	104.9°	4°05.4'	-30.6'	105.0°	3°49.8'	-31.4'	105.0°	3°34.2'	-32.3'	105.1°	3°18.6'	-33.1'	105.2°	3°02.8'	-34.0'	105.2°	2°47.1'	-34.8'	105.3°	11
12	3°51.1'	-29.7'	105.8°	3°34.8'	-30.6'	105.8°	3°18.4'	-31.5'	105.9°	3°01.9'	-32.3'	105.9°	2°45.4'	-33.2'	106.0°	2°28.9'	-34.0'	106.0°	2°12.3'	-34.8'	106.1°	12
13	3°21.4'	-29.8'	106.6°	3°04.2'	-30.7'	106.7°	2°46.9'	-31.5'	106.7°	2°29.6'	-32.4'	106.8°	2°12.3'	-33.2'	106.8°	1°54.9'	-34.0'	106.9°	1°37.4'	-34.8'	106.9°	13
14	2°51.6'	-29.8'	107.5°	2°33.5'	-30.7'	107.6°	2°15.4'	-31.5'	107.6°	1°57.2'	-32.4'	107.6°	1°39.1'	-33.2'	107.7°	1°20.8'	-34.0'	107.7°	1°02.6'	-34.9'	107.7°	14
15	2°21.8'	-29.9'	108.4°	2°02.8'	-30.7'	108.4°	1°43.9'	-31.6'	108.4°	1°24.9'	-32.4'	108.5°	1°05.8'	-33.2'	108.5°	0°46.8'	-34.1'	108.5°	<u>0°27.7'</u>	-34.9'	108.5°	15
16	1°51.9'	-29.9'	109.2°	1°32.1'	-30.7'	109.3°	1°12.3'	-31.6'	109.3°	0°52.4'	-32.4'	109.3°	<u>0°32.6'</u>	-33.2'	109.3°	<u>0°12.7'</u>	-34.1'	109.3°	0°07.1'	+34.9'	70.7°	16
17	1°22.0'	-29.9'	110.1°	1°01.4'	-30.8'	110.1°	0°40.7'	-31.6'	110.1°	<u>0°20.0'</u>	-32.4'	110.2°	0°00.6'	+33.2'	69.8°	0°21.3'	+34.1'	69.8°	0°42.0'	+34.9'	69.9°	17
18	0°52.1'	-29.9'	111.0°	<u>0°30.6'</u>	-30.8'	111.0°	<u>0°09.1'</u>	-31.6'	111.0°	0°12.4'	+32.4'	69.0°	0°33.9'	+33.2'	69.0°	0°55.4'	+34.0'	69.0°	1°16.9'	+34.8'	69.0°	18
19	<u>0°22.2'</u>	-29.9'	111.8°	0°00.2'	+30.8'	68.1°	0°22.5'	+31.6'	68.2°	0°44.8'	+32.4'	68.2°	1°07.1'	+33.2'	68.2°	1°29.4'	+34.0'	68.2°	1°51.7'	+34.8'	68.2°	19
20	0°07.8'	+29.9'	67.3°	0°30.9'	+30.8'	67.3°	0°54.1'	+31.6'	67.3°	1°17.2'	+32.4'	67.3°	1°40.4'	+33.2'	67.3°	2°03.4'	+34.0'	67.4°	2°26.5'	+34.8'	67.4°	20
21	0°37.7'	+29.9'	66.4°	1°01.7'	+30.7'	66.4°	1°25.7'	+31.6'	66.5°	1°49.6'	+32.4'	66.5°	2°13.6'	+33.2'	66.5°	2°37.4'	+34.0'	66.5°	3°01.3'	+34.8'	66.6°	21
22	1°07.6'	+29.9'	65.6°	1°32.4'	+30.7'	65.6°	1°57.2'	+31.5'	65.6°	2°22.0'	+3											

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

78° 282° LHA

Latitude CONTRARY to 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°34.6'	-28.7'	95.7°	10°28.6'	-29.7'	95.9°	10°22.4'	-30.6'	96.1°	10°15.9'	-31.5'	96.2°	10°09.3'	-32.4'	96.4°	10°02.5'	-33.2'	96.6°	9°55.5'	-34.1'	96.8°	0
1	10°05.9'	-28.9'	96.6°	9°59.0'	-29.8'	96.8°	9°51.8'	-30.7'	96.9°	9°44.5'	-31.6'	97.1°	9°37.0'	-32.5'	97.3°	9°29.3'	-33.4'	97.4°	9°21.4'	-34.2'	97.6°	1
2	9°37.0'	-29.0'	97.5°	9°29.2'	-29.9'	97.6°	9°21.1'	-30.8'	97.8°	9°12.9'	-31.7'	98.0°	9°04.5'	-32.6'	98.1°	8°55.9'	-33.5'	98.3°	8°47.2'	-34.3'	98.4°	2
3	9°08.1'	-29.1'	98.4°	8°59.3'	-30.0'	98.5°	8°50.3'	-30.9'	98.7°	8°41.1'	-31.8'	98.8°	8°31.9'	-32.7'	99.0°	8°22.4'	-33.6'	99.1°	8°12.8'	-34.4'	99.3°	3
4	8°38.9'	-29.3'	99.3°	8°29.2'	-30.2'	99.4°	8°19.3'	-31.1'	99.5°	8°09.3'	-31.9'	99.7°	7°59.1'	-32.8'	99.8°	7°48.8'	-33.7'	100.0°	7°38.4'	-34.5'	100.1°	4
5	8°09.7'	-29.4'	100.1°	7°59.0'	-30.3'	100.3°	7°48.3'	-31.2'	100.4°	7°37.4'	-32.0'	100.5°	7°26.3'	-32.9'	100.7°	7°15.1'	-33.8'	100.8°	7°03.8'	-34.6'	100.9°	5
6	7°40.3'	-29.5'	101.0°	7°28.8'	-30.4'	101.1°	7°17.1'	-31.3'	101.3°	7°05.3'	-32.1'	101.4°	6°53.4'	-33.0'	101.5°	6°41.4'	-33.9'	101.6°	6°29.2'	-34.7'	101.7°	6
7	7°10.8'	-29.6'	101.9°	6°58.4'	-30.5'	102.0°	6°45.8'	-31.4'	102.1°	6°33.2'	-32.2'	102.2°	6°20.4'	-33.1'	102.4°	6°07.5'	-33.9'	102.5°	5°54.5'	-34.8'	102.6°	7
8	6°41.2'	-29.7'	102.8°	6°27.9'	-30.6'	102.9°	6°14.5'	-31.4'	103.0°	6°00.9'	-32.3'	103.1°	5°47.3'	-33.2'	103.2°	5°33.5'	-34.0'	103.3°	5°19.7'	-34.8'	103.4°	8
9	6°11.6'	-29.8'	103.6°	5°57.4'	-30.6'	103.7°	5°43.0'	-31.5'	103.8°	5°28.6'	-32.4'	103.9°	5°14.1'	-33.2'	104.0°	4°59.5'	-34.1'	104.1°	4°44.9'	-34.9'	104.2°	9
10	5°41.8'	-29.8'	104.5°	5°26.7'	-30.7'	104.6°	5°11.5'	-31.6'	104.7°	4°56.3'	-32.4'	104.8°	4°40.9'	-33.3'	104.9°	4°25.5'	-34.1'	104.9°	4°10.0'	-35.0'	105.0°	10
11	5°12.0'	-29.9'	105.4°	4°56.0'	-30.8'	105.5°	4°39.9'	-31.6'	105.6°	4°23.8'	-32.5'	105.6°	4°07.6'	-33.3'	105.7°	3°51.3'	-34.2'	105.8°	3°35.0'	-35.0'	105.8°	11
12	4°42.1'	-30.0'	106.3°	4°25.2'	-30.8'	106.3°	4°08.3'	-31.7'	106.4°	3°51.3'	-32.5'	106.5°	3°34.3'	-33.4'	106.5°	3°17.2'	-34.2'	106.6°	3°00.0'	-35.0'	106.6°	12
13	4°12.1'	-30.0'	107.1°	3°54.4'	-30.9'	107.2°	3°36.6'	-31.7'	107.3°	3°18.8'	-32.6'	107.3°	3°00.9'	-33.4'	107.4°	2°43.0'	-34.2'	107.4°	2°25.0'	-35.1'	107.5°	13
14	3°42.0'	-30.1'	108.0°	3°23.5'	-30.9'	108.1°	3°04.9'	-31.8'	108.1°	2°46.2'	-32.6'	108.2°	2°27.5'	-33.5'	108.2°	2°08.7'	-34.3'	108.2°	1°49.9'	-35.1'	108.3°	14
15	3°12.0'	-30.1'	108.9°	2°52.5'	-31.0'	108.9°	2°33.1'	-31.8'	109.0°	2°13.6'	-32.7'	109.0°	1°54.0'	-33.5'	109.0°	1°34.4'	-34.3'	109.1°	1°14.8'	-35.1'	109.1°	15
16	2°41.8'	-30.2'	109.7°	2°21.6'	-31.0'	109.8°	2°01.3'	-31.8'	109.8°	1°40.9'	-32.7'	109.8°	1°20.5'	-33.5'	109.9°	1°00.1'	-34.3'	109.9°	0°39.7'	-35.1'	109.9°	16
17	2°11.7'	-30.2'	110.6°	1°50.6'	-31.0'	110.6°	1°29.4'	-31.9'	110.7°	1°08.2'	-32.7'	110.7°	0°47.0'	-33.5'	110.7°	<u>0°25.8'</u>	<u>-34.3'</u>	<u>110.7°</u>	<u>0°04.6'</u>	<u>-35.1'</u>	<u>110.7°</u>	17
18	1°41.5'	-30.2'	111.5°	1°19.5'	-31.1'	111.5°	0°57.5'	-31.9'	111.5°	0°35.5'	-32.7'	111.5°	<u>0°13.5'</u>	<u>-33.5'</u>	<u>111.5°</u>	0°08.5'	+34.3'	68.5°	0°30.5'	+35.1'	68.5°	18
19	1°11.3'	-30.2'	112.3°	0°48.5'	-31.1'	112.3°	<u>0°25.7'</u>	<u>-31.9'</u>	<u>112.3°</u>	<u>0°02.8'</u>	<u>-32.7'</u>	<u>112.4°</u>	0°20.0'	+33.5'	67.6°	0°42.8'	+34.3'	67.7°	1°05.6'	+35.1'	67.7°	19
20	0°41.0'	-30.2'	113.2°	<u>0°17.4'</u>	<u>-31.1'</u>	<u>113.2°</u>	0°06.2'	+31.9'	66.8°	0°29.9'	+32.7'	66.8°	0°53.5'	+33.5'	66.8°	1°17.1'	+34.3'	66.8°	1°40.7'	+35.1'	66.9°	20
21	<u>0°10.8'</u>	<u>-30.2'</u>	<u>114.1°</u>	0°13.7'	+31.1'	65.9°	0°38.1'	+31.9'	66.0°	1°02.6'	+32.7'	66.0°	1°27.0'	+33.5'	66.0°	1°51.4'	+34.3'	66.0°	2°15.8'	+35.0'	66.0°	21
22	0°19.5'	+30.2'	65.1°	0°44.7'	+31.1'	65.1°	1°10.0'	+31.9'	65.1°	1°35.2'	+32.7'	65.1°	2°00.5'	+33.4'	65.2°	2°25.6'	+34.2'	65.2°	2°50.8'	+35.0'	65.2°	22
23	0°49.7'	+30.2'	64.2°	1°15.8'	+31.0'	64.2°	1°41.8'	+31.8'	64.3°	2°07.9'	+32.6'	64.3°	2°33.9'	+33.4'	64.3°	2°59.9'	+34.2'	64.4°	3°25.8'	+35.0'	64.4°	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

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	11°27.3'	-28.8'	96.2°	11°20.8'	-29.7'	96.4°	11°14.0'	-30.7'	96.6°	11°07.0'	-31.6'	96.8°	10°59.9'	-32.5'	97.0°	10°52.5'	-33.3'	97.2°	10°44.9'	-34.2'	97.4°	0
1	10°58.5'	-29.0'	97.1°	10°51.1'	-29.9'	97.3°	10°43.4'	-30.8'	97.5°	10°35.5'	-31.7'	97.6°	10°27.4'	-32.6'	97.8°	10°19.1'	-33.5'	98.0°	10°10.7'	-34.3'	98.2°	1
2	10°29.5'	-29.1'	98.0°	10°21.2'	-30.0'	98.2°	10°12.6'	-30.9'	98.3°	10°03.8'	-31.8'	98.5°	9°54.8'	-32.7'	98.7°	9°45.7'	-33.6'	98.9°	9°36.3'	-34.5'	99.0°	2
3	10°00.5'	-29.3'	98.9°	9°51.1'	-30.2'	99.0°	9°41.6'	-31.1'	99.2°	9°31.9'	-32.0'	99.4°	9°22.1'	-32.8'	99.5°	9°12.1'	-33.7'	99.7°	9°01.9'	-34.6'	99.9°	3
4	9°31.2'	-29.4'	99.7°	9°20.9'	-30.3'	99.9°	9°10.5'	-31.2'	100.1°	8°60.0'	-32.1'	100.2°	8°49.2'	-33.0'	100.4°	8°38.3'	-33.8'	100.5°	8°27.3'	-34.7'	100.7°	4
5	9°01.8'	-29.5'	100.6°	8°50.6'	-30.4'	100.8°	8°39.3'	-31.3'	100.9°	8°27.9'	-32.2'	101.1°	8°16.3'	-33.1'	101.2°	8°04.5'	-33.9'	101.4°	7°52.6'	-34.8'	101.5°	5
6	8°32.3'	-29.6'	101.5°	8°20.2'	-30.5'	101.7°	8°08.0'	-31.4'	101.8°	7°55.7'	-32.3'	101.9°	7°43.2'	-33.2'	102.1°	7°30.6'	-34.0'	102.2°	7°17.8'	-34.9'	102.3°	6
7	8°02.6'	-29.8'	102.4°	7°49.7'	-30.6'	102.5°	7°36.6'	-31.5'	102.7°	7°23.4'	-32.4'	102.8°	7°10.0'	-33.3'	102.9°	6°56.6'	-34.1'	103.0°	6°43.0'	-34.9'	103.1°	7
8	7°32.9'	-29.9'	103.3°	7°19.0'	-30.7'	103.4°	7°05.1'	-31.6'	103.5°	6°51.0'	-32.5'	103.6°	6°36.8'	-33.3'	103.7°	6°22.5'	-34.2'	103.9°	6°08.0'	-35.0'	104.0°	8
9	7°03.0'	-30.0'	104.1°	6°48.3'	-30.8'	104.3°	6°33.4'	-31.7'	104.4°	6°18.5'	-32.6'	104.5°	6°03.4'	-33.4'	104.6°	5°48.3'	-34.3'	104.7°	5°33.0'	-35.1'	104.8°	9
10	6°33.0'	-30.0'	105.0°	6°17.4'	-30.9'	105.1°	6°01.7'	-31.8'	105.2°	5°45.9'	-32.6'	105.3°	5°30.0'	-33.5'	105.4°	5°14.0'	-34.3'	105.5°	4°57.9'	-35.1'	105.6°	10
11	6°03.0'	-30.1'	105.9°	5°46.5'	-31.0'	106.0°	5°29.9'	-31.9'	106.1°	5°13.3'	-32.7'	106.2°	4°56.5'	-33.5'	106.3°	4°39.7'	-34.4'	106.3°	4°22.8'	-35.2'	106.4°	11
12	5°32.9'	-30.2'	106.8°	5°15.5'	-31.1'	106.8°	4°58.1'	-31.9'	106.9°	4°40.6'	-32.8'	107.0°	4°23.0'	-33.6'	107.1°	4°05.3'	-34.4'	107.2°	3°47.6'	-35.2'	107.2°	12
13	5°02.6'	-30.3'	107.6°	4°44.4'	-31.1'	107.7°	4°26.2'	-32.0'	107.8°	4°07.8'	-32.8'	107.8°	3°49.4'	-33.7'	107.9°	3°30.9'	-34.5'	108.0°	3°12.3'	-35.3'	108.0°	13
14	4°32.4'	-30.3'	108.5°	4°13.3'	-31.2'	108.6°	3°54.2'	-32.0'	108.6°	3°35.0'	-32.9'	108.7°	3°15.7'	-33.7'	108.7°	2°56.4'	-34.5'	108.8°	2°37.1'	-35.3'	108.8°	14
15	4°02.0'	-30.4'	109.4°	3°42.1'	-31.2'	109.4°	3°22.1'	-32.1'	109.5°	3°02.1'	-32.9'	109.5°	2°42.0'	-33.7'	109.6°	2°21.9'	-34.5'	109.6°	2°01.8'	-35.3'	109.7°	15
16	3°31.6'	-30.4'	110.2°	3°10.9'	-31.3'	110.3°	2°50.1'	-32.1'	110.3°	2°29.2'	-32.9'	110.4°	2°08.3'	-33.8'	110.4°	1°47.4'	-34.6'	110.4°	1°26.4'	-35.4'	110.5°	16
17	3°01.2'	-30.5'	111.1°	2°39.6'	-31.3'	111.1°	2°17.9'	-32.1'	111.2°	1°56.3'	-33.0'	111.2°	1°34.6'	-33.8'	111.2°	1°12.8'	-34.6'	111.3°	0°51.1'	-35.4'	111.3°	17
18	2°30.7'	-30.5'	111.9°	2°08.3'	-31.3'	112.0°	1°45.8'	-32.2'	112.0°	1°23.3'	-33.0'	112.0°	1°00.8'	-33.8'	112.1°	0°38.2'	-34.6'	112.1°	0°15.7'	-35.4'	112.1°	18
19	2°00.2'	-30.5'	112.8°	1°36.9'	-31.4'	112.8°	1°13.6'	-32.2'	112.9°	0°50.3'	-33.0'	112.9°	<u>0°27.0'</u>	<u>-33.8'</u>	<u>112.9°</u>	<u>0°03.7'</u>	<u>-34.6'</u>	<u>112.9°</u>	0°19.7'	+35.4'	67.1°	19
20	1°29.6'	-30.6'	113.7°	1°05.6'	-31.4'	113.7°	0°41.4'	-32.2'	113.7°	<u>0°17.3'</u>	<u>-33.0'</u>	<u>113.7°</u>	0°06.8'	+33.8'	66.3°	0°30.9'	+34.6'	66.3°	0°55.0'	+35.4'	66.3°	20
21	0°59.1'	-30.6'	114.5°	0°34.2'	-31.4'	114.5°	<u>0°09.2'</u>	<u>-32.2'</u>	<u>114.5°</u>	0°15.7'	+33.0'	65.5°	0°40.6'	+33.8'	65.5°	1°05.5'	+34.6'					

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°20.0'	-28.9'	96.7°	12°12.9'	-29.8'	96.9°	12°05.6'	-30.8'	97.1°	11°58.1'	-31.7'	97.3°	11°50.3'	-32.6'	97.5°	11°42.4'	-33.4'	97.7°	11°34.2'	-34.3'	97.9°	0
1	11°51.0'	-29.1'	97.6°	11°43.1'	-30.0'	97.8°	11°34.9'	-30.9'	98.0°	11°26.4'	-31.8'	98.2°	11°17.8'	-32.7'	98.4°	11°08.9'	-33.6'	98.6°	10°59.9'	-34.5'	98.8°	1
2	11°22.0'	-29.2'	98.5°	11°13.1'	-30.2'	98.7°	11°03.9'	-31.1'	98.9°	10°54.6'	-32.0'	99.0°	10°45.1'	-32.8'	99.2°	10°35.3'	-33.7'	99.4°	10°25.4'	-34.6'	99.6°	2
3	10°52.8'	-29.4'	99.4°	10°42.9'	-30.3'	99.5°	10°32.9'	-31.2'	99.7°	10°22.6'	-32.1'	99.9°	10°12.2'	-33.0'	100.1°	10°01.6'	-33.8'	100.3°	9°50.8'	-34.7'	100.4°	3
4	10°23.4'	-29.5'	100.2°	10°12.6'	-30.5'	100.4°	10°01.7'	-31.3'	100.6°	9°50.5'	-32.2'	100.8°	9°39.2'	-33.1'	100.9°	9°27.8'	-34.0'	101.1°	9°16.1'	-34.8'	101.3°	4
5	9°53.8'	-29.7'	101.1°	9°42.1'	-30.6'	101.3°	9°30.3'	-31.5'	101.5°	9°18.3'	-32.4'	101.6°	9°06.1'	-33.2'	101.8°	8°53.8'	-34.1'	101.9°	8°41.3'	-34.9'	102.1°	5
6	9°24.1'	-29.8'	102.0°	9°11.6'	-30.7'	102.2°	8°58.8'	-31.6'	102.3°	8°45.9'	-32.5'	102.5°	8°32.9'	-33.3'	102.6°	8°19.7'	-34.2'	102.8°	8°06.4'	-35.0'	102.9°	6
7	8°54.3'	-29.9'	102.9°	8°40.8'	-30.8'	103.0°	8°27.2'	-31.7'	103.2°	8°13.5'	-32.6'	103.3°	7°59.6'	-33.4'	103.5°	7°45.5'	-34.3'	103.6°	7°31.4'	-35.1'	103.7°	7
8	8°24.4'	-30.1'	103.8°	8°10.0'	-30.9'	103.9°	7°55.5'	-31.8'	104.0°	7°40.9'	-32.7'	104.2°	7°26.1'	-33.5'	104.3°	7°11.3'	-34.4'	104.4°	6°56.2'	-35.2'	104.5°	8
9	7°54.3'	-30.2'	104.6°	7°39.1'	-31.0'	104.8°	7°23.7'	-31.9'	104.9°	7°08.2'	-32.8'	105.0°	6°52.6'	-33.6'	105.1°	6°36.9'	-34.4'	105.3°	6°21.0'	-35.3'	105.4°	9
10	7°24.1'	-30.3'	105.5°	7°08.0'	-31.1'	105.6°	6°51.8'	-32.0'	105.8°	6°35.5'	-32.9'	105.9°	6°19.0'	-33.7'	106.0°	6°02.4'	-34.5'	106.1°	5°45.8'	-35.3'	106.2°	10
11	6°53.9'	-30.4'	106.4°	6°36.9'	-31.2'	106.5°	6°19.8'	-32.1'	106.6°	6°02.6'	-32.9'	106.7°	5°45.3'	-33.8'	106.8°	5°27.9'	-34.6'	106.9°	5°10.4'	-35.4'	107.0°	11
12	6°23.5'	-30.4'	107.2°	6°05.7'	-31.3'	107.4°	5°47.7'	-32.2'	107.5°	5°29.7'	-33.0'	107.5°	5°11.5'	-33.8'	107.6°	4°53.3'	-34.6'	107.7°	4°35.0'	-35.5'	107.8°	12
13	5°53.1'	-30.5'	108.1°	5°34.4'	-31.4'	108.2°	5°15.6'	-32.2'	108.3°	4°56.7'	-33.1'	108.4°	4°37.7'	-33.9'	108.5°	4°18.7'	-34.7'	108.5°	3°59.6'	-35.5'	108.6°	13
14	5°22.5'	-30.6'	109.0°	5°03.0'	-31.5'	109.1°	4°43.3'	-32.3'	109.1°	4°23.6'	-33.1'	109.2°	4°03.8'	-33.9'	109.3°	3°44.0'	-34.7'	109.4°	3°24.1'	-35.5'	109.4°	14
15	4°51.9'	-30.7'	109.8°	4°31.5'	-31.5'	109.9°	4°11.0'	-32.3'	110.0°	3°50.5'	-33.2'	110.1°	3°29.9'	-34.0'	110.1°	3°09.2'	-34.8'	110.2°	2°48.5'	-35.6'	110.2°	15
16	4°21.3'	-30.7'	110.7°	4°00.0'	-31.6'	110.8°	3°38.7'	-32.4'	110.8°	3°17.3'	-33.2'	110.9°	2°55.9'	-34.0'	110.9°	2°34.4'	-34.8'	111.0°	2°12.9'	-35.6'	111.0°	16
17	3°50.5'	-30.8'	111.6°	3°28.5'	-31.6'	111.6°	3°06.3'	-32.4'	111.7°	2°44.1'	-33.2'	111.7°	2°21.9'	-34.0'	111.8°	1°59.6'	-34.8'	111.8°	1°37.3'	-35.6'	111.8°	17
18	3°19.8'	-30.8'	112.4°	2°56.8'	-31.6'	112.5°	2°33.9'	-32.5'	112.5°	2°10.9'	-33.3'	112.6°	1°47.8'	-34.1'	112.6°	1°24.8'	-34.9'	112.6°	1°01.7'	-35.6'	112.6°	18
19	2°48.9'	-30.9'	113.3°	2°25.2'	-31.7'	113.3°	2°01.4'	-32.5'	113.4°	1°37.6'	-33.3'	113.4°	1°13.8'	-34.1'	113.4°	0°49.9'	-34.9'	113.4°	0°26.1'	-35.6'	113.4°	19
20	2°18.1'	-30.9'	114.1°	1°53.5'	-31.7'	114.2°	1°28.9'	-32.5'	114.2°	1°04.3'	-33.3'	114.2°	0°39.7'	-34.1'	114.2°	0°15.1'	-34.9'	114.2°	0°09.6'	+35.6'	65.8°	20
21	1°47.2'	-30.9'	115.0°	1°21.8'	-31.7'	115.0°	0°56.4'	-32.5'	115.0°	0°31.0'	-33.3'	115.1°	0°05.6'	-34.1'	115.1°	0°19.8'	+34.9'	64.9°	0°45.2'	+35.6'	64.9°	21
22	1°16.3'	-30.9'	115.9°	0°50.1'	-31.7'	115.9°	0°23.9'	-32.5'	115.9°	0°02.3'	+33.3'	64.1°	0°28.5'	+34.1'	64.1°	0°54.7'	+34.9'	64.1°	1°20.9'	+35.6'	64.1°	22
23	0°45.3'	-30.9'	116.7°	0°18.4'	-31.7'	116.7°	0°08.6'	+32.5'	63.3°	0°35.6'	+33.3'	63.3°	1°02.6'	+34.1'	63.3°	1°29.5'	+34.8'	63.3°	1°56.5'	+35.6'	63.3°	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°12.6'	-29.0'	97.2°	13°05.0'	-30.0'	97.4°	12°57.2'	-30.9'	97.6°	12°49.1'	-31.8'	97.9°	12°40.7'	-32.7'	98.1°	12°32.2'	-33.6'	98.3°	12°23.4'	-34.4'	98.5°	0
1	12°43.5'	-29.2'	98.1°	12°35.0'	-30.1'	98.3°	12°26.3'	-31.0'	98.5°	12°17.3'	-31.9'	98.7°	12°08.1'	-32.8'	98.9°	11°58.6'	-33.7'	99.2°	11°49.0'	-34.6'	99.4°	1
2	12°14.3'	-29.4'	99.0°	12°04.9'	-30.3'	99.2°	11°55.2'	-31.2'	99.4°	11°45.4'	-32.1'	99.6°	11°35.2'	-33.0'	99.8°	11°24.9'	-33.9'	100.0°	11°14.4'	-34.7'	100.2°	2
3	11°45.0'	-29.5'	99.9°	11°34.6'	-30.5'	100.1°	11°24.0'	-31.4'	100.3°	11°13.3'	-32.2'	100.5°	11°02.3'	-33.1'	100.6°	10°51.1'	-34.0'	100.8°	10°39.7'	-34.8'	101.0°	3
4	11°15.4'	-29.7'	100.7°	11°04.2'	-30.6'	100.9°	10°52.7'	-31.5'	101.1°	10°41.0'	-32.4'	101.3°	10°29.1'	-33.3'	101.5°	10°17.1'	-34.1'	101.7°	10°04.9'	-35.0'	101.9°	4
5	10°45.7'	-29.9'	101.6°	10°33.6'	-30.8'	101.8°	10°21.2'	-31.6'	102.0°	10°08.6'	-32.5'	102.2°	9°55.9'	-33.4'	102.3°	9°43.0'	-34.2'	102.5°	9°29.9'	-35.1'	102.7°	5
6	10°15.9'	-30.0'	102.5°	10°02.8'	-30.9'	102.7°	9°49.5'	-31.8'	102.9°	9°36.1'	-32.6'	103.0°	9°22.5'	-33.5'	103.2°	9°08.7'	-34.4'	103.3°	8°54.8'	-35.2'	103.5°	6
7	9°45.9'	-30.1'	103.4°	9°31.9'	-31.0'	103.6°	9°17.8'	-31.9'	103.7°	9°03.5'	-32.8'	103.9°	8°49.0'	-33.6'	104.0°	8°34.4'	-34.5'	104.2°	8°19.6'	-35.3'	104.3°	7
8	9°15.8'	-30.3'	104.3°	9°00.9'	-31.1'	104.4°	8°45.9'	-32.0'	104.6°	8°30.7'	-32.9'	104.7°	8°15.4'	-33.7'	104.9°	7°59.9'	-34.6'	105.0°	7°44.3'	-35.4'	105.1°	8
9	8°45.5'	-30.4'	105.1°	8°29.8'	-31.3'	105.3°	8°13.9'	-32.1'	105.4°	7°57.8'	-33.0'	105.6°	7°41.7'	-33.8'	105.7°	7°25.4'	-34.6'	105.8°	7°08.9'	-35.5'	105.9°	9
10	8°15.1'	-30.5'	106.0°	7°58.5'	-31.4'	106.1°	7°41.8'	-32.2'	106.3°	7°24.9'	-33.1'	106.4°	7°07.9'	-33.9'	106.5°	6°50.7'	-34.7'	106.6°	6°33.5'	-35.5'	106.8°	10
11	7°44.6'	-30.6'	106.9°	7°27.1'	-31.5'	107.0°	7°09.5'	-32.3'	107.1°	6°51.8'	-33.2'	107.2°	6°34.0'	-34.0'	107.4°	6°16.0'	-34.8'	107.5°	5°57.9'	-35.6'	107.6°	11
12	7°14.0'	-30.7'	107.7°	6°55.7'	-31.6'	107.9°	6°37.2'	-32.4'	108.0°	6°18.6'	-33.2'	108.1°	5°60.0'	-34.1'	108.2°	5°41.2'	-34.9'	108.3°	5°22.3'	-35.7'	108.4°	12
13	6°43.3'	-30.8'	108.6°	6°24.1'	-31.6'	108.7°	6°04.8'	-32.5'	108.8°	5°45.4'	-33.3'	108.9°	5°25.9'	-34.1'	109.0°	5°06.3'	-34.9'	109.1°	4°46.6'	-35.7'	109.2°	13
14	6°12.6'	-30.9'	109.5°	5°52.5'	-31.7'	109.6°	5°32.3'	-32.5'	109.7°	5°12.1'	-33.4'	109.8°	4°51.8'	-34.2'	109.8°	4°31.4'	-35.0'	109.9°	4°10.9'	-35.8'	110.0°	14
15	5°41.7'	-30.9'	110.3°	5°20.8'	-31.8'	110.4°	4°59.8'	-32.6'	110.5°	4°38.7'	-33.4'	110.6°	4°17.6'	-34.2'	110.7°	3°56.4'	-35.0'	110.7°	3°35.1'	-35.8'	110.8°	15
16	5°10.7'	-31.0'	111.2°	4°49.0'	-31.8'	111.3°	4°27.2'	-32.7'	111.4°	4°05.3'	-33.5'	111.4°	3°43.3'	-34.3'	111.5°	3°21.3'	-35.1'	111.5°	2°59.3'	-35.9'	111.6°	16
17	4°39.7'	-31.1'	112.1°	4°17.2'	-31.9'	112.1°	3°54.5'	-32.7'	112.2°	3°31.8'	-33.5'	112.3°	3°09.1'	-34.3'	112.3°	2°46.3'	-35.1'	112.4°	2°23.4'	-35.9'	112.4°	17
18	4°08.6'	-31.1'	112.9°	3°45.2'	-32.0'	113.0°	3°21.8'	-32.8'	113.0°	2°58.3'	-33.6'	113.1°	2°34.7'	-34.4'	113.1°	2°11.1'	-35.1'	113.2°	1°47.5'	-35.9'	113.2°	18
19	3°37.5'	-31.2'	113.8°	3°13.3'	-32.0'	113.8°	2°49.0'	-32.8'	113.9°	2°24.7'	-33.6'	113.9°	2°00.4'	-34.4'	114.0°	1°36.0'	-35.2'	114.0°	1°11.6'	-35.9'	114.0°	19
20	3°06.3'	-31.2'	114.6°	2°41.3'	-32.0'	114.7°	2°16.2'	-32.8'	114.7°	1°51.1'	-33.6'	114.7°	1°26.0'	-34.4'	114.8°	1°00.8'	-35.2'	114.8°	0°35.7'	-35.9'	114.8°	20
21	2°35.1'	-31.3'	115.5°	2°09.3'	-32.1'	115.5°	1°43.4'	-32.9'	115.6°	1°17.5'	-33.6'	115.6°	0°51.6'	-34.4'	115.6°	0°25.7'	-35.2'	115.6°	0°00.3'	+35.9'	64.4°	2

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

74° 286° LHA

Latitude CONTRARY to Declination

74° 286° 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	14°05.1'-29.1'	97.7°	13°57.0'-30.1'	97.9°	13°48.6'-31.0'	98.2°	13°40.0'-31.9'	98.4°	13°31.1'-32.8'	98.6°	13°22.0'-33.7'	98.9°	13°12.6'-34.5'	99.1°	13°03.5'-35.4'	99.4°	12°54.4'-36.2'	99.7°	12°45.3'-37.0'	100.0°	12°36.2'-37.7'	100.3°	12°27.1'-38.4'	100.6°	12°18.0'-39.1'	100.9°	12°08.9'-39.8'	101.2°	12°00.0'-40.5'	101.5°	11°51.0'-41.2'	101.8°	11°42.0'-42.0'	102.1°	11°33.0'-42.7'	102.4°	11°24.0'-43.4'	102.7°	11°15.0'-44.1'	103.0°	11°06.0'-44.8'	103.3°	10°57.0'-45.5'	103.6°	10°48.0'-46.2'	103.9°	10°39.0'-46.9'	104.2°	10°30.0'-47.6'	104.5°	10°21.0'-48.3'	104.8°	10°12.0'-49.0'	105.1°	10°03.0'-49.7'	105.4°	9°54.0'-50.4'	105.7°	9°45.0'-51.1'	106.0°	9°36.0'-51.8'	106.3°	9°27.0'-52.5'	106.6°	9°18.0'-53.2'	106.9°	9°09.0'-53.9'	107.2°	9°00.0'-54.6'	107.5°	8°51.0'-55.3'	107.8°	8°42.0'-56.0'	108.1°	8°33.0'-56.7'	108.4°	8°24.0'-57.4'	108.7°	8°15.0'-58.1'	109.0°	8°06.0'-58.8'	109.3°	7°57.0'-59.5'	109.6°	7°48.0'-60.2'	109.9°	7°39.0'-60.9'	110.2°	7°30.0'-61.6'	110.5°	7°21.0'-62.3'	110.8°	7°12.0'-63.0'	111.1°	7°03.0'-63.7'	111.4°	6°54.0'-64.4'	111.7°	6°45.0'-65.1'	112.0°	6°36.0'-65.8'	112.3°	6°27.0'-66.5'	112.6°	6°18.0'-67.2'	112.9°	6°09.0'-67.9'	113.2°	6°00.0'-68.6'	113.5°	5°51.0'-69.3'	113.8°	5°42.0'-70.0'	114.1°	5°33.0'-70.7'	114.4°	5°24.0'-71.4'	114.7°	5°15.0'-72.1'	115.0°	5°06.0'-72.8'	115.3°	4°57.0'-73.5'	115.6°	4°48.0'-74.2'	115.9°	4°39.0'-74.9'	116.2°	4°30.0'-75.6'	116.5°	4°21.0'-76.3'	116.8°	4°12.0'-77.0'	117.1°	4°03.0'-77.7'	117.4°	3°54.0'-78.4'	117.7°	3°45.0'-79.1'	118.0°	3°36.0'-79.8'	118.3°	3°27.0'-80.5'	118.6°	3°18.0'-81.2'	118.9°	3°09.0'-81.9'	119.2°	3°00.0'-82.6'	119.5°	2°51.0'-83.3'	119.8°	2°42.0'-84.0'	120.1°	2°33.0'-84.7'	120.4°	2°24.0'-85.4'	120.7°	2°15.0'-86.1'	121.0°	2°06.0'-86.8'	121.3°	1°57.0'-87.5'	121.6°	1°48.0'-88.2'	121.9°	1°39.0'-88.9'	122.2°	1°30.0'-89.6'	122.5°	1°21.0'-90.3'	122.8°	1°12.0'-91.0'	123.1°	1°03.0'-91.7'	123.4°	0°54.0'-92.4'	123.7°	0°45.0'-93.1'	124.0°	0°36.0'-93.8'	124.3°	0°27.0'-94.5'	124.6°	0°18.0'-95.2'	124.9°	0°09.0'-95.9'	125.2°	0°00.0'-96.6'	125.5°	359°51.0'-97.3'	125.8°	359°42.0'-98.0'	126.1°	359°33.0'-98.7'	126.4°	359°24.0'-99.4'	126.7°	359°15.0'-100.1'	127.0°	359°06.0'-100.8'	127.3°	358°57.0'-101.5'	127.6°	358°48.0'-102.2'	127.9°	358°39.0'-102.9'	128.2°	358°30.0'-103.6'	128.5°	358°21.0'-104.3'	128.8°	358°12.0'-105.0'	129.1°	358°03.0'-105.7'	129.4°	357°54.0'-106.4'	129.7°	357°45.0'-107.1'	130.0°	357°36.0'-107.8'	130.3°	357°27.0'-108.5'	130.6°	357°18.0'-109.2'	130.9°	357°09.0'-109.9'	131.2°	357°00.0'-110.6'	131.5°	356°51.0'-111.3'	131.8°	356°42.0'-112.0'	132.1°	356°33.0'-112.7'	132.4°	356°24.0'-113.4'	132.7°	356°15.0'-114.1'	133.0°	356°06.0'-114.8'	133.3°	355°57.0'-115.5'	133.6°	355°48.0'-116.2'	133.9°	355°39.0'-116.9'	134.2°	355°30.0'-117.6'	134.5°	355°21.0'-118.3'	134.8°	355°12.0'-119.0'	135.1°	355°03.0'-119.7'	135.4°	354°54.0'-120.4'	135.7°	354°45.0'-121.1'	136.0°	354°36.0'-121.8'	136.3°	354°27.0'-122.5'	136.6°	354°18.0'-123.2'	136.9°	354°09.0'-123.9'	137.2°	354°00.0'-124.6'	137.5°	353°51.0'-125.3'	137.8°	353°42.0'-126.0'	138.1°	353°33.0'-126.7'	138.4°	353°24.0'-127.4'	138.7°	353°15.0'-128.1'	139.0°	353°06.0'-128.8'	139.3°	352°57.0'-129.5'	139.6°	352°48.0'-130.2'	139.9°	352°39.0'-130.9'	140.2°	352°30.0'-131.6'	140.5°	352°21.0'-132.3'	140.8°	352°12.0'-133.0'	141.1°	352°03.0'-133.7'	141.4°	351°54.0'-134.4'	141.7°	351°45.0'-135.1'	142.0°	351°36.0'-135.8'	142.3°	351°27.0'-136.5'	142.6°	351°18.0'-137.2'	142.9°	351°09.0'-137.9'	143.2°	351°00.0'-138.6'	143.5°	350°51.0'-139.3'	143.8°	350°42.0'-140.0'	144.1°	350°33.0'-140.7'	144.4°	350°24.0'-141.4'	144.7°	350°15.0'-142.1'	145.0°	350°06.0'-142.8'	145.3°	349°57.0'-143.5'	145.6°	349°48.0'-144.2'	145.9°	349°39.0'-144.9'	146.2°	349°30.0'-145.6'	146.5°	349°21.0'-146.3'	146.8°	349°12.0'-147.0'	147.1°	349°03.0'-147.7'	147.4°	348°54.0'-148.4'	147.7°	348°45.0'-149.1'	148.0°	348°36.0'-149.8'	148.3°	348°27.0'-150.5'	148.6°	348°18.0'-151.2'	148.9°	348°09.0'-151.9'	149.2°	348°00.0'-152.6'	149.5°	347°51.0'-153.3'	149.8°	347°42.0'-154.0'	150.1°	347°33.0'-154.7'	150.4°	347°24.0'-155.4'	150.7°	347°15.0'-156.1'	151.0°	347°06.0'-156.8'	151.3°	346°57.0'-157.5'	151.6°	346°48.0'-158.2'	151.9°	346°39.0'-158.9'	152.2°	346°30.0'-159.6'	152.5°	346°21.0'-160.3'	152.8°	346°12.0'-161.0'	153.1°	346°03.0'-161.7'	153.4°	345°54.0'-162.4'	153.7°	345°45.0'-163.1'	154.0°	345°36.0'-163.8'	154.3°	345°27.0'-164.5'	154.6°	345°18.0'-165.2'	154.9°	345°09.0'-165.9'	155.2°	345°00.0'-166.6'	155.5°	344°51.0'-167.3'	155.8°	344°42.0'-168.0'	156.1°	344°33.0'-168.7'	156.4°	344°24.0'-169.4'	156.7°	344°15.0'-170.1'	157.0°	344°06.0'-170.8'	157.3°	343°57.0'-171.5'	157.6°	343°48.0'-172.2'	157.9°	343°39.0'-172.9'	158.2°	343°30.0'-173.6'	158.5°	343°21.0'-174.3'	158.8°	343°12.0'-175.0'	159.1°	343°03.0'-175.7'	159.4°	342°54.0'-176.4'	159.7°	342°45.0'-177.1'	160.0°	342°36.0'-177.8'	160.3°	342°27.0'-178.5'	160.6°	342°18.0'-179.2'	160.9°	342°09.0'-179.9'	161.2°	342°00.0'-180.6'	161.5°	341°51.0'-181.3'	161.8°	341°42.0'-182.0'	162.1°	341°33.0'-182.7'	162.4°	341°24.0'-183.4'	162.7°	341°15.0'-184.1'	163.0°	341°06.0'-184.8'	163.3°	340°57.0'-185.5'	163.6°	340°48.0'-186.2'	163.9°	340°39.0'-186.9'	164.2°	340°30.0'-187.6'	164.5°	340°21.0'-188.3'	164.8°	340°12.0'-189.0'	165.1°	340°03.0'-189.7'	165.4°	339°54.0'-190.4'	165.7°	339°45.0'-191.1'	166.0°	339°36.0'-191.8'	166.3°	339°27.0'-192.5'	166.6°	339°18.0'-193.2'	166.9°	339°09.0'-193.9'	167.2°	339°00.0'-194.6'	167.5°	338°51.0'-195.3'	167.8°	338°42.0'-196.0'	168.1°	338°33.0'-196.7'	168.4°	338°24.0'-197.4'	168.7°	338°15.0'-198.1'	169.0°	338°06.0'-198.8'	169.3°	337°57.0'-199.5'	169.6°	337°48.0'-200.2'	169.9°	337°39.0'-200.9'	170.2°	337°30.0'-201.6'	170.5°	337°21.0'-202.3'	170.8°	337°12.0'-203.0'	171.1°	337°03.0'-203.7'	171.4°	336°54.0'-204.4'	171.7°	336°45.0'-205.1'	172.0°	336°36.0'-205.8'	172.3°	336°27.0'-206.5'	172.6°	336°18.0'-207.2'	172.9°	336°09.0'-207.9'	173.2°	336°00.0'-208.6'	173.5°	335°51.0'-209.3'	173.8°	335°42.0'-210.0'	174.1°	335°33.0'-210.7'	174.4°	335°24.0'-211.4'	174.7°	335°15.0'-212.1'	175.0°	335°06.0'-212.8'	175.3°	334°57.0'-213.5'	175.6°	334°48.0'-214.2'	175.9°	334°39.0'-214.9'	176.2°	334°30.0'-215.6'	176.5°	334°21.0'-216.3'	176.8°	334°12.0'-217.0'	177.1°	334°03.0'-217.7'	177.4°	333°54.0'-218.4'	177.7°	333°45.0'-219.1'	178.0°	333°36.0'-219.8'	178.3°	333°27.0'-220.5'	178.6°	333°18.0'-221.2'	178.9°	333°09.0'-221.9'	179.2°	333°00.0'-222.6'	179.5°	332°51.0'-223.3'	179.8°	332°42.0'-224.0'	180.1°	332°33.0'-224.7'	180.4°	332°24.0'-225.4'	180.7°	332°15.0'-226.1'	181.0°	332°06.0'-226.8'	181.3°	331°57.0'-227.5'	181.6°	331°48.0'-228.2'	181.9°	331°39.0'-228.9'	182.2°	331°30.0'-229.6'	182.5°	331°21.0'-230.3'	182.8°	331°12.0'-231.0'	183.1°	331°03.0'-231.7'	183.4°	330°54.0'-232.4'	183.7°	330°45.0'-233.1'	184.0°	330°36.0'-233.8'	184.3°	330°27.0'-234.5'	184.6°	330°18.0'-235.2'	184.9°	330°09.0'-235.9'	185.2°	330°00.0'-236.6'	185.5°	329°51.0'-237.3'	185.8°	329°42.0'-238.0'	186.1°	329°33.0'-238.7'	186.4°	329°24.0'-239.4'	186.7°	329°15.0'-240.1'	187.0°	329°06.0'-240.8'	187.3°	328°57.0'-241.5'	187.6°	328°48.0'-242.2'	187.9°	328°39.0'-242.9'	188.2°	328°30.0'-243.6'	188.5°	328°21.0'-244.3'	188.8°	328°12.0'-245.0'	189.1°	328°03.0'-245.7'	189.4°	327°54.0'-246.4'	189.7°	327°45.0'-247.1'	190.0°	327°36.0'-247.8'	190.3°	327°27.0'-248.5'	190.6°	327°18.0'-249.2'	190.9°	327°09.0'-249.9'	191.2°	327°00.0'-250.6'	191.5°	326°51.0'-251.3'	191.8°	326°42.0'-252.0'	192.1°	326°33.0'-252.7'	192.4°	326°24.0'-253.4'	192.7°	326°15.0'-254.1'	193.0°	326°06.0'-254.8'	193.3°	325°57.0'-255.5'	193.6°	325°48.0'-256.2'	193.9°	325°39.0'-256.9'	194.2°	325°30.0'-257.6'	194.5°	325°21.0'-258.3'	194.8°	325°12.0'-259.0'	195.1°	325°03.0'-259.7'	195.4°	324°54.0'-260.4'	195.7°	324°45.0'-261.1'	196.0°	324°36.0'-261.8'	196.3°	324°27.0'-262.5'	196.6°	324°18.0'-263.2'	196.9°	324°09.0'-263.9'	197.2°	324°00.0'-264.6'	197.5°	323°51.0'-265.3'	197.8°	323°42.0'-266.0'	198.1°	323°33.0'-266.7'	198.4°	323°24.0'-267.4'	198.7°	323°15.0'-268.1'	199.0°	323°06.0'-268.8'	199.3°	322°57.0'-269.5'	199.6°	322°48.0'-270.2'	199.9°	322°39.0'-270.9'	200.2°	322°30.0'-271.6'	200.5°	322°21.0'-272.3'	200.8°	322°12.0'-273.0'	201.1°	322°03.0'-273.7'	201.4°	321°54.0'-274.4'	201.7°	321°45.0'-275.1'	202.0°	321°36.0'-275.8'	202.3°	321°27.0'-276.5'	202.6°	321°18.0'-277.2'	202.9°	321°09.0'-277.9'	203.2°	321°00.0'-278.6'	203.5°	320°51.0'-279.3'	203.8°	320°42.0'-280.0'	204.1°	320°33.0'-280.7'	204.4°	320°24.0'-281.4'	204.7°	320°15.0'-282.1'	205.0°	320°06.0'-282.8'	205.3°	319°57.0'-283.5'	205.6°	319°48.0'-284.2'	205.9°	319°39.0'-284.9'	206.2°	319°30.0'-285.6'	206.5°	319°21.0'-286.3'	206.8°	319°12.0'-287.0'	207.1°	319°03.0'-287.7'	207.4°	318°54.0'-288.4'	207.7°	318°45.0'-289.1'	208.0°	318°36.0'-289.8'	208.3°	318°27.0'-290.5'	208.6°	318°18.0'-291.2'	208.9°	318°09.0'-291.9'	209.2°	318°00.0'-292.6'	209.5°	317°51.0'-293.3'	209.8°	317°42.0'-294.0'	210.1°	317°33.0'-294.7'	210.4°	317°24.0'-295.4'	210.7°	317°15.0'-296.1'	211.0°	317°06.0'-296.8'	211.3°	316°57.0'-297.5'	211.6°	316°48.0'-298.2'	211.9°	316°39.0'-298.9'	212.2°	316°30.0'-299.6'	212.5°	316°21.0'-300.3'	212.8°	316°12.0'-301.0'	213.1°	316°03.0'-301.7'	213.4°	315°54.0'-302.4'	213.7°	315°45.0'-303.1'	214.0°	315°36.0'-303.8'	214.3°	315°27.0'-304.5'	214.6°	315°18.0'-305.2'	214.9°	315°09.0'-305.9'	215.2°	315°00.0'-306.6'	215.5°	314°51.0'-307.3'	215.8°	314°42.0'-308.0'	216.1°	314°33.0'-308.7'	216.4°	314°24.0'-309.4'	216.7°	314°15.0'-310.1'	217.0°	314°06.0'-310.8'	217.3°	313°57.0'-311.5'	217.6°	313°48.0'-312.2'	217.9°	313°39.0'-312.9'	218.2°	313°30.0'-313.6'



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°50.0'	-29.4'	98.7°	15°40.8'	-30.3'	99.0°	15°31.3'	-31.2'	99.2°	15°21.6'	-32.1'	99.5°	15°11.5'	-33.0'	99.8°	15°01.2'	-33.9'	100.0°	14°50.6'	-34.8'	100.3°	0
1	15°20.6'	-29.6'	99.6°	15°10.5'	-30.5'	99.8°	15°00.1'	-31.4'	100.1°	14°49.4'	-32.3'	100.4°	14°38.5'	-33.2'	100.6°	14°27.3'	-34.1'	100.9°	14°15.8'	-35.0'	101.1°	1
2	14°51.0'	-29.8'	100.5°	14°40.0'	-30.7'	100.7°	14°28.7'	-31.6'	101.0°	14°17.1'	-32.5'	101.2°	14°05.3'	-33.4'	101.5°	13°53.2'	-34.3'	101.7°	13°40.9'	-35.1'	102.0°	2
3	14°21.2'	-30.0'	101.4°	14°09.2'	-30.9'	101.6°	13°57.0'	-31.8'	101.9°	13°44.6'	-32.7'	102.1°	13°31.8'	-33.6'	102.3°	13°18.9'	-34.5'	102.6°	13°05.7'	-35.3'	102.8°	3
4	13°51.2'	-30.2'	102.3°	13°38.3'	-31.1'	102.5°	13°25.2'	-32.0'	102.7°	13°11.8'	-32.9'	103.0°	12°58.3'	-33.8'	103.2°	12°44.4'	-34.6'	103.4°	12°30.4'	-35.5'	103.6°	4
5	13°21.0'	-30.4'	103.2°	13°07.2'	-31.3'	103.4°	12°53.2'	-32.2'	103.6°	12°39.0'	-33.1'	103.8°	12°24.5'	-33.9'	104.0°	12°09.8'	-34.8'	104.3°	11°55.0'	-35.6'	104.5°	5
6	12°50.6'	-30.6'	104.0°	12°35.9'	-31.5'	104.3°	12°21.0'	-32.3'	104.5°	12°05.9'	-33.2'	104.7°	11°50.6'	-34.1'	104.9°	11°35.1'	-34.9'	105.1°	11°19.4'	-35.7'	105.3°	6
7	12°20.0'	-30.7'	104.9°	12°04.4'	-31.6'	105.1°	11°48.7'	-32.5'	105.3°	11°32.7'	-33.4'	105.5°	11°16.5'	-34.2'	105.7°	11°00.2'	-35.0'	105.9°	10°43.6'	-35.9'	106.1°	7
8	11°49.3'	-30.9'	105.8°	11°32.8'	-31.8'	106.0°	11°16.2'	-32.6'	106.2°	10°59.3'	-33.5'	106.4°	10°42.3'	-34.3'	106.6°	10°25.1'	-35.2'	106.7°	10°07.8'	-36.0'	106.9°	8
9	11°18.3'	-31.1'	106.7°	11°01.0'	-31.9'	106.9°	10°43.5'	-32.8'	107.0°	10°25.9'	-33.6'	107.2°	10°08.0'	-34.5'	107.4°	9°50.0'	-35.3'	107.6°	9°31.8'	-36.1'	107.7°	9
10	10°47.3'	-31.2'	107.5°	10°29.1'	-32.1'	107.7°	10°10.7'	-32.9'	107.9°	9°52.2'	-33.8'	108.1°	9°33.5'	-34.6'	108.2°	9°14.7'	-35.4'	108.4°	8°55.7'	-36.2'	108.5°	10
11	10°16.1'	-31.3'	108.4°	9°57.0'	-32.2'	108.6°	9°37.8'	-33.0'	108.8°	9°18.5'	-33.9'	108.9°	8°59.0'	-34.7'	109.1°	8°39.3'	-35.5'	109.2°	8°19.5'	-36.3'	109.3°	11
12	9°44.7'	-31.5'	109.3°	9°24.8'	-32.3'	109.4°	9°04.8'	-33.2'	109.6°	8°44.6'	-34.0'	109.7°	8°24.3'	-34.8'	109.9°	8°03.8'	-35.6'	110.0°	7°43.2'	-36.4'	110.2°	12
13	9°13.3'	-31.6'	110.1°	8°52.5'	-32.4'	110.3°	8°31.6'	-33.3'	110.4°	8°10.6'	-34.1'	110.6°	7°49.5'	-34.9'	110.7°	7°28.2'	-35.7'	110.8°	7°06.8'	-36.5'	111.0°	13
14	8°41.7'	-31.7'	111.0°	8°20.1'	-32.5'	111.1°	7°58.4'	-33.4'	111.3°	7°36.5'	-34.2'	111.4°	7°14.6'	-35.0'	111.5°	6°52.5'	-35.8'	111.6°	6°30.3'	-36.5'	111.8°	14
15	8°10.0'	-31.8'	111.9°	7°47.5'	-32.6'	112.0°	7°25.0'	-33.5'	112.1°	7°02.4'	-34.3'	112.2°	6°39.6'	-35.1'	112.3°	6°16.7'	-35.8'	112.5°	5°53.8'	-36.6'	112.6°	15
16	7°38.1'	-31.9'	112.7°	7°14.9'	-32.7'	112.8°	6°51.6'	-33.5'	113.0°	6°28.1'	-34.3'	113.1°	6°04.5'	-35.1'	113.2°	5°40.9'	-35.9'	113.3°	5°17.2'	-36.7'	113.3°	16
17	7°06.2'	-32.0'	113.6°	6°42.2'	-32.8'	113.7°	6°18.0'	-33.6'	113.8°	5°53.8'	-34.4'	113.9°	5°29.4'	-35.2'	114.0°	5°05.0'	-36.0'	114.1°	4°40.5'	-36.7'	114.1°	17
18	6°34.2'	-32.1'	114.4°	6°09.3'	-32.9'	114.5°	5°44.4'	-33.7'	114.6°	5°19.3'	-34.5'	114.7°	4°54.2'	-35.3'	114.8°	4°29.0'	-36.0'	114.9°	4°03.8'	-36.8'	114.9°	18
19	6°02.1'	-32.2'	115.3°	5°36.4'	-33.0'	115.4°	5°10.7'	-33.8'	115.5°	4°44.9'	-34.5'	115.5°	4°19.0'	-35.3'	115.6°	3°53.0'	-36.1'	115.7°	3°27.0'	-36.8'	115.7°	19
20	5°29.9'	-32.3'	116.1°	5°03.5'	-33.0'	116.2°	4°36.9'	-33.8'	116.3°	4°10.3'	-34.6'	116.4°	3°43.7'	-35.4'	116.4°	3°16.9'	-36.1'	116.5°	2°50.2'	-36.8'	116.5°	20
21	4°57.7'	-32.3'	117.0°	4°30.4'	-33.1'	117.0°	4°03.1'	-33.9'	117.1°	3°35.7'	-34.6'	117.2°	3°08.3'	-35.4'	117.2°	2°40.8'	-36.1'	117.3°	2°13.3'	-36.9'	117.3°	21
22	4°25.4'	-32.4'	117.8°	3°57.3'	-33.1'	117.9°	3°29.2'	-33.9'	117.9°	3°01.1'	-34.7'	118.0°	2°32.9'	-35.4'	118.0°	2°04.7'	-36.2'	118.1°	1°36.5'	-36.9'	118.1°	22
23	3°53.0'	-32.4'	118.7°	3°24.2'	-33.2'	118.7°	2°55.3'	-34.0'	118.8°	2°26.4'	-34.7'	118.8°	1°57.5'	-35.4'	118.8°	1°28.5'	-36.2'	118.9°	0°59.6'	-36.9'	118.9°	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°42.3'	-29.5'	99.2°	16°32.6'	-30.5'	99.5°	16°22.6'	-31.4'	99.8°	16°12.3'	-32.3'	100.1°	16°01.6'	-33.2'	100.3°	15°50.7'	-34.1'	100.6°	15°39.5'	-34.9'	100.9°	0
1	16°12.8'	-29.8'	100.1°	16°02.2'	-30.7'	100.4°	15°51.2'	-31.6'	100.7°	15°40.0'	-32.5'	100.9°	15°28.5'	-33.4'	101.2°	15°16.7'	-34.3'	101.5°	15°04.6'	-35.1'	101.7°	1
2	15°43.0'	-30.0'	101.0°	15°31.5'	-30.9'	101.3°	15°19.6'	-31.8'	101.5°	15°07.5'	-32.7'	101.8°	14°55.1'	-33.6'	102.1°	14°42.4'	-34.4'	102.3°	14°29.5'	-35.3'	102.6°	2
3	15°13.1'	-30.2'	101.9°	15°00.6'	-31.1'	102.2°	14°47.8'	-32.0'	102.4°	14°34.8'	-32.9'	102.7°	14°21.5'	-33.8'	102.9°	14°08.0'	-34.6'	103.2°	13°54.2'	-35.5'	103.4°	3
4	14°42.9'	-30.4'	102.8°	14°29.5'	-31.3'	103.0°	14°15.8'	-32.2'	103.3°	14°01.9'	-33.1'	103.5°	13°47.7'	-33.9'	103.8°	13°33.3'	-34.8'	104.0°	13°18.7'	-35.6'	104.2°	4
5	14°12.5'	-30.6'	103.7°	13°58.2'	-31.5'	103.9°	13°43.6'	-32.4'	104.2°	13°28.8'	-33.2'	104.4°	13°13.8'	-34.1'	104.6°	12°58.5'	-35.0'	104.8°	12°43.1'	-35.8'	105.1°	5
6	13°41.9'	-30.8'	104.6°	13°26.7'	-31.7'	104.8°	13°11.3'	-32.5'	105.0°	12°55.6'	-33.4'	105.2°	12°39.7'	-34.3'	105.5°	12°23.6'	-35.1'	105.7°	12°07.3'	-35.9'	105.9°	6
7	13°11.1'	-31.0'	105.4°	12°55.0'	-31.8'	105.7°	12°38.7'	-32.7'	105.9°	12°22.2'	-33.6'	106.1°	12°05.4'	-34.4'	106.3°	11°48.5'	-35.2'	106.5°	11°31.3'	-36.1'	106.7°	7
8	12°40.2'	-31.1'	106.3°	12°23.2'	-32.0'	106.5°	12°06.0'	-32.9'	106.7°	11°48.6'	-33.7'	106.9°	11°31.0'	-34.6'	107.1°	11°13.2'	-35.4'	107.3°	10°55.3'	-36.2'	107.5°	8
9	12°09.0'	-31.3'	107.2°	11°51.2'	-32.2'	107.4°	11°33.1'	-33.0'	107.6°	11°14.9'	-33.9'	107.8°	10°56.5'	-34.7'	108.0°	10°37.9'	-35.5'	108.2°	10°19.1'	-36.3'	108.3°	9
10	11°37.7'	-31.5'	108.1°	11°19.0'	-32.3'	108.3°	11°00.1'	-33.2'	108.5°	10°41.0'	-34.0'	108.6°	10°21.8'	-34.8'	108.8°	10°02.3'	-35.6'	109.0°	9°42.8'	-36.4'	109.1°	10
11	11°06.3'	-31.6'	108.9°	10°46.7'	-32.5'	109.1°	10°27.0'	-33.3'	109.3°	10°07.0'	-34.1'	109.5°	9°47.0'	-34.9'	109.6°	9°26.7'	-35.7'	109.8°	9°06.3'	-36.5'	109.9°	11
12	10°34.7'	-31.7'	109.8°	10°14.2'	-32.6'	110.0°	9°53.7'	-33.4'	110.1°	9°32.9'	-34.2'	110.3°	9°12.0'	-35.0'	110.5°	8°51.0'	-35.8'	110.6°	8°29.8'	-36.6'	110.8°	12
13	10°02.9'	-31.9'	110.7°	9°41.7'	-32.7'	110.8°	9°20.2'	-33.5'	111.0°	8°58.7'	-34.4'	111.1°	8°37.0'	-35.2'	111.3°	8°15.1'	-35.9'	111.4°	7°53.1'	-36.7'	111.6°	13
14	9°31.0'	-32.0'	111.5°	9°08.9'	-32.8'	111.7°	8°46.7'	-33.6'	111.8°	8°24.3'	-34.5'	112.0°	8°01.8'	-35.3'	112.1°	7°39.2'	-36.0'	112.2°	7°16.4'	-36.8'	112.4°	14
15	8°59.0'	-32.1'	112.4°	8°36.1'	-32.9'	112.5°	8°13.1'	-33.8'	112.7°	7°49.9'	-34.6'	112.8°	7°26.6'	-35.3'	112.9°	7°03.1'	-36.1'	113.0°	6°39.6'	-36.9'	113.1°	15
16	8°26.9'	-32.2'	113.2°	8°03.2'	-33.0'	113.4°	7°39.3'	-33.8'	113.5°	7°15.3'	-34.6'	113.6°	6°51.2'	-35.4'	113.7°	6°27.0'	-36.2'	113.8°	6°02.7'	-37.0'	113.9°	16
17	7°54.7'	-32.3'	114.1°	7°30.1'	-33.1'	114.2°	7°05.5'	-33.9'	114.3°	6°40.7'	-34.7'	114.4°	6°15.8'	-35.5'	114.5°	5°50.8'	-36.3'	114.6°	5°25.8'	-37.0'	114.7°	17
18	7°22.3'	-32.4'	114.9°	6°57.0'	-33.2'	115.1°	6°31.5'	-34.0'	115.2°	6°06.0'	-34.8'	115.3°	5°40.3'	-35.6'	115.4°	5°14.6'	-36.3'	115.4°	4°48.8'	-37.1'	115.5°	18
19	6°49.9'	-32.5'	115.8°	6°23.7'	-33.3'	115.9°	5°57.5'	-34.1'	116.0°	5°31.2'	-34.9'	116.1°	5°04.7'	-35.6'	116.2°	4°38.3'	-36.4'	116.2°	4°11.7'	-37.1'	116.3°	19
20	6°17.4'	-32.6'	116.6°	5°50.4'	-33.4'	116.7°	5°23.4'	-34.2'	116.8°	4°56.3'	-34.9'	116.9°	4°29.1'	-35.7'	117.0°	4°01.9'	-36.4'	117.0°	3°34.6'	-37.2'	117.1°	20
21	5°44.8'	-32.7'	117.5°	5°17.0'	-33.5'	117.6°	4°49.2'	-34														

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

70° 290° LHA

**Latitude CONTRARY to Declination**

70° 290° 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	17°34.6'	-29.7'	99.7°	17°24.3'	-30.6'	100.0°	17°13.8'	-31.5'	100.3°	17°02.9'	-32.4'	100.6°	16°51.7'	-33.3'	100.9°	16°40.1'	-34.2'	101.2°	16°28.3'	-35.1'	101.5°	0
1	17°04.9'	-29.9'	100.6°	16°53.7'	-30.8'	100.9°	16°42.2'	-31.8'	101.2°	16°30.4'	-32.7'	101.5°	16°18.3'	-33.5'	101.8°	16°05.9'	-34.4'	102.1°	15°53.2'	-35.3'	102.3°	1
2	16°35.0'	-30.1'	101.5°	16°22.9'	-31.1'	101.8°	16°10.5'	-32.0'	102.1°	15°57.8'	-32.9'	102.4°	15°44.8'	-33.7'	102.6°	15°31.5'	-34.6'	102.9°	15°18.0'	-35.5'	103.2°	2
3	16°04.9'	-30.4'	102.4°	15°51.8'	-31.3'	102.7°	15°38.5'	-32.2'	103.0°	15°24.9'	-33.1'	103.2°	15°11.0'	-33.9'	103.5°	14°56.9'	-34.8'	103.8°	14°42.5'	-35.6'	104.0°	3
4	15°34.5'	-30.6'	103.3°	15°20.6'	-31.5'	103.6°	15°06.3'	-32.4'	103.8°	14°51.8'	-33.3'	104.1°	14°37.1'	-34.1'	104.4°	14°22.1'	-35.0'	104.6°	14°06.8'	-35.8'	104.9°	4
5	15°03.9'	-30.8'	104.2°	14°49.1'	-31.7'	104.5°	14°34.0'	-32.6'	104.7°	14°18.6'	-33.4'	105.0°	14°03.0'	-34.3'	105.2°	13°47.1'	-35.1'	105.4°	13°31.0'	-36.0'	105.7°	5
6	14°33.1'	-31.0'	105.1°	14°17.4'	-31.9'	105.3°	14°01.4'	-32.8'	105.6°	13°45.1'	-33.6'	105.8°	13°28.7'	-34.5'	106.1°	13°12.0'	-35.3'	106.3°	12°55.0'	-36.1'	106.5°	6
7	14°02.1'	-31.2'	106.0°	13°45.5'	-32.1'	106.2°	13°28.6'	-32.9'	106.4°	13°11.5'	-33.8'	106.7°	12°54.2'	-34.6'	106.9°	12°36.7'	-35.5'	107.1°	12°18.9'	-36.3'	107.3°	7
8	13°30.9'	-31.4'	106.9°	13°13.4'	-32.2'	107.1°	12°55.7'	-33.1'	107.3°	12°37.7'	-33.9'	107.5°	12°19.6'	-34.8'	107.7°	12°01.2'	-35.6'	107.9°	11°42.6'	-36.4'	108.1°	8
9	12°59.6'	-31.5'	107.7°	12°41.2'	-32.4'	107.9°	12°22.6'	-33.3'	108.2°	12°03.8'	-34.1'	108.4°	11°44.8'	-34.9'	108.6°	11°25.6'	-35.7'	108.8°	11°06.2'	-36.5'	108.9°	9
10	12°28.0'	-31.7'	108.6°	12°08.8'	-32.6'	108.8°	11°49.3'	-33.4'	109.0°	11°29.7'	-34.2'	109.2°	11°09.9'	-35.1'	109.4°	10°49.8'	-35.9'	109.6°	10°29.7'	-36.7'	109.8°	10
11	11°56.3'	-31.9'	109.5°	11°36.2'	-32.7'	109.7°	11°15.9'	-33.6'	109.9°	10°55.4'	-34.4'	110.0°	10°34.8'	-35.2'	110.2°	10°14.0'	-36.0'	110.4°	9°53.0'	-36.8'	110.6°	11
12	11°24.4'	-32.0'	110.3°	11°03.5'	-32.9'	110.5°	10°42.4'	-33.7'	110.7°	10°21.1'	-34.5'	110.9°	9°59.6'	-35.3'	111.0°	9°38.0'	-36.1'	111.2°	9°16.2'	-36.9'	111.4°	12
13	10°52.4'	-32.2'	111.2°	10°30.6'	-33.0'	111.4°	10°08.7'	-33.8'	111.5°	9°46.6'	-34.6'	111.7°	9°24.3'	-35.4'	111.9°	9°01.9'	-36.2'	112.0°	8°39.3'	-37.0'	112.2°	13
14	10°20.2'	-32.3'	112.1°	9°57.6'	-33.1'	112.2°	9°34.8'	-33.9'	112.4°	9°11.9'	-34.7'	112.5°	8°48.9'	-35.5'	112.7°	8°25.7'	-36.3'	112.8°	8°02.3'	-37.1'	113.0°	14
15	9°47.9'	-32.4'	112.9°	9°24.5'	-33.2'	113.1°	9°00.9'	-34.1'	113.2°	8°37.2'	-34.8'	113.4°	8°13.3'	-35.6'	113.5°	7°49.4'	-36.4'	113.6°	7°25.2'	-37.2'	113.7°	15
16	9°15.5'	-32.6'	113.8°	8°51.2'	-33.4'	113.9°	8°26.9'	-34.2'	114.0°	8°02.3'	-34.9'	114.2°	7°37.7'	-35.7'	114.3°	7°13.0'	-36.5'	114.4°	6°48.1'	-37.2'	114.5°	16
17	8°42.9'	-32.7'	114.6°	8°17.9'	-33.5'	114.8°	7°52.7'	-34.3'	114.9°	7°27.4'	-35.0'	115.0°	7°02.0'	-35.8'	115.1°	6°36.5'	-36.6'	115.2°	6°10.8'	-37.3'	115.3°	17
18	8°10.3'	-32.8'	115.5°	7°44.4'	-33.6'	115.6°	7°18.4'	-34.3'	115.7°	6°52.4'	-35.1'	115.8°	6°26.2'	-35.9'	115.9°	5°59.9'	-36.6'	116.0°	5°33.5'	-37.4'	116.1°	18
19	7°37.5'	-32.9'	116.3°	7°10.9'	-33.7'	116.4°	6°44.1'	-34.4'	116.5°	6°17.2'	-35.2'	116.6°	5°50.3'	-35.9'	116.7°	5°23.3'	-36.7'	116.8°	4°56.2'	-37.4'	116.9°	19
20	7°04.6'	-33.0'	117.2°	6°37.2'	-33.7'	117.3°	6°09.7'	-34.5'	117.4°	5°42.1'	-35.3'	117.5°	5°14.4'	-36.0'	117.5°	4°46.6'	-36.7'	117.6°	4°18.7'	-37.5'	117.7°	20
21	6°31.7'	-33.0'	118.0°	6°03.5'	-33.8'	118.1°	5°35.2'	-34.6'	118.2°	5°06.8'	-35.3'	118.3°	4°38.3'	-36.1'	118.3°	4°09.8'	-36.8'	118.4°	3°41.3'	-37.5'	118.5°	21
22	5°58.6'	-33.1'	118.8°	5°29.6'	-33.9'	118.9°	5°00.6'	-34.6'	119.0°	4°31.5'	-35.4'	119.1°	4°02.3'	-36.1'	119.1°	3°33.0'	-36.8'	119.2°	3°03.7'	-37.6'	119.2°	22
23	5°25.5'	-33.2'	119.7°	4°55.8'	-33.9'	119.7°	4°26.0'	-34.7'	119.8°	3°56.1'	-35.4'	119.9°	3°26.2'	-36.2'	119.9°	2°56.2'	-36.9'	120.0°	2°26.2'	-37.6'	120.0°	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

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	18°26.7'	-29.8'	100.2°	18°16.0'	-30.8'	100.5°	18°04.8'	-31.7'	100.9°	17°53.4'	-32.6'	101.2°	17°41.6'	-33.5'	101.5°	17°29.4'	-34.4'	101.8°	17°17.0'	-35.2'	102.1°	0
1	17°56.9'	-30.1'	101.1°	17°45.2'	-31.0'	101.4°	17°33.2'	-31.9'	101.8°	17°20.8'	-32.8'	102.1°	17°08.1'	-33.7'	102.4°	16°55.1'	-34.6'	102.7°	16°41.8'	-35.4'	103.0°	1
2	17°26.8'	-30.3'	102.0°	17°14.2'	-31.2'	102.3°	17°01.2'	-32.1'	102.6°	16°48.0'	-33.0'	102.9°	16°34.4'	-33.9'	103.2°	16°20.5'	-34.8'	103.5°	16°06.3'	-35.6'	103.8°	2
3	16°56.6'	-30.6'	102.9°	16°43.0'	-31.5'	103.2°	16°29.1'	-32.4'	103.5°	16°14.9'	-33.3'	103.8°	16°00.4'	-34.1'	104.1°	15°45.7'	-35.0'	104.4°	15°30.7'	-35.8'	104.6°	3
4	16°26.0'	-30.8'	103.8°	16°11.5'	-31.7'	104.1°	15°56.7'	-32.6'	104.4°	15°41.7'	-33.5'	104.7°	15°26.3'	-34.3'	104.9°	15°10.7'	-35.2'	105.2°	14°54.8'	-36.0'	105.5°	4
5	15°55.2'	-31.0'	104.7°	15°39.8'	-31.9'	105.0°	15°24.1'	-32.8'	105.3°	15°08.2'	-33.7'	105.5°	14°52.0'	-34.5'	105.8°	14°35.5'	-35.4'	106.0°	14°18.8'	-36.2'	106.3°	5
6	15°24.2'	-31.2'	105.6°	15°07.9'	-32.1'	105.9°	14°51.4'	-33.0'	106.1°	14°34.6'	-33.8'	106.4°	14°17.5'	-34.7'	106.6°	14°00.2'	-35.5'	106.9°	13°42.6'	-36.3'	107.1°	6
7	14°53.0'	-31.4'	106.5°	14°35.8'	-32.3'	106.8°	14°18.4'	-33.2'	107.0°	14°00.7'	-34.0'	107.2°	13°42.8'	-34.9'	107.5°	13°24.7'	-35.7'	107.7°	13°06.3'	-36.5'	107.9°	7
8	14°21.6'	-31.6'	107.4°	14°03.5'	-32.5'	107.6°	13°45.2'	-33.3'	107.9°	13°26.7'	-34.2'	108.1°	13°08.0'	-35.0'	108.3°	12°49.0'	-35.8'	108.5°	12°29.8'	-36.6'	108.8°	8
9	13°49.9'	-31.8'	108.3°	13°31.0'	-32.7'	108.5°	13°11.9'	-33.5'	108.7°	12°52.5'	-34.3'	108.9°	12°32.9'	-35.2'	109.2°	12°13.2'	-36.0'	109.4°	11°53.2'	-36.8'	109.6°	9
10	13°18.1'	-32.0'	109.1°	12°58.4'	-32.8'	109.4°	12°38.4'	-33.7'	109.6°	12°18.2'	-34.5'	109.8°	11°57.8'	-35.3'	110.0°	11°37.2'	-36.1'	110.2°	11°16.4'	-36.9'	110.4°	10
11	12°46.2'	-32.1'	110.0°	12°25.5'	-33.0'	110.2°	12°04.7'	-33.8'	110.4°	11°43.7'	-34.6'	110.6°	11°22.5'	-35.5'	110.8°	11°01.0'	-36.2'	111.0°	10°39.5'	-37.0'	111.2°	11
12	12°14.0'	-32.3'	110.9°	11°52.5'	-33.1'	111.1°	11°30.9'	-34.0'	111.3°	11°09.0'	-34.8'	111.4°	10°47.0'	-35.6'	111.6°	10°24.8'	-36.4'	111.8°	10°02.4'	-37.1'	112.0°	12
13	11°41.7'	-32.5'	111.7°	11°19.4'	-33.3'	111.9°	10°56.9'	-34.1'	112.1°	10°34.2'	-34.9'	112.3°	10°11.4'	-35.7'	112.4°	9°48.4'	-36.5'	112.6°	9°25.3'	-37.3'	112.8°	13
14	11°09.2'	-32.6'	112.6°	10°46.1'	-33.4'	112.8°	10°22.8'	-34.2'	112.9°	9°59.3'	-35.0'	113.1°	9°35.7'	-35.8'	113.3°	9°11.9'	-36.6'	113.4°	8°48.0'	-37.4'	113.6°	14
15	10°36.6'	-32.7'	113.4°	10°12.7'	-33.6'	113.6°	9°48.6'	-34.4'	113.8°	9°24.3'	-35.1'	113.9°	8°59.9'	-35.9'	114.1°	8°35.4'	-36.7'	114.2°	8°10.7'	-37.4'	114.4°	15
16	10°03.9'	-32.9'	114.3°	9°39.1'	-33.7'	114.5°	9°14.2'	-34.5'	114.6°	8°49.2'	-35.3'	114.7°	8°24.0'	-36.0'	114.9°	7°58.7'	-36.8'	115.0°	7°33.2'	-37.5'	115.1°	16
17	9°31.0'	-33.0'	115.1°	9°05.4'	-33.8'	115.3°	8°39.7'	-34.6'	115.4°	8°13.9'	-35.4'	115.6°	7°47.9'	-36.1'	115.7°	7°21.9'	-36.9'	115.8°	6°55.7'	-37.6'	115.9°	17
18	8°58.0'	-33.1'	116.0°	8°31.6'	-33.9'	116.1°	8°05.2'	-34.7'	116.3°	7°38.5'	-35.4'	116.4°	7°11.8'	-36.2'	116.5°	6°45.0'	-36.9'	116.6°	6°18.1'	-37.7'	116.7°	18
19	8°24.9'	-33.2'	116.8°	7°57.7'	-34.0'	117.0°	7°30.5'	-34.8'	117.1°	7°03.1'	-35.5'	117.2°	6°35.6'	-36.3'	117.3°	6°08.1'	-37.0'	117.4°	5°40.4'	-37.7'	117.5°	19
20	7°51.7'	-33.3'	117.7°	7°23.7'	-34.1'	117.8°	6°55.7'	-34.9'	117.9°	6°27.6'	-35.6'	118.0°	5°59.4'	-36.3'	118.1°	5°31.0'	-37.1'	118.2°	5°02.7'	-37.8'	118.3°	20
21	7°18.3'	-33.4'	118.5°																			

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°18.8'	-30.0'	100.7°	19°07.5'	-30.9'	101.1°	18°55.8'	-31.8'	101.4°	18°43.8'	-32.8'	101.8°	18°31.4'	-33.7'	102.1°	18°18.6'	-34.5'	102.4°	18°05.6'	-35.4'	102.7°	0
1	18°48.9'	-30.3'	101.7°	18°36.6'	-31.2'	102.0°	18°24.0'	-32.1'	102.3°	18°11.0'	-33.0'	102.6°	17°57.7'	-33.9'	103.0°	17°44.1'	-34.8'	103.3°	17°30.2'	-35.6'	103.6°	1
2	18°18.6'	-30.5'	102.6°	18°05.4'	-31.4'	102.9°	17°51.9'	-32.3'	103.2°	17°38.0'	-33.2'	103.5°	17°23.8'	-34.1'	103.8°	17°09.4'	-35.0'	104.1°	16°54.6'	-35.8'	104.4°	2
3	17°48.1'	-30.8'	103.5°	17°34.0'	-31.7'	103.8°	17°19.6'	-32.6'	104.1°	17°04.8'	-33.4'	104.4°	16°49.7'	-34.3'	104.7°	16°34.4'	-35.2'	105.0°	16°18.7'	-36.0'	105.3°	3
4	17°17.4'	-31.0'	104.4°	17°02.3'	-31.9'	104.7°	16°47.0'	-32.8'	105.0°	16°31.3'	-33.7'	105.3°	16°15.4'	-34.5'	105.5°	15°59.2'	-35.4'	105.8°	15°42.7'	-36.2'	106.1°	4
5	16°46.4'	-31.2'	105.3°	16°30.4'	-32.1'	105.6°	16°14.2'	-33.0'	105.8°	15°57.7'	-33.9'	106.1°	15°40.9'	-34.7'	106.4°	15°23.8'	-35.6'	106.7°	15°06.5'	-36.4'	106.9°	5
6	16°15.2'	-31.5'	106.2°	15°58.3'	-32.3'	106.4°	15°41.2'	-33.2'	106.7°	15°23.8'	-34.1'	107.0°	15°06.2'	-34.9'	107.2°	14°48.3'	-35.7'	107.5°	14°30.1'	-36.6'	107.7°	6
7	15°43.7'	-31.7'	107.0°	15°26.0'	-32.5'	107.3°	15°08.0'	-33.4'	107.6°	14°49.8'	-34.2'	107.8°	14°31.3'	-35.1'	108.1°	14°12.5'	-35.9'	108.3°	13°53.5'	-36.7'	108.6°	7
8	15°12.0'	-31.9'	107.9°	14°53.4'	-32.7'	108.2°	14°34.6'	-33.6'	108.4°	14°15.5'	-34.4'	108.7°	13°56.2'	-35.3'	108.9°	13°36.6'	-36.1'	109.1°	13°16.8'	-36.9'	109.4°	8
9	14°40.2'	-32.1'	108.8°	14°20.7'	-32.9'	109.0°	14°01.0'	-33.8'	109.3°	13°41.1'	-34.6'	109.5°	13°20.9'	-35.4'	109.7°	13°00.5'	-36.2'	110.0°	12°39.9'	-37.0'	110.2°	9
10	14°08.1'	-32.3'	109.7°	13°47.8'	-33.1'	109.9°	13°27.2'	-33.9'	110.1°	13°06.5'	-34.8'	110.4°	12°45.5'	-35.6'	110.6°	12°24.3'	-36.4'	110.8°	12°02.9'	-37.2'	111.0°	10
11	13°35.9'	-32.4'	110.5°	13°14.7'	-33.3'	110.8°	12°53.3'	-34.1'	111.0°	12°31.7'	-34.9'	111.2°	12°09.9'	-35.7'	111.4°	11°47.9'	-36.5'	111.6°	11°25.8'	-37.3'	111.8°	11
12	13°03.4'	-32.6'	111.4°	12°41.4'	-33.4'	111.6°	12°19.2'	-34.3'	111.8°	11°56.8'	-35.1'	112.0°	11°34.2'	-35.9'	112.2°	11°11.4'	-36.6'	112.4°	10°48.5'	-37.4'	112.6°	12
13	12°30.8'	-32.8'	112.3°	12°08.0'	-33.6'	112.5°	11°45.0'	-34.4'	112.7°	11°21.7'	-35.2'	112.9°	10°58.3'	-36.0'	113.0°	10°34.8'	-36.8'	113.2°	10°11.0'	-37.5'	113.4°	13
14	11°58.1'	-32.9'	113.1°	11°34.4'	-33.7'	113.3°	11°10.6'	-34.5'	113.5°	10°46.5'	-35.3'	113.7°	10°22.4'	-36.1'	113.9°	9°58.0'	-36.9'	114.0°	9°33.5'	-37.6'	114.2°	14
15	11°25.1'	-33.1'	114.0°	11°00.7'	-33.9'	114.2°	10°36.0'	-34.7'	114.3°	10°11.2'	-35.5'	114.5°	9°46.2'	-36.2'	114.7°	9°21.1'	-37.0'	114.8°	8°55.9'	-37.7'	115.0°	15
16	10°52.1'	-33.2'	114.8°	10°26.8'	-34.0'	115.0°	10°01.3'	-34.8'	115.2°	9°35.8'	-35.6'	115.3°	9°10.0'	-36.3'	115.5°	8°44.1'	-37.1'	115.6°	8°18.1'	-37.8'	115.7°	16
17	10°18.8'	-33.3'	115.7°	9°52.8'	-34.1'	115.8°	9°26.5'	-34.9'	116.0°	9°00.2'	-35.7'	116.1°	8°33.7'	-36.4'	116.3°	8°07.1'	-37.2'	116.4°	7°40.3'	-37.9'	116.5°	17
18	9°45.5'	-33.5'	116.5°	9°18.6'	-34.2'	116.7°	8°51.6'	-35.0'	116.8°	8°24.5'	-35.8'	117.0°	7°57.3'	-36.5'	117.1°	7°29.9'	-37.3'	117.2°	7°02.4'	-38.0'	117.3°	18
19	9°12.0'	-33.6'	117.4°	8°44.4'	-34.4'	117.5°	8°16.6'	-35.1'	117.6°	7°48.7'	-35.9'	117.8°	7°20.7'	-36.6'	117.9°	6°52.6'	-37.3'	118.0°	6°24.4'	-38.1'	118.1°	19
20	8°38.5'	-33.7'	118.2°	8°10.0'	-34.5'	118.3°	7°41.5'	-35.2'	118.5°	7°12.9'	-36.0'	118.6°	6°44.1'	-36.7'	118.7°	6°15.3'	-37.4'	118.8°	5°46.3'	-38.1'	118.9°	20
21	8°04.8'	-33.8'	119.0°	7°35.6'	-34.5'	119.2°	7°06.3'	-35.3'	119.3°	6°36.9'	-36.0'	119.4°	6°07.4'	-36.8'	119.5°	5°37.9'	-37.5'	119.6°	5°08.2'	-38.2'	119.6°	21
22	7°31.0'	-33.9'	119.9°	7°01.0'	-34.6'	120.0°	6°31.0'	-35.4'	120.1°	6°00.9'	-36.1'	120.2°	5°30.7'	-36.8'	120.3°	5°00.4'	-37.5'	120.3°	4°30.0'	-38.2'	120.4°	22
23	6°57.1'	-34.0'	120.7°	6°26.4'	-34.7'	120.8°	5°55.6'	-35.4'	120.9°	5°24.8'	-36.2'	121.0°	4°53.9'	-36.9'	121.1°	4°22.9'	-37.6'	121.1°	3°51.8'	-38.3'	121.2°	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°10.8'	-30.2'	101.3°	19°59.0'	-31.1'	101.6°	19°46.7'	-32.0'	102.0°	19°34.1'	-32.9'	102.3°	19°21.1'	-33.8'	102.7°	19°07.7'	-34.7'	103.0°	18°54.0'	-35.6'	103.4°	0
1	19°40.7'	-30.4'	102.2°	19°27.9'	-31.4'	102.5°	19°14.7'	-32.3'	102.9°	19°01.1'	-33.2'	103.2°	18°47.3'	-34.1'	103.6°	18°33.0'	-34.9'	103.9°	18°18.5'	-35.8'	104.2°	1
2	19°10.3'	-30.7'	103.1°	18°56.5'	-31.6'	103.4°	18°42.4'	-32.5'	103.8°	18°28.0'	-33.4'	104.1°	18°13.2'	-34.3'	104.4°	17°58.1'	-35.2'	104.7°	17°42.7'	-36.0'	105.0°	2
3	18°39.6'	-31.0'	104.0°	18°24.9'	-31.9'	104.3°	18°09.9'	-32.8'	104.7°	17°54.5'	-33.7'	105.0°	17°38.9'	-34.5'	105.3°	17°22.9'	-35.4'	105.6°	17°06.6'	-36.2'	105.9°	3
4	18°08.6'	-31.2'	104.9°	17°53.0'	-32.1'	105.2°	17°37.1'	-33.0'	105.5°	17°20.9'	-33.9'	105.8°	17°04.4'	-34.7'	106.1°	16°47.5'	-35.6'	106.4°	16°30.4'	-36.4'	106.7°	4
5	17°37.4'	-31.5'	105.8°	17°20.9'	-32.3'	106.1°	17°04.1'	-33.2'	106.4°	16°47.0'	-34.1'	106.7°	16°29.6'	-34.9'	107.0°	16°12.0'	-35.8'	107.3°	15°54.0'	-36.6'	107.5°	5
6	17°06.0'	-31.7'	106.7°	16°48.6'	-32.6'	107.0°	16°30.9'	-33.4'	107.3°	16°12.9'	-34.3'	107.6°	15°54.7'	-35.1'	107.8°	15°36.2'	-36.0'	108.1°	15°17.4'	-36.8'	108.4°	6
7	16°34.3'	-31.9'	107.6°	16°16.0'	-32.8'	107.9°	15°57.5'	-33.6'	108.1°	15°38.6'	-34.5'	108.4°	15°19.6'	-35.3'	108.7°	15°00.2'	-36.1'	108.9°	14°40.6'	-37.0'	109.2°	7
8	16°02.4'	-32.1'	108.5°	15°43.2'	-33.0'	108.7°	15°23.8'	-33.8'	109.0°	15°04.1'	-34.7'	109.3°	14°44.2'	-35.5'	109.5°	14°24.1'	-36.3'	109.8°	14°03.7'	-37.1'	110.0°	8
9	15°30.2'	-32.3'	109.4°	15°10.2'	-33.2'	109.6°	14°50.0'	-34.0'	109.9°	14°29.5'	-34.9'	110.1°	14°08.7'	-35.7'	110.3°	13°47.7'	-36.5'	110.6°	13°26.5'	-37.3'	110.8°	9
10	14°57.9'	-32.5'	110.2°	14°37.0'	-33.4'	110.5°	14°15.9'	-34.2'	110.7°	13°54.6'	-35.0'	110.9°	13°33.0'	-35.8'	111.2°	13°11.3'	-36.6'	111.4°	12°49.3'	-37.4'	111.6°	10
11	14°25.4'	-32.7'	111.1°	14°03.7'	-33.6'	111.3°	13°41.7'	-34.4'	111.6°	13°19.6'	-35.2'	111.8°	12°57.2'	-36.0'	112.0°	12°34.6'	-36.8'	112.2°	12°11.8'	-37.6'	112.4°	11
12	13°52.7'	-32.9'	112.0°	13°30.1'	-33.7'	112.2°	13°07.3'	-34.5'	112.4°	12°44.4'	-35.3'	112.6°	12°21.2'	-36.1'	112.8°	11°57.8'	-36.9'	113.0°	11°34.3'	-37.7'	113.2°	12
13	13°19.7'	-33.1'	112.8°	12°56.4'	-33.9'	113.0°	12°32.8'	-34.7'	113.2°	12°09.0'	-35.5'	113.4°	11°45.1'	-36.3'	113.6°	11°20.9'	-37.1'	113.8°	10°56.6'	-37.8'	114.0°	13
14	12°46.7'	-33.2'	113.7°	12°22.5'	-34.1'	113.9°	11°58.1'	-34.8'	114.1°	11°33.5'	-35.6'	114.3°	11°08.8'	-36.4'	114.4°	10°43.9'	-37.2'	114.6°	10°18.8'	-37.9'	114.8°	14
15	12°13.4'	-33.4'	114.5°	11°48.4'	-34.2'	114.7°	11°23.2'	-35.0'	114.9°	10°57.9'	-35.8'	115.1°	10°32.4'	-36.5'	115.3°	10°06.7'	-37.3'	115.4°	9°40.9'	-38.0'	115.6°	15
16	11°40.0'	-33.5'	115.4°	11°14.2'	-34.3'	115.6°	10°48.3'	-35.1'	115.7°	10°22.1'	-35.9'	115.9°	9°55.8'	-36.6'	116.1°	9°29.4'	-37.4'	116.2°	9°02.8'	-38.1'	116.4°	16
17	11°06.5'	-33.7'	116.2°	10°39.9'	-34.5'	116.4°	10°13.1'	-35.2'	116.6°	9°46.2'	-36.0'	116.7°	9°19.2'	-36.8'	116.9°	8°52.0'	-37.5'	117.0°	8°24.7'	-38.2'	117.1°	17
18	10°32.8'	-33.8'	117.1°	10°05.4'	-34.6'	117.2°	9°37.9'	-35.4'	117.4°	9°10.2'	-36.1'	117.5°	8°42.4'	-36.9'	117.7°	8°14.5'	-37.6'	117.8°	7°46.5'	-38.3'	117.9°	18
19	9°59.0'	-33.9'	117.9°	9°30.8'	-34.7'	118.1°	9°02.5'	-35.5'	118.2°	8°34.1'	-36.2'	118.3°	8°05.6'	-36.9'	118.5°	7°05.9'	-37.7'	118.6°	7°08.2'	-38.4'	118.7°	19
20	9°25.0'	-34.1'	118.7°	8°56.1'	-34.8'	118.9°	8°27.1'	-35.6'	119.0°	7°57.9'	-36.3'	119.1°	7°28.6'	-37.0'	119.3°	6°59.3'	-37.8'	119.4°	6°29.8'	-38.5'	119.5°	20
21	8																					

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°02.7'	-30.3'	101.8°	20°50.3'	-31.3'	102.2°	20°37.5'	-32.2'	102.6°	20°24.3'	-33.1'	102.9°	20°10.7'	-34.0'	103.3°	19°56.7'	-34.9'	103.6°	19°42.4'	-35.8'	104.0°	0
1	20°32.4'	-30.6'	102.7°	20°19.1'	-31.6'	103.1°	20°05.3'	-32.5'	103.5°	19°51.1'	-33.4'	103.8°	19°36.7'	-34.3'	104.2°	19°21.8'	-35.1'	104.5°	19°06.6'	-36.0'	104.8°	1
2	20°01.8'	-30.9'	103.6°	19°47.5'	-31.8'	104.0°	19°32.8'	-32.7'	104.3°	19°17.8'	-33.6'	104.7°	19°02.4'	-34.5'	105.0°	18°46.7'	-35.4'	105.4°	18°30.6'	-36.2'	105.7°	2
3	19°30.9'	-31.2'	104.6°	19°15.7'	-32.1'	104.9°	19°00.1'	-33.0'	105.2°	18°44.2'	-33.9'	105.6°	18°27.9'	-34.7'	105.9°	18°11.3'	-35.6'	106.2°	17°54.4'	-36.4'	106.5°	3
4	18°59.8'	-31.4'	105.5°	18°43.6'	-32.3'	105.8°	18°27.1'	-33.2'	106.1°	18°10.3'	-34.1'	106.4°	17°53.2'	-35.0'	106.7°	17°35.7'	-35.8'	107.0°	17°18.0'	-36.6'	107.4°	4
5	18°28.3'	-31.7'	106.4°	18°11.3'	-32.6'	106.7°	17°53.9'	-33.5'	107.0°	17°36.2'	-34.3'	107.3°	17°18.2'	-35.2'	107.6°	16°59.9'	-36.0'	107.9°	16°41.4'	-36.8'	108.2°	5
6	17°56.6'	-31.9'	107.3°	17°38.7'	-32.8'	107.6°	17°20.4'	-33.7'	107.9°	17°01.9'	-34.5'	108.2°	16°43.0'	-35.4'	108.4°	16°23.9'	-36.2'	108.7°	16°04.5'	-37.0'	109.0°	6
7	17°24.7'	-32.2'	108.1°	17°05.9'	-33.0'	108.4°	16°46.8'	-33.9'	108.7°	16°27.3'	-34.7'	109.0°	16°07.7'	-35.6'	109.3°	15°47.7'	-36.4'	109.6°	15°27.5'	-37.2'	109.8°	7
8	16°52.5'	-32.4'	109.0°	16°32.8'	-33.3'	109.3°	16°12.9'	-34.1'	109.6°	15°52.6'	-34.9'	109.9°	15°32.1'	-35.8'	110.1°	15°11.3'	-36.6'	110.4°	14°50.3'	-37.4'	110.6°	8
9	16°20.1'	-32.6'	109.9°	15°59.6'	-33.5'	110.2°	15°38.8'	-34.3'	110.4°	15°17.7'	-35.1'	110.7°	14°56.3'	-35.9'	111.0°	14°34.8'	-36.7'	111.2°	14°12.9'	-37.5'	111.4°	9
10	15°47.5'	-32.8'	110.8°	15°26.1'	-33.7'	111.0°	15°04.4'	-34.5'	111.3°	14°42.5'	-35.3'	111.5°	14°20.4'	-36.1'	111.8°	13°58.0'	-36.9'	112.0°	13°35.4'	-37.7'	112.2°	10
11	15°14.7'	-33.0'	111.6°	14°52.5'	-33.9'	111.9°	14°30.0'	-34.7'	112.1°	14°07.2'	-35.5'	112.4°	13°44.3'	-36.3'	112.6°	13°21.1'	-37.1'	112.8°	12°57.7'	-37.8'	113.0°	11
12	14°41.7'	-33.2'	112.5°	14°18.6'	-34.0'	112.8°	13°55.3'	-34.8'	113.0°	13°31.7'	-35.6'	113.2°	13°08.0'	-36.4'	113.4°	12°44.0'	-37.2'	113.6°	12°19.9'	-38.0'	113.8°	12
13	14°08.5'	-33.4'	113.4°	13°44.6'	-34.2'	113.6°	13°20.4'	-35.0'	113.8°	12°56.1'	-35.8'	114.0°	12°31.6'	-36.6'	114.2°	12°06.8'	-37.3'	114.4°	11°41.9'	-38.1'	114.6°	13
14	13°35.1'	-33.6'	114.2°	13°10.4'	-34.4'	114.4°	12°45.4'	-35.2'	114.7°	12°20.3'	-35.9'	114.9°	11°55.0'	-36.7'	115.1°	11°29.5'	-37.5'	115.2°	11°03.8'	-38.2'	115.4°	14
15	13°01.5'	-33.7'	115.1°	12°36.0'	-34.5'	115.3°	12°10.3'	-35.3'	115.5°	11°44.4'	-36.1'	115.7°	11°18.3'	-36.8'	115.9°	10°52.0'	-37.6'	116.0°	10°25.6'	-38.3'	116.2°	15
16	12°27.8'	-33.9'	115.9°	12°01.5'	-34.7'	116.1°	11°35.0'	-35.5'	116.3°	11°08.3'	-36.2'	116.5°	10°41.4'	-37.0'	116.7°	10°14.4'	-37.7'	116.8°	9°47.3'	-38.4'	117.0°	16
17	11°53.9'	-34.0'	116.8°	11°26.8'	-34.8'	117.0°	10°59.5'	-35.6'	117.1°	10°32.1'	-36.3'	117.3°	10°04.5'	-37.1'	117.5°	9°36.7'	-37.8'	117.6°	9°08.8'	-38.5'	117.8°	17
18	11°19.9'	-34.2'	117.6°	10°52.0'	-35.0'	117.8°	10°23.9'	-35.7'	118.0°	9°55.7'	-36.5'	118.1°	9°27.4'	-37.2'	118.3°	8°58.9'	-37.9'	118.4°	8°30.3'	-38.6'	118.5°	18
19	10°45.7'	-34.3'	118.4°	10°17.0'	-35.1'	118.6°	9°48.2'	-35.8'	118.8°	9°19.3'	-36.6'	118.9°	8°50.2'	-37.3'	119.1°	8°21.0'	-38.0'	119.2°	7°51.7'	-38.7'	119.3°	19
20	10°11.4'	-34.4'	119.3°	9°41.9'	-35.2'	119.4°	9°12.4'	-35.9'	119.6°	8°42.7'	-36.7'	119.7°	8°12.9'	-37.4'	119.8°	7°43.0'	-38.1'	120.0°	7°13.0'	-38.8'	120.1°	20
21	9°36.9'	-34.6'	120.1°	9°06.7'	-35.3'	120.3°	8°36.4'	-36.0'	120.4°	8°06.0'	-36.8'	120.5°	7°35.5'	-37.5'	120.6°	7°04.9'	-38.2'	120.7°	6°34.2'	-38.9'	120.9°	21
22	9°02.4'	-34.7'	120.9°	8°31.4'	-35.4'	121.1°	8°00.4'	-36.1'	121.2°	7°29.3'	-36.8'	121.3°	6°58.0'	-37.5'	121.4°	6°26.7'	-38.2'	121.5°	5°55.3'	-38.9'	121.6°	22
23	8°27.7'	-34.8'	121.8°	7°56.0'	-35.5'	121.9°	7°24.3'	-36.2'	122.0°	6°52.4'	-36.9'	122.1°	6°20.5'	-37.6'	122.2°	5°48.5'	-38.3'	122.3°	5°16.4'	-39.0'	122.4°	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°54.6'	-30.5'	102.3°	21°41.6'	-31.5'	102.7°	21°28.1'	-32.4'	103.1°	21°14.3'	-33.3'	103.5°	21°00.1'	-34.2'	103.9°	20°45.5'	-35.1'	104.3°	20°30.6'	-35.9'	104.6°	0
1	21°24.0'	-30.8'	103.3°	21°10.1'	-31.7'	103.7°	20°55.8'	-32.7'	104.0°	20°41.0'	-33.6'	104.4°	20°25.9'	-34.5'	104.8°	20°10.5'	-35.3'	105.1°	19°54.6'	-36.2'	105.5°	1
2	20°53.2'	-31.1'	104.2°	20°38.4'	-32.0'	104.6°	20°23.1'	-32.9'	104.9°	20°07.5'	-33.8'	105.3°	19°51.5'	-34.7'	105.6°	19°35.1'	-35.6'	106.0°	19°18.4'	-36.4'	106.3°	2
3	20°22.2'	-31.4'	105.1°	20°06.3'	-32.3'	105.5°	19°50.2'	-33.2'	105.8°	19°33.6'	-34.1'	106.2°	19°16.8'	-35.0'	106.5°	18°59.6'	-35.8'	106.8°	18°42.0'	-36.6'	107.2°	3
4	19°50.8'	-31.7'	106.0°	19°34.0'	-32.6'	106.4°	19°17.0'	-33.5'	106.7°	18°59.6'	-34.3'	107.0°	18°41.8'	-35.2'	107.4°	18°23.8'	-36.0'	107.7°	18°05.4'	-36.9'	108.0°	4
5	19°19.1'	-31.9'	106.9°	19°01.5'	-32.8'	107.2°	18°43.5'	-33.7'	107.6°	18°25.2'	-34.6'	107.9°	18°06.6'	-35.4'	108.2°	17°47.7'	-36.2'	108.5°	17°28.5'	-37.1'	108.8°	5
6	18°47.2'	-32.2'	107.8°	18°28.6'	-33.1'	108.1°	18°09.8'	-33.9'	108.4°	17°50.7'	-34.8'	108.8°	17°31.2'	-35.6'	109.1°	17°11.5'	-36.4'	109.4°	16°51.5'	-37.3'	109.6°	6
7	18°15.0'	-32.4'	108.7°	17°55.6'	-33.3'	109.0°	17°35.9'	-34.2'	109.3°	17°15.9'	-35.0'	109.6°	16°55.6'	-35.8'	109.9°	16°35.0'	-36.6'	110.2°	16°14.2'	-37.4'	110.5°	7
8	17°42.5'	-32.7'	109.6°	17°22.3'	-33.5'	109.9°	17°01.7'	-34.4'	110.2°	16°40.9'	-35.2'	110.5°	16°19.8'	-36.0'	110.7°	15°58.4'	-36.8'	111.0°	15°36.8'	-37.6'	111.3°	8
9	17°09.9'	-32.9'	110.5°	16°48.7'	-33.7'	110.8°	16°27.3'	-34.6'	111.0°	16°05.7'	-35.4'	111.3°	15°43.7'	-36.2'	111.6°	15°21.6'	-37.0'	111.8°	14°59.1'	-37.8'	112.1°	9
10	16°37.0'	-33.1'	111.3°	16°15.0'	-34.0'	111.6°	15°52.8'	-34.8'	111.9°	15°30.3'	-35.6'	112.1°	15°07.5'	-36.4'	112.4°	14°44.6'	-37.2'	112.6°	14°21.3'	-38.0'	112.9°	10
11	16°03.9'	-33.3'	112.2°	15°41.0'	-34.2'	112.5°	15°18.0'	-35.0'	112.7°	14°54.7'	-35.8'	113.0°	14°31.1'	-36.6'	113.2°	14°07.4'	-37.3'	113.5°	13°43.4'	-38.1'	113.7°	11
12	15°30.5'	-33.5'	113.1°	15°06.9'	-34.3'	113.3°	14°43.0'	-35.1'	113.6°	14°18.9'	-35.9'	113.8°	13°54.6'	-36.7'	114.0°	13°30.0'	-37.5'	114.3°	13°05.3'	-38.3'	114.5°	12
13	14°57.0'	-33.7'	113.9°	14°32.6'	-34.5'	114.2°	14°07.9'	-35.3'	114.4°	13°43.0'	-36.1'	114.6°	13°17.9'	-36.9'	114.9°	12°52.5'	-37.6'	115.1°	12°27.0'	-38.4'	115.3°	13
14	14°23.3'	-33.9'	114.8°	13°58.0'	-34.7'	115.0°	13°32.5'	-35.5'	115.2°	13°06.9'	-36.3'	115.5°	12°41.0'	-37.0'	115.7°	12°14.9'	-37.8'	115.9°	11°48.6'	-38.5'	116.1°	14
15	13°49.4'	-34.1'	115.6°	13°23.3'	-34.9'	115.9°	12°57.1'	-35.6'	116.1°	12°30.6'	-36.4'	116.3°	12°03.9'	-37.2'	116.5°	11°37.1'	-37.9'	116.7°	11°10.1'	-38.6'	116.8°	15
16	13°15.3'	-34.2'	116.5°	12°48.5'	-35.0'	116.7°	12°21.4'	-35.8'	116.9°	11°54.2'	-36.5'	117.1°	11°26.8'	-37.3'	117.3°	10°59.2'	-38.0'	117.4°	10°31.5'	-38.8'	117.6°	16
17	12°41.1'	-34.4'	117.3°	12°13.4'	-35.2'	117.5°	11°45.6'	-35.9'	117.7°	11°17.6'	-36.7'	117.9°	10°49.5'	-37.4'	118.1°	10°21.2'	-38.1'	118.2°	9°52.7'	-38.9'	118.4°	17
18	12°06.7'	-34.5'	118.2°	11°38.3'	-35.3'	118.4°	11°09.7'	-36.1'	118.5°	10°41.0'	-36.8'	118.7°	10°12.1'	-37.5'	118.9°	9°43.0'	-38.3'	119.0°	9°13.9'	-39.0'	119.2°	18
19	11°32.1'	-34.7'	119.0°	11°03.0'	-35.4'	119.2°	10°33.6'	-36.2'	119.3°	10°04.2'	-36.9'	119.5°	9°34.5'	-37.6'	119.7°	9°04.8'	-38.3'	119.8°	8°34.9'	-39.0'	119.9°	19
20	10°57.4'	-34.8'	119.8°	10°27.5'	-35.6'	120.0°	9°57.4'	-36.3'	120.2°	9°27.2'	-37.0'	120.3°	8°56.9'	-37.7'	120.4°	8°26.4'	-38.4'	120.6°	7°55.9'	-39.1'		

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°46.2'	-30.7'	102.9°	22°32.7'	-31.7'	103.3°	22°18.7'	-32.6'	103.7°	22°04.3'	-33.5'	104.1°	21°49.5'	-34.4'	104.5°	21°34.2'	-35.3'	104.9°	21°18.6'	-36.1'	105.3°	0
1	22°15.5'	-31.0'	103.8°	22°01.0'	-32.0'	104.2°	21°46.1'	-32.9'	104.6°	21°30.8'	-33.8'	105.0°	21°15.1'	-34.7'	105.4°	20°59.0'	-35.5'	105.7°	20°42.5'	-36.4'	106.1°	1
2	21°44.5'	-31.3'	104.8°	21°29.1'	-32.2'	105.1°	21°13.2'	-33.2'	105.5°	20°57.0'	-34.0'	105.9°	20°40.4'	-34.9'	106.2°	20°23.4'	-35.8'	106.6°	20°06.1'	-36.6'	107.0°	2
3	21°13.2'	-31.6'	105.7°	20°56.8'	-32.5'	106.0°	20°40.1'	-33.4'	106.4°	20°23.0'	-34.3'	106.8°	20°05.5'	-35.2'	107.1°	19°47.6'	-36.0'	107.5°	19°29.5'	-36.9'	107.8°	3
4	20°41.6'	-31.9'	106.6°	20°24.3'	-32.8'	106.9°	20°06.7'	-33.7'	107.3°	19°48.6'	-34.6'	107.6°	19°30.3'	-35.4'	108.0°	19°11.6'	-36.3'	108.3°	18°52.6'	-37.1'	108.6°	4
5	20°09.7'	-32.2'	107.5°	19°51.5'	-33.1'	107.8°	19°33.0'	-33.9'	108.2°	19°14.1'	-34.8'	108.5°	18°54.9'	-35.7'	108.8°	18°35.4'	-36.5'	109.2°	18°15.5'	-37.3'	109.5°	5
6	19°37.5'	-32.4'	108.4°	19°18.4'	-33.3'	108.7°	18°59.0'	-34.2'	109.0°	18°39.3'	-35.0'	109.4°	18°19.2'	-35.9'	109.7°	17°58.9'	-36.7'	110.0°	17°38.2'	-37.5'	110.3°	6
7	19°05.1'	-32.7'	109.3°	18°45.1'	-33.6'	109.6°	18°24.8'	-34.4'	109.9°	18°04.2'	-35.3'	110.2°	17°43.4'	-36.1'	110.5°	17°22.2'	-36.9'	110.8°	17°00.7'	-37.7'	111.1°	7
8	18°32.4'	-33.0'	110.2°	18°11.5'	-33.8'	110.5°	17°50.4'	-34.7'	110.8°	17°29.0'	-35.5'	111.1°	17°07.3'	-36.3'	111.4°	16°45.3'	-37.1'	111.6°	16°23.0'	-37.9'	111.9°	8
9	17°59.4'	-33.2'	111.0°	17°37.7'	-34.0'	111.3°	17°15.7'	-34.9'	111.6°	16°53.5'	-35.7'	111.9°	16°31.0'	-36.5'	112.2°	16°08.2'	-37.3'	112.5°	15°45.1'	-38.1'	112.7°	9
10	17°26.2'	-33.4'	111.9°	17°03.7'	-34.3'	112.2°	16°40.9'	-35.1'	112.5°	16°17.8'	-35.9'	112.8°	15°54.5'	-36.7'	113.0°	15°30.9'	-37.5'	113.3°	15°07.1'	-38.2'	113.5°	10
11	16°52.8'	-33.6'	112.8°	16°29.4'	-34.5'	113.1°	16°05.8'	-35.3'	113.3°	15°41.9'	-36.1'	113.6°	15°17.8'	-36.9'	113.8°	14°53.4'	-37.6'	114.1°	14°28.8'	-38.4'	114.3°	11
12	16°19.2'	-33.8'	113.6°	15°55.0'	-34.7'	113.9°	15°30.5'	-35.5'	114.2°	15°05.9'	-36.3'	114.4°	14°40.9'	-37.0'	114.7°	14°15.8'	-37.8'	114.9°	13°50.4'	-38.5'	115.1°	12
13	15°45.3'	-34.0'	114.5°	15°20.3'	-34.8'	114.8°	14°55.1'	-35.6'	115.0°	14°29.6'	-36.4'	115.2°	14°03.9'	-37.2'	115.5°	13°38.0'	-37.9'	115.7°	13°11.9'	-38.7'	115.9°	13
14	15°11.3'	-34.2'	115.4°	14°45.5'	-35.0'	115.6°	14°19.4'	-35.8'	115.8°	13°53.2'	-36.6'	116.1°	13°26.7'	-37.3'	116.3°	13°00.1'	-38.1'	116.5°	12°33.2'	-38.8'	116.7°	14
15	14°37.0'	-34.4'	116.2°	14°10.4'	-35.2'	116.4°	13°43.6'	-36.0'	116.7°	13°16.6'	-36.7'	116.9°	12°49.4'	-37.5'	117.1°	12°22.0'	-38.2'	117.3°	11°54.4'	-39.0'	117.5°	15
16	14°02.6'	-34.6'	117.1°	13°35.2'	-35.4'	117.3°	13°07.6'	-36.1'	117.5°	12°39.9'	-36.9'	117.7°	12°11.9'	-37.6'	117.9°	11°43.7'	-38.4'	118.1°	11°15.4'	-39.1'	118.2°	16
17	13°28.0'	-34.8'	117.9°	12°59.9'	-35.5'	118.1°	12°31.5'	-36.3'	118.3°	12°03.0'	-37.0'	118.5°	11°34.3'	-37.8'	118.7°	11°05.4'	-38.5'	118.9°	10°36.4'	-39.2'	119.0°	17
18	12°53.3'	-34.9'	118.7°	12°24.3'	-35.7'	118.9°	11°55.2'	-36.4'	119.1°	11°25.9'	-37.2'	119.3°	10°56.5'	-37.9'	119.5°	10°26.9'	-38.6'	119.6°	9°57.2'	-39.3'	119.8°	18
19	12°18.3'	-35.1'	119.6°	11°48.6'	-35.8'	119.7°	11°18.8'	-36.6'	119.9°	10°48.8'	-37.3'	120.1°	10°18.6'	-38.0'	120.3°	9°48.3'	-38.7'	120.4°	9°17.9'	-39.4'	120.6°	19
20	11°43.3'	-35.2'	120.4°	11°12.8'	-36.0'	120.6°	10°42.2'	-36.7'	120.7°	10°11.5'	-37.4'	120.9°	9°40.6'	-38.1'	121.0°	9°09.6'	-38.8'	121.2°	8°38.5'	-39.5'	121.3°	20
21	11°08.0'	-35.4'	121.2°	10°36.9'	-36.1'	121.4°	10°05.6'	-36.8'	121.5°	9°34.1'	-37.5'	121.7°	9°02.5'	-38.2'	121.8°	8°30.8'	-38.9'	122.0°	7°59.0'	-39.6'	122.1°	21
22	10°32.7'	-35.5'	122.0°	10°00.8'	-36.2'	122.2°	9°28.8'	-36.9'	122.3°	8°56.6'	-37.6'	122.5°	8°24.3'	-38.3'	122.6°	7°51.9'	-39.0'	122.7°	7°19.5'	-39.6'	122.8°	22
23	9°57.2'	-35.6'	122.9°	9°24.6'	-36.3'	123.0°	8°51.9'	-37.0'	123.1°	8°19.0'	-37.7'	123.3°	7°46.0'	-38.4'	123.4°	7°13.0'	-39.0'	123.5°	6°39.8'	-39.7'	123.6°	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°37.8'	-30.9'	103.5°	23°23.7'	-31.9'	103.9°	23°09.1'	-32.8'	104.3°	22°54.1'	-33.7'	104.7°	22°38.6'	-34.6'	105.1°	22°22.8'	-35.5'	105.5°	22°06.6'	-36.3'	105.9°	0
1	23°06.9'	-31.2'	104.4°	22°51.8'	-32.2'	104.8°	22°36.3'	-33.1'	105.2°	22°20.4'	-34.0'	105.6°	22°04.1'	-34.9'	106.0°	21°47.3'	-35.8'	106.4°	21°30.2'	-36.6'	106.8°	1
2	22°35.7'	-31.6'	105.3°	22°19.7'	-32.5'	105.7°	22°03.2'	-33.4'	106.1°	21°46.4'	-34.3'	106.5°	21°29.2'	-35.1'	106.9°	21°11.6'	-36.0'	107.2°	20°53.6'	-36.9'	107.6°	2
3	22°04.2'	-31.9'	106.2°	21°47.2'	-32.8'	106.6°	21°29.8'	-33.7'	107.0°	21°12.1'	-34.5'	107.4°	20°54.0'	-35.4'	107.7°	20°35.6'	-36.3'	108.1°	20°16.7'	-37.1'	108.5°	3
4	21°32.3'	-32.2'	107.1°	21°14.4'	-33.1'	107.5°	20°56.2'	-33.9'	107.9°	20°37.6'	-34.8'	108.2°	20°18.6'	-35.7'	108.6°	19°59.3'	-36.5'	108.9°	19°39.6'	-37.3'	109.3°	4
5	21°00.1'	-32.4'	108.1°	20°41.4'	-33.3'	108.4°	20°22.2'	-34.2'	108.8°	20°02.8'	-35.1'	109.1°	19°42.9'	-35.9'	109.5°	19°22.8'	-36.7'	109.8°	19°02.3'	-37.5'	110.1°	5
6	20°27.7'	-32.7'	109.0°	20°08.0'	-33.6'	109.3°	19°48.0'	-34.5'	109.6°	19°27.7'	-35.3'	110.0°	19°07.0'	-36.1'	110.3°	18°46.1'	-37.0'	110.6°	18°24.8'	-37.8'	110.9°	6
7	19°55.0'	-33.0'	109.8°	19°34.4'	-33.8'	110.2°	19°13.6'	-34.7'	110.5°	18°52.4'	-35.5'	110.8°	18°30.9'	-36.4'	111.2°	18°09.1'	-37.2'	111.5°	17°47.0'	-38.0'	111.8°	7
8	19°22.0'	-33.2'	110.7°	19°00.6'	-34.1'	111.1°	18°38.9'	-34.9'	111.4°	18°16.9'	-35.8'	111.7°	17°54.5'	-36.6'	112.0°	17°31.9'	-37.4'	112.3°	17°09.0'	-38.2'	112.6°	8
9	18°48.8'	-33.5'	111.6°	18°26.5'	-34.3'	111.9°	18°03.9'	-35.2'	112.2°	17°41.1'	-36.0'	112.5°	17°18.0'	-36.8'	112.8°	16°54.6'	-37.6'	113.1°	16°30.9'	-38.3'	113.4°	9
10	18°15.3'	-33.7'	112.5°	17°52.2'	-34.6'	112.8°	17°28.8'	-35.4'	113.1°	17°05.1'	-36.2'	113.4°	16°41.2'	-37.0'	113.6°	16°17.0'	-37.8'	113.9°	15°52.6'	-38.5'	114.2°	10
11	17°41.5'	-34.0'	113.4°	17°17.6'	-34.8'	113.6°	16°53.4'	-35.6'	113.9°	16°28.9'	-36.4'	114.2°	16°04.2'	-37.2'	114.5°	15°39.3'	-37.9'	114.7°	15°14.0'	-38.7'	115.0°	11
12	17°07.6'	-34.2'	114.2°	16°42.8'	-35.0'	114.5°	16°17.8'	-35.8'	114.8°	15°52.6'	-36.6'	115.0°	15°27.1'	-37.3'	115.3°	15°01.3'	-38.1'	115.5°	14°35.4'	-38.8'	115.8°	12
13	16°33.4'	-34.4'	115.1°	16°07.9'	-35.2'	115.3°	15°42.1'	-36.0'	115.6°	15°16.0'	-36.7'	115.9°	14°49.7'	-37.5'	116.1°	14°23.2'	-38.3'	116.3°	13°56.5'	-39.0'	116.6°	13
14	15°59.0'	-34.6'	115.9°	15°32.7'	-35.4'	116.2°	15°06.1'	-36.1'	116.4°	14°39.3'	-36.9'	116.7°	14°12.2'	-37.7'	116.9°	13°45.0'	-38.4'	117.1°	13°17.5'	-39.1'	117.3°	14
15	15°24.5'	-34.8'	116.8°	14°57.3'	-35.6'	117.0°	14°29.9'	-36.3'	117.3°	14°02.3'	-37.1'	117.5°	13°34.6'	-37.8'	117.7°	13°06.6'	-38.6'	117.9°	12°38.4'	-39.3'	118.1°	15
16	14°49.7'	-35.0'	117.6°	14°21.7'	-35.7'	117.9°	13°53.6'	-36.5'	118.1°	13°25.3'	-37.2'	118.3°	12°56.7'	-38.0'	118.5°	12°28.0'	-38.7'	118.7°	11°59.1'	-39.4'	118.9°	16
17	14°14.7'	-35.1'	118.5°	13°46.0'	-35.9'	118.7°	13°17.1'	-36.6'	118.9°	12°48.0'	-37.4'	119.1°	12°18.8'	-38.1'	119.3°	11°49.3'	-38.8'	119.5°	11°19.7'	-39.5'	119.7°	17
18	13°39.6'	-35.3'	119.3°	13°10.1'	-36.1'	119.5°	12°40.5'	-36.8'	119.7°	12°10.7'	-37.5'	119.9°	11°40.7'	-38.2'	120.1°	11°10.5'	-38.9'	120.3°	10°40.2'	-39.6'	120.4°	18
19	13°04.3'	-35.5'	120.1°	12°34.1'	-36.2'	120.3°	12°03.7'	-36.9'	120.5°	11°33.1'	-37.6'	120.7°	11°02.4'	-38.4'	120.9°	10°31.6'	-39.0'	121.0°	10°00.6'	-39.7'	121.2°	19
20	12°28.8'	-35.6'	121.0°	11°57.9'	-36.3'	121.1°	11°26.8'	-37.1'	121.3°	10°55.5'	-37.8'	121.5°	10°24.1'	-38.5'	121.7°	9°52.5'						

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

62° 298° LHA

Latitude CONTRARY to Declination

62° 298° 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	24°29.3'	-31.1'	104.0°	24°14.6'	-32.1'	104.5°	23°59.4'	-33.0'	104.9°	23°43.8'	-33.9'	105.3°	23°27.7'	-34.8'	105.7°	23°11.2'	-35.7'	106.2°	22°54.3'	-36.6'	106.6°	0
1	23°58.2'	-31.5'	105.0°	23°42.5'	-32.4'	105.4°	23°26.4'	-33.3'	105.8°	23°09.8'	-34.2'	106.2°	22°52.9'	-35.1'	106.6°	22°35.5'	-36.0'	107.0°	22°17.8'	-36.8'	107.4°	1
2	23°26.7'	-31.8'	105.9°	23°10.1'	-32.7'	106.3°	22°53.1'	-33.6'	106.7°	22°35.6'	-34.5'	107.1°	22°17.8'	-35.4'	107.5°	21°59.5'	-36.2'	107.9°	21°40.9'	-37.1'	108.3°	2
3	22°55.0'	-32.1'	106.8°	22°37.4'	-33.0'	107.2°	22°19.5'	-33.9'	107.6°	22°01.1'	-34.8'	108.0°	21°42.4'	-35.7'	108.4°	21°23.3'	-36.5'	108.7°	21°03.8'	-37.3'	109.1°	3
4	22°22.8'	-32.4'	107.7°	22°04.4'	-33.3'	108.1°	21°45.5'	-34.2'	108.5°	21°26.3'	-35.1'	108.9°	21°06.7'	-35.9'	109.2°	20°46.8'	-36.8'	109.6°	20°26.5'	-37.6'	110.0°	4
5	21°50.4'	-32.7'	108.6°	21°31.1'	-33.6'	109.0°	21°11.4'	-34.5'	109.4°	20°51.3'	-35.3'	109.7°	20°30.8'	-36.2'	110.1°	20°10.0'	-37.0'	110.4°	19°48.9'	-37.8'	110.8°	5
6	21°17.7'	-33.0'	109.5°	20°57.5'	-33.9'	109.9°	20°36.9'	-34.7'	110.3°	20°15.9'	-35.6'	110.6°	19°54.7'	-36.4'	110.9°	19°33.1'	-37.2'	111.3°	19°11.1'	-38.0'	111.6°	6
7	20°44.7'	-33.3'	110.4°	20°23.6'	-34.1'	110.8°	20°02.2'	-35.0'	111.1°	19°40.4'	-35.8'	111.5°	19°18.3'	-36.6'	111.8°	18°55.8'	-37.4'	112.1°	18°33.1'	-38.2'	112.4°	7
8	20°11.4'	-33.5'	111.3°	19°49.5'	-34.4'	111.7°	19°27.2'	-35.2'	112.0°	19°04.6'	-36.0'	112.3°	18°41.6'	-36.9'	112.6°	18°18.4'	-37.7'	112.9°	17°54.9'	-38.4'	113.2°	8
9	19°37.9'	-33.8'	112.2°	19°15.1'	-34.6'	112.5°	18°51.9'	-35.5'	112.8°	18°28.5'	-36.3'	113.2°	18°04.8'	-37.1'	113.5°	17°40.7'	-37.9'	113.8°	17°16.4'	-38.6'	114.0°	9
10	19°04.1'	-34.0'	113.1°	18°40.4'	-34.9'	113.4°	18°16.5'	-35.7'	113.7°	17°52.2'	-36.5'	114.0°	17°27.7'	-37.3'	114.3°	17°02.9'	-38.0'	114.6°	16°37.8'	-38.8'	114.8°	10
11	18°30.1'	-34.3'	113.9°	18°05.6'	-35.1'	114.2°	17°40.8'	-35.9'	114.5°	17°15.7'	-36.7'	114.8°	16°50.4'	-37.5'	115.1°	16°24.8'	-38.2'	115.4°	15°59.0'	-39.0'	115.6°	11
12	17°55.8'	-34.5'	114.8°	17°30.5'	-35.3'	115.1°	17°04.9'	-36.1'	115.4°	16°39.1'	-36.9'	115.7°	16°13.0'	-37.7'	115.9°	15°46.6'	-38.4'	116.2°	15°20.0'	-39.1'	116.4°	12
13	17°21.3'	-34.7'	115.7°	16°55.2'	-35.5'	115.9°	16°28.8'	-36.3'	116.2°	16°02.2'	-37.1'	116.5°	15°35.3'	-37.8'	116.7°	15°08.2'	-38.6'	117.0°	14°40.9'	-39.3'	117.2°	13
14	16°46.6'	-34.9'	116.5°	16°19.6'	-35.7'	116.8°	15°52.5'	-36.5'	117.0°	15°25.1'	-37.3'	117.3°	14°57.5'	-38.0'	117.5°	14°29.6'	-38.7'	117.8°	14°01.6'	-39.5'	118.0°	14
15	16°11.6'	-35.1'	117.4°	15°43.9'	-35.9'	117.6°	15°16.0'	-36.7'	117.9°	14°47.8'	-37.4'	118.1°	14°19.5'	-38.2'	118.3°	13°50.9'	-38.9'	118.6°	13°22.1'	-39.6'	118.8°	15
16	15°36.5'	-35.3'	118.2°	15°08.0'	-36.1'	118.4°	14°39.3'	-36.8'	118.7°	14°10.4'	-37.6'	118.9°	13°41.3'	-38.3'	119.1°	13°12.0'	-39.0'	119.3°	12°42.5'	-39.7'	119.5°	16
17	15°01.2'	-35.5'	119.0°	14°31.9'	-36.3'	119.3°	14°02.5'	-37.0'	119.5°	13°32.8'	-37.7'	119.7°	13°03.0'	-38.5'	119.9°	12°33.0'	-39.2'	120.1°	12°02.8'	-39.9'	120.3°	17
18	14°25.7'	-35.7'	119.9°	13°55.7'	-36.4'	120.1°	13°25.5'	-37.2'	120.3°	12°55.1'	-37.9'	120.5°	12°24.6'	-38.6'	120.7°	11°53.8'	-39.3'	120.9°	11°23.0'	-40.0'	121.1°	18
19	13°50.0'	-35.8'	120.7°	13°19.2'	-36.6'	120.9°	12°48.3'	-37.3'	121.1°	12°17.2'	-38.0'	121.3°	11°46.0'	-38.7'	121.5°	11°14.6'	-39.4'	121.7°	10°43.0'	-40.1'	121.8°	19
20	13°14.1'	-36.0'	121.5°	12°42.7'	-36.7'	121.7°	12°11.0'	-37.4'	121.9°	11°39.2'	-38.1'	122.1°	11°07.3'	-38.8'	122.3°	10°35.2'	-39.5'	122.4°	10°02.9'	-40.2'	122.6°	20
21	12°38.1'	-36.2'	122.4°	12°05.9'	-36.9'	122.5°	11°33.6'	-37.6'	122.7°	11°01.1'	-38.3'	122.9°	10°28.4'	-38.9'	123.0°	9°55.6'	-39.6'	123.2°	9°22.7'	-40.3'	123.3°	21
22	12°02.0'	-36.3'	123.2°	11°29.1'	-37.0'	123.3°	10°56.0'	-37.7'	123.5°	10°22.8'	-38.4'	123.7°	9°49.5'	-39.1'	123.8°	9°16.0'	-39.7'	124.0°	8°42.5'	-40.4'	124.1°	22
23	11°25.7'	-36.4'	124.0°	10°52.0'	-37.1'	124.1°	10°18.3'	-37.8'	124.3°	9°44.4'	-38.5'	124.4°	9°10.4'	-39.1'	124.6°	8°36.3'	-39.8'	124.7°	8°02.1'	-40.4'	124.8°	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

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	25°20.6'	-31.3'	104.6°	25°05.3'	-32.3'	105.0°	24°49.5'	-33.2'	105.5°	24°33.3'	-34.1'	105.9°	24°16.6'	-35.0'	106.4°	23°59.5'	-35.9'	106.8°	23°41.9'	-36.8'	107.2°	0
1	24°49.3'	-31.7'	105.5°	24°33.0'	-32.6'	106.0°	24°16.3'	-33.5'	106.4°	23°59.2'	-34.4'	106.8°	23°41.6'	-35.3'	107.3°	23°23.6'	-36.2'	107.7°	23°05.1'	-37.1'	108.1°	1
2	24°17.6'	-32.0'	106.5°	24°00.4'	-33.0'	106.9°	23°42.8'	-33.9'	107.3°	23°24.7'	-34.8'	107.7°	23°06.2'	-35.6'	108.1°	22°47.3'	-36.5'	108.5°	22°28.1'	-37.3'	108.9°	2
3	23°45.6'	-32.4'	107.4°	23°27.5'	-33.3'	107.8°	23°08.9'	-34.2'	108.2°	22°49.9'	-35.0'	108.6°	22°30.6'	-35.9'	109.0°	22°10.9'	-36.8'	109.4°	21°50.7'	-37.6'	109.8°	3
4	23°13.2'	-32.7'	108.3°	22°54.2'	-33.6'	108.7°	22°34.7'	-34.5'	109.1°	22°14.9'	-35.3'	109.5°	21°54.7'	-36.2'	109.9°	21°34.1'	-37.0'	110.3°	21°13.2'	-37.8'	110.6°	4
5	22°40.5'	-33.0'	109.2°	22°40.5'	-33.9'	109.6°	22°00.3'	-34.7'	110.0°	21°39.6'	-35.6'	110.4°	21°18.5'	-36.4'	110.7°	20°57.1'	-37.3'	111.1°	20°35.3'	-38.1'	111.4°	5
6	22°07.6'	-33.3'	110.1°	21°46.7'	-34.2'	110.5°	21°25.5'	-35.0'	110.9°	21°04.0'	-35.8'	111.2°	20°42.1'	-36.7'	111.6°	20°19.8'	-37.5'	111.9°	19°57.3'	-38.3'	112.3°	6
7	21°34.3'	-33.6'	111.0°	21°12.6'	-34.4'	111.4°	20°50.5'	-35.3'	111.7°	20°28.1'	-36.1'	112.1°	20°05.4'	-36.9'	112.4°	19°42.3'	-37.7'	112.8°	19°19.0'	-38.5'	113.1°	7
8	21°00.7'	-33.8'	111.9°	20°38.1'	-34.7'	112.3°	20°15.2'	-35.5'	112.6°	19°52.0'	-36.3'	112.9°	19°28.5'	-37.2'	113.3°	19°04.6'	-37.9'	113.6°	18°40.5'	-38.7'	113.9°	8
9	20°26.9'	-34.1'	112.8°	20°03.4'	-34.9'	113.1°	19°39.7'	-35.8'	113.5°	19°15.7'	-36.6'	113.8°	18°51.3'	-37.4'	114.1°	18°26.7'	-38.1'	114.4°	18°01.7'	-38.9'	114.7°	9
10	19°52.7'	-34.4'	113.7°	19°28.5'	-35.2'	114.0°	19°04.0'	-36.0'	114.3°	18°39.1'	-36.8'	114.6°	18°14.0'	-37.6'	114.9°	17°48.5'	-38.3'	115.2°	17°22.8'	-39.1'	115.5°	10
11	19°18.4'	-34.6'	114.5°	18°53.3'	-35.4'	114.8°	18°27.9'	-36.2'	115.2°	18°02.3'	-37.0'	115.5°	17°36.4'	-37.8'	115.7°	17°10.2'	-38.5'	116.0°	16°43.7'	-39.3'	116.3°	11
12	18°43.8'	-34.8'	115.4°	18°17.9'	-35.7'	115.7°	17°51.7'	-36.4'	116.0°	17°25.3'	-37.2'	116.3°	16°58.6'	-38.0'	116.6°	16°31.6'	-38.7'	116.8°	16°04.4'	-39.5'	117.1°	12
13	18°08.9'	-35.1'	116.3°	17°42.2'	-35.9'	116.5°	17°15.3'	-36.6'	116.8°	16°48.1'	-37.4'	117.1°	16°20.6'	-38.2'	117.4°	15°52.9'	-38.9'	117.6°	15°25.0'	-39.6'	117.9°	13
14	17°33.8'	-35.3'	117.1°	17°06.4'	-36.1'	117.4°	16°38.6'	-36.8'	117.7°	16°10.7'	-37.6'	117.9°	15°42.5'	-38.3'	118.2°	15°14.0'	-39.1'	118.4°	14°45.4'	-39.8'	118.6°	14
15	16°58.5'	-35.5'	118.0°	16°30.3'	-36.3'	118.2°	16°01.8'	-37.0'	118.5°	15°33.1'	-37.8'	118.7°	15°04.1'	-38.5'	119.0°	14°35.0'	-39.2'	119.2°	14°05.6'	-39.9'	119.4°	15
16	16°23.0'	-35.7'	118.8°	15°54.0'	-36.5'	119.1°	15°24.8'	-37.2'	119.3°	14°55.3'	-37.9'	119.5°	14°25.6'	-38.7'	119.8°	13°55.7'	-39.4'	120.0°	13°25.7'	-40.1'	120.2°	16
17	15°47.3'	-35.9'	119.6°	15°17.6'	-36.6'	119.9°	14°47.6'	-37.4'	120.1°	14°17.4'	-38.1'	120.3°	13°47.0'	-38.8'	120.5°	13°16.4'	-39.5'	120.8°	12°45.6'	-40.2'	121.0°	17
18	15°11.5'	-36.1'	120.5°	14°40.9'	-36.8'	120.7°	14°10.2'	-37.5'	120.9°	13°39.3'	-38.2'	121.1°	13°08.2'	-38.9'	121.3°	12°36.9'	-39.6'	121.5°	12°05.4'	-40.3'	121.7°	18
19	14°35.4'	-36.2'	121.3°	14°04.1'	-37.0'	121.5°	13°32.7'	-37.7'	121.7°	13°01.6'	-38.4'	121.9°	12°29.2'	-39.1'	122.1°	11°57.2'	-39.8'	122.3°	11°25.1'	-40.4'	122.5°	19
20	13°59.1'	-36.4'	122.1°	13°27.1'	-37.1'	122.3°	12°55.0'	-37.8'	122.5°	12°22.6'	-38.5'	122.7°	11°50.1'	-39.2'	122.9°	11°17.5'						

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°11.8'	-31.6'	105.2°	25°55.9'	-32.5'	105.6°	25°39.5'	-33.5'	106.1°	25°22.7'	-34.4'	106.6°	25°05.3'	-35.3'	107.0°	24°47.6'	-36.1'	107.5°	24°29.3'	-37.0'	107.9°	0
1	25°40.2'	-31.9'	106.1°	25°23.4'	-32.9'	106.6°	25°06.1'	-33.8'	107.0°	24°48.3'	-34.7'	107.5°	24°30.1'	-35.6'	107.9°	24°11.4'	-36.4'	108.3°	23°52.3'	-37.3'	108.8°	1
2	25°08.3'	-32.3'	107.0°	24°50.5'	-33.2'	107.5°	24°32.3'	-34.1'	107.9°	24°13.6'	-35.0'	108.4°	23°54.5'	-35.9'	108.8°	23°35.0'	-36.7'	109.2°	23°15.0'	-37.6'	109.6°	2
3	24°36.1'	-32.6'	108.0°	24°17.3'	-33.5'	108.4°	23°58.2'	-34.4'	108.8°	23°38.6'	-35.3'	109.3°	23°18.6'	-36.2'	109.7°	22°58.2'	-37.0'	110.1°	22°37.5'	-37.8'	110.5°	3
4	24°03.4'	-33.0'	108.9°	23°43.8'	-33.9'	109.3°	23°23.7'	-34.7'	109.7°	23°03.3'	-35.6'	110.1°	22°42.4'	-36.4'	110.5°	22°21.2'	-37.3'	110.9°	21°59.6'	-38.1'	111.3°	4
5	23°30.5'	-33.3'	109.8°	23°09.9'	-34.2'	110.2°	22°49.0'	-35.0'	110.6°	22°27.7'	-35.9'	111.0°	22°06.0'	-36.7'	111.4°	21°43.9'	-37.5'	111.8°	21°21.5'	-38.3'	112.1°	5
6	22°57.2'	-33.6'	110.7°	22°35.8'	-34.5'	111.1°	22°14.0'	-35.3'	111.5°	21°51.8'	-36.1'	111.9°	21°29.3'	-37.0'	112.2°	21°06.4'	-37.8'	112.6°	20°43.2'	-38.6'	113.0°	6
7	22°23.6'	-33.9'	111.6°	22°01.3'	-34.7'	112.0°	21°38.7'	-35.6'	112.4°	21°15.7'	-36.4'	112.7°	20°52.3'	-37.2'	113.1°	20°28.6'	-38.0'	113.4°	20°04.6'	-38.8'	113.8°	7
8	21°49.7'	-34.2'	112.5°	21°26.6'	-35.0'	112.9°	21°03.1'	-35.8'	113.2°	20°39.3'	-36.7'	113.6°	20°15.1'	-37.5'	113.9°	19°50.6'	-38.2'	114.3°	19°25.8'	-39.0'	114.6°	8
9	21°15.6'	-34.4'	113.4°	20°51.6'	-35.3'	113.7°	20°27.3'	-36.1'	114.1°	20°02.6'	-36.9'	114.4°	19°37.7'	-37.7'	114.8°	19°12.4'	-38.5'	115.1°	18°46.8'	-39.2'	115.4°	9
10	20°41.2'	-34.7'	114.3°	20°16.3'	-35.5'	114.6°	19°51.2'	-36.3'	114.9°	19°25.7'	-37.1'	115.3°	18°60.0'	-37.9'	115.6°	18°33.9'	-38.7'	115.9°	18°07.6'	-39.4'	116.2°	10
11	20°06.5'	-35.0'	115.1°	19°40.8'	-35.8'	115.5°	19°14.9'	-36.6'	115.8°	18°48.6'	-37.3'	116.1°	18°22.1'	-38.1'	116.4°	17°55.3'	-38.9'	116.7°	17°28.2'	-39.6'	117.0°	11
12	19°31.5'	-35.2'	116.0°	19°05.0'	-36.0'	116.3°	18°38.3'	-36.8'	116.6°	18°11.3'	-37.5'	116.9°	17°44.0'	-38.3'	117.2°	17°16.4'	-39.0'	117.5°	16°48.6'	-39.8'	117.8°	12
13	18°56.3'	-35.4'	116.9°	18°29.1'	-36.2'	117.2°	18°01.5'	-37.0'	117.5°	17°33.7'	-37.7'	117.7°	17°05.7'	-38.5'	118.0°	16°37.4'	-39.2'	118.3°	16°08.8'	-39.9'	118.5°	13
14	18°20.9'	-35.7'	117.7°	17°52.8'	-36.4'	118.0°	17°24.5'	-37.2'	118.3°	16°56.0'	-37.9'	118.6°	16°27.2'	-38.7'	118.8°	15°58.1'	-39.4'	119.1°	15°28.9'	-40.1'	119.3°	14
15	17°45.2'	-35.9'	118.6°	17°16.4'	-36.6'	118.8°	16°47.3'	-37.4'	119.1°	16°18.0'	-38.1'	119.4°	15°48.5'	-38.8'	119.6°	15°18.8'	-39.6'	119.9°	14°48.8'	-40.3'	120.1°	15
16	17°09.3'	-36.1'	119.4°	16°39.8'	-36.8'	119.7°	16°10.0'	-37.6'	119.9°	15°39.9'	-38.3'	120.2°	15°09.7'	-39.0'	120.4°	14°39.2'	-39.7'	120.6°	14°08.5'	-40.4'	120.9°	16
17	16°33.3'	-36.3'	120.2°	16°02.9'	-37.0'	120.5°	15°32.4'	-37.7'	120.7°	15°01.6'	-38.5'	121.0°	14°30.6'	-39.2'	121.2°	13°59.5'	-39.9'	121.4°	13°28.1'	-40.5'	121.6°	17
18	15°57.0'	-36.5'	121.1°	15°25.9'	-37.2'	121.3°	14°54.6'	-37.9'	121.5°	14°23.2'	-38.6'	121.8°	13°51.5'	-39.3'	122.0°	13°19.6'	-40.0'	122.2°	12°47.6'	-40.7'	122.4°	18
19	15°20.5'	-36.6'	121.9°	14°48.7'	-37.4'	122.1°	14°16.7'	-38.1'	122.3°	13°44.5'	-38.8'	122.5°	13°12.2'	-39.5'	122.7°	12°39.6'	-40.1'	122.9°	12°06.9'	-40.8'	123.1°	19
20	14°43.9'	-36.8'	122.7°	14°11.3'	-37.5'	122.9°	13°38.6'	-38.2'	123.1°	13°05.8'	-38.9'	123.3°	12°32.7'	-39.6'	123.5°	11°59.5'	-40.2'	123.7°	11°26.1'	-40.9'	123.9°	20
21	14°07.0'	-37.0'	123.5°	13°33.8'	-37.7'	123.7°	13°00.4'	-38.4'	123.9°	12°26.8'	-39.0'	124.1°	11°53.1'	-39.7'	124.3°	11°19.2'	-40.4'	124.5°	10°45.2'	-41.0'	124.6°	21
22	13°30.1'	-37.1'	124.3°	12°56.1'	-37.8'	124.5°	12°22.0'	-38.5'	124.7°	11°47.8'	-39.2'	124.9°	11°13.4'	-39.8'	125.1°	10°38.9'	-40.5'	125.2°	10°04.2'	-41.1'	125.4°	22
23	12°52.9'	-37.3'	125.1°	12°18.3'	-38.0'	125.3°	11°43.5'	-38.6'	125.5°	11°08.6'	-39.3'	125.7°	10°33.6'	-39.9'	125.8°	9°58.4'	-40.6'	126.0°	9°23.1'	-41.2'	126.1°	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°02.9'	-31.8'	105.8°	26°46.4'	-32.8'	106.2°	26°29.4'	-33.7'	106.7°	26°11.9'	-34.6'	107.2°	25°53.9'	-35.5'	107.7°	25°35.5'	-36.4'	108.1°	25°16.6'	-37.3'	108.6°	0
1	26°31.1'	-32.2'	106.7°	26°13.6'	-33.1'	107.2°	25°55.7'	-34.0'	107.6°	25°37.3'	-34.9'	108.1°	25°18.4'	-35.8'	108.6°	24°59.1'	-36.7'	109.0°	24°39.3'	-37.5'	109.4°	1
2	25°58.9'	-32.6'	107.6°	25°40.5'	-33.5'	108.1°	25°21.6'	-34.4'	108.6°	25°02.3'	-35.3'	109.0°	24°42.6'	-36.1'	109.4°	24°22.4'	-37.0'	109.9°	24°01.8'	-37.8'	110.3°	2
3	25°26.4'	-32.9'	108.6°	25°07.0'	-33.8'	109.0°	24°47.3'	-34.7'	109.5°	24°27.1'	-35.6'	109.9°	24°06.4'	-36.4'	110.3°	23°45.4'	-37.3'	110.7°	23°24.0'	-38.1'	111.1°	3
4	24°53.5'	-33.2'	109.5°	24°33.2'	-34.1'	109.9°	24°12.6'	-35.0'	110.4°	23°51.5'	-35.9'	110.8°	23°30.0'	-36.7'	111.2°	23°08.1'	-37.6'	111.6°	22°45.8'	-38.4'	112.0°	4
5	24°20.2'	-33.6'	110.4°	23°59.1'	-34.4'	110.8°	23°37.5'	-35.3'	111.2°	23°15.6'	-36.2'	111.7°	22°53.3'	-37.0'	112.0°	22°30.6'	-37.8'	112.4°	22°07.5'	-38.6'	112.8°	5
6	23°46.7'	-33.9'	111.3°	23°24.6'	-34.8'	111.7°	23°02.2'	-35.6'	112.1°	22°39.4'	-36.4'	112.5°	22°16.3'	-37.3'	112.9°	21°52.8'	-38.1'	113.3°	21°28.9'	-38.9'	113.6°	6
7	23°12.8'	-34.2'	112.2°	22°49.9'	-35.0'	112.6°	22°26.6'	-35.9'	113.0°	22°03.0'	-36.7'	113.4°	21°39.0'	-37.5'	113.7°	21°14.7'	-38.3'	114.1°	20°50.0'	-39.1'	114.5°	7
8	22°38.6'	-34.5'	113.1°	22°14.8'	-35.3'	113.5°	21°50.7'	-36.2'	113.9°	21°26.3'	-37.0'	114.2°	21°01.5'	-37.8'	114.6°	20°36.4'	-38.5'	114.9°	20°10.9'	-39.3'	115.3°	8
9	22°04.1'	-34.8'	114.0°	21°39.5'	-35.6'	114.4°	21°14.6'	-36.4'	114.7°	20°49.3'	-37.2'	115.1°	20°23.7'	-38.0'	115.4°	19°57.8'	-38.8'	115.7°	19°31.6'	-39.5'	116.1°	9
10	21°29.3'	-35.0'	114.9°	21°03.9'	-35.9'	115.2°	20°38.2'	-36.7'	115.6°	20°12.1'	-37.4'	115.9°	19°45.7'	-38.2'	116.2°	19°19.1'	-39.0'	116.6°	18°52.1'	-39.7'	116.9°	10
11	20°54.3'	-35.3'	115.7°	20°28.1'	-36.1'	116.1°	20°01.5'	-36.9'	116.4°	19°34.7'	-37.7'	116.7°	19°07.5'	-38.4'	117.1°	18°40.1'	-39.2'	117.4°	18°12.4'	-39.9'	117.7°	11
12	20°19.0'	-35.6'	116.6°	19°52.0'	-36.3'	116.9°	19°24.6'	-37.1'	117.3°	18°57.0'	-37.9'	117.6°	18°29.1'	-38.6'	117.9°	18°00.9'	-39.4'	118.2°	17°32.5'	-40.1'	118.4°	12
13	19°43.4'	-35.8'	117.5°	19°15.6'	-36.6'	117.8°	18°47.5'	-37.3'	118.1°	18°19.1'	-38.1'	118.4°	17°50.5'	-38.8'	118.7°	17°21.5'	-39.6'	118.9°	16°52.4'	-40.3'	119.2°	13
14	19°07.6'	-36.0'	118.3°	18°39.0'	-36.8'	118.6°	18°10.2'	-37.6'	118.9°	17°41.0'	-38.3'	119.2°	17°11.6'	-39.0'	119.5°	16°42.0'	-39.7'	119.7°	16°12.1'	-40.4'	120.0°	14
15	18°31.6'	-36.3'	119.2°	18°02.2'	-37.0'	119.5°	17°32.6'	-37.8'	119.7°	17°02.7'	-38.5'	120.0°	16°32.6'	-39.2'	120.3°	16°02.2'	-39.9'	120.5°	15°31.7'	-40.6'	120.8°	15
16	17°55.4'	-36.5'	120.0°	17°25.2'	-37.2'	120.3°	16°54.8'	-37.9'	120.5°	16°24.2'	-38.7'	120.8°	15°53.4'	-39.4'	121.1°	15°22.3'	-40.1'	121.3°	14°51.1'	-40.7'	121.5°	16
17	17°18.9'	-36.7'	120.8°	16°48.0'	-37.4'	121.1°	16°16.9'	-38.1'	121.4°	15°45.6'	-38.8'	121.6°	15°14.0'	-39.5'	121.8°	14°42.3'	-40.2'	122.1°	14°10.3'	-40.9'	122.3°	17
18	16°42.2'	-36.9'	121.7°	16°10.6'	-37.6'	121.9°	15°38.8'	-38.3'	122.0°	15°06.7'	-39.0'	122.4°	14°34.5'	-39.7'	122.6°	14°02.1'	-40.4'	122.8°	13°29.4'	-41.0'	123.0°	18
19	16°05.3'	-37.1'	122.5°	15°33.0'	-37.8'	122.7°	15°00.5'	-38.5'	122.9°	14°27.7'	-39.2'	123.2°	13°54.8'	-39.8'	123.4°	13°21.7'	-40.5'	123.6°	12°48.4'	-41.1'	123.8°	19
20	15°28.3'	-37.2'	123.3°	14°55.2'	-37.9'	123.5°	14°22.0'	-38.6'	123.7°	13°48.6'	-39.3'	124.0°	13°15.0'	-40.0'	124.2°							

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

58° 302° LHA

Latitude CONTRARY to 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°53.8'	-32.1'	106.3°	27°36.7'	-33.0'	106.9°	27°19.1'	-33.9'	107.4°	27°00.9'	-34.9'	107.8°	26°42.3'	-35.8'	108.3°	26°23.2'	-36.6'	108.8°	26°03.6'	-37.5'	109.3°	0
1	27°21.7'	-32.5'	107.3°	27°03.7'	-33.4'	107.8°	26°45.1'	-34.3'	108.3°	26°26.1'	-35.2'	108.8°	26°06.5'	-36.1'	109.2°	25°46.6'	-37.0'	109.7°	25°26.1'	-37.8'	110.1°	1
2	26°49.3'	-32.8'	108.2°	26°30.3'	-33.7'	108.7°	26°10.8'	-34.7'	109.2°	25°50.9'	-35.5'	109.7°	25°30.5'	-36.4'	110.1°	25°09.6'	-37.3'	110.5°	24°48.3'	-38.1'	111.0°	2
3	26°16.5'	-33.2'	109.2°	25°56.6'	-34.1'	109.6°	25°36.2'	-35.0'	110.1°	25°15.3'	-35.9'	110.5°	24°54.0'	-36.7'	111.0°	24°32.3'	-37.6'	111.4°	24°10.2'	-38.4'	111.8°	3
4	25°43.3'	-33.5'	110.1°	25°22.5'	-34.4'	110.6°	25°01.2'	-35.3'	111.0°	24°39.5'	-36.2'	111.4°	24°17.3'	-37.0'	111.9°	23°54.8'	-37.8'	112.3°	23°31.9'	-38.6'	112.7°	4
5	25°09.8'	-33.9'	111.0°	24°48.0'	-34.8'	111.5°	24°25.9'	-35.6'	111.9°	24°03.3'	-36.5'	112.3°	23°40.3'	-37.3'	112.7°	23°17.0'	-38.1'	113.1°	22°53.2'	-38.9'	113.5°	5
6	24°35.9'	-34.2'	111.9°	24°13.3'	-35.1'	112.4°	23°50.3'	-35.9'	112.8°	23°26.8'	-36.7'	113.2°	23°03.0'	-37.6'	113.6°	22°38.9'	-38.4'	114.0°	22°14.3'	-39.1'	114.3°	6
7	24°01.7'	-34.5'	112.8°	23°38.2'	-35.4'	113.2°	23°14.3'	-36.2'	113.6°	22°50.1'	-37.0'	114.0°	22°25.5'	-37.8'	114.4°	22°00.5'	-38.6'	114.8°	21°35.2'	-39.4'	115.1°	7
8	23°27.2'	-34.8'	113.7°	23°02.9'	-35.7'	114.1°	22°38.1'	-36.5'	114.5°	22°13.1'	-37.3'	114.9°	21°47.6'	-38.1'	115.3°	21°21.9'	-38.9'	115.6°	20°55.8'	-39.6'	116.0°	8
9	22°52.4'	-35.1'	114.6°	22°27.2'	-35.9'	115.0°	22°01.7'	-36.7'	115.4°	21°35.8'	-37.5'	115.7°	21°09.6'	-38.3'	116.1°	20°43.0'	-39.1'	116.4°	20°16.2'	-39.8'	116.8°	9
10	22°17.3'	-35.4'	115.5°	21°51.3'	-36.2'	115.9°	21°24.9'	-37.0'	116.2°	20°58.3'	-37.8'	116.6°	20°31.3'	-38.5'	116.9°	20°04.0'	-39.3'	117.2°	19°36.3'	-40.0'	117.6°	10
11	21°41.9'	-35.7'	116.4°	21°15.1'	-36.5'	116.7°	20°47.9'	-37.2'	117.1°	20°20.5'	-38.0'	117.4°	19°52.7'	-38.8'	117.7°	19°24.7'	-39.5'	118.0°	18°56.3'	-40.2'	118.3°	11
12	21°06.2'	-35.9'	117.2°	20°38.6'	-36.7'	117.6°	20°10.7'	-37.5'	117.9°	19°42.5'	-38.2'	118.2°	19°13.9'	-39.0'	118.5°	18°45.1'	-39.7'	118.8°	18°16.1'	-40.4'	119.1°	12
13	20°30.3'	-36.2'	118.1°	20°01.9'	-36.9'	118.4°	19°33.2'	-37.7'	118.7°	19°04.2'	-38.5'	119.0°	18°35.0'	-39.2'	119.3°	18°05.4'	-39.9'	119.6°	17°35.6'	-40.6'	119.9°	13
14	19°54.1'	-36.4'	118.9°	19°25.0'	-37.2'	119.3°	18°55.5'	-37.9'	119.6°	18°25.8'	-38.7'	119.8°	17°55.8'	-39.4'	120.1°	17°25.5'	-40.1'	120.4°	16°55.0'	-40.8'	120.7°	14
15	19°17.7'	-36.6'	119.8°	18°47.8'	-37.4'	120.1°	18°17.6'	-38.1'	120.4°	17°47.1'	-38.9'	120.7°	17°16.4'	-39.6'	120.9°	16°45.4'	-40.3'	121.2°	16°14.3'	-40.9'	121.4°	15
16	18°41.1'	-36.9'	120.6°	18°10.4'	-37.6'	120.9°	17°39.5'	-38.3'	121.2°	17°08.3'	-39.0'	121.5°	16°36.8'	-39.7'	121.7°	16°05.2'	-40.4'	122.0°	15°33.3'	-41.1'	122.2°	16
17	18°04.2'	-37.1'	121.5°	17°32.8'	-37.8'	121.7°	17°01.1'	-38.5'	122.0°	16°29.2'	-39.2'	122.2°	15°57.1'	-39.9'	122.5°	15°24.8'	-40.6'	122.7°	14°52.2'	-41.2'	123.0°	17
18	17°27.2'	-37.3'	122.3°	16°55.0'	-38.0'	122.5°	16°22.6'	-38.7'	122.8°	15°50.0'	-39.4'	123.0°	15°17.2'	-40.1'	123.3°	14°44.2'	-40.7'	123.5°	14°11.0'	-41.4'	123.7°	18
19	16°49.9'	-37.5'	123.1°	16°17.0'	-38.2'	123.3°	15°43.9'	-38.9'	123.6°	15°10.6'	-39.5'	123.8°	14°37.1'	-40.2'	124.0°	14°03.5'	-40.9'	124.2°	13°29.6'	-41.5'	124.5°	19
20	16°12.4'	-37.7'	123.9°	15°38.8'	-38.3'	124.1°	15°05.0'	-39.0'	124.4°	14°31.1'	-39.7'	124.6°	13°56.9'	-40.4'	124.8°	13°22.6'	-41.0'	125.0°	12°48.1'	-41.6'	125.2°	20
21	15°34.8'	-37.8'	124.7°	15°00.5'	-38.5'	124.9°	14°26.0'	-39.2'	125.2°	13°51.4'	-39.8'	125.4°	13°16.6'	-40.5'	125.6°	12°41.6'	-41.1'	125.8°	12°06.4'	-41.8'	125.9°	21
22	14°56.9'	-38.0'	125.5°	14°22.0'	-38.7'	125.7°	13°46.8'	-39.3'	125.9°	13°11.5'	-40.0'	126.1°	12°36.1'	-40.6'	126.3°	12°00.5'	-41.2'	126.5°	11°24.7'	-41.9'	126.7°	22
23	14°18.9'	-38.2'	126.3°	13°43.3'	-38.8'	126.5°	13°07.5'	-39.5'	126.7°	12°31.5'	-40.1'	126.9°	11°55.4'	-40.7'	127.1°	11°19.2'	-41.4'	127.2°	10°42.8'	-42.0'	127.4°	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			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	28°44.6'	-32.3'	107.0°	28°26.8'	-33.3'	107.5°	28°08.6'	-34.2'	108.0°	27°49.8'	-35.1'	108.5°	27°30.5'	-36.0'	109.0°	27°10.7'	-36.9'	109.5°	26°50.5'	-37.8'	110.0°	0
1	28°12.2'	-32.7'	107.9°	27°53.6'	-33.7'	108.4°	27°34.4'	-34.6'	108.9°	27°14.7'	-35.5'	109.4°	26°54.5'	-36.4'	109.9°	26°33.8'	-37.2'	110.4°	26°12.7'	-38.1'	110.8°	1
2	27°39.5'	-33.1'	108.9°	27°19.9'	-34.0'	109.4°	26°59.8'	-34.9'	109.8°	26°39.2'	-35.8'	110.3°	26°18.1'	-36.7'	110.8°	25°56.6'	-37.5'	111.2°	25°34.7'	-38.4'	111.7°	2
3	27°06.4'	-33.5'	109.8°	26°45.9'	-34.4'	110.3°	26°24.9'	-35.3'	110.7°	26°03.4'	-36.1'	111.2°	25°41.4'	-37.0'	111.7°	25°19.1'	-37.8'	112.1°	24°56.3'	-38.7'	112.5°	3
4	26°33.0'	-33.8'	110.7°	26°11.5'	-34.7'	111.2°	25°49.6'	-35.6'	111.6°	25°27.2'	-36.5'	112.1°	25°04.4'	-37.3'	112.5°	24°41.2'	-38.1'	113.0°	24°17.6'	-38.9'	113.4°	4
5	25°59.1'	-34.2'	111.7°	25°36.8'	-35.1'	112.1°	25°14.0'	-35.9'	112.5°	24°50.8'	-36.8'	113.0°	24°27.1'	-37.6'	113.4°	24°03.1'	-38.4'	113.8°	23°38.7'	-39.2'	114.2°	5
6	25°24.9'	-34.5'	112.6°	25°01.7'	-35.4'	113.0°	24°38.1'	-36.2'	113.4°	24°14.0'	-37.1'	113.8°	23°49.6'	-37.9'	114.2°	23°24.7'	-38.7'	114.6°	22°59.5'	-39.4'	115.0°	6
7	24°50.4'	-34.8'	113.5°	24°26.3'	-35.7'	113.9°	24°01.8'	-36.5'	114.3°	23°36.9'	-37.3'	114.7°	23°11.7'	-38.1'	115.1°	22°46.1'	-38.9'	115.5°	22°20.1'	-39.7'	115.9°	7
8	24°15.6'	-35.2'	114.4°	23°50.6'	-36.0'	114.8°	23°25.3'	-36.8'	115.2°	22°59.6'	-37.6'	115.6°	22°33.5'	-38.4'	115.9°	22°07.1'	-39.2'	116.3°	21°40.4'	-39.9'	116.7°	8
9	23°40.4'	-35.5'	115.2°	23°14.6'	-36.3'	115.6°	22°48.5'	-37.1'	116.0°	22°22.0'	-37.9'	116.4°	21°55.1'	-38.6'	116.8°	21°28.0'	-39.4'	117.1°	21°00.4'	-40.1'	117.5°	9
10	23°05.0'	-35.7'	116.1°	22°38.4'	-36.6'	116.5°	22°11.4'	-37.3'	116.9°	21°44.1'	-38.1'	117.2°	21°16.5'	-38.9'	117.6°	20°48.6'	-39.6'	117.9°	20°20.3'	-40.4'	118.3°	10
11	22°29.2'	-36.0'	117.0°	22°01.8'	-36.8'	117.4°	21°34.1'	-37.6'	117.7°	21°06.0'	-38.4'	118.1°	20°37.6'	-39.1'	118.4°	20°08.9'	-39.8'	118.7°	19°39.9'	-40.6'	119.0°	11
12	21°53.2'	-36.3'	117.9°	21°25.0'	-37.1'	118.2°	20°56.5'	-37.8'	118.6°	20°27.6'	-38.6'	118.9°	19°58.5'	-39.3'	119.2°	19°29.1'	-40.1'	119.5°	18°59.4'	-40.8'	119.8°	12
13	21°16.9'	-36.5'	118.7°	20°47.9'	-37.3'	119.1°	20°18.6'	-38.1'	119.4°	19°49.0'	-38.8'	119.7°	19°19.2'	-39.5'	120.0°	18°49.0'	-40.2'	120.3°	18°18.6'	-40.9'	120.6°	13
14	20°40.4'	-36.8'	119.6°	20°10.6'	-37.6'	119.9°	19°40.6'	-38.3'	120.2°	19°10.2'	-39.0'	120.5°	18°39.6'	-39.7'	120.8°	18°08.8'	-40.4'	121.1°	17°37.7'	-41.1'	121.4°	14
15	20°03.6'	-37.0'	120.4°	19°33.0'	-37.8'	120.7°	19°02.3'	-38.5'	121.0°	18°31.2'	-39.2'	121.3°	17°59.9'	-39.9'	121.6°	17°28.3'	-40.6'	121.9°	16°56.5'	-41.3'	122.1°	15
16	19°26.5'	-37.3'	121.2°	18°55.3'	-38.0'	121.5°	18°23.8'	-38.7'	121.8°	17°52.0'	-39.4'	122.1°	17°20.0'	-40.1'	122.4°	16°47.7'	-40.8'	122.6°	16°15.3'	-41.5'	122.9°	16
17	18°49.3'	-37.5'	122.1°	18°17.3'	-38.2'	122.4°	17°45.0'	-38.9'	122.6°	17°12.6'	-39.6'	122.9°	16°39.9'	-40.3'	123.2°	16°06.9'	-40.9'	123.4°	15°33.8'	-41.6'	123.6°	17
18	18°11.8'	-37.7'	122.9°	17°39.1'	-38.4'	123.2°	17°06.1'	-39.1'	123.4°	16°33.0'	-39.8'	123.7°	15°59.6'	-40.4'	123.9°	15°26.0'	-41.1'	124.2°	14°52.2'	-41.7'	124.4°	18
19	17°34.1'	-37.9'	123.7°	17°00.7'	-38.6'	124.0°	16°27.0'	-39.3'	124.2°	15°53.2'	-39.9'	124.5°	15°19.1'	-40.6'	124.7°	14°44.9'	-41.2'	124.9°	14°10.5'	-41.9'	125.1°	19
20	16°56.2'	-38.1'	124.5°	16°22.1'	-38.8'	124.8°	15°47.8'	-39.4'	125.0°	15°13.2'	-40.1'	125.2°	14°38.5'	-40.7'	125.5°							



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°35.1'	-32.6'	107.6°	29°16.8'	-33.5'	108.1°	28°57.9'	-34.5'	108.6°	28°38.5'	-35.4'	109.2°	28°18.5'	-36.3'	109.7°	27°58.1'	-37.2'	110.2°	27°37.1'	-38.0'	110.7°	0			
1	29°02.5'	-33.0'	108.5°	28°43.3'	-33.9'	109.1°	28°23.4'	-34.9'	109.6°	28°03.1'	-35.8'	110.1°	27°42.2'	-36.6'	110.6°	27°20.9'	-37.5'	111.1°	26°59.1'	-38.3'	111.5°	1			
2	28°29.5'	-33.4'	109.5°	28°09.3'	-34.3'	110.0°	27°48.6'	-35.2'	110.5°	27°27.3'	-36.1'	111.0°	27°05.6'	-37.0'	111.5°	26°43.4'	-37.8'	111.9°	26°20.8'	-38.7'	112.4°	2			
3	27°56.2'	-33.8'	110.4°	27°35.0'	-34.7'	110.9°	27°13.3'	-35.6'	111.4°	26°51.2'	-36.4'	111.9°	26°28.6'	-37.3'	112.3°	26°05.6'	-38.1'	112.8°	25°42.1'	-38.9'	113.2°	3			
4	27°22.4'	-34.2'	111.4°	27°00.3'	-35.0'	111.8°	26°37.8'	-35.9'	112.3°	26°14.8'	-36.8'	112.8°	25°51.3'	-37.6'	113.2°	25°27.5'	-38.4'	113.7°	25°03.2'	-39.2'	114.1°	4			
5	26°48.2'	-34.5'	112.3°	26°25.3'	-35.4'	112.7°	26°01.8'	-36.2'	113.2°	25°38.0'	-37.1'	113.6°	25°13.7'	-37.9'	114.1°	24°49.0'	-38.7'	114.5°	24°23.9'	-39.5'	114.9°	5			
6	26°13.7'	-34.9'	113.2°	25°49.9'	-35.7'	113.6°	25°25.6'	-36.6'	114.1°	25°00.9'	-37.4'	114.5°	24°35.8'	-38.2'	114.9°	24°10.3'	-39.0'	115.3°	23°44.5'	-39.8'	115.7°	6			
7	25°38.9'	-35.2'	114.1°	25°14.2'	-36.0'	114.5°	24°49.1'	-36.9'	115.0°	24°23.5'	-37.7'	115.4°	23°57.6'	-38.5'	115.8°	23°31.3'	-39.2'	116.2°	23°04.7'	-40.0'	116.6°	7			
8	25°03.7'	-35.5'	115.0°	24°38.1'	-36.3'	115.4°	24°12.2'	-37.1'	115.8°	23°45.9'	-37.9'	116.2°	23°19.2'	-38.7'	116.6°	22°52.1'	-39.5'	117.0°	22°24.7'	-40.2'	117.4°	8			
9	24°28.2'	-35.8'	115.9°	24°01.8'	-36.6'	116.3°	23°35.1'	-37.4'	116.7°	23°07.9'	-38.2'	117.1°	22°40.4'	-39.0'	117.4°	22°12.6'	-39.7'	117.8°	21°44.4'	-40.5'	118.2°	9			
10	23°52.4'	-36.1'	116.8°	23°25.2'	-36.9'	117.2°	22°57.6'	-37.7'	117.5°	22°29.7'	-38.5'	117.9°	22°01.5'	-39.2'	118.3°	21°32.9'	-40.0'	118.6°	21°04.0'	-40.7'	119.0°	10			
11	23°16.3'	-36.4'	117.6°	22°48.3'	-37.2'	118.0°	22°19.9'	-38.0'	118.4°	21°51.2'	-38.7'	118.7°	21°22.2'	-39.5'	119.1°	20°52.9'	-40.2'	119.4°	20°23.3'	-40.9'	119.8°	11			
12	22°39.9'	-36.7'	118.5°	22°11.1'	-37.4'	118.9°	21°42.0'	-38.2'	119.2°	21°12.5'	-39.0'	119.6°	20°42.8'	-39.7'	119.9°	20°12.7'	-40.4'	120.2°	19°42.4'	-41.1'	120.5°	12			
13	22°03.2'	-36.9'	119.4°	21°33.6'	-37.7'	119.7°	21°03.8'	-38.4'	120.0°	20°33.6'	-39.2'	120.4°	20°03.1'	-39.9'	120.7°	19°32.3'	-40.6'	121.0°	19°01.3'	-41.3'	121.3°	13			
14	21°26.3'	-37.2'	120.2°	20°55.9'	-37.9'	120.5°	20°25.3'	-38.7'	120.9°	19°54.4'	-39.4'	121.2°	19°23.2'	-40.1'	121.5°	18°51.7'	-40.8'	121.8°	18°20.0'	-41.5'	122.1°	14			
15	20°49.1'	-37.4'	121.0°	20°18.0'	-38.2'	121.4°	19°46.6'	-38.9'	121.7°	19°15.0'	-39.6'	122.0°	18°43.1'	-40.3'	122.3°	18°10.9'	-41.0'	122.6°	17°38.5'	-41.6'	122.8°	15			
16	20°11.7'	-37.7'	121.9°	19°39.8'	-38.4'	122.2°	19°07.7'	-39.1'	122.5°	18°35.4'	-39.8'	122.8°	18°02.8'	-40.5'	123.1°	17°29.9'	-41.2'	123.3°	16°56.9'	-41.8'	123.6°	16			
17	19°34.0'	-37.9'	122.7°	19°01.4'	-38.6'	123.0°	18°28.6'	-39.3'	123.3°	17°55.6'	-40.0'	123.6°	17°22.3'	-40.7'	123.8°	16°48.8'	-41.3'	124.1°	16°15.1'	-42.0'	124.3°	17			
18	18°56.1'	-38.1'	123.5°	18°22.8'	-38.8'	123.8°	17°49.3'	-39.5'	124.1°	17°15.6'	-40.2'	124.3°	16°41.6'	-40.8'	124.6°	16°07.5'	-41.5'	124.8°	15°33.1'	-42.1'	125.1°	18			
19	18°18.0'	-38.3'	124.3°	17°44.0'	-39.0'	124.6°	17°09.8'	-39.7'	124.9°	16°35.4'	-40.3'	125.1°	16°00.8'	-41.0'	125.4°	15°26.0'	-41.6'	125.6°	14°51.0'	-42.3'	125.8°	19			
20	17°39.7'	-38.5'	125.2°	17°05.0'	-39.2'	125.4°	16°30.2'	-39.9'	125.7°	15°55.1'	-40.5'	125.9°	15°19.8'	-41.1'	126.1°	14°44.3'	-41.8'	126.3°	14°08.7'	-42.4'	126.5°	20			
21	17°01.2'	-38.7'	126.0°	16°25.8'	-39.4'	126.2°	15°50.3'	-40.0'	126.4°	15°14.6'	-40.7'	126.7°	14°38.7'	-41.3'	126.9°	14°02.6'	-41.9'	127.1°	13°26.3'	-42.5'	127.3°	21			
22	16°22.5'	-38.9'	126.8°	15°46.5'	-39.5'	127.0°	15°10.3'	-40.2'	127.2°	14°33.9'	-40.8'	127.4°	13°57.4'	-41.4'	127.6°	13°20.7'	-42.0'	127.8°	12°43.8'	-42.6'	128.0°	22			
23	15°43.6'	-39.0'	127.6°	15°07.0'	-39.7'	127.8°	14°30.1'	-40.3'	128.0°	13°53.1'	-40.9'	128.2°	13°15.9'	-41.6'	128.4°	12°38.6'	-42.2'	128.5°	12°01.2'	-42.7'	128.7°	23			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	28			29			30			31			32			33			34					Dec°	

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°25.6'	-32.9'	108.2°	30°06.6'	-33.8'	108.8°	29°47.0'	-34.8'	109.3°	29°26.9'	-35.7'	109.8°	29°06.3'	-36.6'	110.4°	28°45.2'	-37.4'	110.9°	28°23.6'	-38.3'	111.4°	0
1	29°52.7'	-33.3'	109.2°	29°32.8'	-34.2'	109.7°	29°12.3'	-35.2'	110.2°	28°51.3'	-36.0'	110.8°	28°29.8'	-36.9'	111.3°	28°07.8'	-37.8'	111.8°	27°45.3'	-38.6'	112.3°	1
2	29°19.4'	-33.7'	110.1°	28°58.5'	-34.6'	110.6°	28°37.1'	-35.5'	111.2°	28°15.2'	-36.4'	111.7°	27°52.8'	-37.3'	112.2°	27°30.0'	-38.1'	112.6°	27°06.6'	-38.9'	113.1°	2
3	28°45.7'	-34.1'	111.1°	28°23.9'	-35.0'	111.6°	28°01.6'	-35.9'	112.1°	27°38.8'	-36.8'	112.6°	27°15.6'	-37.6'	113.0°	26°51.9'	-38.4'	113.5°	26°27.7'	-39.2'	114.0°	3
4	28°11.6'	-34.5'	112.0°	27°48.9'	-35.4'	112.5°	27°25.7'	-36.2'	113.0°	27°02.1'	-37.1'	113.5°	26°38.0'	-37.9'	113.9°	26°13.4'	-38.7'	114.4°	25°48.5'	-39.5'	114.8°	4
5	27°37.2'	-34.8'	112.9°	27°13.5'	-35.7'	113.4°	26°49.5'	-36.6'	113.9°	26°25.0'	-37.4'	114.3°	26°00.0'	-38.2'	114.8°	25°34.7'	-39.0'	115.2°	25°08.9'	-39.8'	115.6°	5
6	27°02.3'	-35.2'	113.8°	26°37.8'	-36.0'	114.3°	26°12.9'	-36.9'	114.8°	25°47.6'	-37.7'	115.2°	25°21.8'	-38.5'	115.6°	24°55.7'	-39.3'	116.1°	24°29.1'	-40.1'	116.5°	6
7	26°27.1'	-35.5'	114.8°	26°01.8'	-36.4'	115.2°	25°36.0'	-37.2'	115.6°	25°09.9'	-38.0'	116.1°	24°43.3'	-38.8'	116.5°	24°16.4'	-39.6'	116.9°	23°49.0'	-40.3'	117.3°	7
8	25°51.6'	-35.9'	115.7°	25°25.4'	-36.7'	116.1°	24°58.8'	-37.5'	116.5°	24°31.9'	-38.3'	116.9°	24°04.5'	-39.1'	117.3°	23°36.8'	-39.8'	117.7°	23°08.7'	-40.6'	118.1°	8
9	25°15.7'	-36.2'	116.5°	24°48.7'	-37.0'	117.0°	24°21.3'	-37.8'	117.4°	23°53.6'	-38.6'	117.8°	23°25.4'	-39.3'	118.1°	22°57.0'	-40.1'	118.5°	22°28.1'	-40.8'	118.9°	9
10	24°39.6'	-36.5'	117.4°	24°11.7'	-37.3'	117.8°	23°43.6'	-38.1'	118.2°	23°15.0'	-38.8'	118.6°	22°46.1'	-39.6'	119.0°	22°16.9'	-40.3'	119.3°	21°47.3'	-41.0'	119.7°	10
11	24°03.1'	-36.8'	118.3°	23°34.5'	-37.6'	118.7°	23°05.5'	-38.3'	119.1°	22°36.2'	-39.1'	119.4°	22°06.5'	-39.8'	119.8°	21°36.6'	-40.5'	120.1°	21°06.3'	-41.2'	120.5°	11
12	23°26.3'	-37.1'	119.2°	22°56.9'	-37.8'	119.5°	22°27.2'	-38.6'	119.9°	21°57.1'	-39.3'	120.2°	21°26.7'	-40.0'	120.6°	20°56.0'	-40.8'	120.9°	20°25.1'	-41.4'	121.2°	12
13	22°49.2'	-37.3'	120.0°	22°19.1'	-38.1'	120.4°	21°48.6'	-38.8'	120.7°	21°17.8'	-39.6'	121.1°	20°46.7'	-40.3'	121.4°	20°15.3'	-41.0'	121.7°	19°43.6'	-41.6'	122.0°	13
14	22°11.9'	-37.6'	120.9°	21°41.0'	-38.3'	121.2°	21°09.8'	-39.1'	121.5°	20°38.2'	-39.8'	121.9°	20°06.4'	-40.5'	122.2°	19°34.3'	-41.2'	122.5°	19°02.0'	-41.8'	122.8°	14
15	21°34.3'	-37.8'	121.7°	21°02.7'	-38.6'	122.0°	20°30.7'	-39.3'	122.3°	19°58.5'	-40.0'	122.7°	19°25.9'	-40.7'	123.0°	18°53.2'	-41.3'	123.3°	18°20.1'	-42.0'	123.5°	15
16	20°56.5'	-38.1'	122.5°	20°24.1'	-38.8'	122.8°	19°51.4'	-39.5'	123.2°	19°18.5'	-40.2'	123.5°	18°45.3'	-40.9'	123.7°	18°11.8'	-41.5'	124.0°	17°38.1'	-42.2'	124.3°	16
17	20°18.4'	-38.3'	123.4°	19°45.3'	-39.0'	123.7°	19°11.9'	-39.7'	124.0°	18°38.3'	-40.4'	124.2°	18°04.4'	-41.0'	124.5°	17°30.3'	-41.7'	124.8°	16°56.0'	-42.3'	125.0°	17
18	19°40.1'	-38.5'	124.2°	19°06.3'	-39.2'	124.5°	18°32.2'	-39.9'	124.7°	17°57.9'	-40.6'	125.0°	17°23.3'	-41.2'	125.3°	16°48.6'	-41.9'	125.5°	16°13.6'	-42.5'	125.8°	18
19	19°01.6'	-38.7'	125.0°	18°27.1'	-39.4'	125.3°	17°52.3'	-40.1'	125.5°	17°17.3'	-40.7'	125.8°	16°42.1'	-41.4'	126.0°	16°06.7'	-42.0'	126.3°	15°31.1'	-42.6'	126.5°	19
20	18°22.8'	-38.9'	125.8°	17°47.6'	-39.6'	126.1°	17°12.2'	-40.3'	126.3°	16°36.6'	-40.9'	126.6°										

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

54° 306° LHA

Latitude CONTRARY to Declination

54° 306° 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	31°15.8'	-33.2'	108.8°	30°56.2'	-34.1'	109.4°	30°36.0'	-35.1'	110.0°	30°15.2'	-36.0'	110.5°	29°53.9'	-36.9'	111.1°	29°32.1'	-37.7'	111.6°	29°09.8'	-38.6'	112.1°	0
1	30°42.6'	-33.6'	109.8°	30°22.1'	-34.5'	110.4°	30°00.9'	-35.5'	110.9°	29°39.3'	-36.3'	111.4°	29°17.1'	-37.2'	112.0°	28°54.4'	-38.1'	112.5°	28°31.2'	-38.9'	113.0°	1
2	30°09.0'	-34.0'	110.8°	29°47.5'	-34.9'	111.3°	29°25.5'	-35.8'	111.8°	29°02.9'	-36.7'	112.4°	28°39.8'	-37.6'	112.9°	28°16.3'	-38.4'	113.4°	27°52.3'	-39.2'	113.8°	2
3	29°35.1'	-34.4'	111.7°	29°12.6'	-35.3'	112.2°	28°49.6'	-36.2'	112.8°	28°26.2'	-37.1'	113.3°	28°02.3'	-37.9'	113.7°	27°37.9'	-38.7'	114.2°	27°13.0'	-39.5'	114.7°	3
4	29°00.6'	-34.8'	112.7°	28°37.3'	-35.7'	113.2°	28°13.4'	-36.6'	113.7°	27°49.1'	-37.4'	114.1°	27°24.4'	-38.2'	114.6°	26°59.1'	-39.0'	115.1°	26°33.5'	-39.8'	115.5°	4
5	28°25.8'	-35.2'	113.6°	28°01.6'	-36.0'	114.1°	27°36.9'	-36.9'	114.6°	27°11.7'	-37.7'	115.0°	26°46.1'	-38.5'	115.5°	26°20.1'	-39.3'	115.9°	25°53.6'	-40.1'	116.4°	5
6	27°50.6'	-35.5'	114.5°	27°25.5'	-36.4'	115.0°	26°60.0'	-37.2'	115.4°	26°34.0'	-38.0'	115.9°	26°07.6'	-38.8'	116.3°	25°40.7'	-39.6'	116.8°	25°13.5'	-40.4'	117.2°	6
7	27°15.1'	-35.9'	115.4°	26°49.1'	-36.7'	115.9°	26°22.7'	-37.5'	116.3°	25°55.9'	-38.4'	116.8°	25°28.7'	-39.1'	117.2°	25°01.1'	-39.9'	117.6°	24°33.1'	-40.7'	118.0°	7
8	26°39.2'	-36.2'	116.3°	26°12.4'	-37.0'	116.8°	25°45.2'	-37.9'	117.2°	25°17.6'	-38.6'	117.6°	24°49.6'	-39.4'	118.0°	24°21.2'	-40.2'	118.4°	23°52.4'	-40.9'	118.8°	8
9	26°03.0'	-36.5'	117.2°	25°35.4'	-37.4'	117.6°	25°07.3'	-38.1'	118.0°	24°38.9'	-38.9'	118.5°	24°10.2'	-39.7'	118.9°	23°41.0'	-40.4'	119.2°	23°11.5'	-41.1'	119.6°	9
10	25°26.4'	-36.9'	118.1°	24°58.0'	-37.7'	118.5°	24°29.2'	-38.4'	118.9°	24°00.0'	-39.2'	119.3°	23°30.5'	-39.9'	119.7°	23°00.6'	-40.7'	120.0°	22°30.4'	-41.4'	120.4°	10
11	24°49.6'	-37.2'	119.0°	24°20.3'	-37.9'	119.4°	23°50.8'	-38.7'	119.7°	23°20.8'	-39.4'	120.1°	22°50.5'	-40.2'	120.5°	22°19.9'	-40.9'	120.8°	21°49.0'	-41.6'	121.2°	11
12	24°12.4'	-37.4'	119.8°	23°42.4'	-38.2'	120.2°	23°12.1'	-39.0'	120.6°	22°41.4'	-39.7'	120.9°	22°10.4'	-40.4'	121.3°	21°39.0'	-41.1'	121.6°	21°07.4'	-41.8'	122.0°	12
13	23°35.0'	-37.7'	120.7°	23°04.2'	-38.5'	121.0°	22°33.1'	-39.2'	121.4°	22°01.7'	-39.9'	121.7°	21°30.0'	-40.6'	122.1°	20°57.9'	-41.3'	122.4°	20°25.6'	-42.0'	122.7°	13
14	22°57.2'	-38.0'	121.5°	22°25.7'	-38.7'	121.9°	21°53.9'	-39.5'	122.2°	21°21.7'	-40.2'	122.6°	20°49.3'	-40.9'	122.9°	20°16.6'	-41.5'	123.2°	19°43.6'	-42.2'	123.5°	14
15	22°19.2'	-38.3'	122.4°	21°47.0'	-39.0'	122.7°	21°14.4'	-39.7'	123.0°	20°41.6'	-40.4'	123.3°	20°08.5'	-41.1'	123.7°	19°35.1'	-41.7'	124.0°	19°01.4'	-42.4'	124.2°	15
16	21°41.0'	-38.5'	123.2°	21°08.0'	-39.2'	123.5°	20°34.7'	-39.9'	123.8°	20°01.2'	-40.6'	124.1°	19°27.4'	-41.3'	124.4°	18°53.4'	-41.9'	124.7°	18°19.1'	-42.5'	125.0°	16
17	21°02.5'	-38.7'	124.0°	20°28.8'	-39.4'	124.3°	19°54.8'	-40.1'	124.6°	19°20.6'	-40.8'	124.9°	18°46.1'	-41.4'	125.2°	18°11.4'	-42.1'	125.5°	17°36.5'	-42.7'	125.7°	17
18	20°23.8'	-39.0'	124.8°	19°49.4'	-39.6'	125.1°	19°14.7'	-40.3'	125.4°	18°39.8'	-41.0'	125.7°	18°04.7'	-41.6'	126.0°	17°29.4'	-42.3'	126.2°	16°53.8'	-42.9'	126.5°	18
19	19°44.8'	-39.2'	125.6°	19°09.7'	-39.8'	125.9°	18°34.4'	-40.5'	126.2°	17°58.9'	-41.2'	126.5°	17°23.1'	-41.8'	126.7°	16°47.1'	-42.4'	127.0°	16°10.9'	-43.0'	127.2°	19
20	19°05.6'	-39.4'	126.4°	18°29.9'	-40.0'	126.7°	17°53.9'	-40.7'	127.0°	17°17.7'	-41.3'	127.2°	16°41.3'	-41.9'	127.5°	16°04.7'	-42.6'	127.7°	15°27.9'	-43.2'	127.9°	20
21	18°26.2'	-39.6'	127.2°	17°49.8'	-40.2'	127.5°	17°13.2'	-40.9'	127.7°	16°36.4'	-41.5'	128.0°	15°59.4'	-42.1'	128.2°	15°22.1'	-42.7'	128.4°	14°44.8'	-43.3'	128.6°	21
22	17°46.7'	-39.8'	128.0°	17°09.6'	-40.4'	128.3°	16°32.3'	-41.0'	128.5°	15°54.9'	-41.6'	128.7°	15°17.2'	-42.2'	129.0°	14°39.4'	-42.8'	129.2°	14°01.5'	-43.4'	129.4°	22
23	17°06.9'	-39.9'	128.8°	16°29.2'	-40.6'	129.0°	15°51.3'	-41.2'	129.3°	15°13.2'	-41.8'	129.5°	14°35.0'	-42.4'	129.7°	13°56.6'	-43.0'	129.9°	13°18.1'	-43.5'	130.1°	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			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°05.8'	-33.5'	109.5°	31°45.6'	-34.4'	110.1°	31°24.7'	-35.4'	110.6°	31°03.3'	-36.3'	111.2°	30°41.3'	-37.2'	111.8°	30°18.8'	-38.0'	112.3°	29°55.7'	-38.9'	112.8°	0
1	31°32.4'	-33.9'	110.5°	31°11.2'	-34.9'	111.0°	30°49.4'	-35.8'	111.6°	30°27.0'	-36.7'	112.1°	30°04.1'	-37.5'	112.7°	29°40.7'	-38.4'	113.2°	29°16.9'	-39.2'	113.7°	1
2	30°58.4'	-34.3'	111.4°	30°36.3'	-35.3'	112.0°	30°13.6'	-36.2'	112.5°	29°50.4'	-37.0'	113.1°	29°26.6'	-37.9'	113.6°	29°02.4'	-38.7'	114.1°	28°37.6'	-39.6'	114.6°	2
3	30°24.2'	-34.8'	112.4°	30°01.1'	-35.7'	112.9°	29°37.4'	-36.5'	113.4°	29°13.3'	-37.4'	114.0°	28°48.7'	-38.2'	114.5°	28°23.6'	-39.1'	115.0°	27°58.1'	-39.9'	115.4°	3
4	29°49.4'	-35.1'	113.3°	29°25.4'	-36.0'	113.8°	29°00.9'	-36.9'	114.4°	28°35.9'	-37.7'	114.9°	28°10.5'	-38.6'	115.3°	27°44.6'	-39.4'	115.8°	27°18.2'	-40.2'	116.3°	4
5	29°14.3'	-35.5'	114.3°	28°49.4'	-36.4'	114.8°	28°24.0'	-37.2'	115.3°	27°58.2'	-38.1'	115.7°	27°31.9'	-38.9'	116.2°	27°05.2'	-39.7'	116.7°	26°38.0'	-40.5'	117.1°	5
6	28°38.7'	-35.9'	115.2°	28°13.0'	-36.8'	115.7°	27°46.8'	-37.6'	116.1°	27°20.1'	-38.4'	116.6°	26°53.0'	-39.2'	117.1°	26°25.5'	-40.0'	117.5°	25°57.6'	-40.7'	117.9°	6
7	28°02.8'	-36.3'	116.1°	27°36.2'	-37.1'	116.6°	27°09.2'	-37.9'	117.0°	26°41.7'	-38.7'	117.5°	26°13.8'	-39.5'	117.9°	25°45.5'	-40.2'	118.3°	25°16.9'	-41.0'	118.8°	7
8	27°26.6'	-36.6'	117.0°	26°59.1'	-37.4'	117.4°	26°31.3'	-38.2'	117.9°	26°03.0'	-39.0'	118.3°	25°34.3'	-39.8'	118.7°	25°05.3'	-40.5'	119.2°	24°35.9'	-41.2'	119.6°	8
9	26°50.0'	-36.9'	117.9°	26°21.7'	-37.7'	118.3°	25°53.1'	-38.5'	118.7°	25°24.0'	-39.3'	119.2°	24°54.6'	-40.0'	119.6°	24°24.8'	-40.8'	120.0°	23°54.6'	-41.5'	120.4°	9
10	26°13.0'	-37.2'	118.8°	25°44.0'	-38.0'	119.2°	25°14.5'	-38.8'	119.6°	24°44.7'	-39.6'	120.0°	24°14.5'	-40.3'	120.4°	23°44.0'	-41.0'	120.8°	23°13.1'	-41.7'	121.1°	10
11	25°35.8'	-37.6'	119.6°	25°05.9'	-38.3'	120.0°	24°35.7'	-39.1'	120.4°	24°05.1'	-39.8'	120.8°	23°34.2'	-40.5'	121.2°	23°03.0'	-41.3'	121.6°	22°31.4'	-41.9'	121.9°	11
12	24°58.2'	-37.9'	120.5°	24°27.6'	-38.6'	120.9°	23°56.6'	-39.4'	121.3°	23°25.3'	-40.1'	121.6°	22°53.7'	-40.8'	122.0°	22°21.7'	-41.5'	122.4°	21°49.5'	-42.2'	122.7°	12
13	24°20.4'	-38.1'	121.3°	23°49.0'	-38.9'	121.7°	23°17.3'	-39.6'	122.1°	22°45.2'	-40.3'	122.5°	22°12.9'	-41.0'	122.8°	21°40.2'	-41.7'	123.1°	21°07.3'	-42.4'	123.5°	13
14	23°42.2'	-38.4'	122.2°	23°10.1'	-39.1'	122.6°	22°37.7'	-39.9'	122.9°	22°04.9'	-40.6'	123.3°	21°31.9'	-41.2'	123.6°	20°58.5'	-41.9'	123.9°	20°24.9'	-42.6'	124.2°	14
15	23°03.8'	-38.7'	123.0°	22°31.0'	-39.4'	123.4°	21°57.8'	-40.1'	123.7°	21°24.4'	-40.8'	124.0°	20°50.6'	-41.4'	124.4°	20°16.6'	-42.1'	124.7°	19°42.4'	-42.7'	125.0°	15
16	22°25.2'	-38.9'	123.9°	21°51.6'	-39.6'	124.2°	21°17.7'	-40.3'	124.5°	20°43.6'	-41.0'	124.8°	20°09.2'	-41.6'	125.1°	19°34.5'	-42.3'	125.4°	18°59.6'	-42.9'	125.7°	16
17	21°46.2'	-39.2'	124.7°	21°12.0'	-39.9'	125.0°	20°37.4'	-40.5'	125.3°	20°02.6'	-41.2'	125.6°	19°27.5'	-41.8'	125.9°	18°52.2'	-42.5'	126.2°	18°16.7'	-43.1'	126.5°	17
18	21°07.1'	-39.4'	125.5°	20°32.1'	-40.1'	125.8°	19°56.9'	-40.7'	126.1°	19°21.4'	-41.4'	126.4°	18°45.7'	-42.0'	126.7°	18°09.8'	-42.6'	126.9°	17°33.6'	-43.3'	127.2°	18
19	20°27.7'	-39.6'	126.3°	19°52.0'	-40.3'	126.6°	19°16.2'	-40.9'	126.9°	18°40.0'	-41.6'	127.2°	18°03.7'	-42.2'	127.4°	17°27.1'	-42.8'	127.7°	16°50.4'	-43.4'	127.9°	19
20	19°48.1'	-39.8'	127.1°	19°11.8'	-40.5'	127.4°	18°35.2'	-41.1'	127.6°	17°58.5'	-41.7'	127.9°	17°21.5'	-42.4'	128.2°							

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°55.7'	-33.8'	110.1°	32°34.8'	-34.7'	110.7°	32°13.2'	-35.7'	111.3°	31°51.1'	-36.6'	111.9°	31°28.4'	-37.5'	112.5°	31°05.2'	-38.3'	113.1°	30°41.5'	-39.2'	113.6°	0
1	32°21.9'	-34.2'	111.1°	32°00.0'	-35.2'	111.7°	31°37.6'	-36.1'	112.3°	31°14.5'	-37.0'	112.8°	30°51.0'	-37.9'	113.4°	30°26.9'	-38.7'	113.9°	30°02.3'	-39.5'	114.5°	1
2	31°47.6'	-34.7'	112.1°	31°24.9'	-35.6'	112.7°	31°01.5'	-36.5'	113.2°	30°37.5'	-37.4'	113.8°	30°13.1'	-38.2'	114.3°	29°48.2'	-39.1'	114.8°	29°22.7'	-39.9'	115.3°	2
3	31°13.0'	-35.1'	113.1°	30°49.3'	-36.0'	113.6°	30°25.0'	-36.9'	114.1°	30°00.2'	-37.7'	114.7°	29°34.9'	-38.6'	115.2°	29°09.1'	-39.4'	115.7°	28°42.9'	-40.2'	116.2°	3
4	30°37.9'	-35.5'	114.0°	30°13.3'	-36.4'	114.5°	29°48.1'	-37.2'	115.1°	29°22.5'	-38.1'	115.6°	28°56.3'	-38.9'	116.1°	28°29.7'	-39.7'	116.6°	28°02.7'	-40.5'	117.0°	4
5	30°02.4'	-35.9'	114.9°	29°36.9'	-36.8'	115.4°	29°10.9'	-37.6'	116.0°	28°44.4'	-38.4'	116.5°	28°17.4'	-39.2'	116.9°	27°50.0'	-40.0'	117.4°	27°22.2'	-40.8'	117.9°	5
6	29°26.5'	-36.3'	115.9°	29°00.1'	-37.1'	116.4°	28°33.3'	-37.9'	116.8°	28°05.9'	-38.8'	117.3°	27°38.2'	-39.5'	117.8°	27°10.0'	-40.3'	118.3°	26°41.4'	-41.1'	118.7°	6
7	28°50.3'	-36.6'	116.8°	28°23.0'	-37.5'	117.3°	27°55.3'	-38.3'	117.7°	27°27.2'	-39.1'	118.2°	26°58.6'	-39.8'	118.6°	26°29.7'	-40.6'	119.1°	26°00.3'	-41.3'	119.5°	7
8	28°13.6'	-37.0'	117.7°	27°45.6'	-37.8'	118.1°	27°17.0'	-38.6'	118.6°	26°48.1'	-39.4'	119.0°	26°18.8'	-40.1'	119.5°	25°49.1'	-40.9'	119.9°	25°19.0'	-41.6'	120.3°	8
9	27°36.6'	-37.3'	118.6°	27°07.8'	-38.1'	119.0°	26°38.5'	-38.9'	119.5°	26°08.8'	-39.7'	119.9°	25°38.7'	-40.4'	120.3°	25°08.2'	-41.1'	120.7°	24°37.4'	-41.8'	121.1°	9
10	26°59.3'	-37.6'	119.4°	26°29.6'	-38.4'	119.9°	25°59.6'	-39.2'	120.3°	25°29.1'	-39.9'	120.7°	24°58.3'	-40.7'	121.1°	24°27.1'	-41.4'	121.5°	23°55.5'	-42.1'	121.9°	10
11	26°21.7'	-38.0'	120.3°	25°51.2'	-38.7'	120.7°	25°20.4'	-39.5'	121.1°	24°49.1'	-40.2'	121.5°	24°17.6'	-40.9'	121.9°	23°45.7'	-41.6'	122.3°	23°13.5'	-42.3'	122.7°	11
12	25°43.7'	-38.3'	121.2°	25°12.5'	-39.0'	121.6°	24°40.9'	-39.7'	122.0°	24°08.9'	-40.5'	122.4°	23°36.7'	-41.2'	122.7°	23°04.1'	-41.9'	123.1°	22°31.1'	-42.5'	123.4°	12
13	25°05.5'	-38.6'	122.0°	24°33.5'	-39.3'	122.4°	24°01.1'	-40.0'	122.8°	23°28.5'	-40.7'	123.2°	22°55.5'	-41.4'	123.5°	22°22.2'	-42.1'	123.9°	21°48.6'	-42.7'	124.2°	13
14	24°26.9'	-38.8'	122.9°	23°54.2'	-39.6'	123.2°	23°21.1'	-40.3'	123.6°	22°47.8'	-41.0'	124.0°	22°14.1'	-41.6'	124.3°	21°40.1'	-42.3'	124.6°	21°05.9'	-42.9'	125.0°	14
15	23°48.1'	-39.1'	123.7°	23°14.6'	-39.8'	124.1°	22°40.9'	-40.5'	124.4°	22°06.8'	-41.2'	124.8°	21°32.5'	-41.8'	125.1°	20°57.8'	-42.5'	125.4°	20°22.9'	-43.1'	125.7°	15
16	23°09.0'	-39.4'	124.5°	22°34.8'	-40.0'	124.9°	22°00.4'	-40.7'	125.2°	21°25.6'	-41.4'	125.5°	20°50.6'	-42.0'	125.9°	20°15.3'	-42.7'	126.2°	19°39.8'	-43.3'	126.4°	16
17	22°29.6'	-39.6'	125.4°	21°54.8'	-40.3'	125.7°	21°19.6'	-40.9'	126.0°	20°44.2'	-41.6'	126.3°	20°08.6'	-42.2'	126.6°	19°32.7'	-42.9'	126.9°	18°56.5'	-43.5'	127.2°	17
18	21°50.0'	-39.8'	126.2°	21°14.5'	-40.5'	126.5°	20°38.7'	-41.2'	126.8°	20°02.6'	-41.8'	127.1°	19°26.3'	-42.4'	127.4°	18°49.8'	-43.0'	127.6°	18°13.1'	-43.6'	127.9°	18
19	21°10.2'	-40.1'	127.0°	20°34.0'	-40.7'	127.3°	19°57.5'	-41.4'	127.6°	19°20.8'	-42.0'	127.8°	18°43.9'	-42.6'	128.1°	18°06.8'	-43.2'	128.4°	17°29.4'	-43.8'	128.6°	19
20	20°30.1'	-40.3'	127.8°	19°53.3'	-40.9'	128.1°	19°16.2'	-41.5'	128.3°	18°38.9'	-42.2'	128.6°	18°01.3'	-42.8'	128.9°	17°23.6'	-43.4'	129.1°	16°45.6'	-43.9'	129.3°	20
21	19°49.9'	-40.5'	128.6°	19°12.4'	-41.1'	128.8°	18°34.6'	-41.7'	129.1°	17°56.7'	-42.3'	129.3°	17°18.5'	-42.9'	129.6°	16°40.2'	-43.5'	129.8°	16°01.7'	-44.1'	130.1°	21
22	19°09.4'	-40.7'	129.3°	18°31.2'	-41.3'	129.6°	17°52.9'	-41.9'	129.9°	17°14.4'	-42.5'	130.1°	16°35.6'	-43.1'	130.3°	15°56.7'	-43.7'	130.5°	15°17.6'	-44.2'	130.8°	22
23	18°28.7'	-40.9'	130.1°	17°49.9'	-41.5'	130.4°	17°11.0'	-42.1'	130.6°	16°31.9'	-42.7'	130.8°	15°52.5'	-43.2'	131.1°	15°13.0'	-43.8'	131.3°	14°33.4'	-44.3'	131.5°	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°45.3'	-34.1'	110.8°	33°23.7'	-35.1'	111.4°	33°01.5'	-36.0'	112.0°	32°38.7'	-36.9'	112.6°	32°15.3'	-37.8'	113.2°	31°51.4'	-38.7'	113.8°	31°26.9'	-39.5'	114.4°	0
1	33°11.2'	-34.6'	111.8°	32°48.7'	-35.5'	112.4°	32°25.5'	-36.4'	113.0°	32°01.8'	-37.3'	113.6°	31°37.5'	-38.2'	114.1°	31°12.7'	-39.0'	114.7°	30°47.4'	-39.9'	115.2°	1
2	32°36.6'	-35.0'	112.8°	32°13.2'	-35.9'	113.4°	31°49.1'	-36.8'	113.9°	31°24.5'	-37.7'	114.5°	30°59.3'	-38.6'	115.0°	30°33.7'	-39.4'	115.6°	30°07.5'	-40.2'	116.1°	2
3	32°01.6'	-35.4'	113.7°	31°37.2'	-36.3'	114.3°	31°12.3'	-37.2'	114.9°	30°46.8'	-38.1'	115.4°	30°20.8'	-38.9'	115.9°	29°54.3'	-39.7'	116.5°	29°27.3'	-40.5'	117.0°	3
4	31°26.2'	-35.9'	114.7°	31°00.9'	-36.7'	115.2°	30°35.0'	-37.6'	115.8°	30°08.7'	-38.4'	116.3°	29°41.9'	-39.3'	116.8°	29°14.6'	-40.1'	117.3°	28°46.8'	-40.8'	117.8°	4
5	30°50.3'	-36.3'	115.6°	30°24.1'	-37.1'	116.2°	29°57.4'	-38.0'	116.7°	29°30.3'	-38.8'	117.2°	29°02.6'	-39.6'	117.7°	28°34.5'	-40.4'	118.2°	28°06.0'	-41.1'	118.6°	5
6	30°14.1'	-36.6'	116.5°	29°47.0'	-37.5'	117.1°	29°19.5'	-38.3'	117.6°	28°51.5'	-39.1'	118.1°	28°23.0'	-39.9'	118.5°	27°54.2'	-40.7'	119.0°	27°24.9'	-41.4'	119.5°	6
7	29°37.4'	-37.0'	117.5°	29°09.5'	-37.8'	118.0°	28°41.2'	-38.7'	118.4°	28°12.4'	-39.4'	118.9°	27°43.1'	-40.2'	119.4°	27°13.5'	-41.0'	119.8°	26°43.4'	-41.7'	120.3°	7
8	29°00.4'	-37.4'	118.4°	28°31.7'	-38.2'	118.8°	28°02.5'	-39.0'	119.3°	27°32.9'	-39.7'	119.8°	27°02.9'	-40.5'	120.2°	26°32.5'	-41.2'	120.7°	26°01.7'	-42.0'	121.1°	8
9	28°23.0'	-37.7'	119.3°	27°53.5'	-38.5'	119.7°	27°23.5'	-39.3'	120.2°	26°53.2'	-40.0'	120.6°	26°22.4'	-40.8'	121.0°	25°51.3'	-41.5'	121.5°	25°19.8'	-42.2'	121.9°	9
10	27°45.3'	-38.1'	120.1°	27°15.0'	-38.8'	120.6°	26°44.2'	-39.6'	121.0°	26°13.1'	-40.3'	121.4°	25°41.6'	-41.1'	121.9°	25°09.8'	-41.8'	122.3°	24°37.6'	-42.4'	122.7°	10
11	27°07.2'	-38.4'	121.0°	26°36.1'	-39.1'	121.4°	26°04.7'	-39.9'	121.9°	25°32.8'	-40.6'	122.3°	25°00.6'	-41.3'	122.7°	24°28.0'	-42.0'	123.1°	23°55.1'	-42.7'	123.4°	11
12	26°28.9'	-38.7'	121.9°	25°57.0'	-39.4'	122.3°	25°24.8'	-40.2'	122.7°	24°52.2'	-40.9'	123.1°	24°19.3'	-41.6'	123.5°	23°46.0'	-42.2'	123.8°	23°12.5'	-42.9'	124.2°	12
13	25°50.2'	-39.0'	122.7°	25°17.6'	-39.7'	123.1°	24°44.6'	-40.4'	123.5°	24°11.3'	-41.1'	123.9°	23°37.7'	-41.8'	124.3°	23°03.8'	-42.5'	124.6°	22°29.6'	-43.1'	125.0°	13
14	25°11.2'	-39.3'	123.6°	24°37.9'	-40.0'	123.9°	24°04.2'	-40.7'	124.3°	23°30.2'	-41.4'	124.7°	22°55.9'	-42.0'	125.0°	22°21.3'	-42.7'	125.4°	21°46.5'	-43.3'	125.7°	14
15	24°32.0'	-39.5'	124.4°	23°57.9'	-40.2'	124.8°	23°23.5'	-40.9'	125.1°	22°48.9'	-41.6'	125.5°	22°13.9'	-42.2'	125.8°	21°38.7'	-42.9'	126.1°	21°03.1'	-43.5'	126.5°	15
16	23°52.4'	-39.8'	125.2°	23°17.7'	-40.5'	125.6°	22°42.6'	-41.1'	125.9°	22°07.3'	-41.8'	126.3°	21°31.7'	-42.4'	126.6°	20°55.8'	-43.1'	126.9°	20°19.6'	-43.7'	127.2°	16
17	23°12.7'	-40.0'	126.0°	22°37.2'	-40.7'	126.4°	22°01.5'	-41.4'	126.7°	21°25.5'	-42.0'	127.0°	20°49.2'	-42.6'	127.3°	20°12.7'	-43.3'	127.6°	19°36.0'	-43.9'	127.9°	17
18	22°32.6'	-40.3'	126.8°	21°56.5'	-40.9'	127.2°	21°20.1'	-41.6'	127.5°	20°43.5'	-42.2'	127.8°	20°06.6'	-42.8'	128.1°	19°29.5'	-43.4'	128.4°	18°52.1'	-44.0'	128.6°	18
19	21°52.3'	-40.5'	127.6°	21°15.6'	-41.2'	128.0°	20°38.5'	-41.8'	128.3°	20°01.3'	-42.4'	128.5°	19°23.8'	-43.0'	128.8°	18°46.0'	-43.6'	129.1°	18°08.1'	-44.2'	129.4°	19
20	21°11.8'	-40.7'	128.4°	20°34.4'	-41.4'	128.7°	19°56.7'	-42.0'	129.0°	19°18.8'	-42.6'	129.3°	18°40.7'	-43.2'	129.6°							

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°34.7'	-34.5'	111.5°	34°12.5'	-35.4'	112.1°	33°49.6'	-36.3'	112.8°	33°26.0'	-37.2'	113.4°	33°02.0'	-38.1'	114.0°	32°37.3'	-39.0'	114.6°	32°12.1'	-39.8'	115.1°	0
1	34°00.3'	-34.9'	112.5°	33°37.1'	-35.9'	113.1°	33°13.2'	-36.8'	113.7°	32°48.8'	-37.7'	114.3°	32°23.8'	-38.5'	114.9°	31°58.3'	-39.4'	115.5°	31°32.2'	-40.2'	116.0°	1
2	33°25.3'	-35.4'	113.5°	33°01.2'	-36.3'	114.1°	32°36.5'	-37.2'	114.7°	32°11.1'	-38.1'	115.2°	31°45.3'	-38.9'	115.8°	31°18.9'	-39.7'	116.3°	30°52.1'	-40.5'	116.9°	2
3	32°50.0'	-35.8'	114.4°	32°24.9'	-36.7'	115.0°	31°59.3'	-37.6'	115.6°	31°33.1'	-38.4'	116.1°	31°06.4'	-39.3'	116.7°	30°39.2'	-40.1'	117.2°	30°11.5'	-40.9'	117.7°	3
4	32°14.2'	-36.2'	115.4°	31°48.2'	-37.1'	115.9°	31°21.7'	-38.0'	116.5°	30°54.7'	-38.8'	117.0°	30°27.1'	-39.6'	117.6°	29°59.1'	-40.4'	118.1°	29°30.7'	-41.2'	118.6°	4
5	31°38.0'	-36.6'	116.3°	31°11.1'	-37.5'	116.9°	30°43.7'	-38.3'	117.4°	30°15.9'	-39.2'	117.9°	29°47.5'	-39.9'	118.4°	29°18.7'	-40.7'	118.9°	28°49.5'	-41.5'	119.4°	5
6	31°01.3'	-37.0'	117.3°	30°33.6'	-37.9'	117.8°	30°05.4'	-38.7'	118.3°	29°36.7'	-39.5'	118.8°	29°07.6'	-40.3'	119.3°	28°38.0'	-41.0'	119.8°	28°08.0'	-41.8'	120.2°	6
7	30°24.3'	-37.4'	118.2°	29°55.7'	-38.2'	118.7°	29°26.7'	-39.0'	119.2°	28°57.2'	-39.8'	119.7°	28°27.3'	-40.6'	120.1°	27°57.0'	-41.3'	120.6°	27°26.2'	-42.0'	121.1°	7
8	29°46.9'	-37.8'	119.1°	29°17.5'	-38.6'	119.6°	28°47.7'	-39.4'	120.0°	28°17.4'	-40.1'	120.5°	27°46.7'	-40.9'	121.0°	27°15.6'	-41.6'	121.4°	26°44.2'	-42.3'	121.9°	8
9	29°09.1'	-38.1'	120.0°	28°38.9'	-38.9'	120.4°	28°08.3'	-39.7'	120.9°	27°37.3'	-40.4'	121.4°	27°05.8'	-41.2'	121.8°	26°34.0'	-41.9'	122.2°	26°01.9'	-42.6'	122.6°	9
10	28°31.0'	-38.5'	120.8°	27°60.0'	-39.2'	121.3°	27°28.6'	-40.0'	121.8°	26°56.8'	-40.7'	122.2°	26°24.7'	-41.4'	122.6°	25°52.2'	-42.1'	123.0°	25°19.3'	-42.8'	123.4°	10
11	27°52.5'	-38.8'	121.7°	27°20.7'	-39.5'	122.2°	26°48.6'	-40.3'	122.6°	26°16.1'	-41.0'	123.0°	25°43.2'	-41.7'	123.4°	25°10.0'	-42.4'	123.8°	24°36.5'	-43.1'	124.2°	11
12	27°13.7'	-39.1'	122.6°	26°41.2'	-39.8'	123.0°	26°08.3'	-40.6'	123.4°	25°35.1'	-41.3'	123.8°	25°01.5'	-42.0'	124.2°	24°27.6'	-42.6'	124.6°	23°53.4'	-43.3'	125.0°	12
13	26°34.6'	-39.4'	123.4°	26°01.4'	-40.1'	123.8°	25°27.8'	-40.8'	124.2°	24°53.9'	-41.5'	124.6°	24°19.6'	-42.2'	125.0°	23°45.0'	-42.8'	125.4°	23°10.1'	-43.5'	125.7°	13
14	25°55.2'	-39.7'	124.3°	25°21.2'	-40.4'	124.7°	24°46.9'	-41.1'	125.0°	24°12.3'	-41.8'	125.4°	23°37.4'	-42.4'	125.8°	23°02.2'	-43.1'	126.1°	22°26.7'	-43.7'	126.5°	14
15	25°15.5'	-40.0'	125.1°	24°40.8'	-40.7'	125.5°	24°05.9'	-41.3'	125.8°	23°30.6'	-42.0'	126.2°	22°55.0'	-42.6'	126.5°	22°19.1'	-43.3'	126.9°	21°43.0'	-43.9'	127.2°	15
16	24°35.5'	-40.2'	125.9°	24°00.2'	-40.9'	126.3°	23°24.5'	-41.6'	126.6°	22°48.6'	-42.2'	127.0°	22°12.3'	-42.9'	127.3°	21°35.8'	-43.5'	127.6°	20°59.1'	-44.1'	127.9°	16
17	23°55.3'	-40.5'	126.7°	23°19.3'	-41.2'	127.1°	22°42.9'	-41.8'	127.4°	22°06.4'	-42.4'	127.7°	21°29.5'	-43.1'	128.1°	20°52.4'	-43.7'	128.4°	20°15.0'	-44.3'	128.7°	17
18	23°14.8'	-40.7'	127.5°	22°38.1'	-41.4'	127.9°	22°01.1'	-42.0'	128.2°	21°23.9'	-42.6'	128.5°	20°46.4'	-43.2'	128.8°	20°08.7'	-43.8'	129.1°	19°30.8'	-44.4'	129.4°	18
19	22°34.1'	-41.0'	128.3°	21°56.7'	-41.6'	128.7°	21°19.1'	-42.2'	129.0°	20°41.3'	-42.8'	129.3°	20°03.2'	-43.4'	129.6°	19°24.9'	-44.0'	129.8°	18°46.3'	-44.6'	130.1°	19
20	21°53.1'	-41.2'	129.1°	21°15.1'	-41.8'	129.4°	20°36.9'	-42.4'	129.7°	19°58.4'	-43.0'	130.0°	19°19.8'	-43.6'	130.3°	18°40.9'	-44.2'	130.5°	18°01.8'	-44.7'	130.8°	20
21	21°11.9'	-41.4'	129.9°	20°33.3'	-42.0'	130.2°	19°54.5'	-42.6'	130.5°	19°15.4'	-43.2'	130.8°	18°36.2'	-43.8'	131.0°	17°56.7'	-44.3'	131.3°	17°17.0'	-44.9'	131.5°	21
22	20°30.5'	-41.6'	130.7°	19°51.3'	-42.2'	131.0°	19°11.9'	-42.8'	131.2°	18°32.2'	-43.4'	131.5°	17°52.4'	-43.9'	131.7°	17°12.4'	-44.5'	132.0°	16°32.1'	-45.0'	132.2°	22
23	19°48.9'	-41.8'	131.5°	19°09.1'	-42.4'	131.7°	18°29.1'	-43.0'	132.0°	17°48.9'	-43.5'	132.2°	17°08.5'	-44.1'	132.4°	16°27.9'	-44.6'	132.7°	15°47.1'	-45.1'	132.9°	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°23.9'	-34.8'	112.2°	35°00.9'	-35.8'	112.9°	34°37.3'	-36.7'	113.5°	34°13.1'	-37.6'	114.1°	33°48.3'	-38.5'	114.7°	33°22.9'	-39.3'	115.3°	32°57.0'	-40.2'	115.9°	0
1	34°49.1'	-35.3'	113.2°	34°25.2'	-36.2'	113.8°	34°00.7'	-37.1'	114.5°	33°35.5'	-38.0'	115.1°	33°09.8'	-38.9'	115.7°	32°43.6'	-39.7'	116.2°	32°16.8'	-40.5'	116.8°	1
2	34°13.8'	-35.7'	114.2°	33°49.0'	-36.7'	114.8°	33°23.5'	-37.5'	115.4°	32°57.5'	-38.4'	116.0°	32°31.0'	-39.3'	116.6°	32°03.9'	-40.1'	117.1°	31°36.3'	-40.9'	117.7°	2
3	33°38.1'	-36.2'	115.1°	33°12.3'	-37.1'	115.7°	32°46.0'	-38.0'	116.3°	32°19.1'	-38.8'	116.9°	31°51.7'	-39.6'	117.5°	31°23.8'	-40.4'	118.0°	30°55.4'	-41.2'	118.5°	3
4	33°01.9'	-36.6'	116.1°	32°35.2'	-37.5'	116.7°	32°08.0'	-38.3'	117.2°	31°40.3'	-39.2'	117.8°	31°12.1'	-40.0'	118.3°	30°43.4'	-40.8'	118.9°	30°14.2'	-41.5'	119.4°	4
5	32°25.3'	-37.0'	117.0°	31°57.8'	-37.9'	117.6°	31°29.7'	-38.7'	118.1°	31°01.1'	-39.5'	118.7°	30°32.1'	-40.3'	119.2°	30°02.6'	-41.1'	119.7°	29°32.6'	-41.8'	120.2°	5
6	31°48.3'	-37.4'	118.0°	31°19.9'	-38.3'	118.5°	30°51.0'	-39.1'	119.0°	30°21.6'	-39.9'	119.6°	29°51.8'	-40.6'	120.1°	29°21.5'	-41.4'	120.6°	28°50.8'	-42.1'	121.0°	6
7	31°10.8'	-37.8'	118.9°	30°41.6'	-38.6'	119.4°	30°11.9'	-39.4'	119.9°	29°41.7'	-40.2'	120.4°	29°11.1'	-41.0'	120.9°	28°40.1'	-41.7'	121.4°	28°08.7'	-42.4'	121.8°	7
8	30°33.0'	-38.2'	119.8°	30°03.0'	-39.0'	120.3°	29°32.5'	-39.8'	120.8°	29°01.5'	-40.5'	121.3°	28°30.2'	-41.3'	121.7°	27°58.4'	-42.0'	122.2°	27°26.2'	-42.7'	122.6°	8
9	29°54.8'	-38.5'	120.7°	29°24.0'	-39.3'	121.2°	28°52.7'	-40.1'	121.6°	28°21.0'	-40.8'	122.1°	27°48.9'	-41.6'	122.6°	27°16.4'	-42.3'	123.0°	26°43.6'	-42.9'	123.4°	9
10	29°16.3'	-38.9'	121.6°	28°44.6'	-39.7'	122.0°	28°12.6'	-40.4'	122.5°	27°40.2'	-41.1'	122.9°	27°07.4'	-41.8'	123.4°	26°34.2'	-42.5'	123.8°	26°00.6'	-43.2'	124.2°	10
11	28°37.4'	-39.2'	122.4°	28°05.0'	-40.0'	122.9°	27°32.2'	-40.7'	123.3°	26°59.1'	-41.4'	123.8°	26°25.5'	-42.1'	124.2°	25°51.6'	-42.8'	124.6°	25°17.4'	-43.4'	125.0°	11
12	27°58.2'	-39.5'	123.3°	27°25.0'	-40.3'	123.7°	26°51.5'	-41.0'	124.2°	26°17.7'	-41.7'	124.6°	25°43.4'	-42.4'	125.0°	25°08.9'	-43.0'	125.4°	24°34.0'	-43.7'	125.7°	12
13	27°18.6'	-39.8'	124.1°	26°44.8'	-40.6'	124.6°	26°10.5'	-41.3'	125.0°	25°36.0'	-41.9'	125.4°	25°01.1'	-42.6'	125.8°	24°25.9'	-43.2'	126.1°	23°50.3'	-43.9'	126.5°	13
14	26°38.8'	-40.1'	125.0°	26°04.2'	-40.8'	125.4°	25°29.3'	-41.5'	125.8°	24°54.1'	-42.2'	126.2°	24°18.5'	-42.8'	126.5°	23°42.6'	-43.5'	126.9°	23°06.5'	-44.1'	127.2°	14
15	25°58.7'	-40.4'	125.8°	25°23.4'	-41.1'	126.2°	24°47.8'	-41.8'	126.6°	24°11.9'	-42.4'	126.9°	23°35.7'	-43.1'	127.3°	22°59.2'	-43.7'	127.6°	22°22.4'	-44.3'	128.0°	15
16	25°18.2'	-40.7'	126.6°	24°42.3'	-41.3'	127.0°	24°06.0'	-42.0'	127.4°	23°29.5'	-42.6'	127.7°	22°52.6'	-43.3'	128.1°	22°15.5'	-43.9'	128.4°	21°38.1'	-44.5'	128.7°	16
17	24°37.6'	-40.9'	127.4°	24°00.9'	-41.6'	127.8°	23°24.0'	-42.2'	128.1°	22°46.8'	-42.9'	128.5°	22°09.3'	-43.5'	128.8°	21°31.6'	-44.1'	129.1°	20°53.6'	-44.6'	129.4°	17
18	23°56.6'	-41.2'	128.2°	23°19.3'	-41.8'	128.6°	22°41.8'	-42.5'	128.9°	22°04.0'	-43.1'	129.2°	21°25.9'	-43.7'	129.5°	20°47.6'	-44.2'	129.8°	20°09.0'	-44.8'	130.1°	18
19	23°15.4'	-41.4'	129.0°	22°37.5'	-42.1'	129.4°	21°59.3'	-42.7'	129.7°	21°20.9'	-43.3'	130.0°	20°42.2'	-43.8'	130.3°	20°03.3'	-44.4'	130.6°	19°24.2'	-45.0'	130.8°	19
20	22°34.0'	-41.6'	129.8°	21°55.5'	-42.3'	130.1°	21°16.7'	-42.9'	130.4°	20°37.6'	-43.5'	130.7°	19°58.4'	-44.0'								

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°12.8'	-35.2'	112.9°	35°49.2'	-36.1'	113.6°	35°24.9'	-37.0'	114.2°	34°59.9'	-37.9'	114.9°	34°34.4'	-38.8'	115.5°	34°08.2'	-39.7'	116.1°	33°41.5'	-40.5'	116.7°	0
1	35°37.6'	-35.7'	113.9°	35°13.1'	-36.6'	114.6°	34°47.8'	-37.5'	115.2°	34°22.0'	-38.4'	115.8°	33°55.6'	-39.2'	116.4°	33°28.6'	-40.1'	117.0°	33°01.0'	-40.9'	117.6°	1
2	35°02.0'	-36.1'	114.9°	34°36.5'	-37.0'	115.5°	34°10.3'	-37.9'	116.1°	33°43.6'	-38.8'	116.7°	33°16.3'	-39.6'	117.3°	32°48.5'	-40.4'	117.9°	32°20.2'	-41.2'	118.5°	2
3	34°25.9'	-36.6'	115.9°	33°59.4'	-37.5'	116.5°	33°32.4'	-38.3'	117.1°	33°04.8'	-39.2'	117.7°	32°36.7'	-40.0'	118.2°	32°08.1'	-40.8'	118.8°	31°38.9'	-41.6'	119.3°	3
4	33°49.3'	-37.0'	116.8°	33°22.0'	-37.9'	117.4°	32°54.1'	-38.7'	118.0°	32°25.7'	-39.6'	118.6°	31°56.7'	-40.4'	119.1°	31°27.3'	-41.1'	119.7°	30°57.3'	-41.9'	120.2°	4
5	33°12.3'	-37.4'	117.8°	32°44.1'	-38.3'	118.3°	32°15.4'	-39.1'	118.9°	31°46.1'	-39.9'	119.5°	31°16.4'	-40.7'	120.0°	30°46.1'	-41.5'	120.5°	30°15.4'	-42.2'	121.0°	5
6	32°34.9'	-37.8'	118.7°	32°05.8'	-38.7'	119.3°	31°36.2'	-39.5'	119.8°	31°06.2'	-40.3'	120.3°	30°35.7'	-41.0'	120.8°	30°04.7'	-41.8'	121.3°	29°33.2'	-42.5'	121.8°	6
7	31°57.0'	-38.2'	119.6°	31°27.1'	-39.0'	120.2°	30°56.8'	-39.8'	120.7°	30°25.9'	-40.6'	121.2°	29°54.6'	-41.4'	121.7°	29°22.9'	-42.1'	122.2°	28°50.7'	-42.8'	122.6°	7
8	31°18.8'	-38.6'	120.5°	30°48.1'	-39.4'	121.0°	30°16.9'	-40.2'	121.5°	29°45.3'	-40.9'	122.0°	29°13.3'	-41.7'	122.5°	28°40.8'	-42.4'	123.0°	28°07.9'	-43.1'	123.4°	8
9	30°40.2'	-39.0'	121.4°	30°08.7'	-39.7'	121.9°	29°36.8'	-40.5'	122.4°	29°04.4'	-41.2'	122.9°	28°31.6'	-41.9'	123.3°	27°58.4'	-42.6'	123.8°	27°24.9'	-43.3'	124.2°	9
10	30°01.2'	-39.3'	122.3°	29°28.9'	-40.1'	122.8°	28°56.3'	-40.8'	123.3°	28°23.2'	-41.5'	123.7°	27°49.7'	-42.2'	124.2°	27°15.8'	-42.9'	124.6°	26°41.6'	-43.6'	125.0°	10
11	29°21.9'	-39.7'	123.2°	28°48.9'	-40.4'	123.6°	28°15.4'	-41.1'	124.1°	27°41.6'	-41.8'	124.5°	27°07.4'	-42.5'	125.0°	26°32.9'	-43.2'	125.4°	25°58.0'	-43.8'	125.8°	11
12	28°42.3'	-40.0'	124.0°	28°08.5'	-40.7'	124.5°	27°34.3'	-41.4'	124.9°	26°59.8'	-42.1'	125.3°	26°24.9'	-42.8'	125.7°	25°49.7'	-43.4'	126.1°	25°14.2'	-44.0'	126.5°	12
13	28°02.3'	-40.3'	124.9°	27°27.8'	-41.0'	125.3°	26°52.9'	-41.7'	125.7°	26°17.7'	-42.3'	126.1°	25°42.2'	-43.0'	126.5°	25°06.3'	-43.6'	126.9°	24°30.1'	-44.3'	127.3°	13
14	27°22.0'	-40.6'	125.7°	26°46.8'	-41.3'	126.1°	26°11.2'	-41.9'	126.5°	25°35.4'	-42.6'	126.9°	24°59.2'	-43.2'	127.3°	24°22.7'	-43.9'	127.7°	23°45.9'	-44.5'	128.0°	14
15	26°41.4'	-40.9'	126.5°	26°05.5'	-41.5'	126.9°	25°29.3'	-42.2'	127.3°	24°52.8'	-42.8'	127.7°	24°15.9'	-43.5'	128.1°	23°38.8'	-44.1'	128.4°	23°01.4'	-44.7'	128.7°	15
16	26°00.6'	-41.1'	127.4°	25°24.0'	-41.8'	127.7°	24°47.1'	-42.4'	128.1°	24°09.9'	-43.1'	128.5°	23°32.5'	-43.7'	128.8°	22°54.7'	-44.3'	129.1°	22°16.7'	-44.9'	129.5°	16
17	25°19.4'	-41.4'	128.2°	24°42.2'	-42.0'	128.5°	24°04.7'	-42.7'	128.9°	23°26.9'	-43.3'	129.2°	22°48.8'	-43.9'	129.6°	22°10.4'	-44.5'	129.9°	21°31.9'	-45.0'	130.2°	17
18	24°38.0'	-41.6'	129.0°	24°00.2'	-42.3'	129.3°	23°22.0'	-42.9'	129.7°	22°43.6'	-43.5'	130.0°	22°04.9'	-44.1'	130.3°	21°26.0'	-44.7'	130.6°	20°46.8'	-45.2'	130.9°	18
19	23°56.4'	-41.9'	129.8°	23°17.9'	-42.5'	130.1°	22°39.1'	-43.1'	130.4°	22°00.1'	-43.7'	130.7°	21°20.8'	-44.3'	131.0°	20°41.3'	-44.8'	131.3°	20°01.6'	-45.4'	131.6°	19
20	23°14.5'	-42.1'	130.5°	22°35.4'	-42.7'	130.9°	21°56.0'	-43.3'	131.2°	21°16.4'	-43.9'	131.5°	20°36.5'	-44.4'	131.7°	19°56.5'	-45.0'	132.0°	19°16.2'	-45.5'	132.3°	20
21	22°32.4'	-42.3'	131.3°	21°52.7'	-42.9'	131.6°	21°12.7'	-43.5'	131.9°	20°32.5'	-44.1'	132.2°	19°52.1'	-44.6'	132.5°	19°11.5'	-45.2'	132.7°	18°30.7'	-45.7'	133.0°	21
22	21°50.0'	-42.5'	132.1°	21°09.7'	-43.1'	132.4°	20°29.2'	-43.7'	132.6°	19°48.4'	-44.2'	132.9°	19°07.5'	-44.8'	133.2°	18°26.3'	-45.3'	133.4°	17°45.0'	-45.8'	133.7°	22
23	21°07.5'	-42.7'	132.8°	20°26.6'	-43.3'	133.1°	19°45.5'	-43.9'	133.4°	19°04.2'	-44.4'	133.6°	18°22.7'	-44.9'	133.9°	17°41.0'	-45.5'	134.1°	16°59.2'	-46.0'	134.3°	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°01.5'	-35.5'	113.6°	36°37.1'	-36.5'	114.3°	36°12.1'	-37.4'	115.0°	35°46.4'	-38.3'	115.7°	35°20.1'	-39.2'	116.3°	34°53.3'	-40.0'	116.9°	34°25.8'	-40.9'	117.5°	0
1	36°25.9'	-36.0'	114.6°	36°00.6'	-37.0'	115.3°	35°34.7'	-37.9'	116.0°	35°08.1'	-38.7'	116.6°	34°41.0'	-39.6'	117.2°	34°13.2'	-40.4'	117.8°	33°44.9'	-41.2'	118.4°	1
2	35°49.9'	-36.5'	115.6°	35°23.7'	-37.4'	116.3°	34°56.8'	-38.3'	116.9°	34°29.4'	-39.2'	117.5°	34°01.4'	-40.0'	118.1°	33°32.8'	-40.8'	118.7°	33°03.7'	-41.6'	119.3°	2
3	35°13.4'	-37.0'	116.6°	34°46.3'	-37.9'	117.2°	34°18.5'	-38.7'	117.8°	33°50.2'	-39.6'	118.4°	33°21.4'	-40.4'	119.0°	32°52.0'	-41.2'	119.6°	32°22.1'	-41.9'	120.2°	3
4	34°36.5'	-37.4'	117.6°	34°08.4'	-38.3'	118.2°	33°39.8'	-39.1'	118.8°	33°10.7'	-39.9'	119.3°	32°41.0'	-40.7'	119.9°	32°10.8'	-41.5'	120.5°	31°40.2'	-42.3'	121.0°	4
5	33°59.0'	-37.9'	118.5°	33°30.1'	-38.7'	119.1°	33°00.7'	-39.5'	119.7°	32°30.7'	-40.3'	120.2°	32°00.3'	-41.1'	120.8°	31°29.3'	-41.8'	121.3°	30°57.9'	-42.6'	121.8°	5
6	33°21.2'	-38.3'	119.5°	32°51.4'	-39.1'	120.0°	32°21.2'	-39.9'	120.6°	31°50.4'	-40.7'	121.1°	31°19.2'	-41.4'	121.6°	30°47.5'	-42.2'	122.1°	30°15.3'	-42.9'	122.6°	6
7	32°42.9'	-38.7'	120.4°	32°12.3'	-39.5'	120.9°	31°41.3'	-40.2'	121.5°	31°09.7'	-41.0'	122.0°	30°37.7'	-41.7'	122.5°	30°05.3'	-42.5'	123.0°	29°32.4'	-43.2'	123.5°	7
8	32°04.3'	-39.0'	121.3°	31°32.9'	-39.8'	121.8°	31°01.0'	-40.6'	122.3°	30°28.7'	-41.3'	122.8°	29°56.0'	-42.1'	123.3°	29°22.8'	-42.8'	123.8°	28°49.3'	-43.4'	124.2°	8
9	31°25.2'	-39.4'	122.2°	30°53.1'	-40.2'	122.7°	30°20.4'	-40.9'	123.2°	29°47.4'	-41.6'	123.7°	29°13.9'	-42.4'	124.1°	28°40.1'	-43.0'	124.6°	28°05.8'	-43.7'	125.0°	9
10	30°45.8'	-39.8'	123.1°	30°12.9'	-40.5'	123.5°	29°39.5'	-41.2'	124.0°	29°05.7'	-41.9'	124.5°	28°31.6'	-42.6'	124.9°	27°57.0'	-43.3'	125.4°	27°22.1'	-44.0'	125.8°	10
11	30°06.1'	-40.1'	123.9°	29°32.4'	-40.8'	124.4°	28°58.3'	-41.5'	124.9°	28°23.8'	-42.2'	125.3°	27°48.9'	-42.9'	125.7°	27°13.7'	-43.6'	126.2°	26°38.1'	-44.2'	126.6°	11
12	29°26.0'	-40.4'	124.8°	28°51.5'	-41.1'	125.2°	28°16.7'	-41.8'	125.7°	27°41.6'	-42.5'	126.1°	27°06.0'	-43.2'	126.5°	26°30.1'	-43.8'	126.9°	25°53.9'	-44.4'	127.3°	12
13	28°45.5'	-40.7'	125.6°	28°10.4'	-41.4'	126.1°	27°34.9'	-42.1'	126.5°	26°59.1'	-42.8'	126.9°	26°22.9'	-43.4'	127.3°	25°46.3'	-44.0'	127.7°	25°09.5'	-44.7'	128.1°	13
14	28°04.8'	-41.0'	126.5°	27°29.0'	-41.7'	126.9°	26°52.8'	-42.4'	127.3°	26°16.3'	-43.0'	127.7°	25°39.4'	-43.7'	128.1°	25°02.3'	-44.3'	128.4°	24°24.8'	-44.9'	128.8°	14
15	27°23.8'	-41.3'	127.3°	26°47.3'	-42.0'	127.7°	26°10.4'	-42.6'	128.1°	25°33.3'	-43.3'	128.5°	24°55.8'	-43.9'	128.8°	24°18.0'	-44.5'	129.2°	23°40.0'	-45.1'	129.5°	15
16	26°42.5'	-41.6'	128.1°	26°05.3'	-42.2'	128.5°	25°27.8'	-42.9'	128.9°	24°50.0'	-43.5'	129.2°	24°11.9'	-44.1'	129.6°	23°33.5'	-44.7'	129.9°	22°54.9'	-45.3'	130.2°	16
17	26°00.9'	-41.9'	128.9°	25°23.0'	-42.5'	129.3°	24°44.9'	-43.1'	129.6°	24°06.5'	-43.7'	130.0°	23°27.8'	-44.3'	130.3°	22°48.8'	-44.9'	130.6°	22°09.6'	-45.4'	131.0°	17
18	25°19.0'	-42.1'	129.7°	24°40.5'	-42.7'	130.1°	24°01.8'	-43.3'	130.4°	23°22.8'	-43.9'	130.7°	22°43.5'	-44.5'	131.1°	22°04.0'	-45.1'	131.4°	21°24.2'	-45.6'	131.7°	18
19	24°36.9'	-42.4'	130.5°	23°57.8'	-43.0'	130.8°	23°18.4'	-43.6'	131.2°	22°38.8'	-44.1'	131.5°	21°59.0'	-44.7'	131.8°	21°18.9'	-45.2'	132.1°	20°38.6'	-45.8'	132.4°	19
20	23°54.5'	-42.6'	131.3°	23°14.8'	-43.2'	131.6°	22°34.9'	-43.8'	131.9°	21°54.7'	-44.3'	132.2°	21°14.3'	-44.9'								

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°49.9'	-35.9'	114.4°	37°24.8'	-36.9'	115.1°	36°59.0'	-37.8'	115.8°	36°32.6'	-38.7'	116.4°	36°05.6'	-39.6'	117.1°	35°38.0'	-40.4'	117.7°	35°09.8'	-41.2'	118.4°	0
1	37°43.9'	-36.4'	115.4°	36°47.9'	-37.4'	116.1°	36°21.2'	-38.3'	116.7°	35°53.9'	-39.1'	117.4°	35°26.0'	-40.0'	118.0°	34°57.6'	-40.8'	118.6°	34°28.5'	-41.6'	119.3°	1
2	36°37.5'	-36.9'	116.4°	36°10.6'	-37.8'	117.1°	35°43.0'	-38.7'	117.7°	35°14.8'	-39.6'	118.3°	34°46.1'	-40.4'	118.9°	34°16.8'	-41.2'	119.5°	33°46.9'	-42.0'	120.1°	2
3	36°00.6'	-37.4'	117.4°	35°32.8'	-38.3'	118.0°	35°04.3'	-39.1'	118.6°	34°35.3'	-40.0'	119.2°	34°05.7'	-40.8'	119.8°	33°35.6'	-41.6'	120.4°	33°04.9'	-42.3'	121.0°	3
4	35°23.3'	-37.8'	118.3°	34°54.5'	-38.7'	119.0°	34°25.2'	-39.5'	119.6°	33°55.3'	-40.3'	120.1°	33°24.9'	-41.1'	120.7°	32°54.0'	-41.9'	121.3°	32°22.6'	-42.6'	121.8°	4
5	34°45.4'	-38.3'	119.3°	34°15.8'	-39.1'	119.9°	33°45.6'	-39.9'	120.5°	33°15.0'	-40.7'	121.0°	32°43.8'	-41.5'	121.6°	32°12.1'	-42.2'	122.1°	31°40.0'	-43.0'	122.7°	5
6	34°07.1'	-38.7'	120.2°	33°36.7'	-39.5'	120.8°	33°05.7'	-40.3'	121.4°	32°34.2'	-41.1'	121.9°	32°02.3'	-41.8'	122.4°	31°29.9'	-42.6'	123.0°	30°57.0'	-43.3'	123.5°	6
7	33°28.5'	-39.1'	121.1°	32°57.2'	-39.9'	121.7°	32°25.4'	-40.7'	122.2°	31°53.2'	-41.4'	122.8°	31°20.5'	-42.2'	123.3°	30°47.3'	-42.9'	123.8°	30°13.7'	-43.6'	124.3°	7
8	32°49.4'	-39.5'	122.0°	32°17.3'	-40.3'	122.6°	31°44.7'	-41.0'	123.1°	31°11.7'	-41.7'	123.6°	30°38.3'	-42.5'	124.1°	30°04.5'	-43.2'	124.6°	29°30.2'	-43.8'	125.1°	8
9	32°09.9'	-39.8'	122.9°	31°37.0'	-40.6'	123.5°	31°03.7'	-41.3'	124.0°	30°30.0'	-42.1'	124.5°	29°55.8'	-42.8'	124.9°	29°21.3'	-43.4'	125.4°	28°46.3'	-44.1'	125.8°	9
10	31°30.0'	-40.2'	123.8°	30°56.4'	-40.9'	124.3°	30°22.4'	-41.7'	124.8°	29°47.9'	-42.4'	125.3°	29°13.1'	-43.1'	125.7°	28°37.8'	-43.7'	126.2°	28°02.2'	-44.4'	126.6°	10
11	30°49.8'	-40.5'	124.7°	30°15.5'	-41.3'	125.2°	29°40.7'	-42.0'	125.6°	29°05.6'	-42.7'	126.1°	28°30.0'	-43.3'	126.5°	27°54.1'	-44.0'	127.0°	27°17.9'	-44.6'	127.4°	11
12	30°09.3'	-40.9'	125.5°	29°34.2'	-41.6'	126.0°	28°58.7'	-42.3'	126.5°	28°22.9'	-42.9'	126.9°	27°46.7'	-43.6'	127.3°	27°10.2'	-44.2'	127.7°	26°33.3'	-44.8'	128.1°	12
13	29°28.4'	-41.2'	126.4°	28°52.6'	-41.9'	126.8°	28°16.5'	-42.5'	127.3°	27°40.0'	-43.2'	127.7°	27°03.1'	-43.8'	128.1°	26°25.9'	-44.5'	128.5°	25°48.4'	-45.1'	128.9°	13
14	28°47.2'	-41.5'	127.2°	28°10.7'	-42.2'	127.6°	27°33.9'	-42.8'	128.1°	26°56.8'	-43.5'	128.5°	26°19.3'	-44.1'	128.9°	25°41.5'	-44.7'	129.2°	25°03.4'	-45.3'	129.6°	14
15	28°05.7'	-41.8'	128.0°	27°28.6'	-42.4'	128.4°	26°51.1'	-43.1'	128.8°	26°13.3'	-43.7'	129.2°	25°35.2'	-44.3'	129.6°	24°56.8'	-44.9'	130.0°	24°18.1'	-45.5'	130.3°	15
16	27°23.9'	-42.1'	128.8°	26°46.1'	-42.7'	129.2°	26°08.0'	-43.3'	129.6°	25°29.6'	-43.9'	130.0°	24°50.9'	-44.5'	130.4°	24°11.9'	-45.1'	130.7°	23°32.6'	-45.7'	131.0°	16
17	26°41.9'	-42.3'	129.6°	26°03.4'	-43.0'	130.0°	25°24.7'	-43.6'	130.4°	24°45.7'	-44.2'	130.8°	24°06.4'	-44.7'	131.1°	23°26.8'	-45.3'	131.4°	22°47.0'	-45.8'	131.7°	17
18	25°59.5'	-42.6'	130.4°	25°20.5'	-43.2'	130.8°	24°41.1'	-43.8'	131.2°	24°01.5'	-44.4'	131.5°	23°21.6'	-44.9'	131.8°	22°41.5'	-45.5'	132.1°	22°01.1'	-46.0'	132.4°	18
19	25°17.0'	-42.8'	131.2°	24°37.3'	-43.4'	131.6°	23°57.3'	-44.0'	131.9°	23°17.1'	-44.6'	132.2°	22°36.7'	-45.1'	132.5°	21°56.0'	-45.7'	132.8°	21°15.1'	-46.2'	133.1°	19
20	24°34.1'	-43.1'	132.0°	23°53.9'	-43.6'	132.3°	23°13.3'	-44.2'	132.6°	22°32.6'	-44.8'	133.0°	21°51.6'	-45.3'	133.3°	21°10.4'	-45.8'	133.5°	20°28.9'	-46.3'	133.8°	20
21	23°51.1'	-43.3'	132.8°	23°10.2'	-43.9'	133.1°	22°29.1'	-44.4'	133.4°	21°47.8'	-45.0'	133.7°	21°06.3'	-45.5'	134.0°	20°24.5'	-46.0'	134.2°	19°42.6'	-46.5'	134.5°	21
22	23°07.8'	-43.7'	133.5°	22°26.4'	-44.4'	133.8°	21°44.7'	-44.9'	134.1°	21°02.9'	-45.0'	134.4°	20°20.8'	-45.6'	134.7°	19°38.5'	-46.2'	134.9°	18°56.1'	-46.7'	135.2°	22
23	22°24.3'	-44.1'	134.3°	21°42.3'	-45.1'	134.5°	21°00.1'	-45.0'	134.8°	20°17.7'	-45.2'	135.1°	19°35.1'	-45.6'	135.3°	18°52.4'	-46.0'	135.6°	18°09.4'	-46.9'	135.8°	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			

134° 226° LHA

Latitude SAME as DECLINATION

134° 226° 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°38.0'	-36.3'	115.1°	38°12.2'	-37.3'	115.9°	37°45.7'	-38.2'	116.6°	37°18.5'	-39.1'	117.3°	36°50.7'	-39.9'	117.9°	36°22.3'	-40.8'	118.6°	35°53.3'	-41.6'	119.2°	0
1	38°01.6'	-36.8'	116.2°	37°34.9'	-37.8'	116.9°	37°07.5'	-38.7'	117.5°	36°39.4'	-39.5'	118.2°	36°10.8'	-40.4'	118.8°	35°41.5'	-41.2'	119.5°	35°11.7'	-42.0'	120.1°	1
2	37°24.8'	-37.3'	117.2°	36°57.2'	-38.2'	117.8°	36°28.8'	-39.1'	118.5°	35°59.9'	-40.0'	119.1°	35°30.4'	-40.8'	119.8°	35°00.4'	-41.6'	120.4°	34°29.7'	-42.4'	121.0°	2
3	36°47.5'	-37.8'	118.1°	36°18.9'	-38.7'	118.8°	35°49.7'	-39.5'	119.4°	35°20.0'	-40.4'	120.1°	34°49.6'	-41.2'	120.7°	34°18.8'	-41.9'	121.2°	33°47.4'	-42.7'	121.8°	3
4	36°09.7'	-38.3'	119.1°	35°40.2'	-39.1'	119.7°	35°10.2'	-39.9'	120.4°	34°39.6'	-40.8'	121.0°	34°08.5'	-41.5'	121.5°	33°36.8'	-42.3'	122.1°	33°04.7'	-43.0'	122.7°	4
5	35°31.4'	-38.7'	120.1°	35°01.1'	-39.5'	120.7°	34°30.2'	-40.3'	121.3°	33°58.8'	-41.1'	121.8°	33°26.9'	-41.9'	122.4°	32°54.5'	-42.6'	123.0°	32°21.7'	-43.4'	123.5°	5
6	34°52.7'	-39.1'	121.0°	34°21.6'	-39.9'	121.6°	33°49.9'	-40.7'	122.2°	33°17.7'	-41.5'	122.7°	32°45.0'	-42.2'	123.3°	32°11.9'	-43.0'	123.8°	31°38.3'	-43.7'	124.3°	6
7	34°13.6'	-39.5'	121.9°	33°41.6'	-40.3'	122.5°	33°09.2'	-41.1'	123.0°	32°36.2'	-41.8'	123.6°	32°02.8'	-42.6'	124.1°	31°28.9'	-43.3'	124.6°	30°54.6'	-44.0'	125.1°	7
8	33°34.1'	-39.9'	122.8°	33°01.3'	-40.7'	123.4°	32°28.1'	-41.4'	123.9°	31°54.4'	-42.2'	124.4°	31°20.2'	-42.9'	124.9°	30°45.7'	-43.6'	125.4°	30°10.7'	-44.2'	125.9°	8
9	32°54.1'	-40.3'	123.7°	32°20.6'	-41.1'	124.2°	31°46.6'	-41.8'	124.8°	31°12.2'	-42.5'	125.3°	30°37.4'	-43.2'	125.7°	30°02.1'	-43.9'	126.2°	29°26.4'	-44.5'	126.7°	9
10	32°13.8'	-40.7'	124.6°	31°39.6'	-41.4'	125.1°	31°04.8'	-42.1'	125.6°	30°29.7'	-42.8'	126.1°	29°54.2'	-43.5'	126.6°	29°18.2'	-44.1'	127.0°	28°41.9'	-44.8'	127.4°	10
11	31°33.2'	-41.0'	125.5°	30°58.2'	-41.7'	126.0°	30°22.7'	-42.4'	126.4°	29°46.9'	-43.1'	126.9°	29°10.7'	-43.7'	127.3°	28°34.1'	-44.4'	127.8°	27°57.2'	-45.0'	128.2°	11
12	30°52.2'	-41.3'	126.3°	30°16.4'	-42.0'	126.8°	29°40.3'	-42.7'	127.2°	29°03.8'	-43.4'	127.7°	28°27.0'	-44.0'	128.1°	27°49.7'	-44.6'	128.5°	27°12.2'	-45.2'	129.0°	12
13	30°10.8'	-41.7'	127.2°	29°34.4'	-42.3'	127.6°	28°57.6'	-43.0'	128.1°	28°20.5'	-43.6'	128.5°	27°42.9'	-44.3'	128.9°	27°05.1'	-44.9'	129.3°	26°26.9'	-45.5'	129.7°	13
14	29°29.2'	-42.0'	128.0°	28°52.1'	-42.6'	128.4°	28°14.6'	-43.3'	128.8°	27°36.8'	-43.9'	129.3°	26°58.7'	-44.5'	129.7°	26°20.2'	-45.1'	130.0°	25°41.5'	-45.7'	130.4°	14
15	28°47.2'	-42.3'	128.8°	28°09.5'	-42.9'	129.2°	27°31.3'	-43.5'	129.6°	26°52.9'	-44.1'	130.0°	26°14.2'	-44.7'	130.4°	25°35.1'	-45.3'	130.8°	24°55.8'	-45.9'	131.1°	15
16	28°05.0'	-42.5'	129.6°	27°26.6'	-43.2'	130.0°	26°47.8'	-43.8'	130.4°	26°08.8'	-44.4'	130.8°	25°29.4'	-45.0'	131.1°	24°49.8'	-45.5'	131.5°	24°09.9'	-46.1'	131.8°	16
17	27°22.4'	-42.8'	130.4°	26°43.4'	-43.4'	130.8°	26°04.0'	-44.0'	131.2°	25°24.4'	-44.6'	131.5°	24°44.5'	-45.2'	131.9°	24°04.3'	-45.7'	132.2°	23°23.9'	-46.3'	132.5°	17
18	26°39.6'	-43.1'	131.2°	25°60.0'	-43.7'	131.6°	25°20.0'	-44.2'	131.9°	24°39.8'	-44.8'	132.3°	23°59.3'	-45.4'	132.6°	23°18.6'	-45.9'	132.9°	22°37.6'	-46.4'	133.2°	18
19	25°56.6'	-43.3'	132.0°	25°16.3'	-43.9'	132.3°	24°35.8'	-44.5'	132.7°	23°55.0'	-45.0'	133.0°	23°14.0'	-45.6'	133.3°	22°32.7'	-46.1'	133.6°	21°51.2'	-46.6'	133.9°	19
20	25°13.3'	-43.5'	132.7°	24°32.4'	-44.1'	133.1°	23°51.3'	-44.7'	133.4°	23°10.0'	-45.2'	133.7°	22°28.4'	-45.7'	134.0°							

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°25.8'	-36.7'	115.9°	38°59.2'	-37.7'	116.7°	38°32.0'	-38.6'	117.4°	38°04.1'	-39.5'	118.1°	37°35.5'	-40.3'	118.8°	37°06.3'	-41.2'	119.4°	36°36.6'	-42.0'	120.1°	0
1	38°49.0'	-37.3'	116.9°	38°21.6'	-38.2'	117.7°	37°53.4'	-39.1'	118.3°	37°24.6'	-39.9'	119.0°	36°55.2'	-40.8'	119.7°	36°25.2'	-41.6'	120.3°	35°54.6'	-42.4'	121.0°	1
2	38°11.8'	-37.8'	117.9°	37°43.4'	-38.7'	118.6°	37°14.3'	-39.5'	119.3°	36°44.7'	-40.4'	120.0°	36°14.4'	-41.2'	120.6°	35°43.6'	-42.0'	121.2°	35°12.2'	-42.7'	121.8°	2
3	37°34.1'	-38.2'	118.9°	37°04.7'	-39.1'	119.6°	36°34.8'	-40.0'	120.2°	36°04.3'	-40.8'	120.9°	35°33.2'	-41.6'	121.5°	35°01.6'	-42.3'	122.1°	34°29.5'	-43.1'	122.7°	3
4	36°55.8'	-38.7'	119.9°	36°25.6'	-39.6'	120.5°	35°54.8'	-40.4'	121.2°	35°23.5'	-41.2'	121.8°	34°51.6'	-42.0'	122.4°	34°19.3'	-42.7'	123.0°	33°46.4'	-43.4'	123.5°	4
5	36°17.1'	-39.2'	120.9°	35°46.1'	-40.0'	121.5°	35°14.5'	-40.8'	122.1°	34°42.3'	-41.6'	122.7°	34°09.7'	-42.3'	123.2°	33°36.6'	-43.0'	123.8°	33°02.9'	-43.8'	124.4°	5
6	35°38.0'	-39.6'	121.8°	35°06.1'	-40.4'	122.4°	34°33.7'	-41.2'	123.0°	34°00.8'	-41.9'	123.5°	33°27.4'	-42.7'	124.1°	32°53.5'	-43.4'	124.6°	32°19.2'	-44.1'	125.2°	6
7	34°58.4'	-40.0'	122.7°	34°25.7'	-40.8'	123.3°	33°52.5'	-41.5'	123.9°	33°18.9'	-42.3'	124.4°	32°44.7'	-43.0'	124.9°	32°10.1'	-43.7'	125.5°	31°35.1'	-44.4'	126.0°	7
8	34°18.4'	-40.4'	123.6°	33°44.9'	-41.1'	124.2°	33°11.0'	-41.9'	124.7°	32°36.6'	-42.6'	125.3°	32°01.7'	-43.3'	125.8°	31°26.5'	-44.0'	126.3°	30°50.8'	-44.6'	126.8°	8
9	33°38.0'	-40.8'	124.5°	33°03.8'	-41.5'	125.0°	32°29.1'	-42.2'	125.6°	31°54.0'	-42.9'	126.1°	31°18.4'	-43.6'	126.6°	30°42.5'	-44.3'	127.1°	30°06.1'	-44.9'	127.5°	9
10	32°57.2'	-41.1'	125.4°	32°22.3'	-41.8'	125.9°	31°46.9'	-42.6'	126.4°	31°11.1'	-43.2'	126.9°	30°34.8'	-43.9'	127.4°	29°58.2'	-44.5'	127.8°	29°21.2'	-45.2'	128.3°	10
11	32°16.1'	-41.5'	126.2°	31°40.4'	-42.2'	126.8°	31°04.3'	-42.9'	127.2°	30°27.8'	-43.5'	127.7°	29°50.9'	-44.2'	128.2°	29°13.7'	-44.8'	128.6°	28°36.0'	-45.4'	129.0°	11
12	31°34.7'	-41.8'	127.1°	30°58.3'	-42.5'	127.6°	30°21.5'	-43.2'	128.1°	29°44.3'	-43.8'	128.5°	29°06.8'	-44.4'	128.9°	28°28.9'	-45.1'	129.4°	27°50.6'	-45.6'	129.8°	12
13	30°52.8'	-42.1'	127.9°	30°15.8'	-42.8'	128.4°	29°38.3'	-43.4'	128.9°	29°00.5'	-44.1'	129.3°	28°22.3'	-44.7'	129.7°	27°43.8'	-45.3'	130.1°	27°05.0'	-45.9'	130.5°	13
14	30°10.7'	-42.4'	128.8°	29°33.0'	-43.1'	129.2°	28°54.9'	-43.7'	129.6°	28°16.4'	-44.3'	130.1°	27°37.6'	-44.9'	130.5°	26°58.5'	-45.5'	130.9°	26°19.1'	-46.1'	131.2°	14
15	29°28.3'	-42.7'	129.6°	28°49.9'	-43.4'	130.0°	28°11.1'	-44.0'	130.4°	27°32.1'	-44.6'	130.8°	26°52.7'	-45.2'	131.2°	26°13.0'	-45.7'	131.6°	25°33.0'	-46.3'	132.0°	15
16	28°45.6'	-43.0'	130.4°	28°06.5'	-43.6'	130.8°	27°27.2'	-44.2'	131.2°	26°47.5'	-44.8'	131.6°	26°07.5'	-45.4'	131.9°	25°27.3'	-45.9'	132.3°	24°46.8'	-46.5'	132.7°	16
17	28°02.6'	-43.3'	131.2°	27°22.9'	-43.9'	131.6°	26°42.9'	-44.5'	132.0°	26°02.7'	-45.0'	132.3°	25°22.1'	-45.6'	132.7°	24°41.3'	-46.1'	133.0°	24°00.3'	-46.7'	133.3°	17
18	27°19.3'	-43.5'	132.0°	26°39.0'	-44.1'	132.3°	25°58.5'	-44.7'	132.7°	25°17.6'	-45.3'	133.1°	24°36.5'	-45.8'	133.4°	23°55.2'	-46.3'	133.7°	23°13.6'	-46.8'	134.0°	18
19	26°35.7'	-43.8'	132.7°	25°54.9'	-44.4'	133.1°	25°13.8'	-44.9'	133.4°	24°32.4'	-45.5'	133.8°	23°50.7'	-46.0'	134.1°	23°08.9'	-46.5'	134.4°	22°26.8'	-47.0'	134.7°	19
20	25°52.0'	-44.0'	133.5°	25°10.5'	-44.6'	133.8°	24°28.8'	-45.1'	134.2°	23°46.9'	-45.7'	134.5°	23°04.7'	-46.2'	134.8°	22°22.4'	-46.7'	135.1°	21°39.8'	-47.2'	135.4°	20
21	25°07.9'	-44.2'	134.2°	24°25.9'	-44.8'	134.6°	23°43.7'	-45.3'	134.9°	23°01.3'	-45.8'	135.2°	22°18.6'	-46.3'	135.5°	21°35.7'	-46.8'	135.8°	20°52.6'	-47.3'	136.0°	21
22	24°23.7'	-44.5'	135.0°	23°41.2'	-45.0'	135.3°	22°58.4'	-45.5'	135.6°	22°15.4'	-46.0'	135.9°	21°32.2'	-46.5'	136.2°	20°48.8'	-47.0'	136.4°	20°05.3'	-47.5'	136.7°	22
23	23°39.2'	-44.7'	135.7°	22°56.2'	-45.2'	136.0°	22°12.9'	-45.7'	136.3°	21°29.4'	-46.2'	136.6°	20°45.7'	-46.7'	136.9°	20°01.8'	-47.1'	137.1°	19°17.8'	-47.6'	137.4°	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°13.3'	-37.2'	116.7°	39°46.0'	-38.1'	117.5°	39°18.0'	-39.0'	118.2°	38°49.3'	-39.9'	118.9°	38°19.9'	-40.8'	119.6°	37°50.0'	-41.6'	120.3°	37°19.4'	-42.4'	120.9°	0
1	39°36.1'	-37.7'	117.7°	39°07.9'	-38.6'	118.5°	38°38.9'	-39.5'	119.2°	38°09.4'	-40.4'	119.9°	37°39.2'	-41.2'	120.5°	37°08.4'	-42.0'	121.2°	36°37.0'	-42.8'	121.8°	1
2	38°58.4'	-38.2'	118.8°	38°29.3'	-39.1'	119.5°	37°59.4'	-40.0'	120.1°	37°29.0'	-40.8'	120.8°	36°58.0'	-41.6'	121.5°	36°26.4'	-42.4'	122.1°	35°54.3'	-43.1'	122.7°	2
3	38°20.2'	-38.7'	119.7°	37°50.2'	-39.6'	120.4°	37°19.5'	-40.4'	121.1°	36°48.2'	-41.2'	121.7°	36°16.4'	-42.0'	122.4°	35°44.0'	-42.8'	123.0°	35°11.1'	-43.5'	123.6°	3
4	37°41.6'	-39.2'	120.7°	37°10.6'	-40.0'	121.4°	36°39.1'	-40.8'	122.0°	36°07.0'	-41.6'	122.6°	35°34.4'	-42.4'	123.2°	35°01.3'	-43.1'	123.8°	34°27.6'	-43.8'	124.4°	4
5	37°02.4'	-39.6'	121.7°	36°30.6'	-40.4'	122.3°	35°58.3'	-41.2'	122.9°	35°25.4'	-42.0'	123.5°	34°52.0'	-42.7'	124.1°	34°18.2'	-43.5'	124.7°	33°43.8'	-44.2'	125.2°	5
6	36°22.8'	-40.0'	122.6°	35°50.2'	-40.8'	123.2°	35°17.1'	-41.6'	123.8°	34°43.4'	-42.4'	124.4°	34°09.3'	-43.1'	125.0°	33°34.7'	-43.8'	125.5°	32°59.6'	-44.5'	126.0°	6
7	35°42.8'	-40.5'	123.5°	35°09.4'	-41.2'	124.1°	34°35.5'	-42.0'	124.7°	34°01.1'	-42.7'	125.2°	33°26.2'	-43.4'	125.8°	32°50.9'	-44.1'	126.3°	32°15.2'	-44.8'	126.8°	7
8	35°02.3'	-40.9'	124.4°	34°28.1'	-41.6'	125.0°	33°53.5'	-42.3'	125.6°	33°18.4'	-43.0'	126.1°	32°42.8'	-43.7'	126.6°	32°06.8'	-44.4'	127.1°	31°30.4'	-45.0'	127.6°	8
9	34°21.5'	-41.2'	125.3°	33°46.5'	-42.0'	125.9°	33°11.1'	-42.7'	126.4°	32°35.3'	-43.4'	126.9°	31°59.1'	-44.0'	127.4°	31°22.4'	-44.7'	127.9°	30°45.3'	-45.3'	128.4°	9
10	33°40.2'	-41.6'	126.2°	33°04.6'	-42.3'	126.7°	32°28.5'	-43.0'	127.2°	31°52.0'	-43.7'	127.7°	31°15.0'	-44.3'	128.2°	30°37.7'	-45.0'	128.7°	30°00.0'	-45.6'	129.1°	10
11	32°58.6'	-41.9'	127.1°	32°22.3'	-42.6'	127.6°	31°45.5'	-43.3'	128.1°	31°08.3'	-44.0'	128.5°	30°30.7'	-44.6'	129.0°	29°52.8'	-45.2'	129.5°	29°14.4'	-45.8'	129.9°	11
12	32°16.7'	-42.3'	127.9°	31°39.6'	-43.0'	128.4°	31°02.2'	-43.6'	128.9°	30°24.3'	-44.3'	129.3°	29°46.1'	-44.9'	129.8°	29°07.5'	-45.5'	130.2°	28°28.6'	-46.1'	130.6°	12
13	31°34.4'	-42.6'	128.7°	30°56.7'	-43.3'	129.2°	30°18.5'	-43.9'	129.7°	29°40.1'	-44.5'	130.1°	29°01.2'	-45.1'	130.5°	28°22.1'	-45.7'	131.0°	27°42.6'	-46.3'	131.4°	13
14	30°51.8'	-42.9'	129.6°	30°13.4'	-43.6'	130.0°	29°34.6'	-44.2'	130.5°	28°55.5'	-44.8'	130.9°	28°16.1'	-45.4'	131.3°	27°36.3'	-45.9'	131.7°	26°56.3'	-46.5'	132.1°	14
15	30°08.9'	-43.2'	130.4°	29°29.8'	-43.8'	130.8°	28°50.5'	-44.4'	131.2°	28°10.7'	-45.0'	131.6°	27°30.7'	-45.6'	132.0°	26°50.4'	-46.2'	132.4°	26°09.8'	-46.7'	132.8°	15
16	29°25.7'	-43.5'	131.2°	28°46.0'	-44.1'	131.6°	28°06.0'	-44.7'	132.0°	27°25.7'	-45.3'	132.4°	26°45.1'	-45.8'	132.8°	26°04.2'	-46.4'	133.1°	25°23.1'	-46.9'	133.5°	16
17	28°42.2'	-43.8'	132.0°	28°01.9'	-44.4'	132.4°	27°21.3'	-44.9'	132.8°	26°40.5'	-45.5'	133.1°	25°59.3'	-46.0'	133.5°	25°17.9'	-46.6'	133.8°	24°36.2'	-47.1'	134.2°	17
18	27°58.4'	-44.0'	132.7°	27°17.6'	-44.6'	133.1°	26°36.4'	-45.2'	133.5°	25°55.0'	-45.7'	133.9°	25°13.3'	-46.2'	134.2°	24°31.3'	-46.8'	134.5°	23°49.1'	-47.3'	134.8°	18
19	27°14.4'	-44.3'	133.5°	26°33.0'	-44.8'	133.9°	25°51.2'	-45.4'	134.2°	25°09.3'	-45.9'	134.6°	24°27.0'	-46.4'	134.9°	23°44.6'	-46.9'	135.2°	23°01.9'	-47.4'	135.5°	19
20	26°30.1'	-44.5'	134.3°	25°48.1'	-45.1'	134.6°	25°05.9'	-45.6'	135.0°	24°23.4'	-46.1'	135.3°	23°40.6'	-46.6'	135.6°							

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°00.4'	-37.6'	117.5°	40°32.4'	-38.5'	118.3°	40°03.6'	-39.4'	119.0°	39°34.1'	-40.3'	119.8°	39°04.0'	-41.2'	120.5°	38°33.2'	-42.0'	121.2°	38°01.9'	-42.8'	121.8°	0
1	40°22.8'	-38.1'	118.6°	39°53.8'	-39.0'	119.3°	39°24.1'	-39.9'	120.0°	38°53.8'	-40.8'	120.7°	38°22.8'	-41.6'	121.4°	37°51.2'	-42.4'	122.1°	37°19.1'	-43.2'	122.7°	1
2	39°44.7'	-38.7'	119.6°	39°14.8'	-39.5'	120.3°	38°44.2'	-40.4'	121.0°	38°13.0'	-41.2'	121.7°	37°41.2'	-42.0'	122.3°	37°08.8'	-42.8'	123.0°	36°35.9'	-43.6'	123.6°	2
3	39°06.1'	-39.1'	120.6°	38°35.2'	-40.0'	121.3°	38°03.8'	-40.8'	121.9°	37°31.8'	-41.6'	122.6°	36°59.2'	-42.4'	123.2°	36°26.0'	-43.2'	123.8°	35°52.4'	-43.9'	124.4°	3
4	38°26.9'	-39.6'	121.5°	37°55.2'	-40.5'	122.2°	37°23.0'	-41.3'	122.9°	36°50.1'	-42.0'	123.5°	36°16.8'	-42.8'	124.1°	35°42.9'	-43.5'	124.7°	35°08.4'	-44.3'	125.3°	4
5	37°47.3'	-40.1'	122.5°	37°14.8'	-40.9'	123.1°	36°41.7'	-41.7'	123.8°	36°08.1'	-42.4'	124.4°	35°34.0'	-43.2'	125.0°	34°59.3'	-43.9'	125.5°	34°24.2'	-44.6'	126.1°	5
6	37°07.2'	-40.5'	123.4°	36°33.9'	-41.3'	124.1°	36°00.0'	-42.1'	124.7°	35°25.7'	-42.8'	125.2°	34°50.8'	-43.5'	125.8°	34°15.4'	-44.2'	126.4°	33°39.6'	-44.9'	126.9°	6
7	36°26.7'	-40.9'	124.3°	35°52.6'	-41.7'	125.0°	35°18.0'	-42.4'	125.5°	34°42.9'	-43.2'	126.1°	34°07.3'	-43.9'	126.7°	33°31.2'	-44.5'	127.2°	32°54.7'	-45.2'	127.7°	7
8	35°45.8'	-41.3'	125.3°	35°10.9'	-42.1'	125.8°	34°35.5'	-42.8'	126.4°	33°59.7'	-43.5'	126.9°	33°23.4'	-44.2'	127.5°	32°46.7'	-44.8'	128.0°	32°09.6'	-45.5'	128.5°	8
9	35°04.5'	-41.7'	126.1°	34°28.8'	-42.4'	126.7°	33°52.7'	-43.1'	127.2°	33°16.2'	-43.8'	127.8°	32°39.2'	-44.5'	128.3°	32°01.9'	-45.1'	128.8°	31°24.1'	-45.7'	129.3°	9
10	34°22.7'	-42.1'	127.0°	33°46.4'	-42.8'	127.6°	33°09.6'	-43.5'	128.1°	32°32.4'	-44.1'	128.6°	31°54.8'	-44.8'	129.1°	31°16.8'	-45.4'	129.6°	30°38.4'	-46.0'	130.0°	10
11	33°40.7'	-42.4'	127.9°	33°03.6'	-43.1'	128.4°	32°26.1'	-43.8'	128.9°	31°48.3'	-44.4'	129.4°	31°10.0'	-45.0'	129.9°	30°31.4'	-45.7'	130.3°	29°52.4'	-46.2'	130.8°	11
12	32°58.2'	-42.8'	128.7°	32°20.5'	-43.4'	129.2°	31°42.4'	-44.1'	129.7°	31°03.8'	-44.7'	130.2°	30°25.0'	-45.3'	130.6°	29°45.7'	-45.9'	131.1°	29°06.1'	-46.5'	131.5°	12
13	32°15.5'	-43.1'	129.6°	31°37.1'	-43.7'	130.0°	30°58.3'	-44.4'	130.5°	30°19.1'	-45.0'	130.9°	29°39.6'	-45.6'	131.4°	28°59.8'	-46.1'	131.8°	28°19.7'	-46.7'	132.2°	13
14	31°32.4'	-43.4'	130.4°	30°53.3'	-44.0'	130.8°	30°13.9'	-44.6'	131.3°	29°34.2'	-45.2'	131.7°	28°54.1'	-45.8'	132.1°	28°13.7'	-46.4'	132.5°	27°33.0'	-46.9'	132.9°	14
15	30°49.0'	-43.7'	131.2°	30°09.3'	-44.3'	131.6°	29°29.3'	-44.9'	132.1°	28°48.9'	-45.5'	132.5°	28°08.3'	-46.0'	132.9°	27°27.3'	-46.6'	133.3°	26°46.1'	-47.1'	133.6°	15
16	30°05.3'	-44.0'	132.0°	29°25.0'	-44.6'	132.4°	28°44.4'	-45.2'	132.8°	28°03.5'	-45.7'	133.2°	27°22.2'	-46.3'	133.6°	26°40.7'	-46.8'	134.0°	25°58.9'	-47.3'	134.3°	16
17	29°21.3'	-44.2'	132.8°	28°40.4'	-44.8'	133.2°	27°59.2'	-45.4'	133.6°	27°17.7'	-45.9'	133.9°	26°36.0'	-46.5'	134.3°	25°53.9'	-47.0'	134.7°	25°11.6'	-47.5'	135.0°	17
18	28°37.1'	-44.5'	133.5°	27°55.6'	-45.1'	133.9°	27°13.8'	-45.6'	134.3°	26°31.8'	-46.2'	134.7°	25°49.5'	-46.7'	135.0°	25°06.9'	-47.2'	135.3°	24°24.1'	-47.7'	135.7°	18
19	27°52.6'	-44.8'	134.3°	27°10.5'	-45.3'	134.7°	26°28.2'	-45.8'	135.0°	25°45.6'	-46.4'	135.4°	25°02.8'	-46.9'	135.7°	24°19.8'	-47.4'	136.0°	23°36.5'	-47.8'	136.3°	19
20	27°07.8'	-45.0'	135.0°	26°25.2'	-45.5'	135.4°	25°42.4'	-46.0'	135.7°	24°59.3'	-46.6'	136.1°	24°16.0'	-47.0'	136.4°	23°32.4'	-47.5'	136.7°	22°48.6'	-48.0'	137.0°	20
21	26°22.8'	-45.2'	135.8°	25°39.7'	-45.7'	136.1°	24°56.3'	-46.2'	136.5°	24°12.7'	-46.7'	136.8°	23°28.9'	-47.2'	137.1°	22°44.9'	-47.7'	137.4°	22°00.6'	-48.1'	137.6°	21
22	25°37.6'	-45.4'	136.5°	24°54.0'	-45.9'	136.8°	24°10.1'	-46.4'	137.2°	23°26.0'	-46.9'	137.5°	22°41.7'	-47.4'	137.7°	21°57.2'	-47.8'	138.0°	21°12.5'	-48.3'	138.3°	22
23	24°52.2'	-45.6'	137.2°	24°08.0'	-46.1'	137.6°	23°23.7'	-46.6'	137.8°	22°39.1'	-47.1'	138.1°	21°54.3'	-47.5'	138.4°	21°09.3'	-48.0'	138.7°	20°24.2'	-48.4'	138.9°	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°47.2'	-38.1'	118.4°	41°18.4'	-39.0'	119.1°	40°48.8'	-39.9'	119.9°	40°18.6'	-40.8'	120.6°	39°47.6'	-41.6'	121.4°	39°16.1'	-42.4'	122.1°	38°43.9'	-43.2'	122.8°	0
1	41°09.1'	-38.6'	119.4°	40°39.4'	-39.5'	120.2°	40°08.9'	-40.4'	120.9°	39°37.8'	-41.2'	121.6°	39°06.0'	-42.0'	122.3°	38°33.7'	-42.8'	123.0°	38°00.7'	-43.6'	123.6°	1
2	40°30.5'	-39.1'	120.4°	39°59.9'	-40.0'	121.1°	39°28.5'	-40.8'	121.9°	38°56.6'	-41.7'	122.5°	38°24.0'	-42.5'	123.2°	37°50.8'	-43.2'	123.9°	37°17.1'	-44.0'	124.5°	2
3	39°51.5'	-39.6'	121.4°	39°19.9'	-40.5'	122.1°	38°47.7'	-41.3'	122.8°	38°14.9'	-42.1'	123.5°	37°41.5'	-42.9'	124.1°	37°07.6'	-43.6'	124.7°	36°33.2'	-44.3'	125.4°	3
4	39°11.9'	-40.1'	122.4°	38°39.4'	-40.9'	123.1°	38°06.4'	-41.7'	123.7°	37°32.8'	-42.5'	124.4°	36°58.7'	-43.2'	125.0°	36°24.0'	-44.0'	125.6°	35°48.8'	-44.7'	126.2°	4
5	38°31.8'	-40.6'	123.3°	37°58.5'	-41.4'	124.0°	37°24.7'	-42.1'	124.6°	36°50.3'	-42.9'	125.3°	36°15.4'	-43.6'	125.9°	35°40.0'	-44.3'	126.4°	35°04.1'	-45.0'	127.0°	5
6	37°51.2'	-41.0'	124.3°	37°17.1'	-41.8'	124.9°	36°42.5'	-42.5'	125.5°	36°07.4'	-43.3'	126.1°	35°31.8'	-44.0'	126.7°	34°55.7'	-44.6'	127.3°	34°19.2'	-45.3'	127.8°	6
7	37°10.2'	-41.4'	125.2°	36°35.4'	-42.2'	125.8°	36°00.0'	-42.9'	126.4°	35°24.2'	-43.6'	127.0°	34°47.9'	-44.3'	127.5°	34°11.1'	-45.0'	128.1°	33°33.8'	-45.6'	128.6°	7
8	36°28.8'	-41.8'	126.1°	35°53.2'	-42.5'	126.7°	35°17.1'	-43.3'	127.3°	34°40.6'	-43.9'	127.8°	34°03.6'	-44.6'	128.4°	33°26.1'	-45.3'	128.9°	32°48.2'	-45.9'	129.4°	8
9	35°47.0'	-42.2'	127.0°	35°10.7'	-42.9'	127.6°	34°33.9'	-43.6'	128.1°	33°56.6'	-44.3'	128.6°	33°18.9'	-44.9'	129.2°	32°40.9'	-45.5'	129.7°	32°02.4'	-46.2'	130.1°	9
10	35°04.8'	-42.6'	127.9°	34°27.8'	-43.3'	128.4°	33°50.3'	-43.9'	128.9°	33°12.4'	-44.6'	129.4°	32°34.0'	-45.2'	129.9°	31°55.3'	-45.8'	130.4°	31°16.2'	-46.4'	130.9°	10
11	34°22.2'	-42.9'	128.7°	33°44.5'	-43.6'	129.2°	33°06.3'	-44.2'	129.8°	32°27.8'	-44.9'	130.2°	31°48.8'	-45.5'	130.7°	31°09.5'	-46.1'	131.2°	30°29.8'	-46.7'	131.6°	11
12	33°39.3'	-43.3'	129.6°	33°00.9'	-43.9'	130.1°	32°22.1'	-44.5'	130.6°	31°42.9'	-45.2'	131.0°	31°03.3'	-45.8'	131.5°	30°23.4'	-46.3'	131.9°	29°43.1'	-46.9'	132.4°	12
13	32°56.1'	-43.6'	130.4°	32°17.0'	-44.2'	130.9°	31°37.6'	-44.8'	131.3°	30°57.7'	-45.4'	131.8°	30°17.6'	-46.0'	132.2°	29°37.1'	-46.6'	132.7°	28°56.3'	-47.1'	133.1°	13
14	32°12.5'	-43.9'	131.2°	31°32.8'	-44.5'	131.7°	30°52.7'	-45.1'	132.1°	30°12.3'	-45.7'	132.6°	29°31.6'	-46.3'	133.0°	28°50.5'	-46.8'	133.4°	28°09.1'	-47.3'	133.8°	14
15	31°28.6'	-44.2'	132.0°	30°48.3'	-44.8'	132.5°	30°07.6'	-45.4'	132.9°	29°26.6'	-45.9'	133.3°	28°45.3'	-46.5'	133.7°	28°03.7'	-47.0'	134.1°	27°21.8'	-47.5'	134.5°	15
16	30°44.4'	-44.5'	132.8°	30°03.5'	-45.1'	133.2°	29°22.2'	-45.6'	133.6°	28°40.7'	-46.2'	134.0°	27°58.8'	-46.7'	134.4°	27°16.7'	-47.2'	134.8°	26°34.3'	-47.7'	135.2°	16
17	29°60.0'	-44.7'	133.6°	29°18.5'	-45.3'	134.0°	28°36.6'	-45.9'	134.4°	27°54.5'	-46.4'	134.8°	27°12.1'	-46.9'	135.1°	26°29.5'	-47.4'	135.5°	25°46.5'	-47.9'	135.8°	17
18	29°15.2'	-45.0'	134.3°	28°33.1'	-45.5'	134.5°	27°50.8'	-46.1'	135.1°	27°08.1'	-46.6'	135.5°	26°25.2'	-47.1'	135.8°	25°42.0'	-47.6'	136.2°	24°58.6'	-48.1'	136.5°	18
19	28°30.2'	-45.2'	135.1°	27°47.6'	-45.8'	135.5°	27°04.7'	-46.3'	135.8°	26°21.5'	-46.8'	136.2°	25°38.1'	-47.3'	136.5°	24°54.4'	-47.8'	136.8°	24°10.6'	-48.3'	137.2°	19
20	27°45.0'	-45.5'	135.8°	27°01.8'	-46.0'	136.2°	26°18.4'	-46.5'	136.6°	25°34.7'	-47.0'	136.9°	24°50.8'	-47.5'								



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°33.6'	-38.5'	119.2°	42°04.0'	-39.5'	120.0°	41°33.6'	-40.3'	120.8°	41°02.6'	-41.2'	121.5°	40°30.9'	-42.0'	122.3°	39°58.5'	-42.9'	123.0°	39°25.6'	-43.6'	123.7°	0
1	41°55.1'	-39.1'	120.3°	41°24.6'	-40.0'	121.0°	40°53.3'	-40.8'	121.8°	40°21.4'	-41.7'	122.5°	39°48.8'	-42.5'	123.2°	39°15.7'	-43.3'	123.9°	38°41.9'	-44.0'	124.6°	1
2	41°16.0'	-39.6'	121.3°	40°44.6'	-40.5'	122.0°	40°12.5'	-41.3'	122.7°	39°39.7'	-42.1'	123.4°	39°06.3'	-42.9'	124.1°	38°32.4'	-43.7'	124.8°	37°57.9'	-44.4'	125.4°	2
3	40°36.5'	-40.1'	122.3°	40°04.1'	-40.9'	123.0°	39°31.2'	-41.8'	123.7°	38°57.6'	-42.5'	124.4°	38°23.4'	-43.3'	125.0°	37°48.7'	-44.0'	125.7°	37°13.5'	-44.8'	126.3°	3
4	39°56.4'	-40.6'	123.2°	39°23.2'	-41.4'	123.9°	38°49.4'	-42.2'	124.6°	38°15.0'	-43.0'	125.3°	37°40.1'	-43.7'	125.9°	37°04.7'	-44.4'	126.5°	36°28.7'	-45.1'	127.1°	4
5	39°15.8'	-41.0'	124.2°	38°41.8'	-41.8'	124.9°	38°07.2'	-42.6'	125.5°	37°32.1'	-43.3'	126.1°	36°56.4'	-44.1'	126.8°	36°20.3'	-44.8'	127.4°	35°43.6'	-45.4'	127.9°	5
6	38°34.8'	-41.5'	125.1°	37°60.0'	-42.2'	125.8°	37°24.6'	-43.0'	126.4°	36°48.7'	-43.7'	127.0°	36°12.4'	-44.4'	127.6°	35°35.5'	-45.1'	128.2°	34°58.2'	-45.7'	128.7°	6
7	37°53.3'	-41.9'	126.1°	37°17.7'	-42.6'	126.7°	36°41.6'	-43.4'	127.3°	36°05.0'	-44.1'	127.9°	35°28.0'	-44.7'	128.4°	34°50.4'	-45.4'	129.0°	34°12.5'	-46.0'	129.5°	7
8	37°11.4'	-42.3'	127.0°	36°35.1'	-43.0'	127.6°	35°58.2'	-43.7'	128.1°	35°21.0'	-44.4'	128.7°	34°43.2'	-45.1'	129.2°	34°05.0'	-45.7'	129.8°	33°26.4'	-46.3'	130.3°	8
9	36°29.1'	-42.7'	127.8°	35°52.0'	-43.4'	128.4°	35°14.5'	-44.1'	129.0°	34°36.5'	-44.7'	129.5°	33°58.2'	-45.4'	130.0°	33°19.3'	-46.0'	130.6°	32°40.1'	-46.6'	131.0°	9
10	35°46.4'	-43.1'	128.7°	35°08.6'	-43.7'	129.3°	34°30.4'	-44.4'	129.8°	33°51.8'	-45.0'	130.3°	33°12.8'	-45.7'	130.8°	32°33.4'	-46.3'	131.3°	31°53.6'	-46.8'	131.8°	10
11	35°03.3'	-43.4'	129.6°	34°24.9'	-44.1'	130.1°	33°46.0'	-44.7'	130.6°	33°06.8'	-45.3'	131.1°	32°27.1'	-45.9'	131.6°	31°47.1'	-46.5'	132.1°	31°06.7'	-47.1'	132.5°	11
12	34°19.9'	-43.7'	130.4°	33°40.8'	-44.4'	130.9°	33°01.3'	-45.0'	131.4°	32°21.4'	-45.6'	131.9°	31°41.2'	-46.2'	132.4°	31°00.6'	-46.8'	132.8°	30°19.6'	-47.3'	133.2°	12
13	33°36.2'	-44.1'	131.2°	32°56.4'	-44.7'	131.7°	32°16.3'	-45.3'	132.2°	31°35.8'	-45.9'	132.7°	30°55.0'	-46.5'	133.1°	30°13.8'	-47.0'	133.5°	29°32.3'	-47.5'	134.0°	13
14	32°52.1'	-44.4'	132.0°	32°11.7'	-45.0'	132.5°	31°31.0'	-45.6'	133.0°	30°49.9'	-46.1'	133.4°	30°08.5'	-46.7'	133.8°	29°26.8'	-47.2'	134.3°	28°44.8'	-47.7'	134.7°	14
15	32°07.7'	-44.7'	132.8°	31°26.7'	-45.3'	133.3°	30°45.4'	-45.8'	133.7°	30°03.8'	-46.4'	134.2°	29°21.8'	-46.9'	134.6°	28°39.6'	-47.4'	135.0°	27°57.0'	-48.0'	135.3°	15
16	31°23.0'	-45.0'	133.6°	30°41.5'	-45.5'	134.1°	29°59.6'	-46.1'	134.5°	29°17.4'	-46.6'	134.9°	28°34.9'	-47.1'	135.3°	27°52.1'	-47.7'	135.7°	27°09.1'	-48.1'	136.0°	16
17	30°38.1'	-45.2'	134.4°	29°55.9'	-45.8'	134.8°	29°13.5'	-46.3'	135.2°	28°30.8'	-46.8'	135.6°	27°47.8'	-47.4'	136.0°	27°04.5'	-47.9'	136.3°	26°20.9'	-48.3'	136.7°	17
18	29°52.9'	-45.5'	135.2°	29°10.2'	-46.0'	135.6°	28°27.2'	-46.6'	135.9°	27°43.9'	-47.1'	136.3°	27°00.4'	-47.6'	136.7°	26°16.6'	-48.0'	137.0°	25°32.6'	-48.5'	137.3°	18
19	29°07.4'	-45.7'	135.9°	28°24.1'	-46.3'	136.3°	27°40.6'	-46.8'	136.7°	26°56.9'	-47.3'	137.0°	26°12.8'	-47.7'	137.4°	25°28.6'	-48.2'	137.7°	24°44.1'	-48.7'	138.0°	19
20	28°21.6'	-46.0'	136.7°	27°37.9'	-46.5'	137.0°	26°53.8'	-47.0'	137.4°	26°09.6'	-47.5'	137.7°	25°25.1'	-47.9'	138.0°	24°40.4'	-48.4'	138.3°	23°55.4'	-48.8'	138.6°	20
21	27°35.7'	-46.2'	137.4°	26°51.4'	-46.7'	137.7°	26°06.9'	-47.2'	138.1°	25°22.1'	-47.6'	138.4°	24°37.2'	-48.1'	138.7°	23°52.0'	-48.5'	139.0°	23°06.6'	-49.0'	139.3°	21
22	26°49.5'	-46.4'	138.1°	26°04.7'	-46.9'	138.4°	25°19.7'	-47.4'	138.7°	24°34.5'	-47.8'	139.1°	23°49.1'	-48.3'	139.3°	23°03.4'	-48.7'	139.6°	22°17.6'	-49.1'	139.9°	22
23	26°03.1'	-46.6'	138.8°	25°17.8'	-47.1'	139.1°	24°32.3'	-47.5'	139.4°	23°46.7'	-48.0'	139.7°	23°00.8'	-48.4'	140.0°	22°14.7'	-48.8'	140.3°	21°28.5'	-49.3'	140.5°	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°19.7'	-39.0'	120.1°	42°49.2'	-39.9'	120.9°	42°18.1'	-40.8'	121.7°	41°46.2'	-41.7'	122.5°	41°13.7'	-42.5'	123.2°	40°40.5'	-43.3'	123.9°	40°06.7'	-44.1'	124.6°	0
1	42°40.6'	-39.6'	121.1°	42°09.3'	-40.5'	121.9°	41°37.3'	-41.3'	122.7°	41°04.5'	-42.1'	123.4°	40°31.2'	-42.9'	124.1°	39°57.2'	-43.7'	124.8°	39°22.6'	-44.5'	125.5°	1
2	42°01.1'	-40.1'	122.2°	41°28.9'	-40.9'	122.9°	40°55.9'	-41.8'	123.6°	40°22.4'	-42.6'	124.4°	39°48.2'	-43.4'	125.0°	39°13.5'	-44.1'	125.7°	38°38.2'	-44.8'	126.4°	2
3	41°21.1'	-40.6'	123.2°	40°47.9'	-41.4'	123.9°	40°14.2'	-42.2'	124.6°	39°39.8'	-43.0'	125.3°	39°04.9'	-43.8'	125.9°	38°29.4'	-44.5'	126.6°	37°53.3'	-45.2'	127.2°	3
4	40°40.5'	-41.1'	124.1°	40°06.5'	-41.9'	124.8°	39°31.9'	-42.7'	125.5°	38°56.8'	-43.4'	126.2°	38°21.1'	-44.2'	126.8°	37°44.9'	-44.9'	127.4°	37°08.1'	-45.5'	128.0°	4
5	39°59.4'	-41.5'	125.1°	39°24.6'	-42.3'	125.8°	38°49.3'	-43.1'	126.4°	38°23.4'	-43.8'	127.1°	37°36.9'	-44.5'	127.7°	37°00.0'	-45.2'	128.3°	36°22.6'	-45.9'	128.9°	5
6	39°17.8'	-42.0'	126.0°	38°42.3'	-42.7'	126.7°	38°06.2'	-43.5'	127.3°	37°29.6'	-44.2'	127.9°	36°52.4'	-44.9'	128.5°	36°14.8'	-45.5'	129.1°	35°36.8'	-46.2'	129.7°	6
7	38°35.9'	-42.4'	126.9°	37°59.5'	-43.1'	127.6°	37°22.7'	-43.8'	128.2°	36°45.4'	-44.5'	128.8°	36°07.6'	-45.2'	129.3°	35°29.3'	-45.8'	129.9°	34°50.6'	-46.5'	130.4°	7
8	37°53.5'	-42.8'	127.8°	37°16.4'	-43.5'	128.4°	36°38.9'	-44.2'	129.0°	36°00.8'	-44.9'	129.6°	35°22.4'	-45.5'	130.2°	34°43.5'	-46.1'	130.7°	34°04.1'	-46.7'	131.2°	8
9	37°10.7'	-43.2'	128.7°	36°32.9'	-43.9'	129.3°	35°54.6'	-44.6'	129.9°	35°16.0'	-45.2'	130.4°	34°36.8'	-45.8'	131.0°	33°57.3'	-46.4'	131.5°	33°17.4'	-47.0'	132.0°	9
10	36°27.5'	-43.6'	129.6°	35°49.0'	-44.2'	130.2°	35°10.1'	-44.9'	130.7°	34°30.8'	-45.5'	131.2°	33°51.0'	-46.1'	131.7°	33°10.9'	-46.7'	132.2°	32°30.4'	-47.3'	132.7°	10
11	35°43.9'	-43.9'	130.4°	35°04.8'	-44.6'	131.0°	34°25.2'	-45.2'	131.5°	33°45.3'	-45.8'	132.0°	33°04.9'	-46.4'	132.5°	32°24.2'	-47.0'	133.0°	31°43.1'	-47.5'	133.4°	11
12	34°60.0'	-44.3'	131.3°	34°20.2'	-44.9'	131.8°	33°40.0'	-45.5'	132.3°	32°59.4'	-46.1'	132.8°	32°18.5'	-46.7'	133.3°	31°37.2'	-47.2'	133.7°	30°55.6'	-47.7'	134.1°	12
13	34°15.7'	-44.6'	132.1°	33°35.3'	-45.2'	132.6°	32°54.5'	-45.8'	133.1°	32°13.4'	-46.4'	133.5°	31°31.9'	-46.9'	134.0°	30°50.0'	-47.4'	134.4°	30°07.9'	-48.0'	134.8°	13
14	33°31.2'	-44.9'	132.9°	32°50.1'	-45.5'	133.4°	32°08.7'	-46.1'	133.8°	31°27.0'	-46.6'	134.3°	30°45.0'	-47.1'	134.7°	30°02.6'	-47.7'	135.1°	29°19.9'	-48.2'	135.5°	14
15	32°46.3'	-45.2'	133.7°	32°04.7'	-45.8'	134.2°	31°22.7'	-46.3'	134.6°	30°40.4'	-46.9'	135.0°	29°57.8'	-47.4'	135.4°	29°14.9'	-47.9'	135.8°	28°31.7'	-48.4'	136.2°	15
16	32°01.1'	-45.5'	134.5°	31°18.9'	-46.0'	134.9°	30°36.4'	-46.6'	135.3°	29°53.6'	-47.1'	135.8°	29°10.4'	-47.6'	136.1°	28°27.0'	-48.1'	136.5°	27°43.4'	-48.6'	136.9°	16
17	31°15.7'	-45.7'	135.2°	30°32.9'	-46.3'	135.7°	29°49.8'	-46.8'	136.1°	29°06.5'	-47.3'	136.5°	28°22.8'	-47.8'	136.8°	27°38.9'	-48.3'	137.2°	26°54.8'	-48.7'	137.6°	17
18	30°29.9'	-46.0'	136.0°	29°46.6'	-46.5'	136.4°	29°03.0'	-47.0'	136.8°	28°19.2'	-47.5'	137.2°	27°35.0'	-48.0'	137.5°	26°50.7'	-48.5'	137.9°	26°06.0'	-48.9'	138.2°	18
19	29°43.9'	-46.2'	136.7°	29°00.1'	-46.7'	137.1°	28°16.0'	-47.2'	137.5°	27°31.6'	-47.7'	137.9°	26°47.0'	-48.2'	138.2°	26°02.2'	-48.6'	138.5°	25°17.1'	-49.1'	138.8°	19
20	28°57.7'	-46.5'	137.5°	28°13.4'	-47.0'	137.8°	27°28.8'	-47.4'	138.2°	26°43.9'	-47.9'	138.5°	25°58.8'	-48.4'	138.9°							

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°05.3'	-39.5'	121.0°	43°34.1'	-40.4'	121.8°	43°02.1'	-41.3'	122.6°	42°29.4'	-42.1'	123.4°	41°56.0'	-43.0'	124.1°	41°22.0'	-43.8'	124.9°	40°47.4'	-44.5'	125.6°	0
1	43°25.8'	-40.1'	122.0°	42°53.6'	-40.9'	122.8°	42°20.8'	-41.8'	123.6°	41°47.2'	-42.6'	124.4°	41°13.1'	-43.4'	125.1°	40°38.3'	-44.2'	125.8°	40°02.9'	-44.9'	126.5°	1
2	42°45.7'	-40.6'	123.1°	42°12.7'	-41.4'	123.8°	41°39.0'	-42.3'	124.6°	41°04.6'	-43.1'	125.3°	40°29.6'	-43.8'	126.0°	39°54.1'	-44.6'	126.7°	39°18.0'	-45.3'	127.3°	2
3	42°05.2'	-41.1'	124.1°	41°31.2'	-41.9'	124.8°	40°56.7'	-42.7'	125.5°	40°21.5'	-43.5'	126.2°	39°45.8'	-44.2'	126.9°	39°09.5'	-44.9'	127.5°	38°32.7'	-45.6'	128.2°	3
4	41°24.1'	-41.6'	125.0°	40°49.3'	-42.4'	125.7°	40°14.0'	-43.2'	126.4°	39°38.1'	-43.9'	127.1°	39°01.6'	-44.6'	127.8°	38°24.6'	-45.3'	128.4°	37°47.1'	-46.0'	129.0°	4
5	40°42.5'	-42.0'	126.0°	40°06.9'	-42.8'	126.7°	39°30.8'	-43.6'	127.3°	38°54.2'	-44.3'	128.0°	38°17.0'	-45.0'	128.6°	37°39.3'	-45.7'	129.2°	37°01.1'	-46.3'	129.8°	5
6	40°00.4'	-42.5'	126.9°	39°24.1'	-43.2'	127.6°	38°47.3'	-44.0'	128.2°	38°09.9'	-44.7'	128.9°	37°32.0'	-45.3'	129.5°	36°53.6'	-46.0'	130.0°	36°14.8'	-46.6'	130.6°	6
7	39°18.0'	-43.9'	127.8°	38°40.9'	-43.6'	128.5°	38°03.3'	-44.3'	129.1°	37°25.2'	-45.0'	129.7°	36°46.6'	-45.7'	130.3°	36°07.6'	-46.3'	130.8°	35°28.2'	-46.9'	131.4°	7
8	38°35.0'	-42.3'	128.7°	37°57.2'	-44.0'	129.4°	37°19.0'	-44.7'	130.0°	36°40.2'	-45.4'	130.5°	36°01.0'	-46.0'	131.1°	35°21.3'	-46.6'	131.6°	34°41.3'	-47.2'	132.1°	8
9	37°51.7'	-43.7'	129.6°	37°13.2'	-44.4'	130.2°	36°34.3'	-45.0'	130.8°	35°54.8'	-45.7'	131.3°	35°15.0'	-46.3'	131.9°	34°34.8'	-46.9'	132.4°	33°54.1'	-47.4'	132.9°	9
10	37°08.0'	-44.1'	130.5°	36°28.8'	-44.7'	131.1°	35°49.2'	-45.4'	131.6°	35°09.2'	-46.0'	132.1°	34°28.7'	-46.6'	132.6°	33°47.9'	-47.1'	133.1°	33°06.7'	-47.7'	133.6°	10
11	36°24.0'	-44.4'	131.3°	35°44.1'	-45.1'	131.9°	35°03.9'	-45.7'	132.4°	34°23.2'	-46.3'	132.9°	33°42.1'	-46.8'	133.4°	33°00.7'	-47.4'	133.9°	32°19.0'	-47.9'	134.3°	11
12	35°39.5'	-44.8'	132.2°	34°59.1'	-45.4'	132.7°	34°18.2'	-46.0'	133.2°	33°36.9'	-46.6'	133.7°	32°55.3'	-47.1'	134.2°	32°13.3'	-47.6'	134.6°	31°31.0'	-48.2'	135.1°	12
13	34°54.8'	-45.1'	133.0°	34°13.7'	-45.7'	133.5°	33°32.2'	-46.3'	134.0°	32°50.4'	-46.8'	134.4°	32°08.2'	-47.4'	134.9°	31°25.7'	-47.9'	135.3°	30°42.9'	-48.4'	135.8°	13
14	34°09.7'	-45.4'	133.8°	33°28.0'	-46.0'	134.3°	32°45.9'	-46.5'	134.7°	32°03.5'	-47.1'	135.2°	31°20.8'	-47.6'	135.6°	30°37.8'	-48.1'	136.0°	29°54.5'	-48.6'	136.4°	14
15	33°24.3'	-45.7'	134.6°	32°42.0'	-46.2'	135.0°	31°59.4'	-46.8'	135.5°	31°16.5'	-47.3'	135.9°	30°33.2'	-47.8'	136.3°	29°49.7'	-48.3'	136.7°	29°05.9'	-48.8'	137.1°	15
16	32°38.6'	-46.0'	135.3°	31°55.8'	-46.5'	135.8°	31°12.6'	-47.0'	136.2°	30°29.2'	-47.5'	136.6°	29°45.4'	-48.0'	137.0°	29°01.4'	-48.5'	137.4°	28°17.1'	-49.0'	137.8°	16
17	31°52.7'	-46.2'	136.1°	31°09.3'	-46.8'	136.5°	30°25.6'	-47.3'	136.9°	29°41.6'	-47.8'	137.3°	28°57.4'	-48.2'	137.7°	28°12.8'	-48.7'	138.1°	27°28.1'	-49.2'	138.4°	17
18	31°06.4'	-46.5'	136.9°	30°22.5'	-47.0'	137.3°	29°38.3'	-47.5'	137.6°	28°53.8'	-48.0'	138.0°	28°09.1'	-48.4'	138.4°	27°24.1'	-48.9'	138.7°	26°38.9'	-49.3'	139.1°	18
19	30°20.0'	-46.7'	137.6°	29°35.5'	-47.2'	138.0°	28°50.8'	-47.7'	138.3°	28°05.9'	-48.2'	138.7°	27°20.7'	-48.6'	139.1°	26°35.2'	-49.1'	139.4°	25°49.6'	-49.5'	139.7°	19
20	29°33.2'	-47.0'	138.3°	28°48.3'	-47.4'	138.7°	28°03.1'	-47.9'	139.0°	27°17.7'	-48.4'	139.4°	26°32.0'	-48.8'	139.7°	25°46.2'	-49.2'	140.0°	25°00.1'	-49.7'	140.3°	20
21	28°46.3'	-47.2'	139.0°	28°00.9'	-47.6'	139.4°	27°15.2'	-48.1'	139.7°	26°29.3'	-48.6'	140.0°	25°43.2'	-49.0'	140.4°	24°56.9'	-49.4'	140.7°	24°10.4'	-49.8'	140.9°	21
22	27°59.1'	-47.4'	139.7°	27°13.2'	-47.8'	140.1°	26°27.1'	-48.3'	140.4°	25°40.8'	-48.7'	140.7°	24°54.2'	-49.1'	141.0°	24°07.5'	-49.5'	141.3°	23°20.6'	-49.9'	141.6°	22
23	27°11.7'	-47.6'	140.4°	26°25.4'	-48.0'	140.7°	25°38.8'	-48.5'	141.0°	24°52.0'	-48.9'	141.3°	24°05.1'	-49.3'	141.6°	23°18.0'	-49.7'	141.9°	22°30.7'	-50.1'	142.2°	23
Dec°	28			29			30			31			32			33			34			Dec°

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°50.5'	-40.0'	121.9°	44°18.4'	-40.9'	122.8°	43°45.6'	-41.8'	123.6°	43°12.1'	-42.6'	124.4°	42°37.9'	-43.4'	125.1°	42°03.1'	-44.2'	125.9°	41°27.6'	-45.0'	126.6°	0
1	44°10.5'	-40.6'	123.0°	43°37.5'	-41.4'	123.8°	43°03.8'	-42.3'	124.6°	42°29.4'	-43.1'	125.3°	41°54.4'	-43.9'	126.0°	41°18.8'	-44.6'	126.8°	40°42.6'	-45.4'	127.5°	1
2	43°29.9'	-41.1'	124.0°	42°56.0'	-42.0'	124.8°	42°21.5'	-42.8'	125.5°	41°46.3'	-43.6'	126.2°	41°10.6'	-44.3'	127.0°	40°34.2'	-45.0'	127.6°	39°57.3'	-45.7'	128.3°	2
3	42°48.8'	-41.6'	125.0°	42°14.1'	-42.4'	125.7°	41°38.7'	-43.2'	126.5°	41°02.8'	-44.0'	127.2°	40°26.3'	-44.7'	127.8°	39°49.2'	-45.4'	128.5°	39°11.5'	-46.1'	129.2°	3
4	42°07.2'	-42.1'	126.0°	41°31.7'	-42.9'	126.7°	40°55.5'	-43.7'	127.4°	40°18.8'	-44.4'	128.1°	39°41.5'	-45.1'	128.7°	39°03.8'	-45.8'	129.4°	38°25.5'	-46.4'	130.0°	4
5	41°25.1'	-42.6'	126.9°	40°48.8'	-43.3'	127.6°	40°11.9'	-44.1'	128.3°	39°34.4'	-44.8'	128.9°	38°56.5'	-45.5'	129.6°	38°18.0'	-46.1'	130.2°	37°39.0'	-46.7'	130.8°	5
6	40°42.5'	-43.0'	127.9°	40°05.4'	-43.7'	128.5°	39°27.8'	-44.5'	129.2°	38°49.7'	-45.1'	129.8°	38°11.0'	-45.8'	130.4°	37°31.9'	-46.4'	131.0°	36°52.3'	-47.1'	131.6°	6
7	39°59.5'	-43.4'	128.8°	39°21.7'	-44.1'	129.4°	38°43.3'	-44.8'	130.0°	38°04.5'	-45.5'	130.6°	37°25.2'	-46.1'	131.2°	36°45.4'	-46.7'	131.8°	36°05.2'	-47.3'	132.3°	7
8	39°16.1'	-43.8'	129.7°	38°37.6'	-44.5'	130.3°	37°58.5'	-45.2'	130.9°	37°19.0'	-45.8'	131.5°	36°39.1'	-46.4'	132.0°	35°58.7'	-47.0'	132.6°	35°17.9'	-47.6'	133.1°	8
9	38°32.3'	-44.2'	130.5°	37°53.0'	-44.9'	131.1°	37°13.3'	-45.5'	131.7°	36°33.2'	-46.2'	132.3°	35°52.6'	-46.8'	132.8°	35°11.6'	-47.3'	133.3°	34°30.3'	-47.9'	133.8°	9
10	37°48.0'	-44.6'	131.4°	37°08.1'	-45.2'	132.0°	36°27.8'	-45.9'	132.5°	35°47.0'	-46.5'	133.1°	35°05.9'	-47.0'	133.6°	34°24.3'	-47.6'	134.1°	33°42.4'	-48.1'	134.6°	10
11	37°03.5'	-44.9'	132.2°	36°22.9'	-45.6'	132.8°	35°41.9'	-46.2'	133.3°	35°00.6'	-46.7'	133.8°	34°18.8'	-47.3'	134.3°	33°36.7'	-47.9'	134.8°	32°54.2'	-48.4'	135.3°	11
12	36°18.5'	-45.3'	133.1°	35°37.3'	-45.9'	133.6°	34°55.8'	-46.5'	134.1°	34°13.8'	-47.0'	134.6°	33°31.5'	-47.6'	135.1°	32°48.9'	-48.1'	135.5°	32°05.9'	-48.6'	136.0°	12
13	35°33.2'	-45.6'	133.9°	34°51.5'	-46.2'	134.4°	34°09.3'	-46.7'	134.9°	33°26.8'	-47.3'	135.4°	32°43.9'	-47.8'	135.8°	32°00.8'	-48.3'	136.2°	31°17.3'	-48.8'	136.7°	13
14	34°47.7'	-45.9'	134.7°	34°05.3'	-46.5'	135.2°	33°22.6'	-47.0'	135.6°	32°39.5'	-47.5'	136.1°	31°56.1'	-48.1'	136.5°	31°12.4'	-48.5'	136.9°	30°28.5'	-49.0'	137.3°	14
15	34°01.8'	-46.2'	135.5°	33°18.8'	-46.7'	135.9°	32°35.6'	-47.3'	136.4°	31°52.0'	-47.8'	136.8°	31°08.1'	-48.3'	137.2°	30°23.9'	-48.8'	137.6°	29°39.4'	-49.2'	138.0°	15
16	33°15.6'	-46.5'	136.2°	32°32.1'	-47.0'	136.7°	31°48.3'	-47.5'	137.1°	31°04.2'	-48.0'	137.5°	30°19.8'	-48.5'	137.9°	29°35.1'	-49.0'	138.3°	28°50.2'	-49.4'	138.7°	16
17	32°29.1'	-46.7'	137.0°	31°45.1'	-47.2'	137.4°	31°00.8'	-47.7'	137.8°	30°16.2'	-48.2'	138.2°	29°31.3'	-48.7'	138.6°	28°46.2'	-49.1'	139.0°	28°00.8'	-49.6'	139.3°	17
18	31°42.4'	-47.0'	137.7°	30°57.8'	-47.5'	138.1°	30°13.0'	-48.0'	138.5°	29°27.9'	-48.4'	138.9°	28°42.6'	-48.9'	139.3°	27°57.0'	-49.3'	139.6°	27°11.2'	-49.8'	140.0°	18
19	30°55.4'	-47.2'	138.4°	30°10.4'	-47.7'	138.8°	29°25.1'	-48.2'	139.2°	28°39.5'	-48.6'	139.6°	27°53.7'	-49.1'	139.9°	27°07.7'	-49.5'	140.3°	26°21.5'	-49.9'	140.6°	19
20	30°08.2'	-47.5'	139.2°	29°22.7'	-47.9'	139.5°	28°36.9'	-48.4'	139.9°	27°50.9'	-48.8'	140.2°	27°04.6'	-49.3'	140.6°	26°18.2'	-49.7'	140.9°	25°31.5'	-50.1'	141.2°	20
21	29°20.7'	-47.7'	139.9°	28°34.7'	-48.1'	140.2°	27°48.5'	-48.6'	140.6°	27°02.1'	-49.0'	1										

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°35.2'	40.5'	122.9°	45°02.3'	41.4'	123.7°	44°28.7'	42.3'	124.5°	43°54.3'	43.1'	125.3°	43°19.3'	43.9'	126.1°	42°43.6'	44.7'	126.9°	42°07.3'	45.4'	127.6°	0
1	44°54.7'	41.1'	123.9°	44°20.9'	42.0'	124.7°	43°46.3'	42.8'	125.5°	43°11.2'	43.6'	126.3°	42°35.3'	44.4'	127.0°	41°58.9'	45.1'	127.8°	41°21.9'	45.8'	128.5°	1
2	44°13.6'	41.6'	124.9°	43°38.9'	42.5'	125.7°	43°03.5'	43.3'	126.5°	42°27.6'	44.0'	127.2°	41°51.0'	44.8'	127.9°	41°13.8'	45.5'	128.6°	40°36.0'	46.2'	129.3°	2
3	43°32.0'	42.1'	125.9°	42°56.4'	43.0'	126.7°	42°20.3'	43.7'	127.4°	41°43.5'	44.5'	128.1°	41°06.2'	45.2'	128.8°	40°28.3'	45.9'	129.5°	39°49.8'	46.5'	130.2°	3
4	42°49.8'	42.6'	126.9°	42°13.5'	43.4'	127.6°	41°36.5'	44.2'	128.4°	40°59.0'	44.9'	129.0°	40°21.0'	45.6'	129.7°	39°42.4'	46.2'	130.3°	39°03.3'	46.9'	131.0°	4
5	42°07.2'	43.1'	127.9°	41°30.1'	43.8'	128.6°	40°52.4'	44.6'	129.3°	40°14.2'	45.3'	129.9°	39°35.4'	45.9'	130.6°	38°56.1'	46.6'	131.2°	38°16.4'	47.2'	131.8°	5
6	41°24.1'	43.5'	128.8°	40°46.2'	44.3'	129.5°	40°07.8'	45.0'	130.1°	39°28.9'	45.6'	130.8°	38°49.5'	46.3'	131.4°	38°09.6'	46.9'	132.0°	37°29.2'	47.5'	132.5°	6
7	40°40.6'	44.0'	129.7°	40°02.0'	44.7'	130.4°	39°22.9'	45.3'	131.0°	38°43.3'	46.0'	131.6°	38°03.2'	46.6'	132.2°	37°22.7'	47.2'	132.8°	36°41.7'	47.8'	133.3°	7
8	39°56.6'	44.4'	130.6°	39°17.3'	45.0'	131.2°	38°37.5'	45.7'	131.8°	37°57.3'	46.3'	132.4°	37°16.6'	46.9'	133.0°	36°35.5'	47.5'	133.5°	35°53.9'	48.1'	134.1°	8
9	39°12.2'	44.7'	131.5°	38°32.3'	45.4'	132.1°	37°51.8'	46.0'	132.7°	37°10.9'	46.6'	133.2°	36°29.6'	47.2'	133.8°	35°47.9'	47.8'	134.3°	35°05.9'	48.3'	134.8°	9
10	38°27.5'	45.1'	132.3°	37°46.9'	45.7'	132.9°	37°05.8'	46.4'	133.5°	36°24.3'	46.9'	134.0°	35°42.4'	47.5'	134.5°	35°00.2'	48.0'	135.0°	34°17.5'	48.6'	135.5°	10
11	37°42.4'	45.5'	133.2°	37°01.1'	46.1'	133.7°	36°19.4'	46.7'	134.3°	35°37.4'	47.2'	134.8°	34°54.9'	47.8'	135.3°	34°12.1'	48.3'	135.8°	33°29.0'	48.8'	136.2°	11
12	36°56.9'	45.8'	134.0°	36°15.1'	46.4'	134.5°	35°32.8'	47.0'	135.0°	34°50.1'	47.5'	135.5°	34°07.2'	48.0'	136.0°	33°23.8'	48.5'	136.5°	32°40.1'	49.0'	136.9°	12
13	36°11.1'	46.1'	134.8°	35°28.7'	46.7'	135.3°	34°45.8'	47.2'	135.8°	34°02.6'	47.8'	136.3°	33°19.1'	48.3'	136.7°	32°35.3'	48.8'	137.2°	31°51.1'	49.2'	137.6°	13
14	35°25.0'	46.4'	135.6°	34°42.0'	47.0'	136.1°	33°58.6'	47.5'	136.5°	33°14.9'	48.0'	137.0°	32°30.8'	48.5'	137.4°	31°46.5'	49.0'	137.9°	31°01.9'	49.5'	138.3°	14
15	34°38.6'	46.7'	136.4°	33°55.0'	47.2'	136.8°	33°11.1'	47.8'	137.3°	32°26.9'	48.2'	137.7°	31°42.3'	48.7'	138.1°	30°57.5'	49.2'	138.5°	30°12.4'	49.6'	138.9°	15
16	33°51.9'	47.0'	137.1°	33°07.8'	47.5'	137.6°	32°23.4'	48.0'	138.0°	31°38.6'	48.5'	138.4°	30°53.6'	48.9'	138.8°	30°08.3'	49.4'	139.2°	29°22.8'	49.8'	139.6°	16
17	33°05.0'	47.2'	137.9°	32°20.3'	47.7'	138.3°	31°35.4'	48.2'	138.7°	30°50.1'	48.7'	139.1°	30°04.7'	49.1'	139.5°	29°18.9'	49.6'	139.9°	28°32.9'	50.0'	140.2°	17
18	32°17.7'	47.5'	138.6°	31°32.6'	48.0'	139.0°	30°47.1'	48.4'	139.4°	30°01.5'	48.9'	139.8°	29°15.5'	49.3'	140.2°	28°29.3'	49.8'	140.5°	27°42.9'	50.2'	140.8°	18
19	31°30.2'	47.7'	139.3°	30°44.6'	48.2'	139.7°	29°58.7'	48.6'	140.1°	29°12.6'	49.1'	140.5°	28°26.2'	49.5'	140.8°	27°39.6'	49.9'	141.1°	26°52.7'	50.3'	141.5°	19
20	30°42.5'	47.9'	140.0°	29°56.4'	48.4'	140.4°	29°10.1'	48.8'	140.8°	28°23.5'	49.3'	141.1°	27°36.7'	49.7'	141.4°	26°49.6'	50.1'	141.8°	26°02.4'	50.5'	142.1°	20
21	29°54.6'	48.2'	140.7°	29°08.0'	48.6'	141.1°	28°21.2'	49.0'	141.4°	27°34.2'	49.5'	141.8°	26°47.0'	49.9'	142.1°	25°59.5'	50.2'	142.4°	25°11.9'	50.6'	142.7°	21
22	29°06.4'	48.4'	141.4°	28°19.4'	48.8'	141.7°	27°32.2'	49.2'	142.1°	26°44.7'	49.6'	142.4°	25°57.1'	50.0'	142.7°	25°09.3'	50.4'	143.0°	24°21.3'	50.8'	143.3°	22
23	28°18.0'	48.6'	142.1°	27°30.6'	49.0'	142.4°	26°43.0'	49.4'	142.7°	25°55.1'	49.8'	143.0°	25°07.1'	50.2'	143.3°	24°18.9'	50.5'	143.6°	23°30.5'	50.9'	143.8°	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°19.4'	41.1'	123.8°	45°45.7'	42.0'	124.7°	45°11.2'	42.8'	125.5°	44°36.0'	43.6'	126.3°	44°00.1'	44.4'	127.1°	43°23.6'	45.2'	127.9°	42°46.4'	45.9'	128.6°	0
1	45°38.4'	41.6'	124.9°	45°03.7'	42.5'	125.7°	44°28.4'	43.3'	126.5°	43°52.3'	44.1'	127.3°	43°15.7'	44.9'	128.0°	42°38.4'	45.6'	128.8°	42°00.5'	46.3'	129.5°	1
2	44°56.7'	42.2'	125.9°	44°21.2'	43.0'	126.7°	43°45.1'	43.8'	127.5°	43°08.2'	44.6'	128.2°	42°30.8'	45.3'	129.0°	41°52.8'	46.0'	129.7°	41°14.2'	46.7'	130.3°	2
3	44°14.6'	42.7'	126.9°	43°38.2'	43.5'	127.7°	43°01.3'	44.2'	128.4°	42°23.7'	45.0'	129.1°	41°45.5'	45.7'	129.8°	41°06.8'	46.4'	130.5°	40°27.6'	47.0'	131.2°	3
4	43°31.9'	43.2'	127.9°	42°54.8'	43.9'	128.6°	42°17.0'	44.7'	129.3°	41°38.7'	45.4'	130.0°	40°59.8'	46.1'	130.7°	40°20.4'	46.7'	131.4°	39°40.6'	47.3'	132.0°	4
5	42°48.7'	43.6'	128.8°	42°10.8'	44.4'	129.5°	41°32.3'	45.1'	130.2°	40°53.3'	45.8'	130.9°	40°13.8'	46.4'	131.5°	39°33.7'	47.1'	132.2°	38°53.2'	47.7'	132.8°	5
6	42°05.1'	44.1'	129.8°	41°26.4'	44.8'	130.5°	40°47.3'	45.5'	131.1°	40°07.5'	46.1'	131.8°	39°27.3'	46.8'	132.4°	38°46.7'	47.4'	133.0°	38°05.6'	48.0'	133.5°	6
7	41°21.0'	44.5'	130.7°	40°41.7'	45.2'	131.3°	40°01.8'	45.8'	132.0°	39°21.4'	46.5'	132.6°	38°40.6'	47.1'	133.2°	37°59.3'	47.7'	133.8°	37°17.6'	48.2'	134.3°	7
8	40°36.5'	44.9'	131.6°	39°56.5'	45.6'	132.2°	39°15.9'	46.2'	132.8°	38°34.9'	46.8'	133.4°	37°53.5'	47.4'	134.0°	37°11.6'	48.0'	134.5°	36°29.4'	48.5'	135.0°	8
9	39°51.6'	45.3'	132.4°	39°10.9'	45.9'	133.0°	38°29.7'	46.5'	133.6°	37°48.1'	47.1'	134.2°	37°06.1'	47.7'	134.7°	36°23.7'	48.2'	135.3°	35°40.9'	48.8'	135.8°	9
10	39°06.4'	45.6'	133.3°	38°25.0'	46.3'	133.9°	37°43.2'	46.9'	134.4°	37°01.0'	47.4'	135.0°	36°18.4'	48.0'	135.5°	35°35.4'	48.5'	136.0°	34°52.1'	49.0'	136.5°	10
11	38°20.7'	46.0'	134.1°	37°38.7'	46.6'	134.7°	36°56.4'	47.2'	135.2°	36°13.6'	47.7'	135.7°	35°30.4'	48.2'	136.2°	34°46.9'	48.8'	136.7°	34°03.1'	49.2'	137.2°	11
12	37°34.7'	46.3'	134.9°	36°52.2'	46.9'	135.5°	36°09.2'	47.4'	136.0°	35°25.9'	48.0'	136.5°	34°42.2'	48.5'	137.0°	33°58.2'	49.0'	137.4°	33°13.8'	49.5'	137.9°	12
13	36°48.4'	46.6'	135.7°	36°05.3'	47.2'	136.2°	35°21.8'	47.7'	136.7°	34°37.9'	48.2'	137.2°	33°53.7'	48.7'	137.7°	33°09.2'	49.2'	138.1°	32°24.3'	49.7'	138.6°	13
14	36°01.8'	46.9'	136.5°	35°18.1'	47.5'	137.0°	34°34.0'	48.0'	137.5°	33°49.7'	48.5'	137.9°	33°05.0'	49.0'	138.4°	32°20.0'	49.4'	138.8°	31°34.7'	49.9'	139.2°	14
15	35°14.9'	47.2'	137.3°	34°30.6'	47.7'	137.8°	33°46.1'	48.2'	138.2°	33°01.2'	48.7'	138.6°	32°16.0'	49.2'	139.1°	31°30.5'	49.6'	139.5°	30°44.8'	50.1'	139.9°	15
16	34°27.7'	47.5'	138.0°	33°42.9'	48.0'	138.5°	32°57.8'	48.5'	138.9°	32°12.4'	48.9'	139.3°	31°26.8'	49.4'	139.7°	30°40.9'	49.8'	140.1°	29°54.7'	50.3'	140.5°	16
17	33°40.2'	47.7'	138.8°	32°54.9'	48.2'	139.2°	32°09.3'	48.7'	139.6°	31°23.5'	49.2'	140.0°	30°37.4'	49.6'	140.4°	29°51.0'	50.0'	140.8°	29°04.5'	50.4'	141.1°	17
18	32°52.4'	48.0'	139.5°	32°06.7'	48.5'	139.9°	31°20.6'	48.9'	140.3°	30°34.4'	49.4'	140.7°	29°47.8'	49.8'	141.1°	29°01.0'	50.2'	141.4°	28°14.0'	50.6'	141.7°	18
19	32°04.5'	48.2'	140.2°	31°18.2'	48.7'	140.6°	30°31.7'	49.1'	141.0°	29°45.0'	49.5'	141.3°	28°58.0'	50.0'	141.7°	28°10.8'	50.4'	142.0°	27°23.4'	50.7'	142.4°	19
20	31°16.2'	48.4'	140.9°	30°29.5'	48.9'	141.3°	29°42.6'	49.3'	141.6°	28°55.5'	49.7'	142.0°	28°08.1'	50.1'	142.3°							

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°03.2'	-41.6'	124.8°	46°28.6'	-42.5'	125.7°	45°53.2'	-43.4'	126.5°	45°17.1'	-44.2'	127.4°	44°40.4'	-44.9'	128.2°	44°03.0'	-45.7'	128.9°	43°25.0'	-46.4'	129.7°	0
1	46°21.6'	-42.2'	125.9°	45°46.1'	-43.0'	126.7°	45°09.9'	-43.9'	127.5°	44°33.0'	-44.6'	128.3°	43°55.5'	-45.4'	129.1°	43°17.3'	-46.1'	129.8°	42°38.6'	-46.8'	130.5°	1
2	45°39.4'	-42.7'	126.9°	45°03.0'	-43.5'	127.7°	44°26.0'	-44.3'	128.5°	43°48.3'	-45.1'	129.3°	43°10.1'	-45.8'	130.0°	42°31.2'	-46.5'	130.7°	41°51.9'	-47.1'	131.4°	2
3	44°56.7'	-43.2'	127.9°	44°19.5'	-44.0'	128.7°	43°41.7'	-44.8'	129.4°	43°03.3'	-45.5'	130.2°	42°24.3'	-46.2'	130.9°	41°44.8'	-46.8'	131.5°	41°04.7'	-47.5'	132.2°	3
4	44°13.4'	-43.7'	128.9°	43°35.5'	-44.5'	129.6°	42°56.9'	-45.2'	130.4°	42°17.8'	-45.9'	131.0°	41°38.1'	-46.6'	131.7°	40°57.9'	-47.2'	132.4°	40°17.2'	-47.8'	133.0°	4
5	43°29.7'	-44.2'	129.8°	42°51.0'	-44.9'	130.6°	42°11.7'	-45.6'	131.2°	41°31.9'	-46.3'	131.9°	40°51.6'	-46.9'	132.6°	40°10.7'	-47.5'	133.2°	39°29.4'	-48.1'	133.8°	5
6	42°45.5'	-44.6'	130.8°	42°06.1'	-45.3'	131.4°	41°26.1'	-46.0'	132.1°	40°45.6'	-46.6'	132.8°	40°04.6'	-47.3'	133.4°	39°23.2'	-47.8'	134.0°	38°41.3'	-48.4'	134.6°	6
7	42°00.9'	-45.0'	131.7°	41°20.8'	-45.7'	132.3°	40°40.1'	-46.4'	133.0°	39°59.0'	-47.0'	133.6°	39°17.4'	-47.6'	134.2°	38°35.4'	-48.1'	134.8°	37°52.9'	-48.7'	135.3°	7
8	41°15.9'	-45.4'	132.5°	40°35.0'	-46.1'	133.2°	39°53.7'	-46.7'	133.8°	39°12.0'	-47.3'	134.4°	38°29.8'	-47.9'	135.0°	37°47.2'	-48.4'	135.5°	37°04.2'	-49.0'	136.1°	8
9	40°30.4'	-45.8'	133.4°	39°49.0'	-46.4'	134.0°	39°07.0'	-47.0'	134.6°	38°24.7'	-47.6'	135.2°	37°41.9'	-48.2'	135.7°	36°58.8'	-48.7'	136.3°	36°15.2'	-49.2'	136.8°	9
10	39°44.6'	-46.2'	134.3°	39°02.5'	-46.8'	134.8°	38°20.0'	-47.4'	135.4°	37°37.1'	-47.9'	136.0°	36°53.8'	-48.4'	136.5°	36°10.1'	-49.0'	137.0°	35°26.0'	-49.5'	137.5°	10
11	38°58.4'	-46.5'	135.1°	38°15.7'	-47.1'	135.6°	37°32.6'	-47.7'	136.2°	36°49.2'	-48.2'	136.7°	36°05.3'	-48.7'	137.2°	35°21.1'	-49.2'	137.7°	34°36.6'	-49.7'	138.2°	11
12	38°11.9'	-46.8'	135.9°	37°28.7'	-47.4'	136.4°	36°45.0'	-47.9'	136.9°	36°01.0'	-48.5'	137.4°	35°16.6'	-49.0'	137.9°	34°31.9'	-49.4'	138.4°	33°46.9'	-49.9'	138.8°	12
13	37°25.1'	-47.1'	136.7°	36°41.2'	-47.7'	137.2°	35°57.0'	-48.2'	137.7°	35°12.5'	-48.7'	138.2°	34°27.6'	-49.2'	138.6°	33°42.4'	-49.7'	139.1°	32°57.0'	-50.1'	139.5°	13
14	36°37.9'	-47.4'	137.5°	35°53.6'	-48.0'	138.0°	35°08.8'	-48.5'	138.4°	34°23.8'	-49.0'	138.9°	33°38.4'	-49.4'	139.3°	32°52.8'	-49.9'	139.8°	32°06.8'	-50.3'	140.2°	14
15	35°50.5'	-47.7'	138.2°	35°05.6'	-48.2'	138.7°	34°20.4'	-48.7'	139.1°	33°34.8'	-49.2'	139.6°	32°49.0'	-49.6'	140.0°	32°02.9'	-50.1'	140.4°	31°16.5'	-50.5'	140.8°	15
16	35°02.8'	-48.0'	139.0°	34°17.4'	-48.5'	139.4°	33°31.6'	-49.0'	139.8°	32°45.6'	-49.4'	140.3°	31°59.4'	-49.8'	140.7°	31°12.8'	-50.3'	141.1°	30°26.0'	-50.7'	141.4°	16
17	34°14.8'	-48.2'	139.7°	33°28.9'	-48.7'	140.1°	32°42.7'	-49.2'	140.5°	31°56.2'	-49.6'	140.9°	31°09.5'	-50.0'	141.3°	30°22.6'	-50.4'	141.7°	29°35.4'	-50.8'	142.1°	17
18	33°26.5'	-48.5'	140.4°	32°40.2'	-48.9'	140.8°	31°53.5'	-49.4'	141.2°	31°06.6'	-49.8'	141.6°	30°19.5'	-50.2'	142.0°	29°32.1'	-50.6'	142.3°	28°44.5'	-51.0'	142.7°	18
19	32°38.0'	-48.7'	141.1°	31°51.2'	-49.2'	141.5°	31°04.1'	-49.6'	141.9°	30°16.8'	-50.0'	142.2°	29°29.3'	-50.4'	142.6°	28°41.5'	-50.8'	142.9°	27°53.5'	-51.2'	143.3°	19
20	31°49.3'	-48.9'	141.8°	31°02.1'	-49.4'	142.2°	30°14.5'	-49.8'	142.5°	29°26.8'	-50.2'	142.9°	28°38.9'	-50.6'	143.2°	27°50.7'	-50.9'	143.5°	27°02.3'	-51.3'	143.8°	20
21	31°00.4'	-49.1'	142.5°	30°12.7'	-49.6'	142.8°	29°24.8'	-50.0'	143.2°	28°36.6'	-50.4'	143.5°	27°48.3'	-50.7'	143.8°	26°59.8'	-51.1'	144.1°	26°11.0'	-51.4'	144.4°	21
22	30°11.2'	-49.3'	143.1°	29°23.1'	-49.7'	143.5°	28°34.8'	-50.1'	143.8°	27°46.3'	-50.5'	144.1°	26°57.6'	-50.9'	144.4°	26°08.7'	-51.2'	144.7°	25°19.6'	-51.6'	145.0°	22
23	29°21.9'	-49.5'	143.8°	28°33.4'	-49.9'	144.1°	27°44.7'	-50.3'	144.4°	26°55.8'	-50.7'	144.7°	26°06.7'	-51.0'	145.0°	25°17.4'	-51.4'	145.3°	24°28.0'	-51.7'	145.6°	23
Dec°	28			29			30			31			32			33			34			Dec°

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°46.4'	-42.2'	125.9°	47°10.9'	-43.1'	126.7°	46°34.7'	-43.9'	127.6°	45°57.7'	-44.7'	128.4°	45°20.1'	-45.5'	129.2°	44°41.9'	-46.2'	130.0°	44°03.0'	-46.9'	130.7°	0
1	47°04.2'	-42.8'	126.9°	46°27.9'	-43.6'	127.8°	45°50.8'	-44.4'	128.6°	45°13.0'	-45.2'	129.4°	44°34.7'	-45.9'	130.1°	43°55.7'	-46.6'	130.9°	43°16.1'	-47.3'	131.6°	1
2	46°21.4'	-43.3'	127.9°	45°44.3'	-44.1'	128.8°	45°06.4'	-44.9'	129.5°	44°27.9'	-45.6'	130.3°	43°48.8'	-46.3'	131.0°	43°09.1'	-47.0'	131.7°	42°28.9'	-47.6'	132.4°	2
3	45°38.2'	-43.8'	128.9°	45°00.2'	-44.6'	129.7°	44°21.5'	-45.3'	130.5°	43°42.3'	-46.0'	131.2°	43°02.5'	-46.7'	131.9°	42°22.1'	-47.3'	132.6°	41°41.3'	-48.0'	133.3°	3
4	44°54.4'	-44.3'	129.9°	44°15.6'	-45.0'	130.7°	43°36.2'	-45.7'	131.4°	42°56.3'	-46.4'	132.1°	42°15.8'	-47.1'	132.8°	41°34.8'	-47.7'	133.4°	40°53.3'	-48.3'	134.1°	4
5	44°10.1'	-44.7'	130.9°	43°30.6'	-45.5'	131.6°	42°50.5'	-46.1'	132.3°	42°09.8'	-46.8'	132.9°	41°28.7'	-47.4'	133.6°	40°47.1'	-48.0'	134.2°	40°05.0'	-48.6'	134.8°	5
6	43°25.3'	-45.2'	131.8°	42°45.1'	-45.9'	132.5°	42°04.3'	-46.5'	133.1°	41°23.1'	-47.1'	133.8°	40°41.3'	-47.7'	134.4°	39°59.1'	-48.3'	135.0°	39°16.4'	-48.9'	135.6°	6
7	42°40.2'	-45.6'	132.7°	41°59.2'	-46.2'	133.3°	41°17.8'	-46.9'	134.0°	40°35.9'	-47.5'	134.6°	39°53.6'	-48.1'	135.2°	39°10.8'	-48.6'	135.8°	38°27.6'	-49.2'	136.3°	7
8	41°54.6'	-46.0'	133.6°	41°13.0'	-46.6'	134.2°	40°30.9'	-47.2'	134.8°	39°48.4'	-47.8'	135.4°	39°05.5'	-48.4'	136.0°	38°22.1'	-48.9'	136.5°	37°38.4'	-49.4'	137.1°	8
9	41°08.6'	-46.4'	134.4°	40°26.4'	-47.0'	135.0°	39°43.7'	-47.6'	135.6°	39°00.6'	-48.1'	136.2°	38°17.1'	-48.7'	136.7°	37°33.2'	-49.2'	137.3°	36°49.0'	-49.7'	137.8°	9
10	40°22.2'	-46.7'	135.3°	39°39.4'	-47.3'	135.8°	38°56.2'	-47.9'	136.4°	38°12.5'	-48.4'	137.0°	37°28.5'	-48.9'	137.5°	36°44.1'	-49.4'	138.0°	35°59.3'	-49.9'	138.5°	10
11	39°35.5'	-47.0'	136.1°	38°52.1'	-47.6'	136.6°	38°08.3'	-48.2'	137.2°	37°24.1'	-48.7'	137.7°	36°39.5'	-49.2'	138.2°	35°54.6'	-49.7'	138.7°	35°09.4'	-50.1'	139.2°	11
12	38°48.5'	-47.4'	136.9°	38°04.5'	-47.9'	137.4°	37°20.1'	-48.4'	137.9°	36°35.4'	-48.9'	138.4°	35°50.4'	-49.4'	138.9°	35°05.0'	-49.9'	139.4°	34°19.3'	-50.3'	139.8°	12
13	38°01.1'	-47.7'	137.7°	37°16.6'	-48.2'	138.2°	36°31.7'	-48.7'	138.7°	35°46.5'	-49.2'	139.1°	35°00.9'	-49.7'	139.6°	34°15.1'	-50.1'	140.1°	33°28.9'	-50.5'	140.5°	13
14	37°13.4'	-48.0'	138.4°	36°28.4'	-48.5'	138.9°	35°43.0'	-49.0'	139.4°	34°57.3'	-49.4'	139.9°	34°11.3'	-49.9'	140.3°	33°25.0'	-50.3'	140.7°	32°38.4'	-50.7'	141.1°	14
15	36°25.5'	-48.2'	139.2°	35°39.9'	-48.7'	139.6°	34°54.0'	-49.2'	140.1°	34°07.8'	-49.7'	140.5°	33°21.4'	-50.1'	141.0°	32°34.6'	-50.5'	141.4°	31°47.6'	-50.9'	141.8°	15
16	35°37.2'	-48.5'	139.9°	34°51.2'	-49.0'	140.4°	34°04.8'	-49.4'	140.8°	33°18.2'	-49.9'	141.2°	32°31.3'	-50.3'	141.6°	31°44.1'	-50.7'	142.0°	30°56.7'	-51.1'	142.4°	16
17	34°48.7'	-48.8'	140.6°	34°02.2'	-49.2'	141.1°	33°15.4'	-49.7'	141.5°	32°28.3'	-50.1'	141.9°	31°41.0'	-50.5'	142.3°	30°53.4'	-50.9'	142.6°	30°05.6'	-51.3'	143.0°	17
18	33°60.0'	-49.0'	141.3°	33°13.0'	-49.4'	141.7°	32°25.7'	-49.9'	142.1°	31°38.2'	-50.3'	142.5°	30°50.5'	-50.7'	142.9°	30°02.5'	-51.1'	143.2°	29°14.4'	-51.4'	143.6°	18
19	33°11.0'	-49.2'	142.0°	32°23.5'	-49.6'	142.4°	31°35.9'	-50.1'	142.8°	30°48.0'	-50.5'	143.2°	29°59.8'	-50.8'	143.5°	29°11.5'	-51.2'	143.9°	28°22.9'	-51.6'	144.2°	19
20	32°21.8'	-49.4'	142.7°	31°33.9'	-49.8'	143.1°	30°45.8'	-50.2'	143.4°	29°57.5'	-50.6'	143.8°	29°09.0'	-51.0'	144.1°	28°20.3'	-51.4'	144.4°	27°31.4'	-51.7'	144.8°	20
21	31°32.3'	-49.6'	143.4°	30°44.1'	-50.0'	143.7°	29°55.6'	-50.4'	144.1°	29°06.9'	-50.8'	1										

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°29.0'	-42.8'	126.9°	47°52.7'	-43.6'	127.8°	47°15.6'	-44.5'	128.7°	46°37.7'	-45.2'	129.5°	45°59.2'	-46.0'	130.3°	45°20.1'	-46.7'	131.1°	44°40.4'	-47.4'	131.8°	0
1	47°46.3'	-43.3'	128.0°	47°09.0'	-44.2'	128.8°	46°31.1'	-44.9'	129.6°	45°52.5'	-45.7'	130.4°	45°13.3'	-46.4'	131.2°	44°33.4'	-47.1'	132.0°	43°53.0'	-47.7'	132.7°	1
2	47°02.9'	-43.9'	129.0°	46°24.9'	-44.7'	129.8°	45°46.1'	-45.4'	130.6°	45°06.8'	-46.1'	131.4°	44°26.8'	-46.8'	132.1°	43°46.3'	-47.5'	132.8°	43°05.3'	-48.1'	133.5°	2
3	46°19.1'	-44.4'	130.0°	45°40.2'	-45.1'	130.8°	45°00.7'	-45.9'	131.5°	44°20.7'	-46.5'	132.3°	43°40.0'	-47.2'	133.0°	42°58.9'	-47.8'	133.7°	42°17.2'	-48.4'	134.3°	3
4	45°34.7'	-44.9'	131.0°	44°55.1'	-45.6'	131.7°	44°14.9'	-46.3'	132.4°	43°34.1'	-46.9'	133.1°	42°52.8'	-47.6'	133.8°	42°11.0'	-48.2'	134.5°	41°28.7'	-48.8'	135.1°	4
5	44°49.8'	-45.3'	131.9°	44°09.5'	-46.0'	132.6°	43°28.6'	-46.7'	133.3°	42°47.2'	-47.3'	134.0°	42°05.2'	-47.9'	134.7°	41°22.8'	-48.5'	135.3°	40°40.0'	-49.1'	135.9°	5
6	44°04.5'	-45.7'	132.8°	43°23.5'	-46.4'	133.5°	42°41.9'	-47.0'	134.2°	41°59.9'	-47.7'	134.8°	41°17.3'	-48.2'	135.5°	40°34.3'	-48.8'	136.1°	39°50.9'	-49.3'	136.7°	6
7	43°18.8'	-46.2'	133.7°	42°37.1'	-46.8'	134.4°	41°54.9'	-47.4'	135.0°	41°12.2'	-48.0'	135.6°	40°29.1'	-48.6'	136.2°	39°45.5'	-49.1'	136.8°	39°01.6'	-49.6'	137.4°	7
8	42°32.6'	-46.5'	134.6°	41°50.3'	-47.2'	135.2°	41°07.5'	-47.7'	135.8°	40°24.2'	-48.3'	136.4°	39°40.5'	-48.9'	137.0°	38°56.4'	-49.4'	137.6°	38°11.9'	-49.9'	138.1°	8
9	41°46.1'	-46.9'	135.4°	41°03.1'	-47.5'	136.0°	40°19.7'	-48.1'	136.6°	39°35.9'	-48.6'	137.2°	38°51.7'	-49.1'	137.8°	38°07.1'	-49.6'	138.3°	37°22.1'	-50.1'	138.8°	9
10	40°59.2'	-47.3'	136.3°	40°15.6'	-47.8'	136.9°	39°31.7'	-48.4'	137.4°	38°47.3'	-48.9'	138.0°	38°02.5'	-49.4'	138.5°	37°17.4'	-49.9'	139.0°	36°32.0'	-50.4'	139.5°	10
11	40°11.9'	-47.6'	137.1°	39°27.8'	-48.1'	137.6°	38°43.3'	-48.7'	138.2°	37°58.4'	-49.2'	138.7°	37°13.1'	-49.7'	139.2°	36°27.5'	-50.1'	139.7°	35°41.6'	-50.6'	140.2°	11
12	39°24.4'	-47.9'	137.9°	38°39.7'	-48.4'	138.4°	37°54.6'	-48.9'	138.9°	37°09.2'	-49.4'	139.4°	36°23.5'	-49.9'	139.9°	35°37.4'	-50.3'	140.4°	34°51.0'	-50.8'	140.8°	12
13	38°36.5'	-48.2'	138.6°	37°51.2'	-48.7'	139.2°	37°05.7'	-49.2'	139.7°	36°19.8'	-49.7'	140.1°	35°33.6'	-50.1'	140.6°	34°47.1'	-50.6'	141.0°	34°00.3'	-51.0'	141.5°	13
14	37°48.3'	-48.5'	139.4°	37°02.5'	-49.0'	139.9°	36°16.5'	-49.5'	140.4°	35°30.1'	-49.9'	140.8°	34°43.4'	-50.3'	141.3°	33°56.5'	-50.8'	141.7°	33°09.3'	-51.2'	142.1°	14
15	36°59.8'	-48.8'	140.1°	36°13.5'	-49.2'	140.6°	35°27.0'	-49.7'	141.1°	34°40.2'	-50.1'	141.5°	33°53.1'	-50.5'	141.9°	33°05.7'	-51.0'	142.3°	32°18.1'	-51.3'	142.7°	15
16	36°11.0'	-49.0'	140.9°	35°24.3'	-49.5'	141.3°	34°37.3'	-49.9'	141.8°	33°50.1'	-50.3'	142.2°	33°02.5'	-50.7'	142.6°	32°14.8'	-51.1'	143.0°	31°26.8'	-51.5'	143.3°	16
17	35°22.0'	-49.3'	141.6°	34°34.8'	-49.7'	142.0°	33°47.4'	-50.1'	142.4°	32°59.7'	-50.5'	142.8°	32°11.8'	-50.9'	143.2°	31°23.6'	-51.3'	143.6°	30°35.2'	-51.7'	143.9°	17
18	34°32.7'	-49.5'	142.3°	33°45.1'	-49.9'	142.7°	32°57.3'	-50.3'	143.1°	32°09.2'	-50.7'	143.5°	31°20.9'	-51.1'	143.8°	30°32.3'	-51.5'	144.2°	29°43.6'	-51.8'	144.5°	18
19	33°43.2'	-49.7'	143.0°	32°55.2'	-50.1'	143.4°	32°07.0'	-50.5'	143.7°	31°18.5'	-50.9'	144.1°	30°29.8'	-51.3'	144.4°	29°40.8'	-51.6'	144.8°	28°51.7'	-52.0'	145.1°	19
20	32°53.5'	-49.9'	143.6°	32°05.1'	-50.3'	144.0°	31°16.4'	-50.7'	144.4°	30°27.6'	-51.1'	144.7°	29°38.5'	-51.4'	145.0°	28°49.2'	-51.8'	145.4°	27°59.8'	-52.1'	145.7°	20
21	32°03.6'	-50.1'	144.3°	31°14.8'	-50.5'	144.6°	30°25.7'	-50.9'	145.0°	29°36.5'	-51.2'	145.3°	28°47.1'	-51.6'	145.6°	27°57.4'	-51.9'	145.9°	27°07.6'	-52.2'	146.2°	21
22	31°13.5'	-50.3'	144.9°	30°24.3'	-50.7'	145.3°	29°34.8'	-51.0'	145.6°	28°45.2'	-51.4'	145.9°	27°55.5'	-51.7'	146.2°	27°05.5'	-52.1'	146.5°	26°15.4'	-52.4'	146.8°	22
23	30°23.1'	-50.5'	145.6°	29°33.6'	-50.9'	145.9°	28°43.8'	-51.2'	146.2°	27°53.8'	-51.5'	146.5°	27°03.7'	-51.9'	146.8°	26°13.5'	-52.2'	147.1°	25°23.0'	-52.5'	147.3°	23
Dec°	28			29			30			31			32			33			34			Dec°

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°11.1'	-43.4'	128.0°	48°33.8'	-44.2'	128.9°	47°55.8'	-45.0'	129.8°	47°17.1'	-45.8'	130.6°	46°37.7'	-46.5'	131.4°	45°57.7'	-47.2'	132.2°	45°17.1'	-47.9'	132.9°	0
1	48°27.7'	-43.9'	129.1°	47°49.6'	-44.7'	129.9°	47°10.8'	-45.5'	130.7°	46°31.3'	-46.2'	131.5°	45°51.2'	-46.9'	132.3°	45°10.5'	-47.6'	133.1°	44°29.3'	-48.2'	133.8°	1
2	47°43.8'	-44.5'	130.1°	47°04.9'	-45.2'	130.9°	46°25.3'	-46.0'	131.7°	45°45.1'	-46.7'	132.5°	45°04.3'	-47.3'	133.2°	44°22.9'	-48.0'	133.9°	43°41.0'	-48.6'	134.6°	2
3	46°59.4'	-45.0'	131.1°	46°19.6'	-45.7'	131.9°	45°39.3'	-46.4'	132.6°	44°58.4'	-47.1'	133.4°	44°16.9'	-47.7'	134.1°	43°34.9'	-48.3'	134.8°	42°52.4'	-48.9'	135.4°	3
4	46°14.4'	-45.4'	132.0°	45°33.9'	-46.1'	132.8°	44°52.9'	-46.8'	133.5°	44°11.3'	-47.5'	134.2°	43°29.2'	-48.1'	134.9°	42°46.6'	-48.7'	135.6°	42°03.5'	-49.2'	136.2°	4
5	45°29.0'	-45.9'	133.0°	44°47.8'	-46.6'	133.7°	44°06.1'	-47.2'	134.4°	43°23.8'	-47.8'	135.1°	42°41.1'	-48.4'	135.7°	41°57.9'	-49.0'	136.4°	41°14.3'	-49.5'	137.0°	5
6	44°43.1'	-46.3'	133.9°	44°01.2'	-47.0'	134.6°	43°18.8'	-47.6'	135.3°	42°36.0'	-48.2'	135.9°	41°52.7'	-48.8'	136.5°	41°08.9'	-49.3'	137.1°	40°24.7'	-49.8'	137.7°	6
7	43°56.8'	-46.7'	134.8°	43°14.2'	-47.3'	135.4°	42°31.3'	-47.9'	136.1°	41°47.8'	-48.5'	136.7°	41°03.9'	-49.1'	137.3°	40°19.6'	-49.6'	137.9°	39°34.9'	-50.1'	138.4°	7
8	43°10.0'	-47.1'	135.6°	42°26.9'	-47.7'	136.3°	41°43.3'	-48.3'	136.9°	40°59.3'	-48.8'	137.5°	40°14.9'	-49.3'	138.1°	39°30.0'	-49.9'	138.6°	38°44.8'	-50.3'	139.2°	8
9	42°22.9'	-47.5'	136.5°	41°39.2'	-48.0'	137.1°	40°55.1'	-48.6'	137.7°	40°10.5'	-49.1'	138.3°	39°25.5'	-49.6'	138.8°	38°40.2'	-50.1'	139.3°	37°54.5'	-50.6'	139.9°	9
10	41°35.5'	-47.8'	137.3°	40°51.2'	-48.4'	137.9°	40°06.5'	-48.9'	138.5°	39°21.4'	-49.4'	139.0°	38°35.9'	-49.9'	139.5°	37°50.1'	-50.4'	140.0°	37°03.9'	-50.8'	140.5°	10
11	40°47.7'	-48.1'	138.1°	40°02.8'	-48.7'	138.7°	39°17.6'	-49.2'	139.2°	38°32.0'	-49.7'	139.7°	37°46.0'	-50.1'	140.2°	36°59.7'	-50.6'	140.7°	36°13.1'	-51.0'	141.2°	11
12	39°59.5'	-48.4'	138.9°	39°14.2'	-49.0'	139.4°	38°28.4'	-49.4'	139.9°	37°42.3'	-49.9'	140.4°	36°55.9'	-50.4'	140.9°	36°09.1'	-50.8'	141.4°	35°22.1'	-51.2'	141.8°	12
13	39°11.1'	-48.7'	139.7°	38°25.2'	-49.2'	140.2°	37°39.0'	-49.7'	140.7°	36°52.4'	-50.2'	141.1°	36°05.5'	-50.6'	141.6°	35°18.3'	-51.0'	142.1°	34°30.9'	-51.4'	142.5°	13
14	38°22.4'	-49.0'	140.4°	37°36.0'	-49.5'	140.9°	36°49.3'	-49.9'	141.4°	36°02.2'	-50.4'	141.8°	35°14.9'	-50.8'	142.3°	34°27.3'	-51.2'	142.7°	33°39.5'	-51.6'	143.1°	14
15	37°33.4'	-49.3'	141.1°	36°46.5'	-49.7'	141.6°	35°59.3'	-50.2'	142.1°	35°11.9'	-50.6'	142.5°	34°24.1'	-51.0'	142.9°	33°36.1'	-51.4'	143.3°	32°47.9'	-51.8'	143.7°	15
16	36°44.1'	-49.5'	141.8°	35°56.8'	-50.0'	142.3°	35°09.1'	-50.4'	142.7°	34°21.3'	-50.8'	143.2°	33°33.1'	-51.2'	143.6°	32°44.7'	-51.6'	143.9°	31°56.1'	-51.9'	144.3°	16
17	35°54.6'	-49.8'	142.5°	35°06.8'	-50.2'	143.0°	34°18.8'	-50.6'	143.4°	33°30.5'	-51.0'	143.8°	32°41.9'	-51.4'	144.2°	31°53.2'	-51.7'	144.5°	31°04.2'	-52.1'	144.9°	17
18	35°04.8'	-50.0'	143.2°	34°16.6'	-50.4'	143.6°	33°28.1'	-50.8'	144.0°	32°39.5'	-51.2'	144.4°	31°50.6'	-51.5'	144.8°	31°01.4'	-51.9'	145.1°	30°12.1'	-52.2'	145.5°	18
19	34°14.8'	-50.2'	143.9°	33°26.2'	-50.6'	144.3°	32°37.3'	-51.0'	144.7°	31°48.3'	-51.4'	145.0°	30°59.0'	-51.7'	145.4°	30°09.5'	-52.1'	145.7°	29°19.9'	-52.4'	146.0°	19
20	33°24.6'	-50.4'	144.6°	32°35.6'	-50.8'	144.9°	31°46.4'	-51.2'	145.3°	30°56.9'	-51.5'	145.6°	30°07.3'	-51.9'	146.0°	29°17.5'	-52.2'	146.3°	28°27.5'	-52.5'	146.6°	20
21	32°34.2'	-50.6'	145.2°	31°44.8'	-51.0'	145.6°	30°55.2'	-51.3'	145.9°	30°05.4'	-51.7'	146.2°	29									

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°52.5'	44.0'	129.1°	49°14.4'	44.8'	130.0°	48°35.4'	45.6'	130.9°	47°55.8'	46.4'	131.7°	47°15.6'	47.1'	132.5°	46°34.7'	47.7'	133.3°	45°53.2'	48.4'	134.1°	0
1	49°08.5'	44.5'	130.2°	48°29.5'	45.3'	131.0°	47°49.8'	46.1'	131.9°	47°09.5'	46.8'	132.7°	46°28.5'	47.5'	133.5°	45°46.9'	48.1'	134.2°	45°04.8'	48.8'	134.9°	1
2	48°24.0'	45.1'	131.2°	47°44.2'	45.8'	132.0°	47°03.7'	46.5'	132.8°	46°22.7'	47.2'	133.6°	45°41.0'	47.9'	134.3°	44°58.8'	48.5'	135.1°	44°16.1'	49.1'	135.7°	2
3	47°39.0'	45.6'	132.2°	46°58.4'	46.3'	133.0°	46°17.2'	47.0'	133.7°	45°35.4'	47.6'	134.5°	44°53.1'	48.3'	135.2°	44°10.3'	48.8'	135.9°	43°27.0'	49.4'	136.5°	3
4	46°53.4'	46.0'	133.1°	46°12.1'	46.7'	133.9°	45°30.2'	47.4'	134.6°	44°47.8'	48.0'	135.3°	44°04.9'	48.6'	136.0°	43°21.5'	49.2'	136.7°	42°37.6'	49.7'	137.3°	4
5	46°07.4'	46.5'	134.1°	45°25.4'	47.1'	134.8°	44°42.8'	47.8'	135.5°	43°59.8'	48.4'	136.2°	43°16.3'	48.9'	136.8°	42°32.3'	49.5'	137.5°	41°47.8'	50.0'	138.1°	5
6	45°20.9'	46.9'	135.0°	44°38.2'	47.5'	135.7°	43°55.1'	48.1'	136.3°	43°11.4'	48.7'	137.0°	42°27.3'	49.3'	137.6°	41°42.8'	49.8'	138.2°	40°57.8'	50.3'	138.8°	6
7	44°34.0'	47.3'	135.8°	43°50.7'	47.9'	136.5°	43°06.9'	48.5'	137.2°	42°22.7'	49.0'	137.8°	41°38.1'	49.6'	138.4°	40°53.0'	50.1'	139.0°	40°07.5'	50.5'	139.5°	7
8	43°46.7'	47.7'	136.7°	43°02.8'	48.2'	137.3°	42°18.5'	48.8'	138.0°	41°33.7'	49.3'	138.6°	40°48.5'	49.8'	139.1°	40°02.9'	50.3'	139.7°	39°17.0'	50.8'	140.2°	8
9	42°59.1'	48.0'	137.5°	42°14.6'	48.6'	138.2°	41°29.7'	49.1'	138.8°	40°44.4'	49.6'	139.3°	39°58.7'	50.1'	139.9°	39°12.6'	50.6'	140.4°	38°26.2'	51.0'	140.9°	9
10	42°11.0'	48.4'	138.4°	41°26.0'	48.9'	138.9°	40°40.6'	49.4'	139.5°	39°54.7'	49.9'	140.1°	39°08.6'	50.4'	140.6°	38°22.0'	50.8'	141.1°	37°35.2'	51.2'	141.6°	10
11	41°22.7'	48.7'	139.1°	40°37.1'	49.2'	139.7°	39°51.2'	49.7'	140.3°	39°04.8'	50.2'	140.8°	38°18.2'	50.6'	141.3°	37°31.2'	51.0'	141.8°	36°43.9'	51.5'	142.2°	11
12	40°34.0'	49.0'	139.9°	39°47.9'	49.5'	140.5°	39°01.5'	49.9'	141.0°	38°14.7'	50.4'	141.5°	37°27.6'	50.8'	142.0°	36°40.2'	51.3'	142.4°	35°52.5'	51.7'	142.9°	12
13	39°45.0'	49.3'	140.7°	38°58.5'	49.7'	141.2°	38°11.5'	50.2'	141.7°	37°24.3'	50.6'	142.2°	36°36.8'	51.1'	142.6°	35°48.9'	51.5'	143.1°	35°00.8'	51.8'	143.5°	13
14	38°55.8'	49.5'	141.4°	38°08.7'	50.0'	141.9°	37°21.3'	50.4'	142.4°	36°33.7'	50.9'	142.8°	35°45.7'	51.3'	143.3°	34°57.5'	51.6'	143.7°	34°09.0'	52.0'	144.1°	14
15	38°06.2'	49.8'	142.1°	37°18.7'	50.2'	142.6°	36°30.9'	50.7'	143.1°	35°42.8'	51.1'	143.5°	34°54.4'	51.5'	143.9°	34°05.8'	51.8'	144.3°	33°17.0'	52.2'	144.7°	15
16	37°16.5'	50.0'	142.8°	36°28.5'	50.5'	143.3°	35°40.2'	50.9'	143.7°	34°51.7'	51.3'	144.1°	34°03.0'	51.6'	144.5°	33°14.0'	52.0'	144.9°	32°24.8'	52.3'	145.3°	16
17	36°26.4'	50.3'	143.5°	35°38.0'	50.7'	144.0°	34°49.4'	51.1'	144.4°	34°00.5'	51.5'	144.8°	33°11.4'	51.8'	145.2°	32°22.0'	52.2'	145.5°	31°32.4'	52.5'	145.9°	17
18	35°36.1'	50.5'	144.2°	34°47.3'	50.9'	144.6°	33°58.3'	51.3'	145.0°	33°09.0'	51.6'	145.4°	32°19.5'	52.0'	145.8°	31°29.8'	52.3'	146.1°	30°39.9'	52.6'	146.4°	18
19	34°45.6'	50.7'	144.9°	33°56.5'	51.1'	145.3°	33°07.0'	51.4'	145.6°	32°17.4'	51.8'	146.0°	31°27.6'	52.1'	146.3°	30°37.5'	52.5'	146.7°	29°47.3'	52.8'	147.0°	19
20	33°54.9'	50.9'	145.5°	33°05.4'	51.3'	145.9°	32°15.6'	51.6'	146.2°	31°25.6'	52.0'	146.6°	30°35.4'	52.3'	146.9°	29°45.1'	52.6'	147.2°	28°54.5'	52.9'	147.5°	20
21	33°04.0'	51.1'	146.2°	32°14.1'	51.4'	146.5°	31°24.0'	51.8'	146.8°	30°33.6'	52.1'	147.2°	29°43.1'	52.4'	147.5°	28°52.5'	52.7'	147.8°	28°01.6'	53.0'	148.1°	21
22	32°12.9'	51.3'	146.8°	31°22.7'	51.6'	147.1°	30°32.2'	51.9'	147.4°	29°41.5'	52.3'	147.7°	28°50.7'	52.6'	148.0°	27°59.7'	52.9'	148.3°	27°08.6'	53.2'	148.6°	22
23	31°21.7'	51.4'	147.4°	30°31.0'	51.8'	147.7°	29°40.2'	52.1'	148.0°	28°49.3'	52.4'	148.3°	27°58.1'	52.7'	148.6°	27°06.8'	53.0'	148.9°	26°15.4'	53.3'	149.1°	23
Dec°	28			29			30			31			32			33			34			Dec°

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°33.3'	44.6'	130.3°	49°54.2'	45.4'	131.2°	49°14.4'	46.2'	132.1°	48°33.8'	46.9'	132.9°	47°52.7'	47.6'	133.7°	47°10.9'	48.3'	134.5°	46°28.6'	48.9'	135.3°	0
1	49°48.7'	45.2'	131.3°	49°08.8'	45.9'	132.2°	48°28.2'	46.7'	133.0°	47°46.9'	47.4'	133.8°	47°05.1'	48.0'	134.6°	46°22.6'	48.7'	135.4°	45°39.7'	49.3'	136.1°	1
2	49°03.5'	45.7'	132.3°	48°22.8'	46.4'	133.2°	47°41.5'	47.1'	134.0°	46°59.5'	47.8'	134.7°	46°17.0'	48.4'	135.5°	45°34.0'	49.0'	136.2°	44°50.4'	49.6'	136.9°	2
3	48°17.9'	46.2'	133.3°	47°36.4'	46.9'	134.1°	46°54.4'	47.5'	134.9°	46°11.8'	48.2'	135.6°	45°28.6'	48.8'	136.3°	44°45.0'	49.4'	137.0°	44°00.8'	49.9'	137.7°	3
4	47°31.7'	46.6'	134.3°	46°49.6'	47.3'	135.0°	46°06.8'	47.9'	135.8°	45°23.6'	48.5'	136.5°	44°39.8'	49.1'	137.2°	43°55.6'	49.7'	137.8°	43°10.9'	50.2'	138.5°	4
5	46°45.1'	47.1'	135.2°	46°02.3'	47.7'	135.9°	45°18.9'	48.3'	136.6°	44°35.0'	48.9'	137.3°	43°50.7'	49.5'	138.0°	43°05.9'	50.0'	138.6°	42°20.7'	50.5'	139.2°	5
6	45°58.0'	47.5'	136.1°	45°14.5'	48.1'	136.8°	44°30.6'	48.7'	137.5°	43°46.1'	49.3'	138.1°	43°01.3'	49.8'	138.7°	42°15.9'	50.3'	139.3°	41°30.2'	50.8'	139.9°	6
7	45°10.5'	47.9'	137.0°	44°26.5'	48.5'	137.6°	43°41.9'	49.0'	138.3°	42°56.9'	49.5'	138.9°	42°11.5'	50.1'	139.5°	41°25.7'	50.5'	140.1°	40°39.5'	51.0'	140.6°	7
8	44°22.7'	48.2'	137.8°	43°38.0'	48.8'	138.4°	42°52.9'	49.3'	139.1°	42°07.4'	49.8'	139.7°	41°21.4'	50.3'	140.2°	40°35.1'	50.8'	140.8°	39°48.5'	51.2'	141.3°	8
9	43°34.5'	48.6'	138.6°	42°49.2'	49.1'	139.2°	42°03.6'	49.6'	139.8°	41°17.5'	50.1'	140.4°	40°31.1'	50.6'	141.0°	39°44.3'	51.0'	141.5°	38°57.2'	51.5'	142.0°	9
10	42°45.9'	48.9'	139.4°	42°00.1'	49.4'	140.0°	41°13.9'	49.9'	140.6°	40°27.4'	50.4'	141.1°	39°40.5'	50.8'	141.7°	38°53.3'	51.3'	142.2°	38°05.7'	51.7'	142.7°	10
11	41°57.0'	49.2'	140.2°	41°10.7'	49.7'	140.8°	40°24.0'	50.2'	141.3°	39°37.0'	50.6'	141.8°	38°49.7'	51.1'	142.3°	38°02.0'	51.5'	142.8°	37°14.0'	51.9'	143.3°	11
12	41°07.8'	49.5'	141.0°	40°21.0'	50.0'	141.5°	39°33.8'	50.4'	142.0°	38°46.4'	50.9'	142.5°	37°58.6'	51.3'	143.0°	37°10.5'	51.7'	143.5°	36°22.1'	52.1'	143.9°	12
13	40°18.2'	49.8'	141.7°	39°31.0'	50.3'	142.2°	38°43.4'	50.7'	142.7°	37°55.5'	51.1'	143.2°	37°07.3'	51.5'	143.7°	36°18.8'	51.9'	144.1°	35°30.1'	52.3'	144.5°	13
14	39°28.4'	50.1'	142.5°	38°40.7'	50.5'	142.9°	37°52.7'	50.9'	143.4°	37°04.4'	51.3'	143.9°	36°15.8'	51.7'	144.3°	35°26.9'	52.1'	144.7°	34°37.8'	52.4'	145.1°	14
15	38°38.4'	50.3'	143.2°	37°50.2'	50.7'	143.6°	37°01.8'	51.1'	144.1°	36°13.0'	51.5'	144.5°	35°24.0'	51.9'	144.9°	34°34.8'	52.3'	145.3°	33°45.4'	52.6'	145.7°	15
16	37°48.1'	50.5'	143.9°	36°59.5'	51.0'	144.3°	36°10.6'	51.3'	144.7°	35°21.5'	51.7'	145.1°	34°32.1'	52.1'	145.5°	33°42.6'	52.4'	145.9°	32°52.8'	52.8'	146.3°	16
17	36°57.5'	50.8'	144.5°	36°08.5'	51.2'	145.0°	35°19.3'	51.5'	145.4°	34°29.8'	51.9'	145.8°	33°40.1'	52.3'	146.1°	32°50.1'	52.6'	146.5°	31°60.0'	52.9'	146.9°	17
18	36°06.7'	51.0'	145.2°	35°17.4'	51.4'	145.6°	34°27.7'	51.7'	146.0°	33°37.9'	52.1'	146.4°	32°47.8'	52.4'	146.7°	31°57.5'	52.7'	147.1°	31°07.1'	53.0'	147.4°	18
19	35°15.8'	51.2'	145.8°	34°26.0'	51.6'	146.2°	33°36.0'	51.9'	146.6°	32°45.8'	52.2'	147.0°	31°55.4'	52.6'	147.3°	31°04.8'	52.9'	147.6°	30°14.0'	53.2'	148.0°	19
20	34°24.6'	51.4'	146.5°	33°34.4'	51.7'	146.9°	32°44.1'	52.1'	147.2°	31°53.6'	52.4'	147.5°	31°02.8'	52.7'	147.9°	30°11.9'	53.0'	148.2°	29°20.9'	53.3'	148.5°	20
21	33°33.2'	51.6'	147.1°	32°42.7'	51.9'	147.5°	31°52.0'	52.2'	147.8°	31°01.2'	52.5'	1										

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°13.4'	-45.3'	131.4°	50°33.3'	-46.0'	132.4°	49°52.6'	-46.8'	133.2°	49°11.2'	-47.5'	134.1°	48°29.1'	-48.2'	134.9°	47°46.5'	-48.8'	135.7°	47°03.2'	-49.4'	136.4°	0
1	50°28.1'	-45.8'	132.5°	49°47.3'	-46.5'	133.4°	49°05.8'	-47.3'	134.2°	48°23.6'	-47.9'	135.0°	47°40.9'	-48.6'	135.8°	46°57.6'	-49.2'	136.5°	46°13.8'	-49.8'	137.3°	1
2	49°42.3'	-46.3'	133.5°	49°00.8'	-47.0'	134.3°	48°18.5'	-47.7'	135.1°	47°35.7'	-48.3'	135.9°	46°52.3'	-49.0'	136.7°	46°08.4'	-49.5'	137.4°	45°24.0'	-50.1'	138.1°	2
3	48°56.1'	-46.8'	134.5°	48°13.7'	-47.5'	135.3°	47°30.8'	-48.1'	136.0°	46°47.4'	-48.7'	136.8°	46°03.4'	-49.3'	137.5°	45°18.9'	-49.9'	138.2°	44°33.9'	-50.4'	138.8°	3
4	48°09.3'	-47.2'	135.4°	47°26.3'	-47.9'	136.2°	46°42.7'	-48.5'	136.9°	45°58.6'	-49.1'	137.6°	45°14.1'	-49.7'	138.3°	44°29.0'	-50.2'	139.0°	43°43.5'	-50.7'	139.6°	4
5	47°22.0'	-47.7'	136.3°	46°38.4'	-48.3'	137.1°	45°54.2'	-48.9'	137.8°	45°09.5'	-49.4'	138.5°	44°24.4'	-50.0'	139.1°	43°38.8'	-50.5'	139.7°	42°52.8'	-51.0'	140.3°	5
6	46°34.4'	-48.1'	137.2°	45°50.1'	-48.7'	137.9°	45°05.3'	-49.2'	138.6°	44°20.1'	-49.8'	139.2°	43°34.4'	-50.3'	139.9°	42°48.3'	-50.8'	140.5°	42°01.9'	-51.2'	141.1°	6
7	45°46.3'	-48.4'	138.1°	45°01.4'	-49.0'	138.8°	44°16.1'	-49.6'	139.4°	43°30.3'	-50.1'	140.0°	42°44.2'	-50.6'	140.6°	41°57.6'	-51.0'	141.2°	41°10.6'	-51.5'	141.8°	7
8	44°57.9'	-48.8'	138.9°	44°12.4'	-49.3'	139.6°	43°26.6'	-49.9'	140.2°	42°40.3'	-50.4'	140.8°	41°53.6'	-50.8'	141.4°	41°06.6'	-51.3'	141.9°	40°19.2'	-51.7'	142.4°	8
9	44°09.1'	-49.1'	139.7°	43°23.1'	-49.7'	140.4°	42°36.7'	-50.2'	140.9°	41°49.9'	-50.6'	141.5°	41°02.8'	-51.1'	142.1°	40°15.3'	-51.5'	142.6°	39°27.5'	-51.9'	143.1°	9
10	43°19.9'	-49.5'	140.5°	42°33.4'	-50.0'	141.1°	41°46.5'	-50.4'	141.7°	40°59.3'	-50.9'	142.2°	40°11.7'	-51.3'	142.8°	39°23.8'	-51.7'	143.3°	38°35.5'	-52.1'	143.7°	10
11	42°30.5'	-49.8'	141.3°	41°43.5'	-50.2'	141.9°	40°56.1'	-50.7'	142.4°	40°08.4'	-51.1'	142.9°	39°20.4'	-51.6'	143.4°	38°32.0'	-51.9'	143.9°	37°43.4'	-52.3'	144.4°	11
12	41°40.7'	-50.1'	142.1°	40°53.2'	-50.5'	142.6°	40°05.4'	-50.9'	143.1°	39°17.3'	-51.4'	143.6°	38°28.8'	-51.8'	144.1°	37°40.1'	-52.1'	144.5°	36°51.1'	-52.5'	145.0°	12
13	40°50.7'	-50.3'	142.8°	40°02.7'	-50.8'	143.3°	39°14.5'	-51.2'	143.8°	38°25.9'	-51.6'	144.3°	37°37.0'	-52.0'	144.7°	36°47.9'	-52.3'	145.2°	35°58.6'	-52.7'	145.6°	13
14	40°00.3'	-50.6'	143.5°	39°12.0'	-51.0'	144.0°	38°23.3'	-51.4'	144.5°	37°34.3'	-51.8'	144.9°	36°45.1'	-52.2'	145.4°	35°55.6'	-52.5'	145.8°	35°05.9'	-52.9'	146.2°	14
15	39°09.8'	-50.8'	144.2°	38°20.9'	-51.2'	144.7°	37°31.9'	-51.6'	145.1°	36°42.5'	-52.0'	145.6°	35°52.9'	-52.3'	146.0°	35°03.1'	-52.7'	146.4°	34°13.0'	-53.0'	146.7°	15
16	38°18.9'	-51.1'	144.9°	37°29.7'	-51.4'	145.3°	36°40.2'	-51.8'	145.8°	35°50.5'	-52.2'	146.2°	35°00.6'	-52.5'	146.6°	34°10.4'	-52.8'	146.9°	33°20.0'	-53.2'	147.3°	16
17	37°27.9'	-51.3'	145.6°	36°38.3'	-51.6'	146.0°	35°48.4'	-52.0'	146.4°	34°58.3'	-52.4'	146.8°	34°08.0'	-52.7'	147.2°	33°17.5'	-53.0'	147.5°	32°26.8'	-53.3'	147.9°	17
18	36°36.6'	-51.5'	146.2°	35°46.6'	-51.8'	146.6°	34°56.4'	-52.2'	147.0°	34°06.0'	-52.5'	147.4°	33°15.4'	-52.8'	147.7°	32°24.5'	-53.1'	148.1°	31°33.5'	-53.4'	148.4°	18
19	35°45.1'	-51.7'	146.8°	34°54.8'	-52.0'	147.2°	34°04.2'	-52.4'	147.6°	33°13.5'	-52.7'	148.0°	32°22.5'	-53.0'	148.3°	31°31.4'	-53.3'	148.6°	30°40.1'	-53.6'	148.9°	19
20	34°53.4'	-51.9'	147.5°	34°02.8'	-52.2'	147.8°	33°11.9'	-52.5'	148.2°	32°20.8'	-52.8'	148.5°	31°29.5'	-53.1'	148.8°	30°38.1'	-53.4'	149.2°	29°46.5'	-53.7'	149.5°	20
21	34°01.6'	-52.0'	148.1°	33°10.6'	-52.4'	148.4°	32°19.3'	-52.7'	148.8°	31°28.0'	-53.0'	149.1°	30°36.4'	-53.3'	149.4°	29°44.7'	-53.5'	149.7°	28°52.8'	-53.8'	150.0°	21
22	33°09.5'	-52.2'	148.7°	32°18.2'	-52.5'	149.0°	31°26.7'	-52.8'	149.3°	30°35.0'	-53.1'	149.6°	29°43.1'	-53.4'	149.9°	28°51.1'	-53.7'	150.2°	27°59.0'	-53.9'	150.5°	22
23	32°17.3'	-52.4'	149.3°	31°25.7'	-52.7'	149.6°	30°33.9'	-53.0'	149.9°	29°41.9'	-53.2'	150.2°	28°49.8'	-53.5'	150.4°	27°57.5'	-53.8'	150.7°	27°05.1'	-54.0'	151.0°	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°52.7'	-45.9'	132.7°	51°11.7'	-46.7'	133.6°	50°30.1'	-47.4'	134.5°	49°47.7'	-48.1'	135.3°	49°04.8'	-48.7'	136.1°	48°21.2'	-49.4'	136.9°	47°37.1'	-50.0'	137.7°	0
1	51°06.8'	-46.4'	133.7°	50°25.1'	-47.2'	134.6°	49°42.6'	-47.9'	135.4°	48°59.6'	-48.5'	136.2°	48°16.0'	-49.1'	137.0°	47°31.9'	-49.7'	137.8°	46°47.2'	-50.3'	138.5°	1
2	50°20.4'	-46.9'	134.7°	49°37.9'	-47.6'	135.5°	48°54.8'	-48.3'	136.3°	48°11.1'	-48.9'	137.1°	47°26.9'	-49.5'	137.9°	46°42.1'	-50.1'	138.6°	45°56.9'	-50.6'	139.3°	2
3	49°33.5'	-47.4'	135.7°	48°50.3'	-48.1'	136.5°	48°06.5'	-48.7'	137.2°	47°22.2'	-49.3'	138.0°	46°37.4'	-49.9'	138.7°	45°52.1'	-50.4'	139.4°	45°06.3'	-50.9'	140.0°	3
4	48°46.1'	-47.8'	136.6°	48°02.2'	-48.5'	137.4°	47°17.8'	-49.1'	138.1°	46°32.9'	-49.6'	138.8°	45°47.5'	-50.2'	139.5°	45°01.7'	-50.7'	140.1°	44°15.4'	-51.2'	140.8°	4
5	47°58.2'	-48.3'	137.5°	47°13.7'	-48.9'	138.2°	46°28.7'	-49.4'	138.9°	45°43.3'	-50.0'	139.6°	44°57.3'	-50.5'	140.3°	44°11.0'	-51.0'	140.9°	43°24.2'	-51.5'	141.5°	5
6	47°10.0'	-48.7'	138.4°	46°24.9'	-49.2'	139.1°	45°39.3'	-49.8'	139.8°	44°53.3'	-50.3'	140.4°	44°06.8'	-50.8'	141.0°	43°20.0'	-51.3'	141.6°	42°32.7'	-51.7'	142.2°	6
7	46°21.3'	-49.0'	139.2°	45°35.6'	-49.6'	139.9°	44°49.5'	-50.1'	140.6°	44°03.0'	-50.6'	141.2°	43°16.0'	-51.1'	141.8°	42°28.7'	-51.5'	142.3°	41°41.0'	-51.9'	142.9°	7
8	45°32.3'	-49.4'	140.1°	44°46.1'	-49.9'	140.7°	43°59.4'	-50.4'	141.3°	43°12.4'	-50.9'	141.9°	42°25.0'	-51.3'	142.5°	41°37.2'	-51.8'	143.0°	40°49.1'	-52.2'	143.6°	8
9	44°42.9'	-49.7'	140.9°	43°56.2'	-50.2'	141.5°	43°09.0'	-50.7'	142.1°	42°21.5'	-51.1'	142.6°	41°33.7'	-51.6'	143.2°	40°45.5'	-52.0'	143.7°	39°56.9'	-52.4'	144.2°	9
10	43°53.2'	-50.0'	141.7°	43°06.0'	-50.5'	142.2°	42°18.3'	-51.0'	142.8°	41°30.4'	-51.4'	143.3°	40°42.1'	-51.8'	143.9°	39°53.5'	-52.2'	144.4°	39°04.6'	-52.6'	144.8°	10
11	43°03.2'	-50.3'	142.4°	42°15.5'	-50.8'	143.0°	41°27.4'	-51.2'	143.5°	40°39.0'	-51.6'	144.0°	39°50.3'	-52.0'	144.5°	39°01.3'	-52.4'	145.0°	38°12.0'	-52.8'	145.5°	11
12	42°12.9'	-50.6'	143.2°	41°24.7'	-51.0'	143.7°	40°36.2'	-51.4'	144.2°	39°47.4'	-51.8'	144.7°	38°58.3'	-52.2'	145.2°	38°08.9'	-52.6'	145.6°	37°19.2'	-52.9'	146.1°	12
13	41°22.3'	-50.9'	143.9°	40°33.7'	-51.3'	144.4°	39°44.7'	-51.7'	144.9°	38°55.5'	-52.1'	145.3°	38°06.0'	-52.4'	145.8°	37°16.3'	-52.8'	146.2°	36°26.3'	-53.1'	146.6°	13
14	40°31.4'	-51.1'	144.6°	39°42.4'	-51.5'	145.1°	38°53.1'	-51.9'	145.5°	38°03.5'	-52.3'	146.0°	37°13.6'	-52.6'	146.4°	36°23.5'	-52.9'	146.8°	35°33.2'	-53.3'	147.2°	14
15	39°40.3'	-51.3'	145.3°	38°50.9'	-51.7'	145.7°	38°01.2'	-52.1'	146.2°	37°11.2'	-52.4'	146.6°	36°21.0'	-52.8'	147.0°	35°30.6'	-53.1'	147.4°	34°39.9'	-53.4'	147.8°	15
16	38°49.0'	-51.6'	145.9°	37°59.2'	-51.9'	146.4°	37°09.1'	-52.3'	146.8°	36°18.8'	-52.6'	147.2°	35°28.2'	-53.0'	147.6°	34°37.4'	-53.3'	148.0°	33°46.5'	-53.6'	148.3°	16
17	37°57.4'	-51.8'	146.6°	37°07.2'	-52.1'	147.0°	36°16.8'	-52.5'	147.4°	35°26.1'	-52.8'	147.8°	34°35.3'	-53.1'	148.2°	33°44.2'	-53.4'	148.5°	32°52.9'	-53.7'	148.9°	17
18	37°05.7'	-52.0'	147.2°	36°15.1'	-52.3'	147.6°	35°24.3'	-52.6'	148.0°	34°33.3'	-53.0'	148.4°	33°42.1'	-53.3'	148.7°	32°50.8'	-53.6'	149.1°	31°59.2'	-53.8'	149.4°	18
19	36°13.7'	-52.2'	147.9°	35°22.8'	-52.5'	148.2°	34°31.7'	-52.8'	148.6°	33°40.4'	-53.1'	148.9°	32°48.9'	-53.4'	149.3°	31°57.2'	-53.7'	149.6°	31°05.4'	-54.0'	149.9°	19
20	35°21.5'	-52.3'	148.5°	34°30.3'	-52.7'	148.8°	33°38.9'	-53.0'	149.2°	32°47.3'	-53.3'	149.5°	31°55.5'	-53.5'	149.8°							

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

26° 334° LHA

Latitude CONTRARY to Declination

26° 334° 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	52°31.3'	46.6'	133.9°	51°49.4'	47.3'	134.8°	51°06.7'	48.0'	135.7°	50°23.5'	48.7'	136.6°	49°39.6'	49.3'	137.4°	48°55.2'	49.9'	138.2°	48°10.2'	50.5'	138.9°	0			
1	51°44.7'	47.1'	134.9°	51°02.1'	47.8'	135.8°	50°18.7'	48.5'	136.7°	49°34.8'	49.1'	137.5°	48°50.3'	49.7'	138.2°	48°05.3'	50.3'	139.0°	47°19.8'	50.8'	139.7°	1			
2	50°57.6'	47.6'	135.9°	50°14.3'	48.2'	136.8°	49°30.3'	48.9'	137.6°	48°45.7'	49.5'	138.3°	48°00.6'	50.1'	139.1°	47°15.0'	50.6'	139.8°	46°29.0'	51.1'	140.5°	2			
3	50°10.1'	48.0'	136.9°	49°26.0'	48.7'	137.7°	48°41.4'	49.3'	138.5°	47°56.2'	49.9'	139.2°	47°10.5'	50.4'	139.9°	46°24.4'	50.9'	140.6°	45°37.8'	51.4'	141.2°	3			
4	49°22.1'	48.5'	137.8°	48°37.3'	49.1'	138.6°	47°52.1'	49.6'	139.3°	47°06.4'	50.2'	140.0°	46°20.1'	50.7'	140.7°	45°33.5'	51.2'	141.4°	44°46.4'	51.7'	142.0°	4			
5	48°33.6'	48.9'	138.7°	47°48.3'	49.4'	139.4°	47°02.4'	50.0'	140.1°	46°16.2'	50.5'	140.8°	45°29.4'	51.0'	141.5°	44°42.3'	51.5'	142.1°	43°54.8'	51.9'	142.7°	5			
6	47°44.7'	49.3'	139.6°	46°58.8'	49.8'	140.3°	46°12.4'	50.3'	141.0°	45°25.6'	50.8'	141.6°	44°38.4'	51.3'	142.2°	43°50.8'	51.7'	142.8°	43°02.8'	52.2'	143.4°	6			
7	46°55.5'	49.6'	140.4°	46°09.0'	50.1'	141.1°	45°22.1'	50.6'	141.7°	44°34.8'	51.1'	142.3°	43°47.1'	51.6'	142.9°	42°59.1'	52.0'	143.5°	42°10.7'	52.4'	144.0°	7			
8	46°05.9'	49.9'	141.2°	45°18.9'	50.5'	141.9°	44°31.5'	50.9'	142.5°	43°43.7'	51.4'	143.1°	42°55.6'	51.8'	143.6°	42°07.1'	52.2'	144.2°	41°18.3'	52.6'	144.7°	8			
9	45°15.9'	50.3'	142.0°	44°28.4'	50.7'	142.6°	43°40.6'	51.2'	143.2°	42°52.3'	51.6'	143.8°	42°03.7'	52.1'	144.3°	41°14.8'	52.4'	144.8°	40°25.6'	52.8'	145.3°	9			
10	44°25.7'	50.6'	142.8°	43°37.7'	51.0'	143.4°	42°49.3'	51.5'	143.9°	42°00.7'	51.9'	144.5°	41°11.7'	52.3'	145.0°	40°22.4'	52.7'	145.5°	39°32.8'	53.0'	146.0°	10			
11	43°35.1'	50.9'	143.6°	42°46.7'	51.3'	144.1°	41°57.9'	51.7'	144.6°	41°08.8'	52.1'	145.1°	40°19.4'	52.5'	145.6°	39°29.7'	52.8'	146.1°	38°39.8'	53.2'	146.6°	11			
12	42°44.2'	51.1'	144.3°	41°55.4'	51.5'	144.8°	41°06.2'	51.9'	145.3°	40°16.7'	52.3'	145.8°	39°26.9'	52.7'	146.3°	38°36.9'	53.0'	146.7°	37°46.6'	53.4'	147.1°	12			
13	41°53.1'	51.4'	145.0°	41°03.8'	51.8'	145.5°	40°14.2'	52.2'	146.0°	39°24.4'	52.5'	146.4°	38°34.2'	52.9'	146.9°	37°43.9'	53.2'	147.3°	36°53.2'	53.5'	147.7°	13			
14	41°01.7'	51.6'	145.7°	40°12.0'	52.0'	146.2°	39°22.1'	52.4'	146.6°	38°31.8'	52.7'	147.1°	37°41.4'	53.1'	147.5°	36°50.7'	53.4'	147.9°	35°59.7'	53.7'	148.3°	14			
15	40°10.1'	51.8'	146.3°	39°20.0'	52.2'	146.8°	38°29.7'	52.6'	147.2°	37°39.1'	52.9'	147.7°	36°48.3'	53.2'	148.1°	35°57.3'	53.5'	148.5°	35°06.0'	53.8'	148.8°	15			
16	39°18.3'	52.1'	147.0°	38°27.8'	52.4'	147.4°	37°37.1'	52.8'	147.9°	36°46.2'	53.1'	148.3°	35°55.1'	53.4'	148.6°	35°03.7'	53.7'	149.0°	34°12.2'	54.0'	149.4°	16			
17	38°26.2'	52.3'	147.6°	37°35.4'	52.6'	148.1°	36°44.4'	52.9'	148.5°	35°53.1'	53.2'	148.8°	35°01.7'	53.5'	149.2°	34°10.1'	53.8'	149.6°	33°18.2'	54.1'	149.9°	17			
18	37°33.9'	52.5'	148.3°	36°42.8'	52.8'	148.7°	35°51.5'	53.1'	149.0°	34°59.9'	53.4'	149.4°	34°08.2'	53.7'	149.8°	33°16.2'	54.0'	150.1°	32°24.2'	54.2'	150.4°	18			
19	36°41.5'	52.6'	148.9°	35°50.0'	52.9'	149.3°	34°58.4'	53.2'	149.6°	34°06.5'	53.5'	150.0°	33°14.5'	53.8'	150.3°	32°22.3'	54.1'	150.6°	31°29.9'	54.3'	150.9°	19			
20	35°48.9'	52.8'	149.5°	34°57.1'	53.1'	149.8°	34°05.1'	53.4'	150.2°	33°13.0'	53.7'	150.5°	32°20.7'	53.9'	150.8°	31°28.2'	54.2'	151.1°	30°35.6'	54.4'	151.4°	20			
21	34°56.0'	53.0'	150.1°	34°04.0'	53.3'	150.4°	33°11.7'	53.5'	150.7°	32°19.3'	53.8'	151.0°	31°26.7'	54.1'	151.3°	30°34.0'	54.3'	151.6°	29°41.2'	54.5'	151.9°	21			
22	34°03.1'	53.1'	150.6°	33°10.7'	53.4'	150.9°	32°18.2'	53.7'	151.3°	31°25.5'	53.9'	151.6°	30°32.7'	54.2'	151.8°	29°39.7'	54.4'	152.1°	28°46.6'	54.6'	152.4°	22			
23	33°10.0'	53.3'	151.2°	32°17.3'	53.5'	151.5°	31°24.5'	53.8'	151.8°	30°31.6'	54.0'	152.1°	29°38.5'	54.3'	152.3°	28°45.3'	54.5'	152.6°	27°52.0'	54.7'	152.8°	23			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	28			29			30			31			32			33			34					Dec°	

26° 334° LHA

Latitude CONTRARY to DECLINATION

26° 334° LHA

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

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

25° 335° LHA

Latitude CONTRARY to Declination

25° 335° LHA

Dec°	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°09.0'	47.2'	135.2°	52°26.2'	48.0'	136.1°	51°42.6'	48.6'	137.0°	50°58.4'	49.3'	137.8°	50°13.7'	49.9'	138.7°	49°28.3'	50.5'	139.4°	48°42.5'	51.0'	140.2°	0
1	52°21.8'	47.7'	136.2°	51°38.2'	48.4'	137.1°	50°54.0'	49.1'	137.9°	50°09.1'	49.7'	138.7°	49°23.8'	50.3'	139.5°	48°37.9'	50.8'	140.3°	47°51.5'	51.3'	141.0°	1
2	51°34.1'	48.2'	137.2°	50°49.8'	48.9'	138.0°	50°04.9'	49.5'	138.8°	49°19.5'	50.1'	139.6°	48°33.5'	50.6'	140.3°	47°47.1'	51.1'	141.1°	47°00.2'	51.6'	141.7°	2
3	50°45.9'	48.7'	138.1°	50°00.9'	49.3'	138.9°	49°15.4'	49.9'	139.7°	48°29.4'	50.4'	140.4°	47°42.9'	50.9'	141.2°	46°55.9'	51.4'	141.8°	46°08.6'	51.9'	142.5°	3
4	49°57.2'	49.1'	139.1°	49°11.6'	49.7'	139.8°	48°25.5'	50.2'	140.6°	47°39.0'	50.7'	141.3°	46°52.0'	51.2'	141.9°	46°04.5'	51.7'	142.6°	45°16.7'	52.2'	143.2°	4
5	49°08.1'	49.5'	139.9°	48°22.0'	50.0'	140.7°	47°35.3'	50.6'	141.4°	46°48.2'	51.1'	142.0°	46°00.7'	51.5'	142.7°	45°12.8'	52.0'	143.3°	44°24.5'	52.4'	143.9°	5
6	48°18.7'	49.8'	140.8°	47°31.9'	50.4'	141.5°	46°44.8'	50.9'	142.2°	45°57.2'	51.4'	142.8°	45°09.2'	51.8'	143.4°	44°20.8'	52.2'	144.0°	43°32.1'	52.6'	144.6°	6
7	47°28.8'	50.2'	141.6°	46°41.5'	50.7'	142.3°	45°53.9'	51.2'	142.9°	45°05.8'	51.6'	143.5°	44°17.4'	52.1'	144.1°	43°28.6'	52.5'	144.7°	42°39.4'	52.9'	145.2°	7
8	46°38.6'	50.5'	142.4°	45°50.8'	51.0'	143.1°	45°02.7'	51.5'	143.7°	44°14.2'	51.9'	144.3°	43°25.3'	52.3'	144.8°	42°36.1'	52.7'	145.4°	41°46.6'	53.1'	145.9°	8
9	45°48.1'	50.8'	143.2°	44°59.8'	51.3'	143.8°	44°11.2'	51.7'	144.4°	43°22.3'	52.1'	145.0°	42°33.0'	52.5'	145.5°	41°43.4'	52.9'	146.0°	40°53.5'	53.3'	146.5°	9
10	44°57.3'	51.1'	144.0°	44°08.6'	51.6'	144.6°	43°19.5'	52.0'	145.1°	42°30.1'	52.4'	145.6°	41°40.5'	52.7'	146.1°	40°50.5'	53.1'	146.6°	40°00.3'	53.4'	147.1°	10
11	44°06.1'	51.4'	144.7°	43°17.0'	51.8'	145.3°	42°27.5'	52.2'	145.8°	41°37.8'	52.6'	146.3°	40°47.7'	52.9'	146.8°	39°57.4'	53.3'	147.2°	39°06.8'	53.6'	147.7°	11
12	43°14.7'	51.7'	145.4°	42°25.2'	52.1'	145.9°	41°35.3'	52.4'	146.4°	40°45.2'	52.8'	146.9°	39°54.8'	53.1'	147.4°	39°04.1'	53.5'	147.8°	38°13.2'	53.8'	148.3°	12
13	42°23.1'	51.9'	146.1°	41°33.1'	52.3'	146.6°	40°42.9'	52.6'	147.1°	39°52.4'	53.0'	147.6°	39°01.6'	53.3'	148.0°	38°10.6'	53.6'	148.4°	37°19.4'	53.9'	148.8°	13
14	41°31.2'	52.1'	146.8°	40°40.8'	52.5'	147.3°	39°50.2'	52.8'	147.7°	38°59.4'	53.2'	148.2°	38°08.3'	53.5'	148.6°	37°17.0'	53.8'	149.0°	36°25.5'	54.1'	149.4°	14
15	40°39.0'	52.3'	147.4°	39°48.3'	52.7'	147.9°	38°57.4'	53.0'	148.3°	38°06.2'	53.3'	148.8°	37°14.8'	53.7'	149.1°	36°23.2'	53.9'	149.5°	35°31.4'	54.2'	149.9°	15
16	39°46.7'	52.6'	148.1°	38°55.6'	52.9'	148.5°	38°04.4'	53.2'	148.9°	37°12.9'	53.5'	149.3°	36°21.2'	53.8'	149.7°	35°29.3'	54.1'	150.1°	34°37.2'	54.4'	150.4°	16
17	38°54.1'	52.7'	148.7°	38°02.8'	53.1'	149.1°	37°11.2'	53.4'	149.5°	36°19.4'	53.7'	149.9°	35°27.4'	54.0'	150.3°	34°35.2'	54.2'	150.6°	33°42.8'	54.5'	150.9°	17
18	38°01.4'	52.9'	149.3°	37°09.7'	53.2'	149.3°	36°17.8'	53.5'	150.1°	35°25.7'	53.8'	150.4°	34°33.4'	54.1'	150.8°	33°40.9'	54.3'	151.1°	32°48.3'	54.6'	151.4°	18
19	37°08.5'	53.1'	149.9°	36°16.5'	53.4'	150.3°	35°24.2'	53.7'	150.6°	34°31.9'	54.0'	151.0°	33°39.3'	54.2'	151.3°	32°46.6'	54.5'	151.6°	31°53.7'	54.7'	151.9°	19
20	36°15.4'	53.3'	150.5°	35°23.0'	53.6'	150.8°	34°30.6'	53.8'	151.2°	33°37.9'	54.1'	151.5°										



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°45.9'	-47.9'	136.5°	53°02.1'	-48.6'	137.4°	52°17.6'	-49.3'	138.3°	51°32.5'	-49.9'	139.2°	50°46.8'	-50.5'	140.0°	50°00.6'	-51.0'	140.7°	49°13.9'	-51.5'	141.5°	0
1	52°58.0'	-48.4'	137.5°	52°13.5'	-49.1'	138.4°	51°28.3'	-49.7'	139.2°	50°42.6'	-50.3'	140.0°	49°56.4'	-50.8'	140.8°	49°09.6'	-51.4'	141.5°	48°22.4'	-51.8'	142.3°	1
2	52°09.6'	-48.9'	138.5°	51°24.4'	-49.5'	139.3°	50°38.6'	-50.1'	140.1°	49°52.3'	-50.6'	140.9°	49°05.5'	-51.2'	141.6°	48°18.3'	-51.7'	142.3°	47°30.6'	-52.1'	143.0°	2
3	51°20.8'	-49.3'	139.4°	50°34.9'	-49.9'	140.2°	49°48.6'	-50.5'	141.0°	49°01.7'	-51.0'	141.7°	48°14.4'	-51.5'	142.4°	47°26.6'	-52.0'	143.1°	46°38.4'	-52.4'	143.7°	3
4	50°31.5'	-49.7'	140.3°	49°45.0'	-50.3'	141.1°	48°58.1'	-50.8'	141.8°	48°10.7'	-51.3'	142.5°	47°22.9'	-51.8'	143.2°	46°34.7'	-52.2'	143.8°	45°46.0'	-52.6'	144.4°	4
5	49°41.8'	-50.1'	141.2°	48°54.8'	-50.6'	141.9°	48°07.3'	-51.1'	142.6°	47°19.4'	-51.6'	143.3°	46°31.1'	-52.1'	143.9°	45°42.4'	-52.5'	144.5°	44°53.4'	-52.9'	145.1°	5
6	48°51.7'	-50.4'	142.1°	48°04.1'	-51.0'	142.7°	47°16.2'	-51.4'	143.4°	46°27.8'	-51.9'	144.0°	45°39.1'	-52.3'	144.6°	44°49.9'	-52.7'	145.2°	44°00.5'	-53.1'	145.8°	6
7	48°01.2'	-50.8'	142.9°	47°13.2'	-51.3'	143.5°	46°24.7'	-51.7'	144.2°	45°35.9'	-52.2'	144.8°	44°46.7'	-52.6'	145.3°	43°57.2'	-52.9'	145.9°	43°07.4'	-53.3'	146.4°	7
8	47°10.5'	-51.1'	143.7°	46°21.9'	-51.6'	144.3°	45°33.0'	-52.0'	144.9°	44°43.8'	-52.4'	145.5°	43°54.2'	-52.8'	146.0°	43°04.3'	-53.2'	146.5°	42°14.1'	-53.5'	147.0°	8
9	46°19.4'	-51.4'	144.4°	45°30.4'	-51.8'	145.0°	44°41.0'	-52.2'	145.6°	43°51.4'	-52.6'	146.1°	43°01.4'	-53.0'	146.7°	42°11.1'	-53.4'	147.2°	41°20.6'	-53.7'	147.7°	9
10	45°28.0'	-51.7'	145.2°	44°38.5'	-52.1'	145.7°	43°48.8'	-52.5'	146.3°	42°58.7'	-52.9'	146.8°	42°08.4'	-53.2'	147.3°	41°17.8'	-53.6'	147.8°	40°26.9'	-53.9'	148.2°	10
11	44°36.3'	-51.9'	145.9°	43°46.5'	-52.3'	146.4°	42°56.3'	-52.7'	146.9°	42°05.9'	-53.1'	147.4°	41°15.2'	-53.4'	147.9°	40°24.2'	-53.7'	148.4°	39°33.0'	-54.0'	148.8°	11
12	43°44.4'	-52.2'	146.6°	42°54.1'	-52.6'	147.1°	42°03.6'	-52.9'	147.6°	41°12.8'	-53.3'	148.1°	40°21.8'	-53.6'	148.5°	39°30.5'	-53.9'	149.0°	38°39.0'	-54.2'	149.4°	12
13	42°52.2'	-52.4'	147.3°	42°01.6'	-52.8'	147.8°	41°10.7'	-53.1'	148.2°	40°19.5'	-53.4'	148.7°	39°28.2'	-53.8'	149.1°	38°36.6'	-54.1'	149.5°	37°44.8'	-54.3'	149.9°	13
14	41°59.8'	-52.6'	147.9°	41°08.8'	-53.0'	148.4°	40°17.6'	-53.3'	148.8°	39°26.1'	-53.6'	149.3°	38°34.4'	-53.9'	149.7°	37°42.5'	-54.2'	150.1°	36°50.4'	-54.5'	150.5°	14
15	41°07.1'	-52.8'	148.6°	40°15.8'	-53.2'	149.0°	39°24.2'	-53.5'	149.4°	38°32.5'	-53.8'	149.8°	37°40.5'	-54.1'	150.2°	36°48.3'	-54.4'	150.6°	35°55.9'	-54.6'	151.0°	15
16	40°14.3'	-53.0'	149.2°	39°22.6'	-53.4'	149.6°	38°30.8'	-53.7'	150.0°	37°38.7'	-53.9'	150.4°	36°46.4'	-54.2'	150.8°	35°54.0'	-54.5'	151.1°	35°01.3'	-54.7'	151.5°	16
17	39°21.2'	-53.2'	149.8°	38°29.3'	-53.5'	150.2°	37°37.1'	-53.8'	150.6°	36°44.7'	-54.1'	151.0°	35°52.2'	-54.4'	151.3°	34°59.5'	-54.6'	151.7°	34°06.6'	-54.9'	152.0°	17
18	38°28.0'	-53.4'	150.4°	37°35.7'	-53.7'	150.8°	36°43.3'	-54.0'	151.1°	35°50.6'	-54.2'	151.5°	34°57.8'	-54.5'	151.8°	34°04.9'	-54.7'	152.2°	33°11.7'	-55.0'	152.5°	18
19	37°34.6'	-53.6'	151.0°	36°42.0'	-53.8'	151.3°	35°49.3'	-54.1'	151.7°	34°56.4'	-54.4'	152.0°	34°03.3'	-54.6'	152.3°	33°10.1'	-54.8'	152.6°	32°16.8'	-55.1'	152.9°	19
20	36°41.0'	-53.7'	151.5°	35°48.2'	-54.0'	151.9°	34°55.2'	-54.2'	152.2°	34°02.0'	-54.5'	152.5°	33°08.7'	-54.7'	152.8°	32°15.3'	-55.0'	153.1°	31°21.7'	-55.2'	153.4°	20
21	35°47.3'	-53.9'	152.1°	34°54.2'	-54.1'	152.4°	34°00.9'	-54.4'	152.7°	33°07.5'	-54.6'	153.0°	32°14.0'	-54.8'	153.3°	31°20.3'	-55.1'	153.6°	30°26.5'	-55.3'	153.9°	21
22	34°53.4'	-54.0'	152.6°	34°00.1'	-54.3'	152.9°	33°06.6'	-54.5'	153.2°	32°12.9'	-54.7'	153.5°	31°19.2'	-54.9'	153.8°	30°25.3'	-55.2'	154.1°	29°31.2'	-55.4'	154.3°	22
23	33°59.4'	-54.1'	153.2°	33°05.8'	-54.4'	153.5°	32°12.1'	-54.6'	153.7°	31°18.2'	-54.8'	154.0°	30°24.2'	-55.0'	154.3°	29°30.1'	-55.2'	154.5°	28°35.9'	-55.4'	154.8°	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°21.9'	-48.6'	137.9°	53°37.1'	-49.3'	138.8°	52°51.7'	-49.9'	139.7°	52°05.7'	-50.5'	140.5°	51°19.1'	-51.1'	141.3°	50°32.0'	-51.6'	142.1°	49°44.5'	-52.1'	142.8°	0
1	53°33.3'	-49.1'	138.9°	52°47.9'	-49.7'	139.7°	52°01.8'	-50.3'	140.6°	51°15.2'	-50.9'	141.4°	50°28.1'	-51.4'	142.1°	49°40.5'	-51.9'	142.9°	48°52.4'	-52.4'	143.6°	1
2	52°44.2'	-49.5'	139.8°	51°58.2'	-50.1'	140.7°	51°11.5'	-50.7'	141.5°	50°24.3'	-51.2'	142.2°	49°36.7'	-51.7'	142.9°	48°48.6'	-52.2'	143.6°	48°00.0'	-52.6'	144.3°	2
3	51°54.8'	-49.9'	140.8°	51°08.0'	-50.5'	141.6°	50°20.8'	-51.0'	142.3°	49°33.1'	-51.5'	143.0°	48°44.9'	-52.0'	143.7°	47°56.4'	-52.5'	144.4°	47°07.4'	-52.9'	145.0°	3
4	51°04.8'	-50.3'	141.7°	50°17.5'	-50.9'	142.4°	49°29.8'	-51.4'	143.1°	48°41.5'	-51.9'	143.8°	47°52.9'	-52.3'	144.5°	47°03.9'	-52.7'	145.1°	46°14.5'	-53.1'	145.7°	4
5	50°14.5'	-50.7'	142.5°	49°26.7'	-51.2'	143.2°	48°38.4'	-51.7'	143.9°	47°49.7'	-52.1'	144.6°	47°00.6'	-52.6'	145.2°	46°11.2'	-53.0'	145.8°	45°21.4'	-53.4'	146.4°	5
6	49°23.8'	-51.0'	143.3°	48°35.4'	-51.5'	144.0°	47°46.7'	-52.0'	144.7°	46°57.6'	-52.4'	145.3°	46°08.0'	-52.8'	145.9°	45°18.2'	-53.2'	146.5°	44°28.0'	-53.6'	147.0°	6
7	48°32.7'	-51.4'	144.1°	47°43.9'	-51.8'	144.8°	46°54.7'	-52.3'	145.4°	46°05.1'	-52.7'	146.0°	45°15.2'	-53.1'	146.6°	44°25.0'	-53.4'	147.1°	43°34.5'	-53.8'	147.6°	7
8	47°41.4'	-51.7'	144.9°	46°52.1'	-52.1'	145.5°	46°02.5'	-52.5'	146.1°	45°12.5'	-52.9'	146.7°	44°22.2'	-53.3'	147.2°	43°31.6'	-53.6'	147.7°	42°40.7'	-54.0'	148.2°	8
9	46°49.7'	-52.0'	145.7°	45°60.0'	-52.4'	146.3°	45°09.9'	-52.8'	146.8°	44°19.6'	-53.1'	147.4°	43°28.9'	-53.5'	147.9°	42°38.0'	-53.8'	148.4°	41°46.7'	-54.1'	148.8°	9
10	45°57.8'	-52.2'	146.4°	45°07.6'	-52.6'	146.9°	44°17.2'	-53.0'	147.5°	43°26.4'	-53.3'	148.0°	42°35.4'	-53.7'	148.5°	41°44.1'	-54.0'	149.0°	40°52.6'	-54.3'	149.4°	10
11	45°05.5'	-52.5'	147.1°	44°15.0'	-52.8'	147.6°	43°24.2'	-53.2'	148.1°	42°33.1'	-53.5'	148.6°	41°41.8'	-53.9'	149.1°	40°50.2'	-54.2'	149.5°	39°58.3'	-54.5'	150.0°	11
12	44°13.1'	-52.7'	147.8°	43°22.2'	-53.1'	148.3°	42°31.0'	-53.4'	148.8°	41°39.6'	-53.7'	149.2°	40°47.9'	-54.0'	149.7°	39°56.0'	-54.3'	150.1°	39°03.9'	-54.6'	150.5°	12
13	43°20.4'	-52.9'	148.4°	42°29.1'	-53.3'	148.9°	41°37.6'	-53.6'	149.4°	40°45.8'	-53.9'	149.8°	39°53.9'	-54.2'	150.2°	39°01.7'	-54.5'	150.7°	38°09.3'	-54.7'	151.0°	13
14	42°27.4'	-53.1'	149.1°	41°35.8'	-53.5'	149.5°	40°44.0'	-53.8'	150.0°	39°51.9'	-54.1'	150.4°	38°59.7'	-54.3'	150.8°	38°07.2'	-54.6'	151.2°	37°14.5'	-54.9'	151.6°	14
15	41°34.3'	-53.3'	149.7°	40°42.4'	-53.6'	150.1°	39°50.2'	-53.9'	150.6°	38°57.9'	-54.2'	151.0°	38°05.3'	-54.5'	151.3°	37°12.6'	-54.8'	151.7°	36°19.7'	-55.0'	152.1°	15
16	40°41.0'	-53.5'	150.3°	39°48.7'	-53.8'	150.7°	38°56.3'	-54.1'	151.1°	38°03.6'	-54.4'	151.5°	37°10.8'	-54.6'	151.9°	36°17.8'	-54.9'	152.2°	35°24.7'	-55.1'	152.6°	16
17	39°47.4'	-53.7'	150.9°	38°54.9'	-54.0'	151.3°	38°02.2'	-54.3'	151.7°	37°09.3'	-54.5'	152.0°	36°16.2'	-54.8'	152.4°	35°22.9'	-55.0'	152.7°	34°29.5'	-55.2'	153.0°	17
18	38°53.7'	-53.9'	151.5°	38°00.9'	-54.1'	151.9°	37°07.9'	-54.4'	152.2°	36°14.8'	-54.6'	152.6°	35°21.4'	-54.9'	152.9°	34°27.9'	-55.1'	153.2°	33°34.3'	-55.3'	153.5°	18
19	37°59.9'	-54.0'	152.0°	37°06.8'	-54.3'	152.4°	36°13.5'	-54.5'	152.7°	35°20.1'	-54.8'	153.1°	34°26.5'	-55.0'	153.4°	33°32.8'	-55.2'	153.7°	32°39.0'	-55.4'	154.0°	19
20	37°05.9'	-54.2'	152.6°	36°12.5'	-54.4'	152.9°	35°19.0'	-54.7'	153.3°	34°25.3'	-54.9'	153.6°	33°31.5'	-55.1'	153.9°							

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°57.0'	-49.3'	139.3°	54°11.2'	-49.9'	140.2°	53°24.8'	-50.5'	141.1°	52°37.9'	-51.1'	141.9°	51°50.4'	-51.6'	142.7°	51°02.5'	-52.1'	143.4°	50°14.1'	-52.6'	144.2°	0
1	54°07.7'	-49.8'	140.3°	53°21.3'	-50.4'	141.1°	52°34.3'	-50.9'	142.0°	51°46.8'	-51.5'	142.7°	50°58.8'	-52.0'	143.5°	50°10.4'	-52.4'	144.2°	49°21.5'	-52.9'	144.9°	1
2	53°17.9'	-50.2'	141.2°	52°30.9'	-50.8'	142.0°	51°43.4'	-51.3'	142.8°	50°55.3'	-51.8'	143.6°	50°06.8'	-52.3'	144.3°	49°17.9'	-52.7'	145.0°	48°28.6'	-53.1'	145.6°	2
3	52°27.8'	-50.6'	142.1°	51°40.2'	-51.1'	142.9°	50°52.1'	-51.6'	143.6°	50°03.5'	-52.1'	144.4°	49°14.6'	-52.6'	145.0°	48°25.2'	-53.0'	145.7°	47°35.5'	-53.4'	146.3°	3
4	51°37.2'	-51.0'	143.0°	50°49.1'	-51.5'	143.7°	50°00.5'	-52.0'	144.4°	49°11.4'	-52.4'	145.1°	48°22.0'	-52.8'	145.8°	47°32.2'	-53.2'	146.4°	46°42.1'	-53.6'	147.0°	4
5	50°46.2'	-51.3'	143.8°	49°57.6'	-51.8'	144.5°	49°08.5'	-52.2'	145.2°	48°19.0'	-52.7'	145.9°	47°29.2'	-53.1'	146.5°	46°39.0'	-53.5'	147.1°	45°48.5'	-53.8'	147.6°	5
6	49°54.9'	-51.6'	144.6°	49°05.8'	-52.1'	145.3°	48°16.3'	-52.5'	146.0°	47°26.4'	-52.9'	146.6°	46°36.1'	-53.3'	147.2°	45°45.5'	-53.7'	147.7°	44°54.7'	-54.0'	148.3°	6
7	49°03.3'	-51.9'	145.4°	48°13.7'	-52.4'	146.1°	47°23.7'	-52.8'	146.7°	46°33.4'	-53.2'	147.3°	45°42.8'	-53.5'	147.8°	44°51.9'	-53.9'	148.4°	44°00.6'	-54.2'	148.9°	7
8	48°11.3'	-52.2'	146.2°	47°21.3'	-52.6'	146.8°	46°30.9'	-53.0'	147.4°	45°40.3'	-53.4'	147.9°	44°49.3'	-53.7'	148.5°	43°58.0'	-54.1'	149.0°	43°06.4'	-54.4'	149.5°	8
9	47°19.1'	-52.5'	146.9°	46°28.7'	-52.9'	147.5°	45°37.9'	-53.3'	148.1°	44°46.9'	-53.6'	148.6°	43°55.5'	-53.9'	149.1°	43°03.9'	-54.3'	149.6°	42°12.0'	-54.6'	150.0°	9
10	46°26.6'	-52.8'	147.6°	45°35.8'	-53.1'	148.2°	44°44.6'	-53.5'	148.7°	43°53.2'	-53.8'	149.2°	43°01.6'	-54.1'	149.7°	42°09.6'	-54.4'	150.2°	41°17.5'	-54.7'	150.6°	10
11	45°33.8'	-53.0'	148.3°	44°42.6'	-53.4'	148.8°	43°51.2'	-53.7'	149.3°	42°59.4'	-54.0'	149.8°	42°07.4'	-54.3'	150.3°	41°15.2'	-54.6'	150.7°	40°22.8'	-54.9'	151.1°	11
12	44°40.8'	-53.2'	149.0°	43°49.3'	-53.6'	149.5°	42°57.5'	-53.9'	150.0°	42°05.4'	-54.2'	150.4°	41°13.1'	-54.5'	150.8°	40°20.6'	-54.7'	151.3°	39°27.9'	-55.0'	151.7°	12
13	43°47.6'	-53.4'	149.6°	42°55.7'	-53.8'	150.1°	42°03.6'	-54.1'	150.6°	41°11.2'	-54.3'	151.0°	40°18.7'	-54.6'	151.4°	39°25.9'	-54.9'	151.8°	38°32.9'	-55.1'	152.2°	13
14	42°54.2'	-53.6'	150.3°	42°02.0'	-53.9'	150.7°	41°09.5'	-54.2'	151.1°	40°16.9'	-54.5'	151.5°	39°24.0'	-54.8'	151.9°	38°31.0'	-55.0'	152.3°	37°37.8'	-55.3'	152.7°	14
15	42°00.6'	-53.8'	150.9°	41°08.0'	-54.1'	151.3°	40°15.3'	-54.4'	151.7°	39°22.4'	-54.7'	152.1°	38°29.3'	-54.9'	152.5°	37°36.0'	-55.1'	152.8°	36°42.5'	-55.4'	153.2°	15
16	41°06.7'	-54.0'	151.4°	40°13.9'	-54.3'	151.9°	39°20.9'	-54.5'	152.2°	38°27.7'	-54.8'	152.6°	37°34.4'	-55.0'	153.0°	36°40.8'	-55.3'	153.3°	35°47.2'	-55.5'	153.6°	16
17	40°12.7'	-54.2'	152.0°	39°19.7'	-54.4'	152.4°	38°26.4'	-54.7'	152.8°	37°33.0'	-54.9'	153.1°	36°39.3'	-55.2'	153.5°	35°45.6'	-55.4'	153.8°	34°51.7'	-55.6'	154.1°	17
18	39°18.6'	-54.3'	152.6°	38°25.2'	-54.6'	153.0°	37°31.7'	-54.8'	153.3°	36°38.0'	-55.0'	153.6°	35°44.2'	-55.3'	154.0°	34°50.2'	-55.5'	154.3°	33°56.1'	-55.7'	154.6°	18
19	38°24.3'	-54.5'	153.1°	37°30.7'	-54.7'	153.5°	36°36.9'	-54.9'	153.8°	35°43.0'	-55.2'	154.1°	34°48.9'	-55.4'	154.4°	33°54.7'	-55.6'	154.7°	33°00.4'	-55.8'	155.0°	19
20	37°29.8'	-54.6'	153.7°	36°36.0'	-54.8'	154.0°	35°42.0'	-55.1'	154.3°	34°47.8'	-55.3'	154.6°	33°53.5'	-55.5'	154.9°	32°59.1'	-55.7'	155.2°	32°04.6'	-55.9'	155.5°	20
21	36°35.2'	-54.7'	154.2°	35°41.1'	-55.0'	154.5°	34°46.9'	-55.2'	154.8°	33°52.5'	-55.4'	155.1°	32°58.1'	-55.6'	155.4°	32°03.5'	-55.8'	155.6°	31°08.8'	-56.0'	155.9°	21
22	35°40.5'	-54.9'	154.7°	34°46.1'	-55.1'	155.0°	33°51.7'	-55.3'	155.3°	32°57.2'	-55.5'	155.5°	32°02.5'	-55.7'	155.8°	31°07.7'	-55.9'	156.1°	30°12.8'	-56.0'	156.3°	22
23	34°45.6'	-55.0'	155.2°	33°51.1'	-55.2'	155.5°	32°56.4'	-55.4'	155.7°	32°01.7'	-55.6'	156.0°	31°06.8'	-55.8'	156.2°	30°11.8'	-55.9'	156.5°	29°16.8'	-56.1'	156.7°	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°31.0'	-50.0'	140.7°	54°44.3'	-50.6'	141.6°	53°57.0'	-51.2'	142.5°	53°09.2'	-51.7'	143.3°	52°20.8'	-52.2'	144.1°	51°32.0'	-52.7'	144.8°	50°42.7'	-53.1'	145.5°	0
1	54°41.0'	-50.4'	141.7°	53°53.7'	-51.0'	142.5°	53°05.8'	-51.5'	143.4°	52°17.4'	-52.1'	144.1°	51°28.6'	-52.5'	144.9°	50°39.3'	-53.0'	145.6°	49°49.6'	-53.4'	146.3°	1
2	53°50.6'	-50.8'	142.6°	53°02.7'	-51.4'	143.4°	52°14.3'	-51.9'	144.2°	51°25.4'	-52.4'	144.9°	50°36.1'	-52.8'	145.6°	49°46.3'	-53.2'	146.3°	48°56.2'	-53.6'	147.0°	2
3	52°59.8'	-51.2'	143.5°	52°11.3'	-51.7'	144.3°	51°22.4'	-52.2'	145.0°	50°33.0'	-52.7'	145.7°	49°43.2'	-53.1'	146.4°	48°53.1'	-53.5'	147.0°	48°02.6'	-53.9'	147.6°	3
4	52°08.6'	-51.6'	144.4°	51°19.6'	-52.1'	145.1°	50°30.2'	-52.5'	145.8°	49°40.4'	-52.9'	146.5°	48°50.2'	-53.3'	147.1°	47°59.6'	-53.7'	147.7°	47°08.7'	-54.1'	148.3°	4
5	51°17.0'	-51.9'	145.2°	50°27.5'	-52.4'	145.9°	49°37.7'	-52.8'	146.6°	48°47.4'	-53.2'	147.2°	47°56.8'	-53.6'	147.8°	47°05.9'	-53.9'	148.4°	46°14.6'	-54.3'	148.9°	5
6	50°25.1'	-52.2'	146.0°	49°35.2'	-52.7'	146.7°	48°44.9'	-53.1'	147.3°	47°54.2'	-53.4'	147.9°	47°03.2'	-53.8'	148.5°	46°11.9'	-54.1'	149.0°	45°20.4'	-54.5'	149.5°	6
7	49°32.9'	-52.5'	146.8°	48°42.5'	-52.9'	147.4°	47°51.8'	-53.3'	148.0°	47°00.7'	-53.7'	148.6°	46°09.4'	-54.0'	149.1°	45°17.8'	-54.3'	149.6°	44°25.9'	-54.6'	150.1°	7
8	48°40.3'	-52.8'	147.5°	47°49.6'	-53.2'	148.1°	46°58.5'	-53.5'	148.7°	46°07.1'	-53.9'	149.2°	45°15.4'	-54.2'	149.7°	44°23.4'	-54.5'	150.2°	43°31.2'	-54.8'	150.7°	8
9	47°47.5'	-53.1'	148.2°	46°56.4'	-53.4'	148.8°	46°04.9'	-53.8'	149.3°	45°13.2'	-54.1'	149.8°	44°21.2'	-54.4'	150.3°	43°28.9'	-54.7'	150.8°	42°36.4'	-55.0'	151.3°	9
10	46°54.5'	-53.3'	148.9°	46°03.0'	-53.6'	149.4°	45°11.2'	-54.0'	150.0°	44°19.1'	-54.3'	150.4°	43°26.8'	-54.6'	150.9°	42°34.2'	-54.9'	151.4°	41°41.5'	-55.1'	151.8°	10
11	46°01.2'	-53.5'	149.6°	45°09.3'	-53.8'	150.1°	44°17.2'	-54.2'	150.6°	43°24.8'	-54.5'	151.0°	42°32.2'	-54.7'	151.5°	41°39.4'	-55.0'	151.9°	40°46.3'	-55.3'	152.3°	11
12	45°07.7'	-53.7'	150.2°	44°15.5'	-54.0'	150.7°	43°23.0'	-54.3'	151.2°	42°30.3'	-54.6'	151.6°	41°37.5'	-54.9'	152.0°	40°44.4'	-55.1'	152.4°	39°51.1'	-55.4'	152.8°	12
13	44°13.9'	-53.9'	150.8°	43°21.4'	-54.2'	151.3°	42°28.7'	-54.5'	151.7°	41°35.7'	-54.8'	152.2°	40°42.6'	-55.0'	152.6°	39°49.2'	-55.3'	153.0°	38°55.7'	-55.5'	153.3°	13
14	43°20.0'	-54.1'	151.4°	42°27.2'	-54.4'	151.9°	41°34.2'	-54.7'	152.3°	40°40.9'	-54.9'	152.7°	39°47.5'	-55.2'	153.1°	38°53.9'	-55.4'	153.5°	38°00.2'	-55.6'	153.8°	14
15	42°25.9'	-54.3'	152.0°	41°32.8'	-54.6'	152.5°	40°39.5'	-54.8'	152.9°	39°46.0'	-55.1'	153.2°	38°52.4'	-55.3'	153.6°	37°58.5'	-55.5'	154.0°	37°04.5'	-55.7'	154.3°	15
16	41°31.6'	-54.5'	152.6°	40°38.2'	-54.7'	153.0°	39°44.7'	-55.0'	153.4°	38°50.9'	-55.2'	153.7°	37°57.1'	-55.4'	154.1°	37°03.0'	-55.6'	154.4°	36°08.8'	-55.8'	154.7°	16
17	40°37.1'	-54.6'	153.2°	39°43.5'	-54.9'	153.5°	38°49.7'	-55.1'	153.9°	37°55.7'	-55.3'	154.2°	37°01.6'	-55.5'	154.6°	36°07.4'	-55.7'	154.9°	35°13.0'	-55.9'	155.2°	17
18	39°42.5'	-54.8'	153.7°	38°48.6'	-55.0'	154.1°	37°54.6'	-55.2'	154.4°	37°00.4'	-55.4'	154.7°	36°06.0'	-55.6'	155.0°	35°11.6'	-55.8'	155.4°	34°17.0'	-56.0'	155.6°	18
19	38°47.8'	-54.9'	154.2°	37°53.6'	-55.1'	154.6°	36°59.4'	-55.3'	154.9°	36°05.0'	-55.5'	155.2°	35°10.4'	-55.7'	155.5°	34°15.8'	-55.9'	155.8°	33°21.0'	-56.1'	156.1°	19
20	37°52.9'	-55.0'	154.7°	36°58.5'	-55.2'	155.1°	36°04.0'	-55.5'	155.4°	35°09.4'	-55.7'	155.7°	34°14.7'	-55.8'								

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°04.0'	-50.7'	142.2°	55°16.4'	-51.3'	143.1°	54°28.1'	-51.8'	143.9°	53°39.4'	-52.3'	144.8°	52°50.1'	-52.8'	145.5°	52°00.5'	-53.2'	146.2°	51°10.4'	-53.6'	146.9°	0
1	55°13.3'	-51.1'	143.2°	54°25.1'	-51.7'	144.0°	53°36.3'	-52.2'	144.8°	52°47.0'	-52.6'	145.6°	51°57.3'	-53.1'	146.3°	51°07.2'	-53.5'	147.0°	50°16.7'	-53.9'	147.6°	1
2	54°22.2'	-51.5'	144.1°	53°33.5'	-52.0'	144.9°	52°44.1'	-52.5'	145.6°	51°54.4'	-52.9'	146.4°	51°04.3'	-53.4'	147.0°	50°13.7'	-53.8'	147.7°	49°22.8'	-54.1'	148.3°	2
3	53°30.8'	-51.9'	144.9°	52°41.4'	-52.3'	145.7°	51°51.7'	-52.8'	146.4°	51°01.5'	-53.2'	147.1°	50°10.9'	-53.6'	147.8°	49°20.0'	-54.0'	148.4°	48°28.7'	-54.3'	149.0°	3
4	52°38.9'	-52.2'	145.8°	51°49.1'	-52.7'	146.5°	50°58.9'	-53.1'	147.2°	50°08.2'	-53.5'	147.8°	49°17.3'	-53.9'	148.5°	48°26.0'	-54.2'	149.1°	47°34.4'	-54.5'	149.6°	4
5	51°46.7'	-52.5'	146.6°	50°56.4'	-53.0'	147.3°	50°05.8'	-53.4'	147.9°	49°14.8'	-53.7'	148.5°	48°23.4'	-54.1'	149.1°	47°31.8'	-54.4'	149.7°	46°39.8'	-54.7'	150.2°	5
6	50°54.2'	-52.8'	147.4°	50°03.5'	-53.2'	148.0°	49°12.4'	-53.6'	148.6°	48°21.0'	-54.0'	149.2°	47°29.3'	-54.3'	149.8°	46°37.4'	-54.6'	150.3°	45°45.1'	-54.9'	150.8°	6
7	50°01.4'	-53.1'	148.1°	49°10.3'	-53.5'	148.7°	48°18.8'	-53.8'	149.3°	47°27.1'	-54.2'	149.9°	46°35.0'	-54.5'	150.4°	45°42.7'	-54.8'	150.9°	44°50.2'	-55.1'	151.4°	7
8	49°08.3'	-53.4'	148.8°	48°16.8'	-53.7'	149.4°	47°25.0'	-54.1'	150.0°	46°32.9'	-54.4'	150.5°	45°40.6'	-54.7'	151.0°	44°47.9'	-55.0'	151.5°	43°55.1'	-55.2'	152.0°	8
9	48°14.9'	-53.6'	149.5°	47°23.1'	-53.9'	150.1°	46°30.9'	-54.3'	150.6°	45°38.5'	-54.6'	151.1°	44°45.9'	-54.8'	151.6°	43°53.0'	-55.1'	152.1°	42°59.9'	-55.4'	152.5°	9
10	47°21.3'	-53.8'	150.2°	46°29.1'	-54.1'	150.7°	45°36.7'	-54.4'	151.2°	44°44.0'	-54.7'	151.7°	43°51.0'	-55.0'	152.2°	42°57.9'	-55.3'	152.6°	42°04.5'	-55.5'	153.0°	10
11	46°27.5'	-54.0'	150.8°	45°35.0'	-54.3'	151.3°	44°42.2'	-54.6'	151.8°	43°49.2'	-54.9'	152.3°	42°56.0'	-55.2'	152.7°	42°02.6'	-55.4'	153.1°	41°09.0'	-55.6'	153.5°	11
12	45°33.5'	-54.2'	151.5°	44°40.7'	-54.5'	151.9°	43°47.6'	-54.8'	152.4°	42°54.3'	-55.1'	152.8°	42°00.8'	-55.3'	153.2°	41°07.2'	-55.5'	153.6°	40°13.3'	-55.8'	154.0°	12
13	44°39.3'	-54.4'	152.1°	43°46.1'	-54.7'	152.5°	42°52.8'	-55.0'	152.9°	41°59.3'	-55.2'	153.4°	41°05.5'	-55.4'	153.8°	40°11.6'	-55.7'	154.1°	39°17.6'	-55.9'	154.5°	13
14	43°44.8'	-54.6'	152.7°	42°51.4'	-54.9'	153.1°	41°57.8'	-55.1'	153.5°	41°04.1'	-55.3'	153.9°	40°10.1'	-55.6'	154.3°	39°16.0'	-55.8'	154.6°	38°21.7'	-56.0'	155.0°	14
15	42°50.2'	-54.8'	153.2°	41°56.6'	-55.0'	153.6°	41°02.7'	-55.2'	154.0°	40°08.7'	-55.5'	154.4°	39°14.5'	-55.7'	154.8°	38°20.2'	-55.9'	155.1°	37°25.7'	-56.1'	155.4°	15
16	41°55.5'	-54.9'	153.8°	41°01.6'	-55.2'	154.2°	40°07.5'	-55.4'	154.5°	39°13.2'	-55.6'	154.9°	38°18.8'	-55.8'	155.2°	37°24.3'	-56.0'	155.6°	36°29.6'	-56.2'	155.9°	16
17	41°00.6'	-55.1'	154.3°	40°06.4'	-55.3'	154.7°	39°12.1'	-55.5'	155.0°	38°17.6'	-55.7'	155.4°	37°23.0'	-55.9'	155.7°	36°28.3'	-56.1'	156.0°	35°33.4'	-56.3'	156.3°	17
18	40°05.5'	-55.2'	154.8°	39°11.1'	-55.4'	155.2°	38°16.6'	-55.6'	155.5°	37°21.9'	-55.8'	155.8°	36°27.1'	-56.0'	156.1°	35°32.2'	-56.2'	156.4°	34°37.1'	-56.4'	156.7°	18
19	39°10.3'	-55.3'	155.3°	38°15.7'	-55.5'	155.7°	37°21.0'	-55.7'	156.0°	36°26.1'	-55.9'	156.3°	35°31.1'	-56.1'	156.6°	34°36.0'	-56.3'	156.9°	33°40.7'	-56.4'	157.1°	19
20	38°15.0'	-55.4'	155.8°	37°20.2'	-55.6'	156.2°	36°25.2'	-55.8'	156.5°	35°30.2'	-56.0'	156.7°	34°35.0'	-56.2'	157.0°	33°39.7'	-56.4'	157.3°	32°44.3'	-56.5'	157.5°	20
21	37°19.6'	-55.6'	156.3°	36°24.5'	-55.8'	156.6°	35°29.4'	-55.9'	156.9°	34°34.2'	-56.1'	157.2°	33°38.8'	-56.3'	157.4°	32°43.3'	-56.4'	157.7°	31°47.8'	-56.6'	157.9°	21
22	36°24.0'	-55.7'	156.8°	35°28.8'	-55.9'	157.1°	34°33.5'	-56.0'	157.4°	33°38.0'	-56.2'	157.6°	32°42.5'	-56.4'	157.9°	31°46.9'	-56.5'	158.1°	30°51.2'	-56.7'	158.3°	22
23	35°28.3'	-55.8'	157.3°	34°32.9'	-55.9'	157.5°	33°37.4'	-56.1'	157.8°	32°41.8'	-56.3'	158.0°	31°46.2'	-56.4'	158.3°	30°50.4'	-56.6'	158.5°	29°54.5'	-56.7'	158.7°	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°35.9'	-51.4'	143.7°	55°47.3'	-51.9'	144.6°	54°58.1'	-52.4'	145.4°	54°08.5'	-52.9'	146.2°	53°18.4'	-53.4'	147.0°	52°27.9'	-53.8'	147.7°	51°37.0'	-54.2'	148.4°	0
1	55°44.5'	-51.8'	144.7°	54°55.4'	-52.3'	145.5°	54°05.7'	-52.8'	146.3°	53°15.6'	-53.2'	147.0°	52°25.0'	-53.6'	147.7°	51°34.1'	-54.0'	148.4°	50°42.8'	-54.4'	149.1°	1
2	54°52.8'	-52.2'	145.6°	54°03.1'	-52.6'	146.3°	53°12.9'	-53.1'	147.1°	52°22.4'	-53.5'	147.8°	51°31.4'	-53.9'	148.5°	50°40.1'	-54.3'	149.1°	49°48.4'	-54.6'	149.7°	2
3	54°00.7'	-52.5'	146.4°	53°10.5'	-53.0'	147.2°	52°19.9'	-53.4'	147.9°	51°28.9'	-53.8'	148.5°	50°37.5'	-54.1'	149.2°	49°45.8'	-54.5'	149.8°	48°53.8'	-54.8'	150.4°	3
4	53°08.2'	-52.8'	147.2°	52°17.5'	-53.2'	147.9°	51°26.5'	-53.6'	148.6°	50°35.1'	-54.0'	149.2°	49°43.4'	-54.4'	149.8°	48°51.3'	-54.7'	150.4°	47°59.0'	-55.0'	151.0°	4
5	52°15.3'	-53.1'	148.0°	51°24.3'	-53.5'	148.7°	50°32.8'	-53.9'	149.3°	49°41.1'	-54.2'	149.9°	48°49.8'	-54.6'	150.5°	47°56.7'	-54.9'	151.0°	47°04.8'	-55.2'	151.6°	5
6	51°22.2'	-53.4'	148.8°	50°30.7'	-53.8'	149.4°	49°38.9'	-54.1'	150.0°	48°46.8'	-54.5'	150.6°	47°54.4'	-54.8'	151.1°	47°01.8'	-55.1'	151.6°	46°08.8'	-55.3'	152.1°	6
7	50°28.8'	-53.7'	149.5°	49°37.0'	-54.0'	150.1°	48°44.8'	-54.3'	150.7°	47°52.4'	-54.7'	151.2°	46°59.7'	-55.0'	151.7°	46°06.7'	-55.2'	152.2°	45°13.5'	-55.5'	152.7°	7
8	49°35.2'	-53.9'	150.2°	48°43.0'	-54.2'	150.7°	47°50.5'	-54.5'	151.3°	46°57.7'	-54.8'	151.8°	46°04.7'	-55.1'	152.3°	45°11.5'	-55.4'	152.8°	44°18.0'	-55.6'	153.2°	8
9	48°41.3'	-54.1'	150.9°	47°48.7'	-54.4'	151.4°	46°55.9'	-54.7'	151.9°	46°02.9'	-55.0'	152.4°	45°09.6'	-55.3'	152.9°	44°16.1'	-55.5'	153.3°	43°22.4'	-55.8'	153.7°	9
10	47°47.1'	-54.3'	151.5°	46°54.3'	-54.6'	152.0°	46°01.2'	-54.9'	152.5°	45°07.8'	-55.2'	153.0°	44°14.3'	-55.4'	153.4°	43°20.5'	-55.7'	153.8°	42°26.6'	-55.9'	154.2°	10
11	46°52.8'	-54.5'	152.1°	45°59.7'	-54.8'	152.6°	45°06.3'	-55.1'	153.1°	44°12.7'	-55.3'	153.5°	43°18.9'	-55.6'	153.9°	42°24.9'	-55.8'	154.3°	41°30.7'	-56.0'	154.7°	11
12	45°58.3'	-54.7'	152.7°	45°04.8'	-55.0'	153.2°	44°11.2'	-55.2'	153.6°	43°17.3'	-55.5'	154.1°	42°23.3'	-55.7'	154.5°	41°29.1'	-55.9'	154.8°	40°34.7'	-56.1'	155.2°	12
13	45°03.6'	-54.9'	153.3°	44°09.8'	-55.1'	153.8°	43°15.9'	-55.4'	154.2°	42°21.8'	-55.6'	154.6°	41°27.6'	-55.8'	155.0°	40°33.1'	-56.0'	155.3°	39°38.5'	-56.2'	155.7°	13
14	44°08.7'	-55.1'	153.9°	43°14.7'	-55.3'	154.3°	42°20.5'	-55.5'	154.7°	41°26.2'	-55.8'	155.1°	40°31.7'	-56.0'	155.4°	39°37.1'	-56.2'	155.8°	38°42.3'	-56.3'	156.1°	14
15	43°13.6'	-55.2'	154.4°	42°19.4'	-55.4'	154.8°	41°25.0'	-55.7'	155.2°	40°30.5'	-55.9'	155.6°	39°35.8'	-56.1'	155.9°	38°40.9'	-56.3'	156.2°	37°45.9'	-56.4'	156.6°	15
16	42°18.4'	-55.4'	155.0°	41°24.0'	-55.6'	155.3°	40°29.3'	-55.8'	155.7°	39°34.6'	-56.0'	156.0°	38°39.7'	-56.2'	156.4°	37°44.7'	-56.4'	156.7°	36°49.5'	-56.5'	157.0°	16
17	41°23.0'	-55.5'	155.5°	40°28.4'	-55.7'	155.8°	39°33.6'	-55.9'	156.2°	38°38.6'	-56.1'	156.5°	37°43.5'	-56.3'	156.8°	36°48.3'	-56.4'	157.1°	35°53.0'	-56.6'	157.4°	17
18	40°27.6'	-55.6'	156.0°	39°32.7'	-55.8'	156.3°	38°37.7'	-56.0'	156.6°	37°42.5'	-56.2'	157.0°	36°47.2'	-56.4'	157.3°	35°51.8'	-56.5'	157.5°	34°56.3'	-56.7'	157.8°	18
19	39°31.9'	-55.7'	156.5°	38°36.9'	-55.9'	156.8°	37°41.7'	-56.1'	157.1°	36°46.3'	-56.3'	157.4°	35°50.9'	-56.5'	157.7°	34°55.3'	-56.6'	157.9°	33°59.7'	-56.8'	158.2°	19
20	38°36.2'	-55.8'	157.0°	37°40.9'	-56.0'	157.3°	36°45.5'	-56.2'	157.6°	35°50.0'	-56.4'	157.8°	34°54.4'	-56.5'	158.1°							

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°06.7'	-52.1'	145.3°	56°17.1'	-52.6'	146.2°	55°27.0'	-53.1'	147.0°	54°36.5'	-53.5'	147.8°	53°45.6'	-53.9'	148.5°	52°54.2'	-54.3'	149.2°	52°02.5'	-54.7'	149.8°	0
1	56°14.6'	-52.5'	146.2°	55°24.5'	-52.9'	147.0°	54°34.0'	-53.4'	147.8°	53°43.0'	-53.8'	148.5°	52°51.6'	-54.2'	149.2°	51°59.9'	-54.5'	149.9°	51°07.9'	-54.9'	150.5°	1
2	55°22.1'	-52.8'	147.1°	54°31.6'	-53.3'	147.8°	53°40.6'	-53.7'	148.6°	52°49.2'	-54.1'	149.3°	51°57.5'	-54.4'	149.9°	51°05.4'	-54.8'	150.5°	50°13.0'	-55.1'	151.1°	2
3	54°29.4'	-53.1'	147.9°	53°38.4'	-53.5'	148.6°	52°46.9'	-53.9'	149.3°	51°55.2'	-54.3'	150.0°	51°03.0'	-54.6'	150.6°	50°10.6'	-55.0'	151.2°	49°17.9'	-55.3'	151.8°	3
4	53°36.3'	-53.4'	148.7°	52°44.8'	-53.8'	149.4°	51°53.0'	-54.2'	150.0°	51°00.8'	-54.5'	150.7°	50°08.4'	-54.9'	151.3°	49°15.6'	-55.2'	151.8°	48°22.6'	-55.4'	152.3°	4
5	52°42.8'	-53.7'	149.5°	51°51.0'	-54.1'	150.1°	50°58.8'	-54.4'	150.7°	50°06.3'	-54.7'	151.3°	49°13.5'	-55.1'	151.9°	48°20.5'	-55.3'	152.4°	47°27.2'	-55.6'	152.9°	5
6	51°49.1'	-54.0'	150.2°	50°56.9'	-54.3'	150.8°	50°04.4'	-54.6'	151.4°	49°11.6'	-54.9'	151.9°	48°18.5'	-55.2'	152.5°	47°25.1'	-55.5'	153.0°	46°31.6'	-55.8'	153.5°	6
7	50°55.2'	-54.2'	150.9°	50°02.6'	-54.5'	151.5°	49°09.7'	-54.8'	152.0°	48°16.6'	-55.1'	152.6°	47°23.2'	-55.4'	153.1°	46°29.6'	-55.7'	153.5°	45°35.8'	-55.9'	154.0°	7
8	50°01.0'	-54.4'	151.6°	49°08.1'	-54.7'	152.1°	48°14.9'	-55.0'	152.6°	47°21.5'	-55.3'	153.1°	46°27.8'	-55.6'	153.6°	45°34.0'	-55.8'	154.1°	44°39.9'	-56.0'	154.5°	8
9	49°06.5'	-54.6'	152.2°	48°13.3'	-54.9'	152.7°	47°19.9'	-55.2'	153.2°	46°26.2'	-55.5'	153.7°	45°32.3'	-55.7'	154.2°	44°38.2'	-55.9'	154.6°	43°43.9'	-56.2'	155.0°	9
10	48°11.9'	-54.8'	152.8°	47°18.4'	-55.1'	153.3°	46°24.6'	-55.4'	153.8°	45°30.7'	-55.6'	154.3°	44°36.6'	-55.9'	154.7°	43°42.2'	-56.1'	155.1°	42°47.7'	-56.3'	155.5°	10
11	47°17.0'	-55.0'	153.4°	46°23.3'	-55.3'	153.9°	45°29.3'	-55.5'	154.4°	44°35.1'	-55.8'	154.8°	43°40.7'	-56.0'	155.2°	42°46.2'	-56.2'	155.6°	41°51.4'	-56.4'	156.0°	11
12	46°22.0'	-55.2'	154.0°	45°28.0'	-55.4'	154.5°	44°33.7'	-55.7'	154.9°	43°39.3'	-55.9'	155.3°	42°44.7'	-56.1'	155.7°	41°50.0'	-56.3'	156.1°	40°55.0'	-56.5'	156.4°	12
13	45°26.8'	-55.4'	154.6°	44°32.5'	-55.6'	155.0°	43°38.1'	-55.8'	155.4°	42°43.4'	-56.0'	155.8°	41°48.6'	-56.2'	156.2°	40°53.6'	-56.4'	156.5°	39°58.5'	-56.6'	156.9°	13
14	44°31.5'	-55.5'	155.1°	43°36.9'	-55.7'	155.5°	42°42.2'	-55.9'	155.9°	41°47.4'	-56.1'	156.3°	40°52.4'	-56.3'	156.6°	39°57.2'	-56.5'	157.0°	39°01.9'	-56.7'	157.3°	14
15	43°36.0'	-55.6'	155.7°	42°41.2'	-55.9'	156.0°	41°46.3'	-56.1'	156.4°	40°51.2'	-56.3'	156.8°	39°56.0'	-56.4'	157.1°	39°00.7'	-56.6'	157.4°	38°05.3'	-56.8'	157.7°	15
16	42°40.3'	-55.8'	156.2°	41°45.4'	-56.0'	156.5°	40°50.2'	-56.2'	156.9°	39°55.0'	-56.4'	157.2°	38°59.6'	-56.5'	157.5°	38°04.1'	-56.7'	157.8°	37°08.5'	-56.9'	158.1°	16
17	41°44.5'	-55.9'	156.7°	40°49.4'	-56.1'	157.0°	39°54.1'	-56.3'	157.3°	38°58.6'	-56.5'	157.7°	38°03.1'	-56.6'	158.0°	37°07.4'	-56.8'	158.2°	36°11.6'	-56.9'	158.5°	17
18	40°48.6'	-56.0'	157.2°	39°53.3'	-56.2'	157.5°	38°57.8'	-56.4'	157.8°	38°02.2'	-56.6'	158.1°	37°06.5'	-56.7'	158.4°	36°10.6'	-56.9'	158.6°	35°14.7'	-57.0'	158.9°	18
19	39°52.6'	-56.1'	157.6°	38°57.1'	-56.3'	157.9°	38°01.4'	-56.5'	158.2°	37°05.6'	-56.6'	158.5°	36°09.7'	-56.8'	158.8°	35°13.8'	-56.9'	159.0°	34°17.7'	-57.1'	159.3°	19
20	38°56.5'	-56.2'	158.1°	38°00.8'	-56.4'	158.4°	37°04.9'	-56.6'	158.7°	36°09.0'	-56.7'	158.9°	35°13.0'	-56.9'	159.2°	34°16.8'	-57.0'	159.4°	33°20.6'	-57.1'	159.7°	20
21	38°00.2'	-56.3'	158.5°	37°04.3'	-56.5'	158.8°	36°08.4'	-56.7'	159.1°	35°12.3'	-56.8'	159.3°	34°16.1'	-56.9'	159.6°	33°19.8'	-57.1'	159.8°	32°23.3'	-57.2'	160.0°	21
22	37°03.9'	-56.4'	159.0°	36°07.8'	-56.6'	159.2°	35°11.7'	-56.7'	159.5°	34°15.5'	-56.9'	159.7°	33°19.1'	-57.0'	159.9°	32°22.7'	-57.1'	160.2°	31°26.3'	-57.3'	160.4°	22
23	36°07.5'	-56.5'	159.4°	35°11.3'	-56.7'	159.6°	34°15.0'	-56.8'	159.9°	33°18.6'	-56.9'	160.1°	32°22.1'	-57.1'	160.3°	31°25.6'	-57.2'	160.5°	30°29.0'	-57.3'	160.7°	23
Dec°	28			29			30			31			32			33			34			Dec°

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°36.2'	-52.8'	146.9°	56°45.7'	-53.2'	147.8°	55°54.8'	-53.7'	148.6°	55°03.4'	-54.1'	149.3°	54°11.6'	-54.5'	150.0°	53°19.4'	-54.8'	150.7°	52°26.9'	-55.2'	151.3°	0
1	56°43.4'	-53.1'	147.8°	55°52.5'	-53.6'	148.6°	55°01.1'	-54.0'	149.3°	54°09.3'	-54.4'	150.1°	53°17.1'	-54.7'	150.7°	52°24.6'	-55.0'	151.4°	51°31.8'	-55.4'	152.0°	1
2	55°50.3'	-53.4'	148.6°	54°58.9'	-53.9'	149.4°	54°07.1'	-54.2'	150.1°	53°14.9'	-54.6'	150.8°	52°22.4'	-54.9'	151.4°	51°29.6'	-55.3'	152.0°	50°36.4'	-55.5'	152.6°	2
3	54°56.9'	-53.7'	149.4°	54°05.1'	-54.1'	150.1°	53°12.9'	-54.5'	150.8°	52°20.3'	-54.8'	151.5°	51°27.5'	-55.1'	152.1°	50°34.3'	-55.4'	152.6°	49°40.9'	-55.7'	153.2°	3
4	54°03.2'	-54.0'	150.2°	53°10.9'	-54.4'	150.9°	52°18.4'	-54.7'	151.5°	51°25.5'	-55.0'	152.1°	50°32.3'	-55.3'	152.7°	49°38.9'	-55.6'	153.2°	48°45.2'	-55.9'	153.7°	4
5	53°09.2'	-54.3'	150.9°	52°16.6'	-54.6'	151.6°	51°23.6'	-54.9'	152.2°	50°30.4'	-55.2'	152.7°	49°37.0'	-55.5'	153.3°	48°43.3'	-55.8'	153.8°	47°49.3'	-56.0'	154.3°	5
6	52°14.9'	-54.5'	151.6°	51°21.9'	-54.8'	152.2°	50°28.7'	-55.1'	152.8°	49°35.2'	-55.4'	153.4°	48°41.4'	-55.7'	153.9°	47°47.5'	-55.9'	154.4°	46°53.3'	-56.2'	154.8°	6
7	51°20.4'	-54.7'	152.3°	50°27.1'	-55.0'	152.9°	49°33.6'	-55.3'	153.4°	48°39.8'	-55.6'	153.9°	47°45.8'	-55.8'	154.4°	46°51.5'	-56.1'	154.9°	45°57.1'	-56.3'	155.3°	7
8	50°25.6'	-55.0'	153.0°	49°32.0'	-55.2'	153.5°	48°38.2'	-55.5'	154.0°	47°44.2'	-55.8'	154.5°	46°49.9'	-56.0'	155.0°	45°55.5'	-56.2'	155.4°	45°00.8'	-56.4'	155.8°	8
9	49°30.7'	-55.1'	153.6°	48°36.8'	-55.4'	154.1°	47°42.7'	-55.7'	154.6°	46°48.4'	-55.9'	155.0°	45°53.9'	-56.1'	155.5°	44°59.2'	-56.3'	155.9°	44°04.4'	-56.5'	156.3°	9
10	48°35.5'	-55.3'	154.2°	47°41.4'	-55.6'	154.7°	46°47.0'	-55.8'	155.1°	45°52.5'	-56.0'	155.6°	44°57.8'	-56.3'	156.0°	44°02.9'	-56.5'	156.4°	43°07.8'	-56.6'	156.8°	10
11	47°40.2'	-55.5'	154.8°	46°45.8'	-55.7'	155.2°	45°51.2'	-56.0'	155.7°	44°56.5'	-56.2'	156.1°	44°01.5'	-56.4'	156.5°	43°06.4'	-56.6'	156.9°	42°11.2'	-56.7'	157.2°	11
12	46°44.7'	-55.7'	155.3°	45°50.1'	-55.9'	155.8°	44°55.3'	-56.1'	156.2°	44°00.3'	-56.3'	156.6°	43°05.2'	-56.5'	156.9°	42°09.9'	-56.7'	157.3°	41°14.4'	-56.8'	157.6°	12
13	45°49.0'	-55.8'	155.9°	44°54.2'	-56.0'	156.3°	43°59.2'	-56.2'	156.7°	43°04.0'	-56.4'	157.0°	42°08.7'	-56.6'	157.4°	41°13.2'	-56.8'	157.7°	40°17.6'	-56.9'	158.1°	13
14	44°53.2'	-55.9'	156.4°	43°58.2'	-56.1'	156.8°	43°02.9'	-56.3'	157.2°	42°07.6'	-56.5'	157.5°	41°12.1'	-56.7'	157.8°	40°16.4'	-56.9'	158.2°	39°20.7'	-57.0'	158.5°	14
15	43°57.3'	-56.1'	156.9°	43°02.0'	-56.3'	157.3°	42°06.6'	-56.5'	157.6°	41°11.0'	-56.6'	158.0°	40°15.4'	-56.8'	158.3°	39°19.6'	-56.9'	158.6°	38°23.7'	-57.1'	158.9°	15
16	43°01.2'	-56.2'	157.4°	42°05.7'	-56.4'	157.7°	41°10.1'	-56.6'	158.1°	40°14.4'	-56.7'	158.4°	39°18.6'	-56.9'	158.7°	38°22.6'	-57.0'	159.0°	37°26.6'	-57.2'	159.3°	16
17	42°05.0'	-56.3'	157.9°	41°09.4'	-56.5'	158.2°	40°13.6'	-56.7'	158.5°	39°17.7'	-56.8'	158.8°	38°21.7'	-57.0'	159.1°	37°25.6'	-57.1'	159.4°	36°29.4'	-57.2'	159.6°	17
18	41°08.7'	-56.4'	158.3°	40°12.9'	-56.6'	158.6°	39°16.9'	-56.7'	158.9°	38°20.9'	-56.9'	159.2°	37°24.7'	-57.0'	159.5°	36°28.5'	-57.2'	159.8°	35°32.1'	-57.3'	160.0°	18
19	40°12.3'	-56.5'	158.8°	39°16.3'	-56.7'	159.1°	38°20.2'	-56.8'	159.4°	37°24.0'	-57.0'	159.6°	36°27.7'	-57.1'	159.9°	35°31.3'	-57.2'	160.1°	34°34.8'	-57.4'	160.4°	19
20	39°15.8'	-56.6'	159.2°	38°19.6'	-56.8'	159.5°	37°23.4'	-56.9'	159.8°	36°27.0'	-57.1'	160.0°	35°30.6'	-57.2'	160.3°	34°34.1'	-57.3'	160.5°	33°37.5'	-57.4'	160.7°	20
21	38°19.1'	-56.7'	159.6°	37°22.8'	-56.8'	159.9°	36°26.5'	-57.0'	160.2°	35°30.0'	-57.1'	1										

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

16° 344° LHA

Latitude CONTRARY to Declination

16° 344° 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°04.5'	-53.4'	148.6°	57°13.1'	-53.9'	149.4°	56°21.2'	-54.3'	150.2°	55°29.0'	-54.7'	150.9°	54°36.4'	-55.0'	151.6°	53°43.5'	-55.3'	152.2°	52°50.2'	-55.6'	152.9°	0
1	57°11.0'	-53.8'	149.4°	56°19.2'	-54.2'	150.2°	55°27.0'	-54.6'	150.9°	54°34.3'	-54.9'	151.6°	53°41.4'	-55.2'	152.3°	52°48.1'	-55.5'	152.9°	51°54.6'	-55.8'	153.5°	1
2	56°17.3'	-54.1'	150.2°	55°25.0'	-54.5'	151.0°	54°32.4'	-54.8'	151.7°	53°39.4'	-55.1'	152.3°	52°46.2'	-55.4'	152.9°	51°52.6'	-55.7'	153.5°	50°58.8'	-56.0'	154.1°	2
3	55°23.2'	-54.3'	151.0°	54°30.6'	-54.7'	151.7°	53°37.6'	-55.0'	152.3°	52°44.3'	-55.3'	153.0°	51°50.7'	-55.6'	153.5°	50°56.9'	-55.9'	154.1°	50°02.8'	-56.1'	154.6°	3
4	54°28.9'	-54.6'	151.8°	53°35.9'	-54.9'	152.4°	52°42.6'	-55.3'	153.0°	51°48.9'	-55.5'	153.6°	50°55.1'	-55.8'	154.1°	50°01.0'	-56.1'	154.7°	49°06.6'	-56.3'	155.2°	4
5	53°34.3'	-54.8'	152.5°	52°40.9'	-55.2'	153.1°	51°47.3'	-55.4'	153.6°	50°53.4'	-55.7'	154.2°	49°59.3'	-56.0'	154.7°	49°04.9'	-56.2'	155.2°	48°10.3'	-56.4'	155.7°	5
6	52°39.4'	-55.1'	153.1°	51°45.8'	-55.4'	153.7°	50°51.9'	-55.6'	154.3°	49°57.7'	-55.9'	154.8°	49°03.3'	-56.1'	155.3°	48°08.7'	-56.4'	155.7°	47°13.9'	-56.6'	156.2°	6
7	51°44.4'	-55.3'	153.8°	50°50.4'	-55.5'	154.3°	49°56.2'	-55.8'	154.8°	49°01.8'	-56.0'	155.3°	48°07.2'	-56.3'	155.8°	47°12.3'	-56.5'	156.3°	46°17.3'	-56.7'	156.7°	7
8	50°49.1'	-55.5'	154.4°	49°54.9'	-55.7'	154.9°	49°00.4'	-56.0'	155.4°	48°05.8'	-56.2'	155.9°	47°10.9'	-56.4'	156.3°	46°15.9'	-56.6'	156.7°	45°20.7'	-56.8'	157.1°	8
9	49°53.6'	-55.6'	155.0°	48°59.1'	-55.9'	155.5°	48°04.5'	-56.1'	156.0°	47°09.6'	-56.3'	156.4°	46°14.5'	-56.5'	156.8°	45°19.3'	-56.7'	157.2°	44°23.9'	-56.9'	157.6°	9
10	48°58.0'	-55.8'	155.6°	48°03.3'	-56.0'	156.0°	47°08.3'	-56.3'	156.5°	46°13.2'	-56.5'	156.9°	45°18.0'	-56.6'	157.3°	44°22.5'	-56.8'	157.7°	43°27.0'	-57.0'	158.0°	10
11	48°02.2'	-56.0'	156.1°	47°07.2'	-56.2'	156.6°	46°12.1'	-56.4'	157.0°	45°16.8'	-56.6'	157.4°	44°21.3'	-56.8'	157.8°	43°25.7'	-56.9'	158.1°	42°30.0'	-57.1'	158.5°	11
12	47°06.2'	-56.1'	156.7°	46°11.0'	-56.3'	157.1°	45°15.7'	-56.5'	157.5°	44°20.2'	-56.7'	157.9°	43°24.6'	-56.9'	158.2°	42°28.8'	-57.0'	158.6°	41°32.9'	-57.2'	158.9°	12
13	46°10.1'	-56.2'	157.2°	45°14.7'	-56.4'	157.6°	44°19.2'	-56.6'	158.0°	43°23.5'	-56.8'	158.3°	42°27.7'	-57.0'	158.7°	41°31.8'	-57.1'	159.0°	40°35.7'	-57.3'	159.3°	13
14	45°13.9'	-56.4'	157.7°	44°18.3'	-56.5'	158.1°	43°22.6'	-56.7'	158.4°	42°26.7'	-56.9'	158.8°	41°30.7'	-57.0'	159.1°	40°34.6'	-57.2'	159.4°	39°38.4'	-57.3'	159.7°	14
15	44°17.5'	-56.5'	158.2°	43°21.8'	-56.7'	158.5°	42°25.9'	-56.8'	158.9°	41°29.8'	-57.0'	159.2°	40°33.7'	-57.1'	159.5°	39°37.5'	-57.3'	159.8°	38°41.1'	-57.4'	160.1°	15
16	43°21.0'	-56.6'	158.6°	42°25.1'	-56.8'	159.0°	41°29.0'	-56.9'	159.3°	40°32.9'	-57.1'	159.6°	39°36.6'	-57.2'	159.9°	38°40.2'	-57.3'	160.2°	37°43.7'	-57.5'	160.4°	16
17	42°24.4'	-56.7'	159.1°	41°28.3'	-56.9'	159.4°	40°32.1'	-57.0'	159.7°	39°35.8'	-57.1'	160.0°	38°39.4'	-57.3'	160.3°	37°42.8'	-57.4'	160.5°	36°46.2'	-57.5'	160.8°	17
18	41°27.7'	-56.8'	159.5°	40°31.5'	-56.9'	159.8°	39°35.1'	-57.1'	160.1°	38°38.6'	-57.2'	160.4°	37°42.1'	-57.4'	160.7°	36°45.4'	-57.5'	160.9°	35°48.7'	-57.6'	161.1°	18
19	40°30.9'	-56.9'	160.0°	39°34.5'	-57.0'	160.2°	38°38.0'	-57.2'	160.5°	37°41.4'	-57.3'	160.8°	36°44.7'	-57.4'	161.0°	35°47.9'	-57.5'	161.3°	34°51.1'	-57.7'	161.5°	19
20	39°34.1'	-57.0'	160.4°	38°37.5'	-57.1'	160.6°	37°40.9'	-57.2'	160.9°	36°44.1'	-57.4'	161.1°	35°47.3'	-57.5'	161.4°	34°50.4'	-57.6'	161.6°	33°53.4'	-57.7'	161.8°	20
21	38°37.1'	-57.1'	160.8°	37°40.4'	-57.2'	161.0°	36°43.6'	-57.3'	161.3°	35°46.7'	-57.4'	161.5°	34°49.8'	-57.5'	161.7°	33°52.8'	-57.7'	161.9°	32°55.7'	-57.8'	162.1°	21
22	37°40.0'	-57.1'	161.2°	36°43.2'	-57.3'	161.4°	35°46.3'	-57.4'	161.6°	34°49.3'	-57.5'	161.9°	33°52.3'	-57.6'	162.1°	32°55.1'	-57.7'	162.3°	31°58.0'	-57.8'	162.5°	22
23	36°42.9'	-57.2'	161.5°	35°45.9'	-57.3'	161.8°	34°48.9'	-57.4'	162.0°	33°51.8'	-57.5'	162.2°	32°54.7'	-57.7'	162.4°	31°57.4'	-57.8'	162.6°	31°00.2'	-57.9'	162.8°	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

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°31.4'	-54.1'	150.3°	57°39.1'	-54.5'	151.1°	56°46.4'	-54.9'	151.8°	55°53.4'	-55.2'	152.5°	54°60.0'	-55.5'	153.2°	54°06.3'	-55.8'	153.8°	53°12.3'	-56.1'	154.4°	0
1	57°37.3'	-54.4'	151.1°	56°44.6'	-54.8'	151.8°	55°51.6'	-55.1'	152.5°	54°58.2'	-55.4'	153.2°	54°04.5'	-55.7'	153.8°	53°10.5'	-56.0'	154.4°	52°16.2'	-56.3'	155.0°	1
2	56°42.9'	-54.7'	151.9°	55°49.9'	-55.0'	152.6°	54°56.4'	-55.4'	153.2°	54°02.7'	-55.7'	153.9°	53°08.7'	-55.9'	154.5°	52°14.5'	-56.2'	155.0°	51°20.0'	-56.4'	155.5°	2
3	55°48.3'	-54.9'	152.6°	54°54.8'	-55.3'	153.3°	54°01.1'	-55.6'	153.9°	53°07.1'	-55.8'	154.5°	52°12.8'	-56.1'	155.1°	51°18.3'	-56.3'	155.6°	50°23.5'	-56.6'	156.1°	3
4	54°53.3'	-55.2'	153.3°	53°59.6'	-55.5'	153.9°	53°05.5'	-55.8'	154.5°	52°11.2'	-56.0'	155.1°	51°16.7'	-56.3'	155.6°	50°21.9'	-56.5'	156.1°	49°27.0'	-56.7'	156.6°	4
5	53°58.1'	-55.4'	154.0°	53°04.1'	-55.7'	154.6°	52°09.8'	-55.9'	155.1°	51°15.2'	-56.2'	155.7°	50°20.4'	-56.4'	156.2°	49°25.4'	-56.6'	156.6°	48°30.3'	-56.8'	157.1°	5
6	53°02.8'	-55.6'	154.6°	52°08.4'	-55.9'	155.2°	51°13.8'	-56.1'	155.7°	50°19.0'	-56.3'	156.2°	49°24.0'	-56.6'	156.7°	48°28.8'	-56.8'	157.2°	47°33.4'	-56.9'	157.6°	6
7	52°07.2'	-55.8'	155.3°	51°12.5'	-56.0'	155.8°	50°17.7'	-56.3'	156.3°	49°22.7'	-56.5'	156.8°	48°27.5'	-56.7'	157.2°	47°32.1'	-56.9'	157.6°	46°36.5'	-57.1'	158.0°	7
8	51°11.4'	-56.0'	155.9°	50°16.5'	-56.2'	156.4°	49°21.5'	-56.4'	156.8°	48°26.2'	-56.6'	157.3°	47°30.8'	-56.8'	157.7°	46°35.2'	-57.0'	158.1°	45°39.4'	-57.2'	158.5°	8
9	50°15.4'	-56.1'	156.4°	49°20.3'	-56.3'	156.9°	48°25.0'	-56.5'	157.3°	47°29.6'	-56.7'	157.8°	46°34.0'	-56.9'	158.2°	45°38.2'	-57.1'	158.6°	44°42.3'	-57.2'	158.9°	9
10	49°19.3'	-56.3'	157.0°	48°24.0'	-56.5'	157.4°	47°28.5'	-56.7'	157.8°	46°32.9'	-56.8'	158.2°	45°37.1'	-57.0'	158.6°	44°41.1'	-57.2'	159.0°	43°45.0'	-57.3'	159.3°	10
11	48°23.0'	-56.4'	157.5°	47°27.5'	-56.6'	157.9°	46°31.8'	-56.8'	158.3°	45°36.0'	-57.0'	158.7°	44°40.0'	-57.1'	159.1°	43°43.9'	-57.3'	159.4°	42°47.7'	-57.4'	159.7°	11
12	47°26.6'	-56.5'	158.0°	46°30.9'	-56.7'	158.4°	45°35.1'	-56.9'	158.8°	44°39.1'	-57.1'	159.2°	43°42.9'	-57.2'	159.5°	42°46.7'	-57.4'	159.8°	41°50.3'	-57.5'	160.1°	12
13	46°30.1'	-56.7'	158.5°	45°34.2'	-56.8'	158.9°	44°38.2'	-57.0'	159.2°	43°42.0'	-57.2'	159.6°	42°45.7'	-57.3'	159.9°	41°49.3'	-57.4'	160.2°	40°52.8'	-57.6'	160.5°	13
14	45°33.4'	-56.8'	159.0°	44°37.4'	-56.9'	159.3°	43°41.2'	-57.1'	159.7°	42°44.8'	-57.2'	160.0°	41°48.4'	-57.4'	160.3°	40°51.9'	-57.5'	160.6°	39°55.2'	-57.6'	160.9°	14
15	44°36.7'	-56.9'	159.4°	43°40.4'	-57.0'	159.8°	42°44.1'	-57.2'	160.1°	41°47.6'	-57.3'	160.4°	40°51.0'	-57.5'	160.7°	39°54.3'	-57.6'	161.0°	38°57.6'	-57.7'	161.2°	15
16	43°39.8'	-57.0'	159.9°	42°43.4'	-57.1'	160.2°	41°46.9'	-57.3'	160.5°	40°50.3'	-57.4'	160.8°	39°53.6'	-57.5'	161.1°	38°56.8'	-57.6'	161.3°	37°59.9'	-57.8'	161.6°	16
17	42°42.8'	-57.1'	160.3°	41°46.3'	-57.2'	160.6°	40°49.6'	-57.3'	160.9°	39°52.9'	-57.5'	161.2°	38°56.0'	-57.6'	161.4°	37°59.1'	-57.7'	161.7°	37°02.1'	-57.8'	161.9°	17
18	41°45.8'	-57.2'	160.7°	40°49.1'	-57.3'	161.0°	39°52.3'	-57.4'	161.3°	38°55.4'	-57.5'	161.6°	37°58.4'	-57.7'	161.8°	37°01.4'	-57.8'	162.0°	36°04.3'	-57.9'	162.3°	18
19	40°48.6'	-57.2'	161.1°	39°51.8'	-57.4'	161.4°	38°54.9'	-57.5'	161.7°	37°57.9'	-57.6'	161.9°	37°00.8'	-57.7'	162.2°	36°03.6'	-57.8'	162.4°	35°06.4'	-57.9'	162.6°	19
20	39°51.4'	-57.3'	161.5°	38°54.4'	-57.4'	161.8°	37°57.4'	-57.6'	162.0°	37°00.3'	-57.7'	162.3°	36°03.1'	-57.8'	162.5°							

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°57.0'	-54.8'	152.0°	58°03.8'	-55.1'	152.8°	57°10.3'	-55.5'	153.5°	56°16.5'	-55.8'	154.2°	55°22.3'	-56.0'	154.8°	54°27.9'	-56.3'	155.4°	53°33.2'	-56.6'	156.0°	0
1	58°02.2'	-55.0'	152.8°	57°08.7'	-55.4'	153.5°	56°14.9'	-55.7'	154.2°	55°20.7'	-56.0'	154.8°	54°26.3'	-56.2'	155.4°	53°31.6'	-56.5'	156.0°	52°36.7'	-56.7'	156.5°	1
2	57°07.2'	-55.3'	153.6°	56°13.4'	-55.6'	154.2°	55°19.2'	-55.9'	154.9°	54°24.7'	-56.2'	155.5°	53°30.0'	-56.4'	156.0°	52°35.1'	-56.6'	156.6°	51°39.9'	-56.8'	157.1°	2
3	56°11.9'	-55.5'	154.3°	55°17.8'	-55.8'	154.9°	54°23.3'	-56.1'	155.5°	53°28.6'	-56.3'	156.1°	52°33.6'	-56.6'	156.6°	51°38.5'	-56.8'	157.1°	50°43.1'	-57.0'	157.6°	3
4	55°16.4'	-55.7'	154.9°	54°22.0'	-56.0'	155.5°	53°27.2'	-56.2'	156.1°	52°32.3'	-56.5'	156.6°	51°37.1'	-56.7'	157.1°	50°41.7'	-56.9'	157.6°	49°46.1'	-57.1'	158.1°	4
5	54°20.7'	-55.9'	155.6°	53°26.0'	-56.2'	156.1°	52°31.0'	-56.4'	156.7°	51°35.8'	-56.6'	157.2°	50°40.4'	-56.8'	157.6°	49°44.8'	-57.0'	158.1°	48°49.0'	-57.2'	158.5°	5
6	53°24.8'	-56.1'	156.2°	52°29.8'	-56.3'	156.7°	51°34.6'	-56.6'	157.2°	50°39.1'	-56.8'	157.7°	49°43.5'	-57.0'	158.1°	48°47.8'	-57.1'	158.6°	47°51.8'	-57.3'	159.0°	6
7	52°28.7'	-56.3'	156.8°	51°33.4'	-56.5'	157.3°	50°38.0'	-56.7'	157.8°	49°42.4'	-56.9'	158.2°	48°46.6'	-57.1'	158.6°	47°50.6'	-57.2'	159.0°	46°54.5'	-57.4'	159.4°	7
8	51°32.4'	-56.4'	157.3°	50°36.9'	-56.6'	157.8°	49°41.3'	-56.8'	158.3°	48°45.5'	-57.0'	158.7°	47°49.5'	-57.2'	159.1°	46°53.4'	-57.3'	159.5°	45°57.1'	-57.5'	159.8°	8
9	50°36.0'	-56.6'	157.9°	49°40.3'	-56.8'	158.3°	48°44.5'	-57.0'	158.8°	47°48.5'	-57.1'	159.2°	46°52.3'	-57.3'	159.5°	45°56.0'	-57.4'	159.9°	44°59.6'	-57.6'	160.3°	9
10	49°39.4'	-56.7'	158.4°	48°43.5'	-56.9'	158.8°	47°47.5'	-57.1'	159.2°	46°51.3'	-57.2'	159.6°	45°55.0'	-57.4'	160.0°	44°58.6'	-57.5'	160.3°	44°02.1'	-57.7'	160.6°	10
11	48°42.7'	-56.8'	158.9°	47°46.7'	-57.0'	159.3°	46°50.5'	-57.2'	159.7°	45°54.1'	-57.3'	160.0°	44°57.7'	-57.5'	160.4°	44°01.1'	-57.6'	160.7°	43°04.4'	-57.7'	161.0°	11
12	47°45.9'	-56.9'	159.4°	46°49.7'	-57.1'	159.8°	45°53.3'	-57.3'	160.1°	44°56.8'	-57.4'	160.5°	44°00.2'	-57.5'	160.8°	43°03.5'	-57.7'	161.1°	42°06.7'	-57.8'	161.4°	12
13	46°48.9'	-57.1'	159.9°	45°52.5'	-57.2'	160.2°	44°56.0'	-57.4'	160.6°	43°59.4'	-57.5'	160.9°	43°02.6'	-57.6'	161.2°	42°05.8'	-57.7'	161.5°	41°08.9'	-57.9'	161.8°	13
14	45°51.9'	-57.2'	160.3°	44°55.3'	-57.3'	160.6°	43°58.7'	-57.4'	161.0°	43°01.9'	-57.6'	161.3°	42°05.0'	-57.7'	161.6°	41°08.1'	-57.8'	161.8°	40°11.0'	-57.9'	162.1°	14
15	44°54.7'	-57.3'	160.7°	43°58.0'	-57.4'	161.1°	43°01.2'	-57.5'	161.4°	42°04.3'	-57.6'	161.7°	41°07.3'	-57.8'	161.9°	40°10.2'	-57.9'	162.2°	39°13.1'	-58.0'	162.4°	15
16	43°57.5'	-57.3'	161.2°	43°00.6'	-57.5'	161.5°	42°03.7'	-57.6'	161.7°	41°06.7'	-57.7'	162.0°	40°09.6'	-57.8'	162.3°	39°12.4'	-57.9'	162.5°	38°15.1'	-58.0'	162.8°	16
17	43°00.1'	-57.4'	161.6°	42°03.2'	-57.5'	161.8°	41°06.1'	-57.7'	162.1°	40°09.0'	-57.8'	162.4°	39°11.7'	-57.9'	162.6°	38°14.4'	-58.0'	162.9°	37°17.1'	-58.1'	163.1°	17
18	42°02.7'	-57.5'	162.0°	41°05.6'	-57.6'	162.2°	40°08.4'	-57.7'	162.5°	39°11.2'	-57.8'	162.7°	38°13.8'	-57.9'	163.0°	37°16.4'	-58.0'	163.2°	36°19.0'	-58.1'	163.4°	18
19	41°05.2'	-57.6'	162.3°	40°08.0'	-57.7'	162.6°	39°10.7'	-57.8'	162.8°	38°13.3'	-57.9'	163.1°	37°15.9'	-58.0'	163.3°	36°18.4'	-58.1'	163.5°	35°20.8'	-58.2'	163.7°	19
20	40°07.6'	-57.6'	162.7°	39°10.3'	-57.8'	162.9°	38°12.9'	-57.9'	163.2°	37°15.4'	-58.0'	163.4°	36°17.9'	-58.0'	163.6°	35°20.3'	-58.1'	163.8°	34°22.7'	-58.2'	164.0°	20
21	39°10.0'	-57.7'	163.1°	38°12.5'	-57.8'	163.3°	37°15.0'	-57.9'	163.5°	36°17.5'	-58.0'	163.7°	35°19.9'	-58.1'	163.9°	34°22.2'	-58.2'	164.1°	33°24.4'	-58.3'	164.3°	21
22	38°12.3'	-57.8'	163.4°	37°14.7'	-57.9'	163.6°	36°17.1'	-58.0'	163.8°	35°17.1'	-58.0'	164.0°	34°21.8'	-58.1'	164.2°	33°24.0'	-58.2'	164.4°	32°26.2'	-58.3'	164.6°	22
23	37°14.5'	-57.8'	163.8°	36°16.9'	-57.9'	164.0°	35°19.2'	-58.0'	164.2°	34°21.4'	-58.1'	164.4°	33°23.6'	-58.2'	164.5°	32°25.8'	-58.3'	164.7°	31°27.9'	-58.3'	164.9°	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°21.1'	-55.4'	153.8°	58°27.1'	-55.7'	154.5°	57°32.8'	-56.0'	155.2°	56°38.2'	-56.3'	155.9°	55°43.3'	-56.5'	156.5°	54°48.2'	-56.8'	157.0°	53°52.8'	-57.0'	157.6°	0
1	58°25.7'	-55.6'	154.6°	57°31.4'	-55.9'	155.2°	56°36.8'	-56.2'	155.9°	55°41.9'	-56.5'	156.5°	54°46.8'	-56.7'	157.0°	53°51.4'	-56.9'	157.6°	52°55.8'	-57.1'	158.1°	1
2	57°30.1'	-55.9'	155.3°	56°35.5'	-56.1'	155.9°	55°40.6'	-56.4'	156.5°	54°45.4'	-56.6'	157.1°	53°50.1'	-56.9'	157.6°	52°54.5'	-57.1'	158.1°	51°58.7'	-57.2'	158.6°	2
3	56°34.3'	-56.1'	155.9°	55°39.3'	-56.3'	156.5°	54°44.2'	-56.6'	157.1°	53°48.8'	-56.8'	157.6°	52°53.2'	-57.0'	158.1°	51°57.4'	-57.2'	158.6°	51°01.5'	-57.4'	159.1°	3
4	55°38.2'	-56.3'	156.6°	54°43.0'	-56.5'	157.1°	53°47.6'	-56.7'	157.7°	52°52.0'	-56.9'	158.2°	51°56.2'	-57.1'	158.7°	51°00.3'	-57.3'	159.1°	50°04.1'	-57.5'	159.5°	4
5	54°41.9'	-56.4'	157.2°	53°46.5'	-56.7'	157.7°	52°50.9'	-56.9'	158.2°	51°55.1'	-57.1'	158.7°	50°59.1'	-57.2'	159.1°	50°03.0'	-57.4'	159.6°	49°06.7'	-57.6'	160.0°	5
6	53°45.5'	-56.6'	157.8°	52°49.9'	-56.8'	158.3°	51°54.0'	-57.0'	158.7°	50°58.0'	-57.1'	159.2°	50°01.9'	-57.3'	159.6°	49°05.6'	-57.5'	160.0°	48°09.1'	-57.7'	160.4°	6
7	52°48.9'	-56.7'	158.3°	51°53.1'	-56.9'	158.8°	50°57.0'	-57.1'	159.2°	50°00.9'	-57.3'	159.7°	49°04.5'	-57.4'	160.1°	48°08.0'	-57.6'	160.5°	47°11.4'	-57.7'	160.8°	7
8	51°52.2'	-56.9'	158.9°	50°56.1'	-57.1'	159.3°	49°59.9'	-57.2'	159.7°	49°03.6'	-57.4'	160.1°	48°07.1'	-57.5'	160.5°	47°10.5'	-57.7'	160.9°	46°13.7'	-57.8'	161.2°	8
9	50°55.3'	-57.0'	159.4°	49°59.1'	-57.2'	159.8°	49°02.7'	-57.3'	160.2°	48°06.2'	-57.5'	160.6°	47°09.5'	-57.6'	160.9°	46°12.8'	-57.8'	161.3°	45°15.9'	-57.9'	161.6°	9
10	49°58.3'	-57.1'	159.9°	49°01.9'	-57.3'	160.3°	48°05.4'	-57.4'	160.6°	47°08.7'	-57.6'	161.0°	46°11.9'	-57.7'	161.3°	45°15.0'	-57.8'	161.7°	44°18.0'	-58.0'	162.0°	10
11	49°01.2'	-57.2'	160.3°	48°04.6'	-57.4'	160.7°	47°07.9'	-57.5'	161.1°	46°11.1'	-57.7'	161.4°	45°14.2'	-57.8'	161.7°	44°17.2'	-57.9'	162.0°	43°20.0'	-58.0'	162.3°	11
12	48°03.9'	-57.3'	160.8°	47°07.2'	-57.5'	161.1°	46°10.4'	-57.6'	161.5°	45°13.4'	-57.7'	161.8°	44°16.4'	-57.9'	162.1°	43°19.2'	-58.0'	162.4°	42°22.0'	-58.1'	162.7°	12
13	47°06.6'	-57.4'	161.2°	46°09.7'	-57.6'	161.6°	45°12.8'	-57.7'	161.9°	44°15.7'	-57.8'	162.2°	43°18.5'	-57.9'	162.5°	42°21.3'	-58.0'	162.7°	41°23.9'	-58.1'	163.0°	13
14	46°09.2'	-57.5'	161.6°	45°12.2'	-57.7'	162.0°	44°15.1'	-57.8'	162.3°	43°17.9'	-57.9'	162.5°	42°20.6'	-58.0'	162.8°	41°23.2'	-58.1'	163.1°	40°25.8'	-58.2'	163.3°	14
15	45°11.6'	-57.6'	162.0°	44°14.5'	-57.7'	162.3°	43°17.3'	-57.8'	162.6°	42°20.0'	-58.0'	162.9°	41°22.6'	-58.1'	163.2°	40°25.1'	-58.2'	163.4°	39°27.6'	-58.2'	163.7°	15
16	44°14.0'	-57.7'	162.4°	43°16.8'	-57.8'	162.7°	42°19.4'	-57.9'	163.0°	41°22.0'	-58.0'	163.3°	40°24.5'	-58.1'	163.5°	39°27.0'	-58.2'	163.7°	38°29.3'	-58.3'	164.0°	16
17	43°16.3'	-57.8'	162.8°	42°19.0'	-57.9'	163.1°	41°21.5'	-58.0'	163.3°	40°24.0'	-58.1'	163.6°	39°26.4'	-58.2'	163.8°	38°28.8'	-58.3'	164.0°	37°31.0'	-58.3'	164.3°	17
18	42°18.6'	-57.8'	163.2°	41°21.1'	-57.9'	163.4°	40°23.6'	-58.0'	163.7°	39°25.9'	-58.1'	163.9°	38°28.2'	-58.2'	164.1°	37°30.5'	-58.3'	164.4°	36°32.7'	-58.4'	164.6°	18
19	41°20.7'	-57.9'	163.5°	40°23.2'	-58.0'	163.8°	39°25.5'	-58.1'	164.0°	38°27.8'	-58.2'	164.2°	37°30.0'	-58.3'	164.4°	36°32.2'	-58.3'	164.6°	35°34.3'	-58.4'	164.8°	19
20	40°22.9'	-58.0'	163.9°	39°25.2'	-58.0'	164.1°	38°27.4'	-58.1'	164.3°	37°29.6'	-58.2'	164.5°	36°31.8'	-58.3'								

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

12° 348° LHA

**Latitude CONTRARY to 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°43.7'	-56.0'	155.6°	58°48.9'	-56.3'	156.3°	57°53.9'	-56.5'	157.0°	56°58.5'	-56.8'	157.6°	56°02.9'	-57.0'	158.1°	55°07.2'	-57.2'	158.7°	54°11.2'	-57.4'	159.2°	0
1	58°47.7'	-56.2'	156.3°	57°52.7'	-56.5'	157.0°	56°57.3'	-56.7'	157.6°	56°01.7'	-56.9'	158.2°	55°05.9'	-57.1'	158.7°	54°09.9'	-57.3'	159.2°	53°13.8'	-57.5'	159.7°	1
2	57°51.5'	-56.4'	157.0°	56°56.2'	-56.7'	157.6°	56°00.6'	-56.9'	158.2°	55°04.8'	-57.1'	158.7°	54°08.8'	-57.3'	159.2°	53°12.6'	-57.5'	159.7°	52°16.2'	-57.6'	160.2°	2
3	56°55.1'	-56.6'	157.6°	55°59.5'	-56.8'	158.2°	55°03.7'	-57.0'	158.7°	54°07.7'	-57.2'	159.2°	53°11.5'	-57.4'	159.7°	52°15.1'	-57.6'	160.2°	51°18.6'	-57.7'	160.6°	3
4	55°58.5'	-56.8'	158.2°	55°02.7'	-57.0'	158.8°	54°06.7'	-57.2'	159.3°	53°10.5'	-57.3'	159.8°	52°14.1'	-57.5'	160.2°	51°17.6'	-57.7'	160.6°	50°20.9'	-57.8'	161.0°	4
5	55°01.8'	-56.9'	158.8°	54°05.7'	-57.1'	159.3°	53°09.5'	-57.3'	159.8°	52°13.1'	-57.5'	160.2°	51°16.6'	-57.6'	160.7°	50°19.9'	-57.8'	161.1°	49°23.1'	-57.9'	161.4°	5
6	54°04.9'	-57.1'	159.4°	53°08.6'	-57.2'	159.8°	52°12.2'	-57.4'	160.3°	51°15.7'	-57.6'	160.7°	50°19.0'	-57.7'	161.1°	49°22.1'	-57.9'	161.5°	48°25.2'	-58.0'	161.8°	6
7	53°07.8'	-57.2'	159.9°	52°11.4'	-57.4'	160.3°	51°14.8'	-57.5'	160.8°	50°18.1'	-57.7'	161.2°	49°21.3'	-57.8'	161.5°	48°24.3'	-57.9'	161.9°	47°27.2'	-58.1'	162.2°	7
8	52°10.6'	-57.3'	160.4°	51°14.0'	-57.5'	160.8°	50°17.3'	-57.6'	161.2°	49°20.4'	-57.8'	161.6°	48°23.5'	-57.9'	161.9°	47°26.4'	-58.0'	162.3°	46°29.2'	-58.1'	162.6°	8
9	51°13.3'	-57.4'	160.9°	50°16.6'	-57.6'	161.3°	49°19.7'	-57.7'	161.6°	48°22.7'	-57.8'	162.0°	47°25.6'	-58.0'	162.3°	46°28.3'	-58.1'	162.7°	45°31.0'	-58.2'	163.0°	9
10	50°15.9'	-57.5'	161.3°	49°19.0'	-57.7'	161.7°	48°22.0'	-57.8'	162.0°	47°24.8'	-57.9'	162.4°	46°27.6'	-58.0'	162.7°	45°30.3'	-58.1'	163.0°	44°32.8'	-58.2'	163.3°	10
11	49°18.4'	-57.6'	161.8°	48°21.3'	-57.8'	162.1°	47°24.2'	-57.9'	162.5°	46°26.9'	-58.0'	162.8°	45°29.6'	-58.1'	163.1°	44°32.1'	-58.2'	163.4°	43°34.6'	-58.3'	163.6°	11
12	48°20.8'	-57.7'	162.2°	47°23.6'	-57.8'	162.5°	46°26.3'	-58.0'	162.8°	45°28.9'	-58.1'	163.1°	44°31.5'	-58.2'	163.4°	43°33.9'	-58.3'	163.7°	42°36.3'	-58.4'	164.0°	12
13	47°23.0'	-57.8'	162.6°	46°25.7'	-57.9'	162.9°	45°28.4'	-58.0'	163.2°	44°30.9'	-58.1'	163.5°	43°33.3'	-58.2'	163.8°	42°35.7'	-58.3'	164.0°	41°37.9'	-58.4'	164.3°	13
14	46°25.3'	-57.9'	163.0°	45°27.8'	-58.0'	163.3°	44°30.3'	-58.1'	163.6°	43°32.7'	-58.2'	163.8°	42°35.1'	-58.3'	164.1°	41°37.3'	-58.4'	164.3°	40°39.5'	-58.5'	164.6°	14
15	45°27.4'	-57.9'	163.4°	44°29.9'	-58.1'	163.6°	43°32.2'	-58.1'	163.9°	42°34.6'	-58.2'	164.2°	41°36.8'	-58.3'	164.4°	40°39.0'	-58.4'	164.7°	39°41.1'	-58.5'	164.9°	15
16	44°29.4'	-58.0'	163.7°	43°31.8'	-58.1'	164.0°	42°34.1'	-58.2'	164.3°	41°36.3'	-58.3'	164.5°	40°38.5'	-58.4'	164.7°	39°40.5'	-58.5'	164.9°	38°42.6'	-58.5'	165.2°	16
17	43°31.4'	-58.1'	164.1°	42°33.7'	-58.2'	164.3°	41°35.9'	-58.3'	164.6°	40°38.0'	-58.3'	164.8°	39°40.1'	-58.4'	165.0°	38°42.1'	-58.5'	165.2°	37°44.0'	-58.6'	165.4°	17
18	42°33.3'	-58.1'	164.4°	41°35.5'	-58.2'	164.7°	40°37.6'	-58.3'	164.9°	39°39.7'	-58.4'	165.1°	38°41.6'	-58.5'	165.3°	37°43.6'	-58.5'	165.5°	36°45.5'	-58.6'	165.7°	18
19	41°35.2'	-58.2'	164.8°	40°37.3'	-58.3'	165.0°	39°39.3'	-58.4'	165.2°	38°41.3'	-58.4'	165.4°	37°43.2'	-58.5'	165.6°	36°45.0'	-58.6'	165.8°	35°46.8'	-58.6'	166.0°	19
20	40°37.0'	-58.2'	165.1°	39°39.0'	-58.3'	165.3°	38°40.9'	-58.4'	165.5°	37°42.8'	-58.5'	165.7°	36°44.7'	-58.5'	165.9°	35°46.5'	-58.6'	166.1°	34°48.2'	-58.7'	166.2°	20
21	39°38.8'	-58.3'	165.4°	38°40.7'	-58.4'	165.6°	37°42.5'	-58.4'	165.8°	36°44.4'	-58.6'	166.0°	35°46.1'	-58.6'	166.2°	34°47.8'	-58.6'	166.4°	33°49.5'	-58.7'	166.5°	21
22	38°40.5'	-58.3'	165.7°	37°42.3'	-58.4'	165.9°	36°44.1'	-58.5'	166.1°	35°45.8'	-58.6'	166.3°	34°47.5'	-58.6'	166.4°	33°49.2'	-58.7'	166.6°	32°50.8'	-58.7'	166.7°	22
23	37°42.1'	-58.4'	166.0°	36°43.9'	-58.5'	166.2°	35°45.6'	-58.5'	166.4°	34°47.3'	-58.6'	166.5°	33°48.9'	-58.6'	166.7°	32°50.5'	-58.7'	166.8°	31°52.1'	-58.8'	167.0°	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

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	60°04.8'	-56.6'	157.5°	59°09.3'	-56.8'	158.2°	58°13.4'	-57.1'	158.8°	57°17.4'	-57.3'	159.3°	56°21.2'	-57.4'	159.9°	55°24.8'	-57.6'	160.4°	54°28.2'	-57.8'	160.8°	0
1	59°08.2'	-56.8'	158.2°	58°12.4'	-57.0'	158.8°	57°16.4'	-57.2'	159.3°	56°20.2'	-57.4'	159.9°	55°23.7'	-57.6'	160.4°	54°27.1'	-57.7'	160.8°	53°30.4'	-57.9'	161.3°	1
2	58°11.4'	-56.9'	158.8°	57°15.4'	-57.1'	159.4°	56°19.2'	-57.3'	159.9°	55°22.8'	-57.5'	160.4°	54°26.2'	-57.7'	160.9°	53°29.4'	-57.8'	161.3°	52°32.5'	-58.0'	161.7°	2
3	57°14.5'	-57.1'	159.4°	56°18.3'	-57.3'	159.9°	55°21.8'	-57.5'	160.4°	54°25.2'	-57.6'	160.9°	53°28.5'	-57.8'	161.3°	52°31.6'	-57.9'	161.7°	51°34.5'	-58.1'	162.1°	3
4	56°17.5'	-57.2'	159.9°	55°21.0'	-57.4'	160.4°	54°24.4'	-57.6'	160.9°	53°27.6'	-57.7'	161.4°	52°30.7'	-57.9'	161.8°	51°33.6'	-58.0'	162.2°	50°36.4'	-58.1'	162.5°	4
5	55°20.2'	-57.4'	160.5°	54°23.6'	-57.5'	160.9°	53°26.8'	-57.7'	161.4°	52°29.9'	-57.8'	161.8°	51°32.8'	-58.0'	162.2°	50°35.6'	-58.1'	162.6°	49°38.3'	-58.2'	162.9°	5
6	54°22.8'	-57.5'	161.0°	53°26.0'	-57.7'	161.4°	52°29.1'	-57.8'	161.8°	51°32.0'	-57.9'	162.2°	50°34.8'	-58.1'	162.6°	49°37.5'	-58.2'	163.0°	48°40.1'	-58.3'	163.3°	6
7	53°25.3'	-57.6'	161.5°	52°28.4'	-57.8'	161.9°	51°31.3'	-57.9'	162.3°	50°34.1'	-58.0'	162.7°	49°36.8'	-58.1'	163.0°	48°39.3'	-58.2'	163.3°	47°41.8'	-58.4'	163.7°	7
8	52°27.7'	-57.7'	161.9°	51°30.6'	-57.8'	162.3°	50°33.4'	-58.0'	162.7°	49°36.1'	-58.1'	163.0°	48°38.6'	-58.2'	163.4°	47°41.1'	-58.3'	163.7°	46°43.4'	-58.4'	164.0°	8
9	51°30.0'	-57.8'	162.4°	50°32.8'	-57.9'	162.7°	49°35.4'	-58.1'	163.1°	48°38.0'	-58.2'	163.4°	47°40.4'	-58.3'	163.7°	46°42.8'	-58.4'	164.0°	45°45.0'	-58.5'	164.3°	9
10	50°32.2'	-57.9'	162.8°	49°34.8'	-58.0'	163.2°	48°37.4'	-58.1'	163.5°	47°39.8'	-58.2'	163.8°	46°42.1'	-58.3'	164.1°	45°44.4'	-58.4'	164.4°	44°46.6'	-58.5'	164.7°	10
11	49°34.3'	-58.0'	163.2°	48°36.8'	-58.1'	163.5°	47°39.2'	-58.2'	163.9°	46°41.6'	-58.3'	164.2°	45°43.8'	-58.4'	164.4°	44°46.0'	-58.5'	164.7°	43°48.1'	-58.6'	165.0°	11
12	48°36.3'	-58.1'	163.6°	47°38.7'	-58.2'	163.9°	46°41.0'	-58.3'	164.2°	45°43.3'	-58.4'	164.5°	44°45.4'	-58.4'	164.8°	43°47.5'	-58.5'	165.0°	42°49.5'	-58.6'	165.3°	12
13	47°38.3'	-58.1'	164.0°	46°40.6'	-58.2'	164.3°	45°42.8'	-58.3'	164.6°	44°44.9'	-58.4'	164.8°	43°47.0'	-58.5'	165.1°	42°49.0'	-58.6'	165.3°	41°50.9'	-58.7'	165.5°	13
14	46°40.2'	-58.2'	164.3°	45°42.3'	-58.3'	164.6°	44°44.5'	-58.4'	164.9°	43°46.5'	-58.5'	165.1°	42°48.5'	-58.5'	165.4°	41°50.4'	-58.6'	165.6°	40°52.2'	-58.7'	165.8°	14
15	45°42.0'	-58.3'	164.7°	44°44.0'	-58.3'	165.0°	43°46.1'	-58.4'	165.2°	42°48.0'	-58.5'	165.5°	41°49.9'	-58.6'	165.7°	40°51.8'	-58.7'	165.9°	39°53.5'	-58.7'	166.1°	15
16	44°43.7'	-58.3'	165.0°	43°45.7'	-58.4'	165.3°	42°47.6'	-58.5'	165.5°	41°49.5'	-58.6'	165.8°	40°51.3'	-58.6'	166.0°	39°53.1'	-58.7'	166.2°	38°54.8'	-58.8'	166.4°	16
17	43°45.4'	-58.4'	165.4°	42°47.3'	-58.5'	165.6°	41°49.2'	-58.5'	165.8°	40°51.0'	-58.6'	166.0°	39°52.7'	-58.7'	166.2°	38°54.4'	-58.7'	166.4°	37°56.0'	-58.8'	166.6°	17
18	42°47.0'	-58.4'	165.7°	41°48.8'	-58.5'	165.9°	40°50.6'	-58.6'	166.1°	39°52.3'	-58.6'	166.3°	38°54.0'	-58.7'	166.5°	37°55.7'	-58.8'	166.7°	36°57.2'	-58.8'	166.9°	18
19	41°48.6'	-58.5'	166.0°	40°50.3'	-58.5'	166.2°	39°52.1'	-58.6'	166.4°	38°53.7'	-58.7'	166.6°	37°55.3'	-58.7'	166.8°	36°56.9'	-58.8'	167.0°	35°58.4'	-58.9'	167.1°	19
20	40°50.1'	-58.5'	166.3°	39°51.8'	-58.6'	166.5°	38°53.4'	-58.7'	166.7°	37°55.0'	-58.7'	166.9°	36°56.6'	-58.8'								

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

10° 350° LHA

Latitude CONTRARY to Declination

10° 350° 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	60°24.2'	-57.1'	159.4°	59°28.0'	-57.3'	160.0°	58°31.5'	-57.5'	160.6°	57°34.8'	-57.7'	161.1°	56°38.0'	-57.9'	161.6°	55°41.0'	-58.0'	162.1°	54°43.8'	-58.2'	162.5°	0
1	59°27.1'	-57.3'	160.0°	58°30.7'	-57.5'	160.6°	57°34.0'	-57.7'	161.1°	56°37.1'	-57.8'	161.6°	55°40.1'	-58.0'	162.1°	54°43.0'	-58.1'	162.5°	53°45.7'	-58.2'	162.9°	1
2	58°29.8'	-57.4'	160.6°	57°33.2'	-57.6'	161.1°	56°36.3'	-57.8'	161.6°	55°39.3'	-57.9'	162.1°	54°42.1'	-58.1'	162.5°	53°44.8'	-58.2'	162.9°	52°47.4'	-58.3'	163.3°	2
3	57°32.4'	-57.6'	161.1°	56°35.6'	-57.7'	161.6°	55°38.5'	-57.9'	162.1°	54°41.4'	-58.0'	162.5°	53°44.1'	-58.2'	163.0°	52°46.7'	-58.3'	163.3°	51°49.1'	-58.4'	163.7°	3
4	56°34.9'	-57.7'	161.7°	55°37.8'	-57.8'	162.1°	54°40.7'	-58.0'	162.6°	53°43.4'	-58.1'	163.0°	52°45.9'	-58.2'	163.4°	51°48.4'	-58.3'	163.7°	50°50.7'	-58.5'	164.1°	4
5	55°37.2'	-57.8'	162.2°	54°40.0'	-57.9'	162.6°	53°42.7'	-58.1'	163.0°	52°44.6'	-58.2'	163.4°	51°47.0'	-58.3'	163.8°	50°49.4'	-58.4'	164.1°	49°51.6'	-58.5'	164.5°	5
6	54°39.4'	-57.9'	162.6°	53°42.1'	-58.0'	163.0°	52°44.6'	-58.2'	163.4°	51°46.4'	-58.2'	163.8°	50°48.8'	-58.3'	164.2°	49°51.0'	-58.4'	164.5°	48°53.8'	-58.6'	164.8°	6
7	53°41.5'	-58.0'	163.1°	52°44.0'	-58.1'	163.5°	51°46.4'	-58.2'	163.8°	50°48.2'	-58.3'	164.2°	49°50.4'	-58.4'	164.5°	48°52.6'	-58.5'	164.8°	47°54.6'	-58.6'	165.1°	7
8	52°43.5'	-58.1'	163.5°	51°45.9'	-58.2'	163.9°	50°48.2'	-58.3'	164.2°	49°50.4'	-58.4'	164.5°	48°52.6'	-58.5'	164.8°	47°54.6'	-58.6'	165.1°	46°56.6'	-58.7'	165.4°	8
9	51°45.4'	-58.2'	163.9°	50°47.7'	-58.3'	164.3°	49°49.9'	-58.4'	164.6°	48°52.0'	-58.5'	164.9°	47°54.0'	-58.6'	165.2°	46°56.0'	-58.6'	165.5°	45°57.9'	-58.7'	165.7°	9
10	50°47.2'	-58.2'	164.3°	49°49.4'	-58.3'	164.6°	48°51.5'	-58.4'	164.9°	47°53.5'	-58.5'	165.2°	46°55.5'	-58.6'	165.5°	45°57.4'	-58.7'	165.8°	44°59.2'	-58.8'	166.0°	10
11	49°49.0'	-58.3'	164.7°	48°51.1'	-58.4'	165.0°	47°53.1'	-58.5'	165.3°	46°55.0'	-58.6'	165.5°	45°56.9'	-58.7'	165.8°	44°58.7'	-58.7'	166.1°	44°00.4'	-58.8'	166.3°	11
12	48°50.7'	-58.4'	165.0°	47°52.6'	-58.5'	165.3°	46°54.6'	-58.6'	165.6°	45°56.4'	-58.6'	165.9°	44°58.2'	-58.7'	166.1°	43°59.9'	-58.8'	166.3°	43°01.6'	-58.8'	166.6°	12
13	47°52.3'	-58.4'	165.4°	46°54.2'	-58.5'	165.7°	45°56.0'	-58.6'	165.9°	44°57.8'	-58.7'	166.2°	43°59.5'	-58.8'	166.4°	43°01.2'	-58.8'	166.6°	42°02.8'	-58.9'	166.8°	13
14	46°53.8'	-58.5'	165.7°	45°55.7'	-58.6'	166.0°	44°57.4'	-58.7'	166.2°	43°59.1'	-58.7'	166.5°	43°00.7'	-58.8'	166.7°	42°02.3'	-58.9'	166.9°	41°03.9'	-58.9'	167.1°	14
15	45°55.3'	-58.6'	166.0°	44°57.1'	-58.6'	166.3°	43°58.8'	-58.7'	166.5°	43°00.4'	-58.8'	166.7°	42°02.0'	-58.8'	166.9°	41°03.5'	-58.9'	167.1°	40°05.0'	-58.9'	167.3°	15
16	44°56.8'	-58.6'	166.4°	43°58.5'	-58.7'	166.6°	43°00.1'	-58.7'	166.8°	42°01.6'	-58.8'	167.0°	41°03.1'	-58.9'	167.2°	40°04.6'	-58.9'	167.4°	39°06.0'	-59.0'	167.6°	16
17	43°58.2'	-58.6'	166.7°	42°59.8'	-58.7'	166.9°	42°01.3'	-58.8'	167.1°	41°02.8'	-58.8'	167.3°	40°04.3'	-58.9'	167.5°	39°05.7'	-58.9'	167.6°	38°07.0'	-59.0'	167.8°	17
18	42°59.5'	-58.7'	167.0°	42°01.1'	-58.8'	167.2°	41°02.5'	-58.8'	167.4°	40°04.0'	-58.9'	167.5°	39°05.4'	-58.9'	167.7°	38°06.7'	-59.0'	167.9°	37°08.0'	-59.0'	168.0°	18
19	42°00.9'	-58.7'	167.2°	41°02.3'	-58.8'	167.4°	40°03.7'	-58.8'	167.6°	39°05.1'	-58.9'	167.8°	38°06.4'	-59.0'	168.0°	37°07.8'	-59.0'	168.1°	36°09.0'	-59.1'	168.3°	19
20	41°02.1'	-58.8'	167.5°	40°03.5'	-58.8'	167.7°	39°04.9'	-58.9'	167.9°	38°06.2'	-58.9'	168.0°	37°07.5'	-59.0'	168.2°	36°08.7'	-59.0'	168.3°	35°10.9'	-59.1'	168.5°	20
21	40°03.4'	-58.8'	167.8°	39°04.7'	-58.9'	167.9°	38°06.0'	-58.9'	168.1°	37°07.3'	-59.0'	168.3°	36°08.5'	-59.0'	168.4°	35°09.5'	-59.0'	168.6°	34°10.7'	-59.1'	168.7°	21
22	39°04.6'	-58.8'	168.0°	38°05.8'	-58.9'	168.2°	37°07.1'	-58.9'	168.4°	36°08.3'	-59.0'	168.5°	35°09.5'	-59.0'	168.6°	34°10.7'	-59.1'	168.8°	33°11.8'	-59.1'	168.9°	22
23	38°05.7'	-58.9'	168.3°	37°07.0'	-58.9'	168.4°	36°08.2'	-59.0'	168.6°	35°09.3'	-59.0'	168.7°	34°10.5'	-59.1'	168.9°	33°11.6'	-59.1'	169.0°	32°12.7'	-59.1'	169.1°	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

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	60°42.0'	-57.6'	161.4°	59°45.1'	-57.8'	161.9°	58°48.0'	-58.0'	162.4°	57°50.7'	-58.1'	162.9°	56°53.3'	-58.2'	163.4°	55°55.7'	-58.4'	163.8°	54°58.1'	-58.5'	164.2°	0
1	59°44.4'	-57.8'	161.9°	58°47.3'	-57.9'	162.4°	57°50.0'	-58.1'	162.9°	56°52.6'	-58.2'	163.4°	55°55.0'	-58.3'	163.8°	54°57.4'	-58.5'	164.2°	53°59.6'	-58.6'	164.6°	1
2	58°46.6'	-57.9'	162.4°	57°49.4'	-58.0'	162.9°	56°51.9'	-58.2'	163.4°	55°54.4'	-58.3'	163.8°	54°56.7'	-58.4'	164.2°	53°58.9'	-58.5'	164.6°	53°01.0'	-58.6'	164.9°	2
3	57°48.8'	-58.0'	162.9°	56°51.3'	-58.1'	163.4°	55°53.8'	-58.3'	163.8°	54°56.1'	-58.4'	164.2°	53°58.3'	-58.5'	164.6°	53°00.4'	-58.6'	165.0°	52°02.4'	-58.7'	165.3°	3
4	56°50.8'	-58.1'	163.4°	55°53.2'	-58.2'	163.8°	54°55.5'	-58.3'	164.2°	53°57.2'	-58.4'	164.6°	52°59.8'	-58.6'	165.0°	52°01.2'	-58.6'	165.3°	51°03.7'	-58.8'	165.9°	4
5	55°52.7'	-58.2'	163.9°	54°55.0'	-58.3'	164.3°	53°57.2'	-58.4'	164.6°	52°58.7'	-58.5'	165.0°	51°02.6'	-58.6'	165.4°	50°04.5'	-58.8'	166.0°	49°06.2'	-58.8'	166.3°	5
6	54°54.5'	-58.3'	164.3°	53°56.6'	-58.4'	164.7°	52°58.7'	-58.5'	165.0°	52°00.7'	-58.6'	165.4°	51°02.6'	-58.7'	165.7°	50°04.5'	-58.8'	166.0°	49°06.2'	-58.8'	166.3°	6
7	53°56.2'	-58.4'	164.7°	52°58.3'	-58.5'	165.1°	52°00.2'	-58.6'	165.4°	51°02.1'	-58.6'	165.7°	50°04.0'	-58.7'	166.0°	49°05.7'	-58.8'	166.3°	48°07.4'	-58.9'	166.5°	7
8	52°57.8'	-58.4'	165.1°	51°59.8'	-58.5'	165.4°	51°01.7'	-58.6'	165.7°	50°03.5'	-58.7'	166.0°	49°05.2'	-58.8'	166.3°	48°06.9'	-58.9'	166.6°	47°08.5'	-58.9'	166.8°	8
9	51°59.4'	-58.5'	165.5°	51°01.3'	-58.6'	165.8°	50°03.1'	-58.7'	166.1°	49°04.8'	-58.8'	166.4°	48°06.4'	-58.8'	166.6°	47°08.0'	-58.9'	166.9°	46°09.6'	-59.0'	167.1°	9
10	51°00.9'	-58.6'	165.8°	50°02.7'	-58.7'	166.1°	49°04.4'	-58.7'	166.4°	48°06.0'	-58.8'	166.7°	47°07.6'	-58.9'	166.9°	46°09.1'	-58.9'	167.2°	45°10.6'	-59.0'	167.4°	10
11	50°02.3'	-58.6'	166.2°	49°04.0'	-58.7'	166.4°	48°05.6'	-58.8'	166.7°	47°07.2'	-58.8'	167.0°	46°08.7'	-58.9'	167.2°	45°10.2'	-59.0'	167.4°	44°11.6'	-59.0'	167.6°	11
12	49°03.7'	-58.7'	166.5°	48°05.3'	-58.8'	166.8°	47°06.9'	-58.8'	167.0°	46°08.4'	-58.9'	167.2°	45°09.8'	-58.9'	167.5°	44°11.2'	-59.0'	167.7°	43°12.6'	-59.1'	167.9°	12
13	48°05.0'	-58.7'	166.8°	47°06.6'	-58.8'	167.1°	46°08.1'	-58.9'	167.3°	45°09.5'	-58.9'	167.5°	44°10.9'	-59.0'	167.7°	43°12.2'	-59.0'	167.9°	42°13.5'	-59.1'	168.1°	13
14	47°06.3'	-58.8'	167.1°	46°07.8'	-58.8'	167.3°	45°09.2'	-58.9'	167.6°	44°10.6'	-59.0'	167.8°	43°11.9'	-59.0'	168.0°	42°13.2'	-59.1'	168.2°	41°14.5'	-59.1'	168.4°	14
15	46°07.5'	-58.8'	167.4°	45°08.9'	-58.9'	167.6°	44°10.3'	-58.9'	167.8°	43°11.6'	-59.0'	168.0°	42°12.9'	-59.0'	168.2°	41°14.1'	-59.1'	168.4°	40°15.3'	-59.1'	168.6°	15
16	45°08.7'	-58.9'	167.7°	44°10.0'	-58.9'	167.9°	43°11.3'	-59.0'	168.1°	42°12.6'	-59.0'	168.3°	41°13.8'	-59.1'	168.5°	40°15.0'	-59.1'	168.6°	39°16.2'	-59.2'	168.8°	16
17	44°09.8'	-58.9'	168.0°	43°11.1'	-59.0'	168.2°	42°12.4'	-59.0'	168.3°	41°13.6'	-59.1'	168.5°	40°14.8'	-59.1'	168.7°	39°15.9'	-59.1'	168.9°	38°17.0'	-59.2'	169.0°	17
18	43°10.9'	-58.9'	168.2°	42°12.2'	-59.0'	168.4°	41°13.4'	-59.0'	168.6°	40°14.5'	-59.1'	168.8°	39°15.7'	-59.1'	168.9°	38°16.8'	-59.2'	169.1°	37°17.9'	-59.2'	169.2°	18
19	42°12.0'	-59.0'	168.5°	41°13.2'	-59.0'	168.7°	40°14.3'	-59.1'	168.8°	39°15.5'	-59.1'	169.0°	38°16.6'	-59.1'	169.1°	37°17.6'	-59.2'	169.3°	36°18.6'	-59.2'	169.4°	19
20	41°13.0'	-59.0'	168.7°	40°14.2'	-59.0'	168.9°	39°15.3'	-59.1'	169.1°	38°16.4'	-59.1'	169.2°	37°17.4'	-59.2'	169.4°	36						



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

8° 352° LHA			Latitude CONTRARY to Declination							8° 352° 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	60°58.1'	-58.1'	163.3°	60°00.6'	-58.2'	163.8°	59°02.9'	-58.4'	164.3°	58°05.0'	-58.5'	164.7°	57°07.1'	-58.6'	165.1°	56°09.1'	-58.7'	165.5°	55°10.9'	-58.8'	165.9°	0			
1	60°00.0'	-58.2'	163.8°	59°02.3'	-58.3'	164.3°	58°04.5'	-58.5'	164.7°	57°06.6'	-58.6'	165.2°	56°08.5'	-58.7'	165.5°	55°10.4'	-58.8'	165.9°	54°12.1'	-58.8'	166.2°	1			
2	59°01.8'	-58.3'	164.3°	58°04.0'	-58.4'	164.8°	57°06.0'	-58.5'	165.2°	56°08.0'	-58.6'	165.5°	55°09.8'	-58.7'	165.9°	54°11.6'	-58.8'	166.2°	53°13.3'	-58.9'	166.6°	2			
3	58°03.5'	-58.4'	164.8°	57°05.5'	-58.5'	165.2°	56°07.5'	-58.6'	165.6°	55°09.3'	-58.7'	165.9°	54°11.1'	-58.8'	166.3°	53°12.8'	-58.9'	166.6°	52°14.4'	-58.9'	166.9°	3			
4	57°05.1'	-58.5'	165.2°	56°07.0'	-58.6'	165.6°	55°08.9'	-58.7'	165.9°	54°10.6'	-58.8'	166.3°	53°12.3'	-58.9'	166.6°	52°13.9'	-58.9'	166.9°	51°15.4'	-59.0'	167.2°	4			
5	56°06.6'	-58.6'	165.6°	55°08.4'	-58.7'	166.0°	54°10.2'	-58.7'	166.3°	53°11.9'	-58.8'	166.6°	52°13.5'	-58.9'	166.9°	51°15.0'	-59.0'	167.2°	50°16.4'	-59.0'	167.5°	5			
6	55°08.0'	-58.6'	166.0°	54°09.8'	-58.7'	166.3°	53°11.4'	-58.8'	166.6°	52°13.0'	-58.9'	166.9°	51°14.6'	-58.9'	167.2°	50°16.0'	-59.0'	167.5°	49°17.4'	-59.1'	167.7°	6			
7	54°09.4'	-58.7'	166.4°	53°11.1'	-58.8'	166.7°	52°12.6'	-58.9'	167.0°	51°14.2'	-58.9'	167.3°	50°15.6'	-59.0'	167.5°	49°17.0'	-59.1'	167.8°	48°18.3'	-59.1'	168.0°	7			
8	53°10.7'	-58.8'	166.7°	52°12.3'	-58.8'	167.0°	51°13.8'	-58.9'	167.3°	50°15.2'	-59.0'	167.6°	49°16.6'	-59.0'	167.8°	48°17.9'	-59.1'	168.0°	47°19.2'	-59.1'	168.3°	8			
9	52°12.0'	-58.8'	167.0°	51°13.5'	-58.9'	167.3°	50°14.9'	-58.9'	167.6°	49°16.3'	-59.0'	167.8°	48°17.6'	-59.1'	168.1°	47°18.9'	-59.1'	168.3°	46°20.1'	-59.2'	168.5°	9			
10	51°13.2'	-58.9'	167.4°	50°14.6'	-58.9'	167.6°	49°15.9'	-59.0'	167.9°	48°17.3'	-59.0'	168.1°	47°18.5'	-59.1'	168.3°	46°19.7'	-59.2'	168.6°	45°20.9'	-59.2'	168.8°	10			
11	50°14.3'	-58.9'	167.7°	49°15.7'	-59.0'	167.9°	48°17.0'	-59.0'	168.2°	47°18.2'	-59.1'	168.4°	46°19.4'	-59.1'	168.6°	45°20.6'	-59.2'	168.8°	44°21.7'	-59.2'	169.0°	11			
12	49°15.4'	-58.9'	168.0°	48°16.7'	-59.0'	168.2°	47°17.9'	-59.1'	168.4°	46°19.1'	-59.1'	168.6°	45°20.3'	-59.2'	168.8°	44°21.4'	-59.2'	169.0°	43°22.5'	-59.3'	169.2°	12			
13	48°16.4'	-59.0'	168.2°	47°17.7'	-59.0'	168.5°	46°18.9'	-59.1'	168.7°	45°20.0'	-59.1'	168.9°	44°21.1'	-59.2'	169.1°	43°22.2'	-59.2'	169.2°	42°23.2'	-59.3'	169.4°	13			
14	47°17.5'	-59.0'	168.5°	46°18.6'	-59.1'	168.7°	45°19.8'	-59.1'	168.9°	44°20.9'	-59.2'	169.1°	43°21.9'	-59.2'	169.3°	42°23.0'	-59.3'	169.5°	41°24.0'	-59.3'	169.6°	14			
15	46°18.4'	-59.1'	168.8°	45°19.6'	-59.1'	169.0°	44°20.6'	-59.2'	169.2°	43°21.7'	-59.2'	169.3°	42°22.7'	-59.2'	169.5°	41°23.7'	-59.3'	169.7°	40°24.7'	-59.3'	169.8°	15			
16	45°19.4'	-59.1'	169.0°	44°20.4'	-59.1'	169.2°	43°21.5'	-59.2'	169.4°	42°22.5'	-59.2'	169.6°	41°23.5'	-59.3'	169.7°	40°24.4'	-59.3'	169.9°	39°25.3'	-59.3'	170.0°	16			
17	44°20.3'	-59.1'	169.3°	43°21.3'	-59.2'	169.5°	42°22.3'	-59.2'	169.6°	41°23.3'	-59.2'	169.8°	40°24.2'	-59.3'	169.9°	39°25.1'	-59.3'	170.1°	38°26.0'	-59.4'	170.2°	17			
18	43°21.2'	-59.2'	169.5°	42°22.1'	-59.2'	169.7°	41°23.1'	-59.2'	169.8°	40°24.0'	-59.3'	170.0°	39°24.9'	-59.3'	170.1°	38°25.8'	-59.3'	170.3°	37°26.7'	-59.4'	170.4°	18			
19	42°22.0'	-59.2'	169.7°	41°22.9'	-59.2'	169.9°	40°23.9'	-59.3'	170.0°	39°24.8'	-59.3'	170.2°	38°25.6'	-59.3'	170.3°	37°26.5'	-59.4'	170.5°	36°27.3'	-59.4'	170.6°	19			
20	41°22.8'	-59.2'	170.0°	40°23.7'	-59.2'	170.1°	39°24.6'	-59.3'	170.3°	38°25.5'	-59.3'	170.4°	37°26.3'	-59.3'	170.5°	36°27.1'	-59.4'	170.6°	35°27.9'	-59.4'	170.8°	20			
21	40°23.6'	-59.2'	170.2°	39°24.5'	-59.3'	170.3°	38°25.3'	-59.3'	170.5°	37°26.2'	-59.3'	170.6°	36°27.0'	-59.4'	170.7°	35°27.7'	-59.4'	170.8°	34°28.3'	-59.4'	170.9°	21			
22	39°24.4'	-59.2'	170.4°	38°25.2'	-59.3'	170.5°	37°26.0'	-59.3'	170.6°	36°26.8'	-59.3'	170.8°	35°27.6'	-59.4'	170.9°	34°28.3'	-59.4'	171.0°	33°29.1'	-59.4'	171.1°	22			
23	38°25.2'	-59.3'	170.6°	37°26.0'	-59.3'	170.7°	36°26.7'	-59.3'	170.8°	35°27.5'	-59.4'	171.0°	34°28.2'	-59.4'	171.1°	33°28.9'	-59.4'	171.2°	32°29.6'	-59.4'	171.3°	23			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	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			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°12.4'	-58.5'	165.3°	60°14.3'	-58.6'	165.8°	59°16.1'	-58.7'	166.2°	58°17.8'	-58.8'	166.6°	57°19.4'	-58.9'	167.0°	56°20.9'	-59.0'	167.3°	55°22.3'	-59.1'	167.6°	0
1	60°13.8'	-58.6'	165.8°	59°15.7'	-58.7'	166.2°	58°17.4'	-58.8'	166.6°	57°18.9'	-58.9'	167.0°	56°20.5'	-59.0'	167.3°	55°21.9'	-59.0'	167.6°	54°23.2'	-59.1'	167.9°	1
2	59°15.2'	-58.7'	166.2°	58°17.0'	-58.8'	166.6°	57°18.5'	-58.9'	167.0°	56°20.1'	-59.0'	167.3°	55°21.5'	-59.0'	167.6°	54°22.8'	-59.1'	167.9°	53°24.1'	-59.2'	168.2°	2
3	58°16.6'	-58.8'	166.6°	57°18.2'	-58.9'	167.0°	56°19.7'	-58.9'	167.3°	55°21.1'	-59.0'	167.6°	54°22.5'	-59.1'	167.9°	53°23.8'	-59.1'	168.2°	52°25.0'	-59.2'	168.5°	3
4	57°17.8'	-58.8'	167.0°	56°19.3'	-58.9'	167.3°	55°20.7'	-59.0'	167.6°	54°22.1'	-59.1'	168.0°	53°23.4'	-59.1'	168.2°	52°24.6'	-59.2'	168.5°	51°25.8'	-59.2'	168.8°	4
5	56°19.0'	-58.9'	167.4°	55°20.4'	-59.0'	167.7°	54°21.8'	-59.0'	168.0°	53°23.0'	-59.1'	168.3°	52°24.3'	-59.2'	168.5°	51°25.4'	-59.2'	168.8°	50°26.6'	-59.3'	169.0°	5
6	55°20.1'	-58.9'	167.7°	54°21.4'	-59.0'	168.0°	53°22.7'	-59.1'	168.3°	52°24.0'	-59.1'	168.5°	51°25.1'	-59.2'	168.8°	50°26.2'	-59.2'	169.0°	49°27.3'	-59.3'	169.3°	6
7	54°21.2'	-59.0'	168.0°	53°22.4'	-59.1'	168.3°	52°23.7'	-59.1'	168.6°	51°24.8'	-59.2'	168.8°	50°25.9'	-59.2'	169.1°	49°27.0'	-59.3'	169.3°	48°28.0'	-59.3'	169.5°	7
8	53°22.2'	-59.0'	168.3°	52°23.4'	-59.1'	168.6°	51°24.5'	-59.2'	168.8°	50°25.6'	-59.2'	169.1°	49°26.7'	-59.3'	169.3°	48°27.7'	-59.3'	169.5°	47°28.7'	-59.3'	169.7°	8
9	52°23.1'	-59.1'	168.6°	51°24.3'	-59.1'	168.9°	50°25.4'	-59.2'	169.1°	49°26.4'	-59.2'	169.3°	48°27.5'	-59.3'	169.5°	47°28.4'	-59.3'	169.7°	46°29.4'	-59.4'	169.9°	9
10	51°24.0'	-59.1'	168.9°	50°25.1'	-59.2'	169.1°	49°26.2'	-59.2'	169.4°	48°27.2'	-59.3'	169.6°	47°28.2'	-59.3'	169.8°	46°29.1'	-59.3'	170.0°	45°30.0'	-59.4'	170.1°	10
11	50°24.9'	-59.2'	169.2°	49°26.0'	-59.2'	169.4°	48°27.0'	-59.3'	169.6°	47°27.9'	-59.3'	169.8°	46°28.9'	-59.3'	170.0°	45°29.8'	-59.4'	170.2°	44°30.6'	-59.4'	170.3°	11
12	49°25.8'	-59.2'	169.4°	48°26.8'	-59.2'	169.6°	47°27.7'	-59.3'	169.8°	46°28.7'	-59.3'	170.0°	45°29.5'	-59.4'	170.2°	44°30.4'	-59.4'	170.4°	43°31.2'	-59.4'	170.5°	12
13	48°26.6'	-59.2'	169.7°	47°27.5'	-59.3'	169.9°	46°28.4'	-59.3'	170.1°	45°29.3'	-59.3'	170.2°	44°30.2'	-59.4'	170.4°	43°31.0'	-59.4'	170.6°	42°31.8'	-59.4'	170.7°	13
14	47°27.4'	-59.2'	169.9°	46°28.3'	-59.3'	170.1°	45°29.1'	-59.3'	170.3°	44°30.0'	-59.4'	170.5°	43°30.8'	-59.4'	170.6°	42°31.6'	-59.4'	170.8°	41°32.4'	-59.5'	170.9°	14
15	46°28.1'	-59.3'	170.2°	45°29.0'	-59.3'	170.3°	44°29.8'	-59.4'	170.5°	43°30.6'	-59.4'	170.7°	42°31.4'	-59.4'	170.8°	41°32.2'	-59.4'	171.0°	40°32.9'	-59.5'	171.1°	15
16	45°28.8'	-59.3'	170.4°	44°29.7'	-59.3'	170.5°	43°30.5'	-59.4'	170.7°	42°31.2'	-59.4'	170.9°	41°32.0'	-59.4'	171.0°	40°32.7'	-59.5'	171.1°	39°33.4'	-59.5'	171.3°	16
17	44°29.5'	-59.3'	170.6°	43°30.3'	-59.4'	170.8°	42°31.1'	-59.4'	170.9°	41°31.8'	-59.4'	171.0°	40°32.6'	-59.5'	171.2°	39°33.3'	-59.5'	171.3°	38°33.9'	-59.5'	171.4°	17
18	43°30.2'	-59.3'	170.8°	42°31.0'	-59.4'	171.1°	41°31.7'	-59.4'	171.1°	40°32.4'	-59.4'	171.2°	39°33.1'	-59.5'	171.4°	38°33.8'	-59.5'	171.5°	37°34.4'	-59.5'	171.6°	18
19	42°30.9'	-59.4'	171.0°	41°31.6'	-59.4'	171.1°	40°32.3'	-59.4'	171.1°	39°33.0'	-59.5'	171.4°	38°33.6'	-59.5'	171.5°	37°34.3'	-59.5'	171.6°	36°34.9'	-59.5'	171.7°	19
20	41°31.5'	-59.4'	171.2°	40°32.2'	-59.4'	171.3°	39°32.9'	-59.4'	171.5°	38°33.5'	-59.5'	171.6°	37°34.2'	-59.5'	171.7°	36°34.8'	-59.5'	171.8°	35°35.4'	-59.5'	171.9°	20
21	40°32.1'	-59.4'	171.4°	39°32.8'	-59.4'	171.5°	38°33.4'	-59.5'	171.6°	37°34.1'	-59.5'	171.7°	36°34.7'	-59.5'	171.9°	35°35.3'	-59.5'	172.0°	34°35.8'			

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°24.9'	-58.9'	167.4°	60°26.3'	-59.0'	167.8°	59°27.6'	-59.1'	168.1°	58°28.9'	-59.1'	168.5°	57°30.1'	-59.2'	168.8°	56°31.2'	-59.3'	169.1°	55°32.2'	-59.3'	169.4°	0
1	60°26.0'	-59.0'	167.8°	59°27.3'	-59.0'	168.1°	58°28.6'	-59.1'	168.5°	57°29.8'	-59.2'	168.8°	56°30.9'	-59.2'	169.1°	55°31.9'	-59.3'	169.4°	54°32.9'	-59.3'	169.6°	1
2	59°27.0'	-59.0'	168.1°	58°28.3'	-59.1'	168.5°	57°29.5'	-59.2'	168.8°	56°30.6'	-59.2'	169.1°	55°31.6'	-59.3'	169.4°	54°32.6'	-59.3'	169.6°	53°33.6'	-59.4'	169.9°	2
3	58°28.0'	-59.1'	168.5°	57°29.2'	-59.1'	168.8°	56°30.3'	-59.2'	169.1°	55°31.3'	-59.3'	169.4°	54°32.4'	-59.3'	169.6°	53°33.3'	-59.4'	169.9°	52°34.2'	-59.4'	170.1°	3
4	57°28.9'	-59.1'	168.8°	56°30.0'	-59.2'	169.1°	55°31.1'	-59.2'	169.4°	54°32.1'	-59.3'	169.6°	53°33.0'	-59.3'	169.9°	52°34.0'	-59.4'	170.1°	51°34.8'	-59.4'	170.3°	4
5	56°29.8'	-59.2'	169.1°	55°30.8'	-59.2'	169.4°	54°31.8'	-59.3'	169.7°	53°32.8'	-59.3'	169.9°	52°33.7'	-59.4'	170.1°	51°34.6'	-59.4'	170.4°	50°35.4'	-59.4'	170.6°	5
6	55°30.6'	-59.2'	169.4°	54°31.6'	-59.3'	169.7°	53°32.6'	-59.3'	169.9°	52°33.5'	-59.4'	170.2°	51°34.4'	-59.4'	170.4°	50°35.2'	-59.4'	170.6°	49°35.9'	-59.5'	170.8°	6
7	54°31.4'	-59.3'	169.7°	53°32.3'	-59.3'	169.9°	52°33.2'	-59.3'	170.2°	51°34.1'	-59.4'	170.4°	50°34.9'	-59.4'	170.6°	49°35.7'	-59.5'	170.8°	48°36.5'	-59.5'	171.0°	7
8	53°32.1'	-59.3'	170.0°	52°33.0'	-59.3'	170.2°	51°33.9'	-59.4'	170.4°	50°34.7'	-59.4'	170.6°	49°35.5'	-59.4'	170.8°	48°36.3'	-59.5'	171.0°	47°37.0'	-59.5'	171.2°	8
9	52°32.9'	-59.3'	170.2°	51°33.7'	-59.4'	170.4°	50°34.5'	-59.4'	170.6°	49°35.3'	-59.4'	170.8°	48°36.1'	-59.5'	171.0°	47°36.8'	-59.5'	171.2°	46°37.5'	-59.5'	171.4°	9
10	51°33.5'	-59.3'	170.5°	50°34.3'	-59.4'	170.7°	49°35.1'	-59.4'	170.9°	48°35.9'	-59.5'	171.0°	47°36.6'	-59.5'	171.2°	46°37.3'	-59.5'	171.4°	45°37.9'	-59.5'	171.5°	10
11	50°34.2'	-59.4'	170.7°	49°35.0'	-59.4'	170.9°	48°35.7'	-59.4'	171.1°	47°36.4'	-59.5'	171.2°	46°37.1'	-59.5'	171.4°	45°37.8'	-59.5'	171.6°	44°38.4'	-59.6'	171.7°	11
12	49°34.8'	-59.4'	170.9°	48°35.5'	-59.4'	171.1°	47°36.2'	-59.5'	171.3°	46°36.9'	-59.5'	171.4°	45°37.6'	-59.5'	171.6°	44°38.2'	-59.6'	171.7°	43°38.8'	-59.6'	171.9°	12
13	48°35.4'	-59.4'	171.1°	47°36.1'	-59.5'	171.3°	46°36.8'	-59.5'	171.5°	45°37.4'	-59.5'	171.6°	44°38.1'	-59.5'	171.8°	43°38.7'	-59.6'	171.9°	42°39.3'	-59.6'	172.0°	13
14	47°36.0'	-59.4'	171.3°	46°36.7'	-59.5'	171.5°	45°37.3'	-59.5'	171.7°	44°37.9'	-59.5'	171.8°	43°38.5'	-59.6'	171.9°	42°39.1'	-59.6'	172.1°	41°39.7'	-59.6'	172.2°	14
15	46°36.5'	-59.5'	171.5°	45°37.2'	-59.5'	171.7°	44°37.8'	-59.5'	171.8°	43°38.4'	-59.5'	172.0°	42°39.0'	-59.6'	172.1°	41°39.5'	-59.6'	172.2°	40°40.1'	-59.6'	172.4°	15
16	45°37.1'	-59.5'	171.7°	44°37.7'	-59.5'	171.9°	43°38.3'	-59.5'	172.0°	42°38.8'	-59.6'	172.1°	41°39.3'	-59.6'	172.3°	40°39.9'	-59.6'	172.4°	39°40.5'	-59.6'	172.5°	16
17	44°37.6'	-59.5'	171.9°	43°38.2'	-59.5'	172.1°	42°38.7'	-59.6'	172.2°	41°39.2'	-59.6'	172.4°	40°39.7'	-59.6'	172.5°	39°40.2'	-59.6'	172.6°	38°40.7'	-59.6'	172.7°	17
18	43°38.1'	-59.5'	172.1°	42°38.6'	-59.5'	172.2°	41°39.2'	-59.6'	172.4°	40°39.7'	-59.6'	172.5°	39°40.2'	-59.6'	172.6°	38°40.7'	-59.6'	172.7°	37°41.2'	-59.6'	172.8°	18
19	42°38.6'	-59.5'	172.3°	41°39.1'	-59.6'	172.4°	40°39.6'	-59.6'	172.5°	39°40.1'	-59.6'	172.6°	38°40.6'	-59.6'	172.7°	37°41.1'	-59.6'	172.8°	36°41.6'	-59.7'	172.9°	19
20	41°39.0'	-59.5'	172.4°	40°39.5'	-59.6'	172.6°	39°40.0'	-59.6'	172.7°	38°40.5'	-59.6'	172.8°	37°41.0'	-59.6'	172.9°	36°41.5'	-59.6'	173.0°	35°41.9'	-59.7'	173.1°	20
21	40°39.5'	-59.6'	172.6°	39°40.0'	-59.6'	172.7°	38°40.5'	-59.6'	172.8°	37°40.9'	-59.6'	172.9°	36°41.4'	-59.6'	173.0°	35°41.8'	-59.7'	173.1°	34°42.2'	-59.7'	173.2°	21
22	39°39.9'	-59.6'	172.8°	38°40.4'	-59.6'	172.9°	37°40.9'	-59.6'	173.0°	36°41.3'	-59.6'	173.1°	35°41.7'	-59.6'	173.1°	34°42.1'	-59.7'	173.2°	33°42.6'	-59.7'	173.3°	22
23	38°40.4'	-59.6'	172.9°	37°40.8'	-59.6'	173.0°	36°41.2'	-59.6'	173.1°	35°41.7'	-59.6'	173.2°	34°42.1'	-59.7'	173.3°	33°42.5'	-59.7'	173.4°	32°42.9'	-59.7'	173.4°	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°35.5'	-59.2'	169.4°	60°36.5'	-59.3'	169.8°	59°37.5'	-59.3'	170.1°	58°38.3'	-59.4'	170.4°	57°39.2'	-59.4'	170.6°	56°39.9'	-59.5'	170.9°	55°40.7'	-59.5'	171.1°	0
1	60°36.3'	-59.3'	169.8°	59°37.3'	-59.3'	170.1°	58°38.1'	-59.4'	170.4°	57°38.9'	-59.4'	170.6°	56°39.7'	-59.5'	170.9°	55°40.5'	-59.5'	171.1°	54°41.2'	-59.5'	171.3°	1
2	59°37.0'	-59.3'	170.1°	58°37.9'	-59.4'	170.4°	57°38.7'	-59.4'	170.6°	56°39.5'	-59.5'	170.9°	55°40.3'	-59.5'	171.1°	54°41.0'	-59.5'	171.3°	53°41.6'	-59.6'	171.5°	2
3	58°37.7'	-59.4'	170.4°	57°38.5'	-59.4'	170.6°	56°39.3'	-59.4'	170.9°	55°40.1'	-59.5'	171.1°	54°40.8'	-59.5'	171.3°	53°41.4'	-59.6'	171.5°	52°42.1'	-59.6'	171.7°	3
4	57°38.4'	-59.4'	170.7°	56°39.1'	-59.4'	170.9°	55°39.9'	-59.5'	171.1°	54°40.6'	-59.5'	171.4°	53°41.2'	-59.5'	171.6°	52°41.9'	-59.6'	171.8°	51°42.5'	-59.6'	171.9°	4
5	56°39.0'	-59.4'	170.9°	55°39.7'	-59.5'	171.1°	54°40.4'	-59.5'	171.4°	53°41.1'	-59.5'	171.6°	52°41.7'	-59.6'	171.8°	51°42.3'	-59.6'	171.9°	50°42.9'	-59.6'	172.1°	5
6	55°39.5'	-59.5'	171.2°	54°40.2'	-59.5'	171.4°	53°40.9'	-59.5'	171.6°	52°41.5'	-59.6'	171.8°	51°42.1'	-59.6'	172.0°	50°42.7'	-59.6'	172.1°	49°43.3'	-59.6'	172.3°	6
7	54°40.1'	-59.5'	171.4°	53°40.8'	-59.5'	171.6°	52°41.4'	-59.5'	171.8°	51°42.0'	-59.6'	172.0°	50°42.6'	-59.6'	172.1°	49°43.1'	-59.6'	172.3°	48°43.6'	-59.6'	172.5°	7
8	53°40.6'	-59.5'	171.6°	52°41.2'	-59.5'	171.8°	51°41.8'	-59.6'	172.0°	50°42.4'	-59.6'	172.2°	49°43.0'	-59.6'	172.3°	48°43.5'	-59.6'	172.5°	47°44.0'	-59.7'	172.6°	8
9	52°41.1'	-59.5'	171.8°	51°41.7'	-59.6'	172.0°	50°42.3'	-59.6'	172.2°	49°42.8'	-59.6'	172.3°	48°43.3'	-59.6'	172.5°	47°43.8'	-59.7'	172.6°	46°44.3'	-59.7'	172.8°	9
10	51°41.6'	-59.5'	172.0°	50°42.2'	-59.6'	172.2°	49°42.7'	-59.6'	172.4°	48°43.2'	-59.6'	172.5°	47°43.7'	-59.6'	172.7°	46°44.2'	-59.7'	172.8°	45°44.7'	-59.7'	172.9°	10
11	50°42.0'	-59.6'	172.2°	49°42.6'	-59.6'	172.4°	48°43.1'	-59.6'	172.5°	47°43.6'	-59.6'	172.7°	46°44.1'	-59.7'	172.8°	45°44.5'	-59.7'	173.0°	44°45.0'	-59.7'	173.1°	11
12	49°42.5'	-59.6'	172.4°	48°43.0'	-59.6'	172.6°	47°43.5'	-59.6'	172.7°	46°44.0'	-59.6'	172.9°	45°44.4'	-59.7'	173.0°	44°44.9'	-59.7'	173.1°	43°45.3'	-59.7'	173.2°	12
13	48°42.9'	-59.6'	172.6°	47°43.4'	-59.6'	172.7°	46°43.9'	-59.6'	172.9°	45°44.3'	-59.7'	173.0°	44°44.7'	-59.7'	173.1°	43°45.2'	-59.7'	173.2°	42°45.6'	-59.7'	173.4°	13
14	47°43.3'	-59.6'	172.8°	46°43.8'	-59.6'	172.9°	45°44.2'	-59.7'	173.0°	44°44.6'	-59.7'	173.2°	43°45.1'	-59.7'	173.3°	42°45.5'	-59.7'	173.4°	41°45.9'	-59.7'	173.5°	14
15	46°43.7'	-59.6'	172.9°	45°44.1'	-59.6'	173.1°	44°44.6'	-59.7'	173.2°	43°45.0'	-59.7'	173.3°	42°45.4'	-59.7'	173.4°	41°45.8'	-59.7'	173.5°	40°46.1'	-59.7'	173.6°	15
16	45°44.1'	-59.6'	173.1°	44°44.5'	-59.7'	173.2°	43°44.9'	-59.7'	173.3°	42°45.3'	-59.7'	173.4°	41°45.7'	-59.7'	173.6°	40°46.1'	-59.7'	173.6°	39°46.4'	-59.7'	173.7°	16
17	44°44.4'	-59.7'	173.3°	43°44.8'	-59.7'	173.4°	42°45.2'	-59.7'	173.5°	41°45.6'	-59.7'	173.6°	40°46.0'	-59.7'	173.7°	39°46.3'	-59.7'	173.8°	38°46.7'	-59.7'	173.9°	17
18	43°44.8'	-59.7'	173.4°	42°45.2'	-59.7'	173.5°	41°45.5'	-59.7'	173.6°	40°45.9'	-59.7'	173.7°	39°46.2'	-59.7'	173.8°	38°46.6'	-59.7'	173.9°	37°46.9'	-59.8'	174.0°	18
19	42°45.1'	-59.7'	173.6°	41°45.5'	-59.7'	173.7°	40°45.8'	-59.7'	173.8°	39°46.2'	-59.7'	173.8°	38°46.5'	-59.7'	173.9°	37°46.9'	-59.7'	174.0°	36°47.2'	-59.8'	174.1°	19
20	41°45.4'	-59.7'	173.7°	40°45.8'	-59.7'	173.8°	39°46.1'	-59.7'	173.9°	38°46.5'	-59.7'	174.0°	37°46.8'	-59.7'	174.1°	36°47.1'	-59.8'	174.1°	35°47.4'	-59.8'	174.2°	20
21	40°45.7'	-59.7'	173.8°	39°46.1'	-59.7'	173.9°	38°46.4'	-59.7'	174.0°	37°46.7'	-59.7'	174.1°	36°47.0'	-59.7'	174.2°	35°47.4'	-					

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

4° 356° LHA			Latitude CONTRARY to 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°44.3'	-59.5'	171.5°	60°45.0'	-59.5'	171.8°	59°45.5'	-59.6'	172.0°	58°46.1'	-59.6'	172.3°	57°46.6'	-59.6'	172.5°	56°47.1'	-59.7'	172.7°	55°47.6'	-59.7'	172.9°	0
1	60°44.8'	-59.5'	171.8°	59°45.4'	-59.6'	172.0°	58°46.0'	-59.6'	172.3°	57°46.5'	-59.6'	172.5°	56°47.0'	-59.7'	172.7°	55°47.5'	-59.7'	172.9°	54°47.9'	-59.7'	173.1°	1
2	59°45.2'	-59.6'	172.0°	58°45.8'	-59.6'	172.3°	57°46.4'	-59.6'	172.5°	56°46.9'	-59.7'	172.7°	55°47.3'	-59.7'	172.9°	54°47.8'	-59.7'	173.1°	53°48.2'	-59.7'	173.2°	2
3	58°45.7'	-59.6'	172.3°	57°46.2'	-59.6'	172.5°	56°46.7'	-59.6'	172.7°	55°47.2'	-59.7'	172.9°	54°47.7'	-59.7'	173.1°	53°48.1'	-59.7'	173.2°	52°48.5'	-59.7'	173.4°	3
4	57°46.1'	-59.6'	172.5°	56°46.6'	-59.6'	172.7°	55°47.1'	-59.7'	172.9°	54°47.4'	-59.7'	173.1°	53°47.9'	-59.7'	173.2°	52°48.3'	-59.7'	173.4°	51°48.7'	-59.7'	173.5°	4
5	56°46.5'	-59.6'	172.7°	55°47.0'	-59.7'	172.9°	54°47.4'	-59.7'	173.1°	53°47.9'	-59.7'	173.2°	52°48.3'	-59.7'	173.4°	51°48.7'	-59.7'	173.5°	50°49.0'	-59.8'	173.7°	5
6	55°46.9'	-59.6'	172.9°	54°47.3'	-59.7'	173.1°	53°47.8'	-59.7'	173.3°	52°48.2'	-59.7'	173.4°	51°48.6'	-59.7'	173.6°	50°48.9'	-59.7'	173.7°	49°49.3'	-59.8'	173.8°	6
7	54°47.2'	-59.7'	173.1°	53°47.7'	-59.7'	173.3°	52°48.1'	-59.7'	173.4°	51°48.5'	-59.7'	173.6°	50°48.8'	-59.7'	173.7°	49°49.2'	-59.8'	173.8°	48°49.5'	-59.8'	174.0°	7
8	53°47.6'	-59.7'	173.3°	52°48.0'	-59.7'	173.4°	51°48.4'	-59.7'	173.6°	50°48.7'	-59.7'	173.7°	49°49.1'	-59.8'	173.9°	48°49.4'	-59.8'	174.0°	47°49.7'	-59.8'	174.1°	8
9	52°47.9'	-59.7'	173.5°	51°48.3'	-59.7'	173.6°	50°48.6'	-59.7'	173.7°	49°48.9'	-59.7'	173.9°	48°49.2'	-59.8'	174.0°	47°49.5'	-59.8'	174.1°	46°49.8'	-59.8'	174.2°	9
10	51°48.2'	-59.7'	173.6°	50°48.6'	-59.7'	173.8°	49°48.9'	-59.7'	173.9°	48°49.2'	-59.8'	174.0°	47°49.5'	-59.8'	174.1°	46°49.8'	-59.8'	174.2°	45°50.2'	-59.8'	174.3°	10
11	50°48.5'	-59.7'	173.8°	49°48.8'	-59.7'	173.9°	48°49.2'	-59.8'	174.0°	47°49.5'	-59.8'	174.1°	46°49.8'	-59.8'	174.3°	45°50.1'	-59.8'	174.4°	44°50.4'	-59.8'	174.5°	11
12	49°48.8'	-59.7'	173.9°	48°49.1'	-59.7'	174.1°	47°49.4'	-59.8'	174.2°	46°49.7'	-59.8'	174.3°	45°50.0'	-59.8'	174.4°	44°50.3'	-59.8'	174.5°	43°50.6'	-59.8'	174.6°	12
13	48°49.0'	-59.7'	174.1°	47°49.4'	-59.8'	174.2°	46°49.7'	-59.8'	174.3°	45°49.9'	-59.8'	174.4°	44°50.2'	-59.8'	174.5°	43°50.5'	-59.8'	174.6°	42°50.8'	-59.8'	174.7°	13
14	47°49.3'	-59.8'	174.2°	46°49.6'	-59.8'	174.3°	45°49.9'	-59.8'	174.4°	44°50.2'	-59.8'	174.5°	43°50.4'	-59.8'	174.6°	42°50.7'	-59.8'	174.7°	41°50.9'	-59.8'	174.8°	14
15	46°49.5'	-59.8'	174.3°	45°49.8'	-59.8'	174.5°	44°50.1'	-59.8'	174.5°	43°50.4'	-59.8'	174.6°	42°50.6'	-59.8'	174.7°	41°50.9'	-59.8'	174.8°	40°51.1'	-59.8'	174.9°	15
16	45°49.8'	-59.8'	174.5°	44°50.1'	-59.8'	174.6°	43°50.3'	-59.8'	174.7°	42°50.5'	-59.8'	174.8°	41°50.8'	-59.8'	174.9°	40°51.0'	-59.8'	174.9°	39°51.2'	-59.8'	175.0°	16
17	44°50.0'	-59.8'	174.6°	43°50.3'	-59.8'	174.7°	42°50.5'	-59.8'	174.8°	41°50.7'	-59.8'	174.9°	40°51.0'	-59.8'	175.0°	39°51.2'	-59.8'	175.0°	38°51.4'	-59.8'	175.1°	17
18	43°50.2'	-59.8'	174.7°	42°50.5'	-59.8'	174.8°	41°50.7'	-59.8'	174.9°	40°51.0'	-59.8'	175.0°	39°51.1'	-59.8'	175.1°	38°51.4'	-59.8'	175.1°	37°51.6'	-59.8'	175.2°	18
19	42°50.5'	-59.8'	174.8°	41°50.7'	-59.8'	174.9°	40°50.9'	-59.8'	175.0°	39°51.1'	-59.8'	175.1°	38°51.3'	-59.8'	175.2°	37°51.5'	-59.8'	175.2°	36°51.7'	-59.8'	175.3°	19
20	41°50.7'	-59.8'	175.0°	40°50.9'	-59.8'	175.0°	39°51.1'	-59.8'	175.1°	38°51.3'	-59.8'	175.2°	37°51.5'	-59.8'	175.2°	36°51.7'	-59.8'	175.3°	35°51.9'	-59.8'	175.4°	20
21	40°50.9'	-59.8'	175.1°	39°51.1'	-59.8'	175.1°	38°51.3'	-59.8'	175.2°	37°51.5'	-59.8'	175.3°	36°51.7'	-59.8'	175.3°	35°51.9'	-59.8'	175.4°	34°52.1'	-59.9'	175.5°	21
22	39°51.1'	-59.8'	175.2°	38°51.3'	-59.8'	175.2°	37°51.5'	-59.8'	175.3°	36°51.7'	-59.8'	175.4°	35°51.9'	-59.8'	175.4°	34°52.1'	-59.8'	175.5°	33°52.2'	-59.9'	175.5°	22
23	38°51.3'	-59.8'	175.3°	37°51.5'	-59.8'	175.3°	36°51.6'	-59.8'	175.4°	35°51.8'	-59.8'	175.5°	34°52.0'	-59.8'	175.5°	33°52.2'	-59.9'	175.6°	32°52.4'	-59.9'	175.6°	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												
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°51.1'	-59.7'	173.6°	60°51.5'	-59.7'	173.8°	59°51.9'	-59.8'	174.0°	58°52.2'	-59.8'	174.2°	57°52.5'	-59.8'	174.4°	56°52.8'	-59.8'	174.5°	55°53.0'	-59.8'	174.6°	0
1	60°51.4'	-59.7'	173.8°	59°51.8'	-59.8'	174.0°	58°52.1'	-59.8'	174.2°	57°52.4'	-59.8'	174.4°	56°52.7'	-59.8'	174.5°	55°52.9'	-59.8'	174.6°	54°53.2'	-59.8'	174.8°	1
2	59°51.7'	-59.8'	174.0°	58°52.0'	-59.8'	174.2°	57°52.3'	-59.8'	174.4°	56°52.6'	-59.8'	174.5°	55°52.9'	-59.8'	174.6°	54°53.1'	-59.8'	174.8°	53°53.4'	-59.8'	174.9°	2
3	58°51.9'	-59.8'	174.2°	57°52.2'	-59.8'	174.4°	56°52.5'	-59.8'	174.5°	55°52.8'	-59.8'	174.7°	54°53.1'	-59.8'	174.8°	53°53.3'	-59.8'	174.9°	52°53.5'	-59.8'	175.0°	3
4	57°52.2'	-59.8'	174.4°	56°52.5'	-59.8'	174.5°	55°52.7'	-59.8'	174.7°	54°53.0'	-59.8'	174.8°	53°53.2'	-59.8'	174.9°	52°53.5'	-59.8'	175.0°	51°53.7'	-59.9'	175.1°	4
5	56°52.4'	-59.8'	174.5°	55°52.7'	-59.8'	174.7°	54°52.9'	-59.8'	174.8°	53°53.2'	-59.8'	174.9°	52°53.5'	-59.8'	175.0°	51°53.6'	-59.9'	175.2°	50°53.8'	-59.9'	175.3°	5
6	55°52.6'	-59.8'	174.7°	54°52.9'	-59.8'	174.8°	53°53.1'	-59.8'	174.9°	52°53.3'	-59.8'	175.1°	51°53.6'	-59.8'	175.2°	50°53.8'	-59.9'	175.3°	49°54.0'	-59.9'	175.4°	6
7	54°52.8'	-59.8'	174.8°	53°53.1'	-59.8'	174.9°	52°53.3'	-59.8'	175.1°	51°53.5'	-59.8'	175.2°	50°53.7'	-59.9'	175.3°	49°53.9'	-59.9'	175.4°	48°54.1'	-59.9'	175.5°	7
8	53°53.0'	-59.8'	175.0°	52°53.2'	-59.8'	175.1°	51°53.4'	-59.8'	175.2°	50°53.7'	-59.9'	175.3°	49°53.9'	-59.9'	175.4°	48°54.0'	-59.9'	175.5°	47°54.2'	-59.9'	175.6°	8
9	52°53.2'	-59.8'	175.1°	51°53.4'	-59.8'	175.2°	50°53.6'	-59.8'	175.3°	49°53.8'	-59.9'	175.4°	48°54.0'	-59.9'	175.5°	47°54.2'	-59.9'	175.6°	46°54.3'	-59.9'	175.7°	9
10	51°53.4'	-59.8'	175.2°	50°53.6'	-59.8'	175.3°	49°53.8'	-59.9'	175.4°	48°53.9'	-59.9'	175.5°	47°54.1'	-59.9'	175.6°	46°54.3'	-59.9'	175.7°	45°54.5'	-59.9'	175.8°	10
11	50°53.5'	-59.8'	175.3°	49°53.7'	-59.9'	175.4°	48°53.9'	-59.9'	175.5°	47°54.1'	-59.9'	175.6°	46°54.3'	-59.9'	175.7°	45°54.4'	-59.9'	175.8°	44°54.6'	-59.9'	175.8°	11
12	49°53.7'	-59.8'	175.4°	48°53.9'	-59.9'	175.5°	47°54.0'	-59.9'	175.6°	46°54.2'	-59.9'	175.7°	45°54.4'	-59.9'	175.8°	44°54.5'	-59.9'	175.9°	43°54.7'	-59.9'	176.0°	12
13	48°53.8'	-59.9'	175.6°	47°54.0'	-59.9'	175.6°	46°54.2'	-59.9'	175.7°	45°54.3'	-59.9'	175.8°	44°54.5'	-59.9'	175.9°	43°54.7'	-59.9'	175.9°	42°54.8'	-59.9'	176.0°	13
14	47°54.0'	-59.9'	175.7°	46°54.1'	-59.9'	175.7°	45°54.3'	-59.9'	175.8°	44°54.4'	-59.9'	175.9°	43°54.6'	-59.9'	176.0°	42°54.8'	-59.9'	176.0°	41°54.9'	-59.9'	176.1°	14
15	46°54.1'	-59.9'	175.8°	45°54.3'	-59.9'	175.8°	44°54.4'	-59.9'	175.9°	43°54.6'	-59.9'	176.0°	42°54.7'	-59.9'	176.0°	41°54.9'	-59.9'	176.1°	40°55.0'	-59.9'	176.2°	15
16	45°54.2'	-59.9'	175.9°	44°54.4'	-59.9'	175.9°	43°54.6'	-59.9'	176.0°	42°54.7'	-59.9'	176.1°	41°54.8'	-59.9'	176.1°	40°55.0'	-59.9'	176.2°	39°55.1'	-59.9'	176.3°	16
17	44°54.4'	-59.9'	175.9°	43°54.5'	-59.9'	176.0°	42°54.7'	-59.9'	176.1°	41°54.8'	-59.9'	176.1°	40°54.9'	-59.9'	176.2°	39°55.0'	-59.9'	176.3°	38°55.2'	-59.9'	176.3°	17
18	43°54.5'	-59.9'	176.0°	42°54.6'	-59.9'	176.1°	41°54.8'	-59.9'	176.2°	40°54.9'	-59.9'	176.2°	39°55.0'	-59.9'	176.3°	38°55.2'	-59.9'	176.3°	37°55.3'	-59.9'	176.4°	18
19	42°54.6'	-59.9'	176.1°	41°54.8'	-59.9'	176.2°	40°54.9'	-59.9'	176.2°	39°55.0'	-59.9'	176.3°	38°55.1'	-59.9'	176.4°	37°55.3'	-59.9'	176.4°	36°55.4'	-59.9'	176.5°	19
20	41°54.7'	-59.9'	176.2°	40°54.9'	-59.9'	176.3°	39°55.0'	-59.9'	176.3°	38°55.1'	-59.9'	176.4°	37°55.2'	-59.9'	176.4°	36°55.4'	-59.9'	176.5°	35°55.5'	-59.9'	176.5°	20
21	40°54.9'	-59.9'	176.3°	39°55.0'	-59.9'	176.3°	38°55.1'	-59.9'	176.4°	37°55.2'	-59.9'	176.4°	36°55.3'	-59.9'	176.5°	35°55.4'	-59					





**SEMI DIAMETER (SD)**

Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
1	16.29'	16.26'	16.17'	16.03'	15.90'	15.80'	15.75'	15.78'	15.87'	16.00'	16.14'	16.24'
3	16.29'	16.25'	16.16'	16.02'	15.89'	15.79'	15.75'	15.79'	15.89'	16.02'	16.15'	16.25'
6	16.29'	16.24'	16.14'	16.00'	15.88'	15.78'	15.75'	15.79'	15.90'	16.03'	16.17'	16.26'
9	16.29'	16.23'	16.13'	15.99'	15.86'	15.78'	15.75'	15.80'	15.91'	16.04'	16.18'	16.26'
12	16.28'	16.22'	16.12'	15.98'	15.85'	15.77'	15.76'	15.81'	15.92'	16.06'	16.19'	16.27'
15	16.28'	16.21'	16.10'	15.96'	15.84'	15.77'	15.76'	15.82'	15.94'	16.07'	16.20'	16.27'
18	16.28'	16.20'	16.09'	15.95'	15.83'	15.76'	15.76'	15.83'	15.95'	16.08'	16.21'	16.28'
21	16.27'	16.19'	16.08'	15.94'	15.82'	15.76'	15.76'	15.84'	15.96'	16.10'	16.22'	16.28'
24	16.27'	16.18'	16.06'	15.92'	15.81'	15.76'	15.77'	15.85'	15.98'	16.11'	16.23'	16.29'
27	16.26'	16.17'	16.05'	15.91'	15.81'	15.76'	15.77'	15.86'	15.99'	16.12'	16.24'	16.29'
30	16.26'	16.17'	16.04'	15.90'	15.80'	15.75'	15.78'	15.87'	16.00'	16.14'	16.24'	16.29'

Lower Limb, ADD.

Upper Limb, SUBTRACT

DIP Correction		
Meters	Dip °	Feet
0.4	1.11'	1.30
0.6	1.36'	1.95
0.8	1.57'	2.60
1.0	1.76'	3.25
1.2	1.93'	3.90
1.4	2.08'	4.55
1.6	2.23'	5.20
1.8	2.36'	5.85
2.0	2.49'	6.50
2.2	2.61'	7.15
2.4	2.73'	7.80
2.6	2.84'	8.45
2.8	2.95'	9.10
3.0	3.05'	9.75
3.2	3.15'	10.40
3.4	3.25'	11.05
3.6	3.34'	11.70
3.8	3.43'	12.35
4.0	3.52'	13.00

**Always SUBTRACT**

PARALLAX	
Alt (Ha)	Parallax
0	0.14'
5	0.14'
10	0.14'
15	0.14'
20	0.14'
25	0.13'
30	0.12'
35	0.12'
40	0.11'
45	0.10'
50	0.09'
55	0.08'
60	0.07'
65	0.06'
70	0.05'
75	0.04'
80	0.03'
85	0.01'
90	0.00'

**Always ADD**

Hs = Sextant Altitude  
 Sextant Corrections  
 Ha = Actual measure altitude  
 Ha = Hs +/- Index Error (IE) - Dip  
 Altitude Corrections  
 Ho = True Observed Altitude  
 Ho = Ha + Parallax - Refraction +/- SD  
 ADD Index Error if OFF the arc  
 SUBTRACT Index Error if ON the arc.

If using an artificial horizon Dip = 0.  
 Add or Subtract IE as normal, then halve the angle Ha.  
 Then apply the Altitude corrections as normal.

Alt (Ha)	mB & DegC			REFRACTION			mB & DegC		
	1000			1015			1030		
	10	20	30	10	20	30	10	20	30
1	24.14'	23.31'	22.54'	24.50'	23.66'	22.88'	24.86'	24.01'	23.22'
2	18.07'	17.46'	16.88'	18.34'	17.72'	17.13'	18.61'	17.98'	17.39'
3	14.23'	13.75'	13.29'	14.44'	13.95'	13.49'	14.66'	14.16'	13.69'
4	11.64'	11.25'	10.87'	11.82'	11.41'	11.04'	11.99'	11.58'	11.20'
5	9.80'	9.47'	9.16'	9.95'	9.61'	9.30'	10.10'	9.75'	9.43'
6	8.44'	8.15'	7.88'	8.57'	8.28'	8.00'	8.69'	8.40'	8.12'
7	7.39'	7.14'	6.91'	7.51'	7.25'	7.01'	7.62'	7.36'	7.11'
8	6.57'	6.34'	6.13'	6.67'	6.44'	6.23'	6.76'	6.53'	6.32'
9	5.90'	5.70'	5.51'	5.99'	5.78'	5.59'	6.08'	5.87'	5.68'
10	5.35'	5.17'	5.00'	5.43'	5.24'	5.07'	5.51'	5.32'	5.15'
12	4.50'	4.34'	4.20'	4.56'	4.41'	4.26'	4.63'	4.47'	4.32'
14	3.86'	3.73'	3.61'	3.92'	3.79'	3.66'	3.98'	3.84'	3.72'
16	3.38'	3.26'	3.16'	3.43'	3.31'	3.20'	3.48'	3.36'	3.25'
18	3.00'	2.89'	2.80'	3.04'	2.94'	2.84'	3.09'	2.98'	2.88'
20	2.68'	2.59'	2.50'	2.72'	2.63'	2.54'	2.76'	2.67'	2.58'
22	2.42'	2.34'	2.26'	2.46'	2.37'	2.30'	2.49'	2.41'	2.33'
24	2.20'	2.13'	2.06'	2.23'	2.16'	2.09'	2.27'	2.19'	2.12'
26	2.01'	1.94'	1.88'	2.04'	1.97'	1.91'	2.07'	2.00'	1.94'
28	1.85'	1.79'	1.73'	1.88'	1.81'	1.75'	1.90'	1.84'	1.78'
30	1.70'	1.65'	1.59'	1.73'	1.67'	1.62'	1.75'	1.69'	1.64'
35	1.41'	1.36'	1.31'	1.43'	1.38'	1.33'	1.45'	1.40'	1.35'
40	1.18'	1.14'	1.10'	1.19'	1.15'	1.11'	1.21'	1.17'	1.13'
45	0.99'	0.95'	0.92'	1.00'	0.97'	0.94'	1.02'	0.98'	0.95'
50	0.83'	0.80'	0.77'	0.84'	0.81'	0.79'	0.85'	0.82'	0.80'
55	0.69'	0.67'	0.65'	0.70'	0.68'	0.66'	0.71'	0.69'	0.67'
60	0.57'	0.55'	0.53'	0.58'	0.56'	0.54'	0.59'	0.57'	0.55'
65	0.46'	0.44'	0.43'	0.47'	0.45'	0.44'	0.47'	0.46'	0.44'
70	0.36'	0.35'	0.34'	0.36'	0.35'	0.34'	0.37'	0.36'	0.35'
75	0.26'	0.26'	0.25'	0.27'	0.26'	0.25'	0.27'	0.26'	0.25'
80	0.17'	0.17'	0.16'	0.18'	0.17'	0.16'	0.18'	0.17'	0.17'
85	0.09'	0.08'	0.08'	0.09'	0.08'	0.08'	0.09'	0.08'	0.08'
90	0.00'	0.00'	0.00'	0.00'	0.00'	0.00'	0.00'	0.00'	0.00'

**Always SUBTRACT**







