

Sight Reduction Tables

Latitude 84° to 90°

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

14° 346° LHA

Latitude SAME as Declination

14° 346° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	5°49.3'	+60.0'	165.9°	4°51.1'	+60.0'	165.9°	3°52.9'	+60.0'	166.0°	2°54.6'	+60.0'	166.0°	1°56.4'	+60.0'	166.0°	0°58.2'	+60.0'	166.0°	0°00.0'	+60.0'	166.0°	0
1	6°49.2'	+60.0'	165.9°	5°51.1'	+60.0'	165.9°	4°52.9'	+60.0'	166.0°	3°54.6'	+60.0'	166.0°	2°56.4'	+60.0'	166.0°	1°58.2'	+60.0'	166.0°	1°00.0'	+60.0'	164.4°	1
2	7°49.2'	+60.0'	165.9°	6°51.0'	+60.0'	165.9°	5°52.8'	+60.0'	165.9°	4°54.6'	+60.0'	166.0°	3°56.4'	+60.0'	166.0°	2°58.2'	+60.0'	166.0°	2°00.0'	+60.0'	180.0°	2
3	8°49.2'	+60.0'	165.8°	7°51.0'	+60.0'	165.9°	6°52.8'	+60.0'	165.9°	5°54.6'	+60.0'	165.9°	4°56.4'	+60.0'	166.0°	3°58.2'	+60.0'	166.0°	3°00.0'	+60.0'	180.0°	3
4	9°49.2'	+60.0'	165.8°	8°51.0'	+60.0'	165.9°	7°52.8'	+60.0'	165.9°	6°54.6'	+60.0'	165.9°	5°56.4'	+60.0'	166.0°	4°58.2'	+60.0'	166.0°	4°00.0'	+60.0'	155.3°	4
5	10°49.2'	+60.0'	165.8°	9°51.0'	+60.0'	165.8°	8°52.8'	+60.0'	165.9°	7°54.6'	+60.0'	165.9°	6°56.4'	+60.0'	165.9°	5°58.2'	+60.0'	166.0°	5°00.0'	+60.0'	133.0°	5
6	11°49.2'	+60.0'	165.8°	10°51.0'	+60.0'	165.8°	9°52.8'	+60.0'	165.9°	8°54.6'	+60.0'	165.9°	7°56.4'	+60.0'	165.9°	6°58.2'	+60.0'	166.0°	6°00.0'	+60.0'	133.1°	6
7	12°49.1'	+60.0'	165.7°	11°51.0'	+60.0'	165.8°	10°52.8'	+60.0'	165.8°	9°54.6'	+60.0'	165.9°	8°56.4'	+60.0'	165.9°	7°58.2'	+60.0'	166.0°	7°00.0'	+60.0'	133.2°	7
8	13°49.1'	+60.0'	165.7°	12°51.0'	+60.0'	165.8°	11°52.8'	+60.0'	165.8°	10°54.6'	+60.0'	165.9°	9°56.4'	+60.0'	165.9°	8°58.2'	+60.0'	166.0°	8°00.0'	+60.0'	117.2°	8
9	14°49.1'	+60.0'	165.7°	13°50.9'	+60.0'	165.8°	12°52.8'	+60.0'	165.8°	11°54.6'	+60.0'	165.9°	10°56.4'	+60.0'	165.9°	9°58.2'	+60.0'	166.0°	9°00.0'	+60.0'	156.6°	9
10	15°49.1'	+60.0'	165.7°	14°50.9'	+60.0'	165.7°	13°52.8'	+60.0'	165.8°	12°54.6'	+60.0'	165.9°	11°56.4'	+60.0'	165.9°	10°58.2'	+60.0'	166.0°	10°00.0'	+60.0'	157.0°	10
11	16°49.0'	+60.0'	165.6°	15°50.9'	+60.0'	165.7°	14°52.8'	+60.0'	165.8°	13°54.6'	+60.0'	165.8°	12°56.4'	+60.0'	165.9°	11°58.2'	+60.0'	166.0°	11°00.0'	+60.0'	157.4°	11
12	17°49.0'	+60.0'	165.6°	16°50.9'	+60.0'	165.7°	15°52.8'	+60.0'	165.8°	14°54.6'	+60.0'	165.8°	13°56.4'	+60.0'	165.9°	12°58.2'	+60.0'	165.9°	12°00.0'	+60.0'	180.0°	12
13	18°49.0'	+60.0'	165.6°	17°50.9'	+60.0'	165.7°	16°52.7'	+60.0'	165.7°	15°54.6'	+60.0'	165.8°	14°56.4'	+60.0'	165.9°	13°58.2'	+60.0'	165.9°	13°00.0'	+60.0'	180.0°	13
14	19°49.0'	+60.0'	165.6°	18°50.9'	+60.0'	165.6°	17°52.7'	+60.0'	165.7°	16°54.6'	+60.0'	165.8°	15°56.4'	+60.0'	165.9°	14°58.2'	+60.0'	165.9°	14°00.0'	+60.0'	159.1°	14
15	20°49.0'	+60.0'	165.5°	19°50.9'	+60.0'	165.6°	18°52.7'	+60.0'	165.7°	17°54.6'	+60.0'	165.8°	16°56.4'	+60.0'	165.9°	15°58.2'	+60.0'	165.9°	15°00.0'	+60.0'	159.7°	15
16	21°48.9'	+60.0'	165.5°	20°50.8'	+60.0'	165.6°	19°52.7'	+60.0'	165.7°	18°54.6'	+60.0'	165.8°	17°56.4'	+60.0'	165.9°	16°58.2'	+60.0'	165.9°	16°00.0'	+60.0'	160.5°	16
17	22°48.9'	+60.0'	165.5°	21°50.8'	+60.0'	165.6°	20°52.7'	+60.0'	165.7°	19°54.6'	+60.0'	165.8°	18°56.4'	+60.0'	165.8°	17°58.2'	+60.0'	165.9°	17°00.0'	+60.0'	161.4°	17
18	23°48.9'	+60.0'	165.4°	22°50.8'	+60.0'	165.5°	21°52.7'	+60.0'	165.6°	20°54.6'	+60.0'	165.7°	19°56.4'	+60.0'	165.8°	18°58.2'	+60.0'	165.9°	18°00.0'	+60.0'	162.3°	18
19	24°48.9'	+60.0'	165.4°	23°50.8'	+60.0'	165.5°	22°52.7'	+60.0'	165.6°	21°54.6'	+60.0'	165.7°	20°56.4'	+60.0'	165.8°	19°58.2'	+60.0'	165.9°	19°00.0'	+60.0'	163.4°	19
20	25°48.8'	+60.0'	165.4°	24°50.8'	+60.0'	165.5°	23°52.7'	+60.0'	165.6°	22°54.5'	+60.0'	165.7°	21°56.4'	+60.0'	165.8°	20°58.2'	+60.0'	165.9°	20°00.0'	+60.0'	164.7°	20
21	26°48.8'	+60.0'	165.3°	25°50.8'	+60.0'	165.5°	24°52.7'	+60.0'	165.6°	23°54.5'	+60.0'	165.7°	22°56.4'	+60.0'	165.8°	21°58.2'	+60.0'	165.9°	21°00.0'	+60.0'	90.0°	21
22	27°48.8'	+60.0'	165.3°	26°50.7'	+60.0'	165.4°	25°52.7'	+60.0'	165.6°	24°54.5'	+60.0'	165.7°	23°56.4'	+60.0'	165.8°	22°58.2'	+60.0'	165.9°	22°00.0'	+60.0'	180.0°	22
23	28°48.8'	+60.0'	165.3°	27°50.7'	+60.0'	165.4°	26°52.6'	+60.0'	165.5°	25°54.5'	+60.0'	165.7°	24°56.4'	+60.0'	165.8°	23°58.2'	+60.0'	165.9°	23°00.0'	+60.0'	169.9°	23
Dec°	84			85			86			87			88			89			90			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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	5°47.7'	+60.0'	164.9°	4°49.8'	+60.0'	164.9°	3°51.8'	+60.0'	165.0°	2°53.9'	+60.0'	165.0°	1°55.9'	+60.0'	165.0°	0°58.0'	+60.0'	165.0°	0°00.0'	+60.0'	165.0°	0
1	6°47.7'	+60.0'	164.9°	5°49.7'	+60.0'	164.9°	4°51.8'	+60.0'	164.9°	3°53.9'	+60.0'	165.0°	2°55.9'	+60.0'	165.0°	1°58.0'	+60.0'	165.0°	1°00.0'	+60.0'	164.4°	1
2	7°47.6'	+60.0'	164.9°	6°49.7'	+60.0'	164.9°	5°51.8'	+60.0'	164.9°	4°53.9'	+60.0'	165.0°	3°55.9'	+60.0'	165.0°	2°58.0'	+60.0'	165.0°	2°00.0'	+60.0'	180.0°	2
3	8°47.6'	+60.0'	164.8°	7°49.7'	+60.0'	164.9°	6°51.8'	+60.0'	164.9°	5°53.8'	+60.0'	164.9°	4°55.9'	+60.0'	165.0°	3°58.0'	+60.0'	165.0°	3°00.0'	+60.0'	180.0°	3
4	9°47.6'	+60.0'	164.8°	8°49.7'	+60.0'	164.9°	7°51.8'	+60.0'	164.9°	6°53.8'	+60.0'	164.9°	5°55.9'	+60.0'	165.0°	4°58.0'	+60.0'	165.0°	4°00.0'	+60.0'	155.3°	4
5	10°47.6'	+60.0'	164.8°	9°49.7'	+60.0'	164.8°	8°51.8'	+60.0'	164.9°	7°53.8'	+60.0'	164.9°	6°55.9'	+60.0'	164.9°	5°58.0'	+60.0'	165.0°	5°00.0'	+60.0'	133.0°	5
6	11°47.6'	+60.0'	164.8°	10°49.7'	+60.0'	164.8°	9°51.7'	+60.0'	164.9°	8°53.8'	+60.0'	164.9°	7°55.9'	+60.0'	164.9°	6°58.0'	+60.0'	165.0°	6°00.0'	+60.0'	133.1°	6
7	12°47.5'	+60.0'	164.7°	11°49.6'	+60.0'	164.8°	10°51.7'	+60.0'	164.8°	9°53.8'	+60.0'	164.9°	8°55.9'	+60.0'	164.9°	7°58.0'	+60.0'	165.0°	7°00.0'	+60.0'	133.2°	7
8	13°47.5'	+60.0'	164.7°	12°49.6'	+60.0'	164.8°	11°51.7'	+60.0'	164.8°	10°53.8'	+60.0'	164.9°	9°55.9'	+60.0'	164.9°	8°58.0'	+60.0'	165.0°	8°00.0'	+60.0'	117.2°	8
9	14°47.5'	+60.0'	164.7°	13°49.6'	+60.0'	164.7°	12°51.7'	+60.0'	164.8°	11°53.8'	+60.0'	164.9°	10°55.9'	+60.0'	164.9°	9°57.9'	+60.0'	165.0°	9°00.0'	+60.0'	156.6°	9
10	15°47.5'	+60.0'	164.6°	14°49.6'	+60.0'	164.7°	13°51.7'	+60.0'	164.8°	12°53.8'	+60.0'	164.8°	11°55.9'	+60.0'	164.9°	10°57.9'	+60.0'	165.0°	10°00.0'	+60.0'	157.0°	10
11	16°47.4'	+60.0'	164.6°	15°49.6'	+60.0'	164.7°	14°51.7'	+60.0'	164.8°	13°53.8'	+60.0'	164.8°	12°55.9'	+60.0'	164.9°	11°57.9'	+60.0'	164.9°	11°00.0'	+60.0'	157.4°	11
12	17°47.4'	+60.0'	164.6°	16°49.6'	+60.0'	164.7°	15°51.7'	+60.0'	164.7°	14°53.8'	+60.0'	164.8°	13°55.9'	+60.0'	164.9°	12°57.9'	+60.0'	164.9°	12°00.0'	+60.0'	180.0°	12
13	18°47.4'	+60.0'	164.6°	17°49.5'	+60.0'	164.6°	16°51.7'	+60.0'	164.7°	15°53.8'	+60.0'	164.8°	14°55.9'	+60.0'	164.9°	13°57.9'	+60.0'	164.9°	13°00.0'	+60.0'	180.0°	13
14	19°47.4'	+60.0'	164.5°	18°49.5'	+60.0'	164.6°	17°51.7'	+60.0'	164.7°	16°53.8'	+60.0'	164.8°	15°55.9'	+60.0'	164.9°	14°57.9'	+60.0'	164.9°	14°00.0'	+60.0'	159.1°	14
15	20°47.3'	+60.0'	164.5°	19°49.5'	+60.0'	164.6°	18°51.7'	+60.0'	164.7°	17°53.8'	+60.0'	164.8°	16°55.9'	+60.0'	164.9°	15°57.9'	+60.0'	164.9°	15°00.0'	+60.0'	159.7°	15
16	21°47.3'	+60.0'	164.5°	20°49.5'	+60.0'	164.6°	19°51.6'	+60.0'	164.7°	18°53.8'	+60.0'	164.8°	17°55.9'	+60.0'	164.8°	16°57.9'	+60.0'	164.9°	16°00.0'	+60.0'	160.5°	16
17	22°47.3'	+60.0'	164.4°	21°49.5'	+60.0'	164.5°	20°51.6'	+60.0'	164.6°	19°53.8'	+60.0'	164.7°	18°55.9'	+60.0'	164.8°	17°57.9'	+60.0'	164.9°	17°00.0'	+60.0'	161.4°	17
18	23°47.3'	+60.0'	164.4°	22°49.5'	+60.0'	164.5°	21°51.6'	+60.0'	164.6°	20°53.8'	+60.0'	164.7°	19°55.9'	+60.0'	164.8°	18°57.9'	+60.0'	164.9°	18°00.0'	+60.0'	162.3°	18
19	24°47.2'	+60.0'	164.4°	23°49.4'	+60.0'	164.5°	22°51.6'	+60.0'	164.6°	21°53.8'	+60.0'	164.7°	20°55.9'	+60.0'	164.8°	19°57.9'	+60.0'	164.9°	19°00.0'	+60.0'	163.4°	19
20	25°47.2'	+60.0'	164.3°	24°49.4'	+60.0'	164.5°	23°51.6'	+60.0'	164.6°	22°53.7'	+60.0'	164.7°	21°55.9'	+60.0'	164.8°	20°57.9'	+60.0'	164.9°	20°00.0'	+60.0'	164.7°	20
21	26°47.2'	+60.0'	164.3°	25°49.4'	+60.0'	164.4°	24°51.6'	+60.0'	164.6°	23°53.7'	+60.0'	164.7°	22°55.9'	+60.0'	164.8°	21°57.9'	+60.0'	164.9°	21°00.0'	+60.0'	90.0°	21
22	27																					

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

16° 344° LHA

Latitude SAME as Declination

16° 344° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	5°46.0'	+60.0'	163.9°	4°48.4'	+60.0'	163.9°	3°50.7'	+60.0'	164.0°	2°53.0'	+60.0'	164.0°	1°55.3'	+60.0'	164.0°	0°57.7'	+60.0'	164.0°	0°00.0'	+60.0'	164.0°	0
1	6°46.0'	+60.0'	163.9°	5°48.3'	+60.0'	163.9°	4°50.7'	+60.0'	163.9°	3°53.0'	+60.0'	164.0°	2°55.3'	+60.0'	164.0°	1°57.7'	+60.0'	164.0°	1°00.0'	+60.0'	164.4°	1
2	7°46.0'	+60.0'	163.9°	6°48.3'	+60.0'	163.9°	5°50.7'	+60.0'	163.9°	4°53.0'	+60.0'	164.0°	3°55.3'	+60.0'	164.0°	2°57.7'	+60.0'	164.0°	2°00.0'	+60.0'	155.1°	2
3	8°45.9'	+60.0'	163.8°	7°48.3'	+60.0'	163.9°	6°50.7'	+60.0'	163.9°	5°53.0'	+60.0'	163.9°	4°55.3'	+60.0'	164.0°	3°57.7'	+60.0'	164.0°	3°00.0'	+60.0'	155.2°	3
4	9°45.9'	+60.0'	163.8°	8°48.3'	+60.0'	163.8°	7°50.6'	+60.0'	163.9°	6°53.0'	+60.0'	163.9°	5°55.3'	+60.0'	164.0°	4°57.7'	+60.0'	164.0°	4°00.0'	+60.0'	155.3°	4
5	10°45.9'	+60.0'	163.8°	9°48.3'	+60.0'	163.8°	8°50.6'	+60.0'	163.9°	7°53.0'	+60.0'	163.9°	6°55.3'	+60.0'	163.9°	5°57.7'	+60.0'	164.0°	5°00.0'	+60.0'	133.0°	5
6	11°45.9'	+60.0'	163.7°	10°48.2'	+60.0'	163.8°	9°50.6'	+60.0'	163.8°	8°53.0'	+60.0'	163.9°	7°55.3'	+60.0'	163.9°	6°57.7'	+60.0'	164.0°	6°00.0'	+60.0'	133.1°	6
7	12°45.8'	+60.0'	163.7°	11°48.2'	+60.0'	163.8°	10°50.6'	+60.0'	163.8°	9°53.0'	+60.0'	163.9°	8°55.3'	+60.0'	163.9°	7°57.7'	+60.0'	164.0°	7°00.0'	+60.0'	133.2°	7
8	13°45.8'	+60.0'	163.7°	12°48.2'	+60.0'	163.7°	11°50.6'	+60.0'	163.8°	10°53.0'	+60.0'	163.9°	9°55.3'	+60.0'	163.9°	8°57.7'	+60.0'	164.0°	8°00.0'	+60.0'	117.2°	8
9	14°45.8'	+60.0'	163.6°	13°48.2'	+60.0'	163.7°	12°50.6'	+60.0'	163.8°	11°53.0'	+60.0'	163.8°	10°55.3'	+60.0'	163.9°	9°57.7'	+60.0'	164.0°	9°00.0'	+60.0'	156.6°	9
10	15°45.7'	+60.0'	163.6°	14°48.2'	+60.0'	163.7°	13°50.6'	+60.0'	163.8°	12°53.0'	+60.0'	163.8°	11°55.3'	+60.0'	163.9°	10°57.7'	+60.0'	163.9°	10°00.0'	+60.0'	157.0°	10
11	16°45.7'	+60.0'	163.6°	15°48.2'	+60.0'	163.7°	14°50.6'	+60.0'	163.7°	13°53.0'	+60.0'	163.8°	12°55.3'	+60.0'	163.9°	11°57.7'	+60.0'	163.9°	11°00.0'	+60.0'	157.4°	11
12	17°45.7'	+60.0'	163.6°	16°48.1'	+60.0'	163.6°	15°50.6'	+60.0'	163.7°	14°52.9'	+60.0'	163.8°	13°55.3'	+60.0'	163.9°	12°57.7'	+60.0'	163.9°	12°00.0'	+60.0'	180.0°	12
13	18°45.7'	+60.0'	163.5°	17°48.1'	+60.0'	163.6°	16°50.5'	+60.0'	163.7°	15°52.9'	+60.0'	163.8°	14°55.3'	+60.0'	163.9°	13°57.7'	+60.0'	163.9°	13°00.0'	+60.0'	180.0°	13
14	19°45.6'	+60.0'	163.5°	18°48.1'	+60.0'	163.6°	17°50.5'	+60.0'	163.7°	16°52.9'	+60.0'	163.8°	15°55.3'	+60.0'	163.9°	14°57.7'	+60.0'	163.9°	14°00.0'	+60.0'	159.1°	14
15	20°45.6'	+60.0'	163.5°	19°48.1'	+60.0'	163.6°	18°50.5'	+60.0'	163.7°	17°52.9'	+60.0'	163.8°	16°55.3'	+60.0'	163.8°	15°57.7'	+60.0'	163.9°	15°00.0'	+60.0'	159.7°	15
16	21°45.6'	+60.0'	163.4°	20°48.1'	+60.0'	163.5°	19°50.5'	+60.0'	163.6°	18°52.9'	+60.0'	163.7°	17°55.3'	+60.0'	163.8°	16°57.7'	+60.0'	163.9°	16°00.0'	+60.0'	160.5°	16
17	22°45.6'	+60.0'	163.4°	21°48.0'	+60.0'	163.5°	20°50.5'	+60.0'	163.6°	19°52.9'	+60.0'	163.7°	18°55.3'	+60.0'	163.8°	17°57.7'	+60.0'	163.9°	17°00.0'	+60.0'	161.4°	17
18	23°45.5'	+60.0'	163.4°	22°48.0'	+60.0'	163.5°	21°50.5'	+60.0'	163.6°	20°52.9'	+60.0'	163.7°	19°55.3'	+60.0'	163.8°	18°57.7'	+60.0'	163.9°	18°00.0'	+60.0'	162.3°	18
19	24°45.5'	+60.0'	163.3°	23°48.0'	+60.0'	163.5°	22°50.5'	+60.0'	163.6°	21°52.9'	+60.0'	163.7°	20°55.3'	+60.0'	163.8°	19°57.7'	+60.0'	163.9°	19°00.0'	+60.0'	163.4°	19
20	25°45.5'	+60.0'	163.3°	24°48.0'	+60.0'	163.4°	23°50.5'	+60.0'	163.6°	22°52.9'	+60.0'	163.7°	21°55.3'	+60.0'	163.8°	20°57.7'	+60.0'	163.9°	20°00.0'	+60.0'	164.7°	20
21	26°45.4'	+60.0'	163.3°	25°48.0'	+60.0'	163.4°	24°50.4'	+60.0'	163.5°	23°52.9'	+60.0'	163.7°	22°55.3'	+60.0'	163.8°	21°57.7'	+60.0'	163.9°	21°00.0'	+60.0'	90.0°	21
22	27°45.4'	+60.0'	163.2°	26°47.9'	+60.0'	163.4°	25°50.4'	+60.0'	163.5°	24°52.9'	+60.0'	163.6°	23°55.3'	+60.0'	163.8°	22°57.7'	+60.0'	163.9°	22°00.0'	+60.0'	180.0°	22
23	28°45.4'	+60.0'	163.2°	27°47.9'	+60.0'	163.3°	26°50.4'	+60.0'	163.5°	25°52.9'	+60.0'	163.6°	24°55.3'	+60.0'	163.8°	23°57.7'	+60.0'	163.9°	23°00.0'	+60.0'	169.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	5°44.2'	+60.0'	162.9°	4°46.9'	+60.0'	162.9°	3°49.5'	+60.0'	163.0°	2°52.1'	+60.0'	163.0°	1°54.8'	+60.0'	163.0°	0°57.4'	+60.0'	163.0°	0°00.0'	+60.0'	163.0°	0
1	6°44.2'	+60.0'	162.9°	5°46.8'	+60.0'	162.9°	4°49.5'	+60.0'	162.9°	3°52.1'	+60.0'	163.0°	2°54.8'	+60.0'	163.0°	1°57.4'	+60.0'	163.0°	1°00.0'	+60.0'	164.4°	1
2	7°44.2'	+60.0'	162.8°	6°46.8'	+60.0'	162.9°	5°49.5'	+60.0'	162.9°	4°52.1'	+60.0'	162.9°	3°54.7'	+60.0'	163.0°	2°57.4'	+60.0'	163.0°	2°00.0'	+60.0'	155.1°	2
3	8°44.1'	+60.0'	162.8°	7°46.8'	+60.0'	162.9°	6°49.5'	+60.0'	162.9°	5°52.1'	+60.0'	162.9°	4°54.7'	+60.0'	163.0°	3°57.4'	+60.0'	163.0°	3°00.0'	+60.0'	155.2°	3
4	9°44.1'	+60.0'	162.8°	8°46.8'	+60.0'	162.8°	7°49.4'	+60.0'	162.9°	6°52.1'	+60.0'	162.9°	5°54.7'	+60.0'	162.9°	4°57.4'	+60.0'	163.0°	4°00.0'	+60.0'	155.3°	4
5	10°44.1'	+60.0'	162.8°	9°46.8'	+60.0'	162.8°	8°49.4'	+60.0'	162.9°	7°52.1'	+60.0'	162.9°	6°54.7'	+60.0'	162.9°	5°57.4'	+60.0'	163.0°	5°00.0'	+60.0'	133.0°	5
6	11°44.0'	+60.0'	162.7°	10°46.7'	+60.0'	162.8°	9°49.4'	+60.0'	162.8°	8°52.1'	+60.0'	162.9°	7°54.7'	+60.0'	162.9°	6°57.4'	+60.0'	163.0°	6°00.0'	+60.0'	133.1°	6
7	12°44.0'	+60.0'	162.7°	11°46.7'	+60.0'	162.8°	10°49.4'	+60.0'	162.8°	9°52.1'	+60.0'	162.9°	8°54.7'	+60.0'	162.9°	7°57.4'	+60.0'	163.0°	7°00.0'	+60.0'	133.2°	7
8	13°44.0'	+60.0'	162.7°	12°46.7'	+60.0'	162.7°	11°49.4'	+60.0'	162.8°	10°52.1'	+60.0'	162.9°	9°54.7'	+60.0'	162.9°	8°57.4'	+60.0'	163.0°	8°00.0'	+60.0'	117.2°	8
9	14°44.0'	+60.0'	162.6°	13°46.7'	+60.0'	162.7°	12°49.4'	+60.0'	162.8°	11°52.1'	+60.0'	162.8°	10°54.7'	+60.0'	162.9°	9°57.4'	+60.0'	163.0°	9°00.0'	+60.0'	156.6°	9
10	15°43.9'	+60.0'	162.6°	14°46.7'	+60.0'	162.7°	13°49.4'	+60.0'	162.8°	12°52.1'	+60.0'	162.8°	11°54.7'	+60.0'	162.9°	10°57.4'	+60.0'	162.9°	10°00.0'	+60.0'	157.0°	10
11	16°43.9'	+60.0'	162.6°	15°46.6'	+60.0'	162.6°	14°49.4'	+60.0'	162.7°	13°52.0'	+60.0'	162.8°	12°54.7'	+60.0'	162.9°	11°57.4'	+60.0'	162.9°	11°00.0'	+60.0'	157.4°	11
12	17°43.9'	+60.0'	162.5°	16°46.6'	+60.0'	162.6°	15°49.3'	+60.0'	162.7°	14°52.0'	+60.0'	162.8°	13°54.7'	+60.0'	162.9°	12°57.4'	+60.0'	162.9°	12°00.0'	+60.0'	180.0°	12
13	18°43.8'	+60.0'	162.5°	17°46.6'	+60.0'	162.6°	16°49.3'	+60.0'	162.7°	15°52.0'	+60.0'	162.8°	14°54.7'	+60.0'	162.9°	13°57.4'	+60.0'	162.9°	13°00.0'	+60.0'	180.0°	13
14	19°43.8'	+60.0'	162.5°	18°46.6'	+60.0'	162.6°	17°49.3'	+60.0'	162.7°	16°52.0'	+60.0'	162.8°	15°54.7'	+60.0'	162.8°	14°57.4'	+60.0'	162.9°	14°00.0'	+60.0'	159.1°	14
15	20°43.8'	+60.0'	162.4°	19°46.6'	+60.0'	162.5°	18°49.3'	+60.0'	162.6°	17°52.0'	+60.0'	162.7°	16°54.7'	+60.0'	162.8°	15°57.4'	+60.0'	162.9°	15°00.0'	+60.0'	159.7°	15
16	21°43.7'	+60.0'	162.4°	20°46.5'	+60.0'	162.5°	19°49.3'	+60.0'	162.6°	18°52.0'	+60.0'	162.7°	17°54.7'	+60.0'	162.8°	16°57.4'	+60.0'	162.9°	16°00.0'	+60.0'	160.5°	16
17	22°43.7'	+60.0'	162.4°	21°46.5'	+60.0'	162.5°	20°49.3'	+60.0'	162.6°	19°52.0'	+60.0'	162.7°	18°54.7'	+60.0'	162.8°	17°57.4'	+60.0'	162.9°	17°00.0'	+60.0'	161.4°	17
18	23°43.7'	+60.0'	162.3°	22°46.5'	+60.0'	162.4°	21°49.3'	+60.0'	162.6°	20°52.0'	+60.0'	162.7°	19°54.7'	+60.0'	162.8°	18°57.4'	+60.0'	162.9°	18°00.0'	+60.0'	162.3°	18
19	24°43.6'	+60.0'	162.3°	23°46.5'	+60.0'	162.4°	22°49.2'	+60.0'	162.5°	21°52.0'	+60.0'	162.7°	20°54.7'	+60.0'	162.8°	19°57.4'	+60.0'	162.9°	19°00.0'	+60.0'	163.4°	19
20	25°43.6'	+60.0'	162.2°	24°46.4'	+60.0'	162.4°	23°49.2'	+60.0'	162.5°	22°52.0'	+60.0'	162.7°	21°54.7'	+60.0'	162.8°	20°57.4'	+60.0'	162.9°	20°00.0'	+60.0'	164.7°	20
21	26°43.6'	+60.0'	162.2°	25°46.4'	+60.0'	162.4°	24°49.2'	+60.0														

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

18° 342° LHA

Latitude SAME as Declination

18° 342° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	5°42.3'	+60.0'	161.9°	4°45.3'	+60.0'	161.9°	3°48.2'	+60.0'	162.0°	2°51.2'	+60.0'	162.0°	1°54.1'	+60.0'	162.0°	0°57.1'	+60.0'	162.0°	0°00.0'	+60.0'	162.0°	0
1	6°42.3'	+60.0'	161.9°	5°45.3'	+60.0'	161.9°	4°48.2'	+60.0'	161.9°	3°51.2'	+60.0'	162.0°	2°54.1'	+60.0'	162.0°	1°57.1'	+60.0'	162.0°	1°00.0'	+60.0'	164.4°	1
2	7°42.3'	+60.0'	161.8°	6°45.2'	+60.0'	161.9°	5°48.2'	+60.0'	161.9°	4°51.2'	+60.0'	161.9°	3°54.1'	+60.0'	162.0°	2°57.1'	+60.0'	162.0°	2°00.0'	+60.0'	155.1°	2
3	8°42.2'	+60.0'	161.8°	7°45.2'	+60.0'	161.9°	6°48.2'	+60.0'	161.9°	5°51.2'	+60.0'	161.9°	4°54.1'	+60.0'	162.0°	3°57.1'	+60.0'	162.0°	3°00.0'	+60.0'	155.2°	3
4	9°42.2'	+60.0'	161.8°	8°45.2'	+60.0'	161.8°	7°48.2'	+60.0'	161.9°	6°51.2'	+60.0'	161.9°	5°54.1'	+60.0'	161.9°	4°57.1'	+60.0'	162.0°	4°00.0'	+60.0'	155.3°	4
5	10°42.2'	+60.0'	161.7°	9°45.2'	+60.0'	161.8°	8°48.2'	+60.0'	161.8°	7°51.1'	+60.0'	161.9°	6°54.1'	+60.0'	161.9°	5°57.1'	+60.0'	162.0°	5°00.0'	+60.0'	133.0°	5
6	11°42.1'	+60.0'	161.7°	10°45.1'	+60.0'	161.8°	9°48.2'	+60.0'	161.8°	8°51.1'	+60.0'	161.9°	7°54.1'	+60.0'	161.9°	6°57.1'	+60.0'	162.0°	6°00.0'	+60.0'	133.1°	6
7	12°42.1'	+60.0'	161.7°	11°45.1'	+60.0'	161.7°	10°48.1'	+60.0'	161.8°	9°51.1'	+60.0'	161.9°	8°54.1'	+60.0'	161.9°	7°57.1'	+60.0'	162.0°	7°00.0'	+60.0'	133.2°	7
8	13°42.1'	+60.0'	161.6°	12°45.1'	+60.0'	161.7°	11°48.1'	+60.0'	161.8°	10°51.1'	+60.0'	161.8°	9°54.1'	+60.0'	161.9°	8°57.1'	+60.0'	162.0°	8°00.0'	+60.0'	117.2°	8
9	14°42.0'	+60.0'	161.6°	13°45.1'	+60.0'	161.7°	12°48.1'	+60.0'	161.8°	11°51.1'	+60.0'	161.8°	10°54.1'	+60.0'	161.9°	9°57.1'	+60.0'	161.9°	9°00.0'	+60.0'	156.6°	9
10	15°42.0'	+60.0'	161.6°	14°45.1'	+60.0'	161.7°	13°48.1'	+60.0'	161.7°	12°51.1'	+60.0'	161.8°	11°54.1'	+60.0'	161.9°	10°57.1'	+60.0'	161.9°	10°00.0'	+60.0'	157.0°	10
11	16°42.0'	+60.0'	161.5°	15°45.0'	+60.0'	161.6°	14°48.1'	+60.0'	161.7°	13°51.1'	+60.0'	161.8°	12°54.1'	+60.0'	161.9°	11°57.1'	+60.0'	161.9°	11°00.0'	+60.0'	157.4°	11
12	17°41.9'	+60.0'	161.5°	16°45.0'	+60.0'	161.6°	15°48.1'	+60.0'	161.7°	14°51.1'	+60.0'	161.8°	13°54.1'	+60.0'	161.9°	12°57.1'	+60.0'	161.9°	12°00.0'	+60.0'	180.0°	12
13	18°41.9'	+60.0'	161.5°	17°45.0'	+60.0'	161.6°	16°48.0'	+60.0'	161.7°	15°51.1'	+60.0'	161.8°	14°54.1'	+60.0'	161.8°	13°57.1'	+60.0'	161.9°	13°00.0'	+60.0'	180.0°	13
14	19°41.9'	+60.0'	161.4°	18°45.0'	+60.0'	161.5°	17°48.0'	+60.0'	161.6°	16°51.1'	+60.0'	161.7°	15°54.1'	+60.0'	161.8°	14°57.1'	+60.0'	161.9°	14°00.0'	+60.0'	159.1°	14
15	20°41.8'	+60.0'	161.4°	19°44.9'	+60.0'	161.5°	18°48.0'	+60.0'	161.6°	17°51.1'	+60.0'	161.7°	16°54.1'	+60.0'	161.8°	15°57.0'	+60.0'	161.9°	15°00.0'	+60.0'	159.7°	15
16	21°41.8'	+60.0'	161.4°	20°44.9'	+60.0'	161.5°	19°48.0'	+60.0'	161.6°	18°51.1'	+60.0'	161.7°	17°54.1'	+60.0'	161.8°	16°57.0'	+60.0'	161.9°	16°00.0'	+60.0'	160.5°	16
17	22°41.7'	+60.0'	161.3°	21°44.9'	+60.0'	161.4°	20°48.0'	+60.0'	161.6°	19°51.0'	+60.0'	161.7°	18°54.1'	+60.0'	161.8°	17°57.0'	+60.0'	161.9°	17°00.0'	+60.0'	161.4°	17
18	23°41.7'	+60.0'	161.3°	22°44.9'	+60.0'	161.4°	21°48.0'	+60.0'	161.5°	20°51.0'	+60.0'	161.7°	19°54.1'	+60.0'	161.8°	18°57.0'	+60.0'	161.9°	18°00.0'	+60.0'	162.3°	18
19	24°41.7'	+60.0'	161.2°	23°44.8'	+60.0'	161.4°	22°48.0'	+60.0'	161.5°	21°51.0'	+60.0'	161.7°	20°54.1'	+60.0'	161.8°	19°57.0'	+60.0'	161.9°	19°00.0'	+60.0'	163.4°	19
20	25°41.6'	+60.0'	161.2°	24°44.8'	+60.0'	161.4°	23°47.9'	+60.0'	161.5°	22°51.0'	+60.0'	161.6°	21°54.1'	+60.0'	161.8°	20°57.0'	+60.0'	161.9°	20°00.0'	+60.0'	164.7°	20
21	26°41.6'	+60.0'	161.2°	25°44.8'	+60.0'	161.3°	24°47.9'	+60.0'	161.5°	23°51.0'	+60.0'	161.6°	22°54.0'	+60.0'	161.7°	21°57.0'	+60.0'	161.9°	21°00.0'	+60.0'	90.0°	21
22	27°41.6'	+60.0'	161.1°	26°44.8'	+60.0'	161.3°	25°47.9'	+60.0'	161.4°	24°51.0'	+60.0'	161.6°	23°54.0'	+60.0'	161.7°	22°57.0'	+60.0'	161.9°	22°00.0'	+60.0'	180.0°	22
23	28°41.5'	+60.0'	161.1°	27°44.7'	+60.0'	161.3°	26°47.9'	+60.0'	161.4°	25°51.0'	+60.0'	161.6°	24°54.0'	+60.0'	161.7°	23°57.0'	+60.0'	161.9°	23°00.0'	+60.0'	169.9°	23
Dec°	84			85			86			87			88			89			90			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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	5°40.3'	+60.0'	160.9°	4°43.6'	+60.0'	160.9°	3°46.9'	+60.0'	161.0°	2°50.2'	+60.0'	161.0°	1°53.5'	+60.0'	161.0°	0°56.7'	+60.0'	161.0°	0°00.0'	+60.0'	161.0°	0
1	6°40.3'	+60.0'	160.9°	5°43.6'	+60.0'	160.9°	4°46.9'	+60.0'	160.9°	3°50.2'	+60.0'	161.0°	2°53.5'	+60.0'	161.0°	1°56.7'	+60.0'	161.0°	1°00.0'	+60.0'	164.4°	1
2	7°40.3'	+60.0'	160.8°	6°43.6'	+60.0'	160.9°	5°46.9'	+60.0'	160.9°	4°50.2'	+60.0'	160.9°	3°53.5'	+60.0'	161.0°	2°56.7'	+60.0'	161.0°	2°00.0'	+60.0'	155.1°	2
3	8°40.2'	+60.0'	160.8°	7°43.5'	+60.0'	160.8°	6°46.9'	+60.0'	160.9°	5°50.2'	+60.0'	160.9°	4°53.4'	+60.0'	161.0°	3°56.7'	+60.0'	161.0°	3°00.0'	+60.0'	155.2°	3
4	9°40.2'	+60.0'	160.8°	8°43.5'	+60.0'	160.8°	7°46.8'	+60.0'	160.9°	6°50.1'	+60.0'	160.9°	5°53.4'	+60.0'	160.9°	4°56.7'	+60.0'	161.0°	4°00.0'	+60.0'	155.3°	4
5	10°40.1'	+60.0'	160.7°	9°43.5'	+60.0'	160.8°	8°46.8'	+60.0'	160.8°	7°50.1'	+60.0'	160.9°	6°53.4'	+60.0'	160.9°	5°56.7'	+60.0'	161.0°	5°00.0'	+60.0'	133.0°	5
6	11°40.1'	+60.0'	160.7°	10°43.5'	+60.0'	160.8°	9°46.8'	+60.0'	160.8°	8°50.1'	+60.0'	160.9°	7°53.4'	+60.0'	160.9°	6°56.7'	+60.0'	161.0°	6°00.0'	+60.0'	133.1°	6
7	12°40.1'	+60.0'	160.7°	11°43.4'	+60.0'	160.7°	10°46.8'	+60.0'	160.8°	9°50.1'	+60.0'	160.9°	8°53.4'	+60.0'	160.9°	7°56.7'	+60.0'	161.0°	7°00.0'	+60.0'	133.2°	7
8	13°40.0'	+60.0'	160.6°	12°43.4'	+60.0'	160.7°	11°46.8'	+60.0'	160.8°	10°50.1'	+60.0'	160.8°	9°53.4'	+60.0'	160.9°	8°56.7'	+60.0'	161.0°	8°00.0'	+60.0'	117.2°	8
9	14°40.0'	+60.0'	160.6°	13°43.4'	+60.0'	160.7°	12°46.8'	+60.0'	160.7°	11°50.1'	+60.0'	160.8°	10°53.4'	+60.0'	160.9°	9°56.7'	+60.0'	160.9°	9°00.0'	+60.0'	156.6°	9
10	15°40.0'	+60.0'	160.5°	14°43.4'	+60.0'	160.6°	13°46.7'	+60.0'	160.7°	12°50.1'	+60.0'	160.8°	11°53.4'	+60.0'	160.9°	10°56.7'	+60.0'	160.9°	10°00.0'	+60.0'	157.0°	10
11	16°39.9'	+60.0'	160.5°	15°43.3'	+60.0'	160.6°	14°46.7'	+60.0'	160.7°	13°50.1'	+60.0'	160.8°	12°53.4'	+60.0'	160.9°	11°56.7'	+60.0'	160.9°	11°00.0'	+60.0'	157.4°	11
12	17°39.9'	+60.0'	160.5°	16°43.3'	+60.0'	160.6°	15°46.7'	+60.0'	160.7°	14°50.1'	+60.0'	160.8°	13°53.4'	+60.0'	160.8°	12°56.7'	+60.0'	160.9°	12°00.0'	+60.0'	180.0°	12
13	18°39.8'	+60.0'	160.4°	17°43.3'	+60.0'	160.5°	16°46.7'	+60.0'	160.7°	15°50.1'	+60.0'	160.7°	14°53.4'	+60.0'	160.8°	13°56.7'	+60.0'	160.9°	13°00.0'	+60.0'	180.0°	13
14	19°39.8'	+60.0'	160.4°	18°43.3'	+60.0'	160.5°	17°46.7'	+60.0'	160.6°	16°50.1'	+60.0'	160.7°	15°53.4'	+60.0'	160.8°	14°56.7'	+60.0'	160.9°	14°00.0'	+60.0'	159.1°	14
15	20°39.8'	+60.0'	160.4°	19°43.2'	+60.0'	160.5°	18°46.7'	+60.0'	160.6°	17°50.0'	+60.0'	160.7°	16°53.4'	+60.0'	160.8°	15°56.7'	+60.0'	160.9°	15°00.0'	+60.0'	159.7°	15
16	21°39.7'	+60.0'	160.3°	20°43.2'	+60.0'	160.5°	19°46.6'	+60.0'	160.6°	18°50.0'	+60.0'	160.7°	17°53.4'	+60.0'	160.8°	16°56.7'	+60.0'	160.9°	16°00.0'	+60.0'	160.5°	16
17	22°39.7'	+60.0'	160.3°	21°43.2'	+60.0'	160.4°	20°46.6'	+60.0'	160.5°	19°50.0'	+60.0'	160.7°	18°53.4'	+60.0'	160.8°	17°56.7'	+60.0'	160.9°	17°00.0'	+60.0'	161.4°	17
18	23°39.6'	+60.0'	160.2°	22°43.2'	+60.0'	160.4°	21°46.6'	+60.0'	160.5°	20°50.0'	+60.0'	160.7°	19°53.4'	+60.0'	160.8°	18°56.7'	+60.0'	160.9°	18°00.0'	+60.0'	162.3°	18
19	24°39.6'	+60.0'	160.2°	23°43.1'	+60.0'	160.4°	22°46.6'	+60.0'	160.5°	21°50.0'	+60.0'	160.6°	20°53.4'	+60.0'	160.8°	19°56.7'	+60.0'	160.9°	19°00.0'	+60.0'	163.4°	19
20	25°39.6'	+60.0'	160.2°	24°43.1'	+60.0'	160.3°	23°46.6'	+60.0'	160.5°	22°50.0'	+60.0'	160.6°	21°53.4'	+60.0'	160.7°	20°56.7'	+60.0'	160.9°	20°00.0'	+60.0'	164.7°	20
21	26°39.5'	+60.0'	160.1°	25°43.1'	+60.0'	160.3°	24°46.6'	+60.0'	160.4°	23°50.0'	+60.0'	160.6°	22°53.4'	+60.0'	160.7°	21°56.7'	+60.0'	160.9°	21°00.0'	+60.0'	90.0°	21
22	27°39.5'																					

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

20° 340° LHA

Latitude SAME as Declination

20° 340° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	5°38.2'	+60.0'	159.9°	4°41.9'	+60.0'	159.9°	3°45.5'	+60.0'	160.0°	2°49.1'	+60.0'	160.0°	1°52.8'	+60.0'	160.0°	0°56.4'	+60.0'	160.0°	0°00.0'	+60.0'	160.0°	0
1	6°38.2'	+60.0'	159.9°	5°41.8'	+60.0'	159.9°	4°45.5'	+60.0'	159.9°	3°49.1'	+60.0'	160.0°	2°52.8'	+60.0'	160.0°	1°56.4'	+60.0'	160.0°	1°00.0'	+60.0'	164.4°	1
2	7°38.1'	+60.0'	159.8°	6°41.8'	+60.0'	159.9°	5°45.5'	+60.0'	159.9°	4°49.1'	+60.0'	159.9°	3°52.8'	+60.0'	160.0°	2°56.4'	+60.0'	160.0°	2°00.0'	+60.0'	155.1°	2
3	8°38.1'	+60.0'	159.8°	7°41.8'	+60.0'	159.8°	6°45.5'	+60.0'	159.9°	5°49.1'	+60.0'	159.9°	4°52.7'	+60.0'	160.0°	3°56.4'	+60.0'	160.0°	3°00.0'	+60.0'	155.2°	3
4	9°38.1'	+60.0'	159.8°	8°41.8'	+60.0'	159.8°	7°45.4'	+60.0'	159.9°	6°49.1'	+60.0'	159.9°	5°52.7'	+60.0'	159.9°	4°56.4'	+60.0'	160.0°	4°00.0'	+60.0'	155.3°	4
5	10°38.0'	+60.0'	159.7°	9°41.7'	+60.0'	159.8°	8°45.4'	+60.0'	159.8°	7°49.1'	+60.0'	159.9°	6°52.7'	+60.0'	159.9°	5°56.4'	+60.0'	160.0°	5°00.0'	+60.0'	133.0°	5
6	11°38.0'	+60.0'	159.7°	10°41.7'	+60.0'	159.7°	9°45.4'	+60.0'	159.8°	8°49.1'	+60.0'	159.9°	7°52.7'	+60.0'	159.9°	6°56.4'	+60.0'	160.0°	6°00.0'	+60.0'	133.1°	6
7	12°37.9'	+60.0'	159.6°	11°41.7'	+60.0'	159.7°	10°45.4'	+60.0'	159.8°	9°49.1'	+60.0'	159.8°	8°52.7'	+60.0'	159.9°	7°56.4'	+60.0'	160.0°	7°00.0'	+60.0'	133.2°	7
8	13°37.9'	+60.0'	159.6°	12°41.6'	+60.0'	159.7°	11°45.4'	+60.0'	159.8°	10°49.1'	+60.0'	159.8°	9°52.7'	+60.0'	159.9°	8°56.4'	+60.0'	159.9°	8°00.0'	+60.0'	117.2°	8
9	14°37.9'	+60.0'	159.6°	13°41.6'	+60.0'	159.7°	12°45.3'	+60.0'	159.7°	11°49.0'	+60.0'	159.8°	10°52.7'	+60.0'	159.9°	9°56.4'	+60.0'	159.9°	9°00.0'	+60.0'	156.6°	9
10	15°37.8'	+60.0'	159.5°	14°41.6'	+60.0'	159.6°	13°45.3'	+60.0'	159.7°	12°49.0'	+60.0'	159.8°	11°52.7'	+60.0'	159.9°	10°56.4'	+60.0'	159.9°	10°00.0'	+60.0'	157.0°	10
11	16°37.8'	+60.0'	159.5°	15°41.6'	+60.0'	159.6°	14°45.3'	+60.0'	159.7°	13°49.0'	+60.0'	159.8°	12°52.7'	+60.0'	159.9°	11°56.4'	+60.0'	159.9°	11°00.0'	+60.0'	157.4°	11
12	17°37.7'	+60.0'	159.4°	16°41.5'	+60.0'	159.6°	15°45.3'	+60.0'	159.7°	14°49.0'	+60.0'	159.8°	13°52.7'	+60.0'	159.8°	12°56.4'	+60.0'	159.9°	12°00.0'	+60.0'	180.0°	12
13	18°37.7'	+60.0'	159.4°	17°41.5'	+60.0'	159.5°	16°45.3'	+60.0'	159.6°	15°49.0'	+60.0'	159.7°	14°52.7'	+60.0'	159.8°	13°56.4'	+60.0'	159.9°	13°00.0'	+60.0'	180.0°	13
14	19°37.6'	+60.0'	159.4°	18°41.5'	+60.0'	159.5°	17°45.3'	+60.0'	159.6°	16°49.0'	+60.0'	159.7°	15°52.7'	+60.0'	159.8°	14°56.4'	+60.0'	159.9°	14°00.0'	+60.0'	159.1°	14
15	20°37.6'	+60.0'	159.3°	19°41.4'	+60.0'	159.5°	18°45.2'	+60.0'	159.6°	17°49.0'	+60.0'	159.7°	16°52.7'	+60.0'	159.8°	15°56.4'	+60.0'	159.9°	15°00.0'	+60.0'	159.7°	15
16	21°37.6'	+60.0'	159.3°	20°41.4'	+60.0'	159.4°	19°45.2'	+60.0'	159.6°	18°49.0'	+60.0'	159.7°	17°52.7'	+60.0'	159.8°	16°56.4'	+60.0'	159.9°	16°00.0'	+60.0'	160.5°	16
17	22°37.5'	+60.0'	159.2°	21°41.4'	+60.0'	159.4°	20°45.2'	+60.0'	159.5°	19°49.0'	+60.0'	159.7°	18°52.7'	+60.0'	159.8°	17°56.4'	+60.0'	159.9°	17°00.0'	+60.0'	161.4°	17
18	23°37.5'	+60.0'	159.2°	22°41.4'	+60.0'	159.4°	21°45.2'	+60.0'	159.5°	20°49.0'	+60.0'	159.6°	19°52.7'	+60.0'	159.8°	18°56.4'	+60.0'	159.9°	18°00.0'	+60.0'	162.3°	18
19	24°37.4'	+60.0'	159.2°	23°41.3'	+60.0'	159.3°	22°45.2'	+60.0'	159.5°	21°48.9'	+60.0'	159.6°	20°52.7'	+60.0'	159.8°	19°56.4'	+60.0'	159.9°	19°00.0'	+60.0'	163.4°	19
20	25°37.4'	+60.0'	159.1°	24°41.3'	+60.0'	159.3°	23°45.1'	+60.0'	159.4°	22°48.9'	+60.0'	159.6°	21°52.7'	+60.0'	159.7°	20°56.4'	+60.0'	159.9°	20°00.0'	+60.0'	164.7°	20
21	26°37.3'	+60.0'	159.1°	25°41.3'	+60.0'	159.2°	24°45.1'	+60.0'	159.4°	23°48.9'	+60.0'	159.6°	22°52.7'	+60.0'	159.7°	21°56.4'	+60.0'	159.9°	21°00.0'	+60.0'	90.0°	21
22	27°37.3'	+60.0'	159.0°	26°41.2'	+60.0'	159.2°	25°45.1'	+60.0'	159.4°	24°48.9'	+60.0'	159.6°	23°52.7'	+60.0'	159.7°	22°56.4'	+60.0'	159.9°	22°00.0'	+60.0'	180.0°	22
23	28°37.2'	+59.9'	159.0°	27°41.2'	+60.0'	159.2°	26°45.1'	+60.0'	159.4°	25°48.9'	+60.0'	159.5°	24°52.7'	+60.0'	159.7°	23°56.4'	+60.0'	159.9°	23°00.0'	+60.0'	169.9°	23
Dec°	84			85			86			87			88			89			90			Dec°

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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	5°36.0'	+60.0'	158.9°	4°40.0'	+60.0'	158.9°	3°44.0'	+60.0'	159.0°	2°48.0'	+60.0'	159.0°	1°52.0'	+60.0'	159.0°	0°56.0'	+60.0'	159.0°	0°00.0'	+60.0'	159.0°	0
1	6°36.0'	+60.0'	158.9°	5°40.0'	+60.0'	158.9°	4°44.0'	+60.0'	158.9°	3°48.0'	+60.0'	159.0°	2°52.0'	+60.0'	159.0°	1°56.0'	+60.0'	159.0°	1°00.0'	+60.0'	155.0°	1
2	7°35.9'	+60.0'	158.8°	6°40.0'	+60.0'	158.9°	5°44.0'	+60.0'	158.9°	4°48.0'	+60.0'	158.9°	3°52.0'	+60.0'	159.0°	2°56.0'	+60.0'	159.0°	2°00.0'	+60.0'	155.1°	2
3	8°35.9'	+60.0'	158.8°	7°39.9'	+60.0'	158.8°	6°44.0'	+60.0'	158.9°	5°48.0'	+60.0'	158.9°	4°52.0'	+60.0'	159.0°	3°56.0'	+60.0'	159.0°	3°00.0'	+60.0'	155.2°	3
4	9°35.8'	+60.0'	158.7°	8°39.9'	+60.0'	158.8°	7°44.0'	+60.0'	158.9°	6°48.0'	+60.0'	158.9°	5°52.0'	+60.0'	158.9°	4°56.0'	+60.0'	159.0°	4°00.0'	+60.0'	155.3°	4
5	10°35.8'	+60.0'	158.7°	9°39.9'	+60.0'	158.8°	8°43.9'	+60.0'	158.8°	7°48.0'	+60.0'	158.9°	6°52.0'	+60.0'	158.9°	5°56.0'	+60.0'	159.0°	5°00.0'	+60.0'	133.0°	5
6	11°35.8'	+60.0'	158.7°	10°39.8'	+60.0'	158.7°	9°43.9'	+60.0'	158.8°	8°48.0'	+60.0'	158.9°	7°52.0'	+60.0'	158.9°	6°56.0'	+60.0'	159.0°	6°00.0'	+60.0'	133.1°	6
7	12°35.7'	+60.0'	158.6°	11°39.8'	+60.0'	158.7°	10°43.9'	+60.0'	158.8°	9°48.0'	+60.0'	158.8°	8°52.0'	+60.0'	158.9°	7°56.0'	+60.0'	159.0°	7°00.0'	+60.0'	133.2°	7
8	13°35.7'	+60.0'	158.6°	12°39.8'	+60.0'	158.7°	11°43.9'	+60.0'	158.7°	10°47.9'	+60.0'	158.8°	9°52.0'	+60.0'	158.9°	8°56.0'	+60.0'	158.9°	8°00.0'	+60.0'	117.2°	8
9	14°35.6'	+60.0'	158.5°	13°39.8'	+60.0'	158.6°	12°43.9'	+60.0'	158.7°	11°47.9'	+60.0'	158.8°	10°52.0'	+60.0'	158.9°	9°56.0'	+60.0'	158.9°	9°00.0'	+60.0'	156.6°	9
10	15°35.6'	+60.0'	158.5°	14°39.7'	+60.0'	158.6°	13°43.8'	+60.0'	158.7°	12°47.9'	+60.0'	158.8°	11°52.0'	+60.0'	158.9°	10°56.0'	+60.0'	158.9°	10°00.0'	+60.0'	157.0°	10
11	16°35.5'	+60.0'	158.5°	15°39.7'	+60.0'	158.6°	14°43.8'	+60.0'	158.7°	13°47.9'	+60.0'	158.8°	12°52.0'	+60.0'	158.8°	11°56.0'	+60.0'	158.9°	11°00.0'	+60.0'	157.4°	11
12	17°35.5'	+60.0'	158.4°	16°39.7'	+60.0'	158.5°	15°43.8'	+60.0'	158.6°	14°47.9'	+60.0'	158.7°	13°52.0'	+60.0'	158.8°	12°56.0'	+60.0'	158.9°	12°00.0'	+60.0'	180.0°	12
13	18°35.4'	+60.0'	158.4°	17°39.6'	+60.0'	158.5°	16°43.8'	+60.0'	158.6°	15°47.9'	+60.0'	158.7°	14°52.0'	+60.0'	158.8°	13°56.0'	+60.0'	158.9°	13°00.0'	+60.0'	180.0°	13
14	19°35.4'	+60.0'	158.3°	18°39.6'	+60.0'	158.5°	17°43.8'	+60.0'	158.6°	16°47.9'	+60.0'	158.7°	15°52.0'	+60.0'	158.8°	14°56.0'	+60.0'	158.9°	14°00.0'	+60.0'	159.1°	14
15	20°35.3'	+60.0'	158.3°	19°39.6'	+60.0'	158.4°	18°43.7'	+60.0'	158.6°	17°47.9'	+60.0'	158.7°	16°52.0'	+60.0'	158.8°	15°56.0'	+60.0'	158.9°	15°00.0'	+60.0'	159.7°	15
16	21°35.3'	+60.0'	158.3°	20°39.5'	+60.0'	158.4°	19°43.7'	+60.0'	158.5°	18°47.9'	+60.0'	158.7°	17°51.9'	+60.0'	158.8°	16°56.0'	+60.0'	158.9°	16°00.0'	+60.0'	160.5°	16
17	22°35.2'	+60.0'	158.2°	21°39.5'	+60.0'	158.4°	20°43.7'	+60.0'	158.5°	19°47.8'	+60.0'	158.6°	18°51.9'	+60.0'	158.8°	17°56.0'	+60.0'	158.9°	17°00.0'	+60.0'	161.4°	17
18	23°35.2'	+59.9'	158.2°	22°39.5'	+60.0'	158.3°	21°43.7'	+60.0'	158.5°	20°47.8'	+60.0'	158.6°	19°51.9'	+60.0'	158.8°	18°56.0'	+60.0'	158.9°	18°00.0'	+60.0'	162.3°	18
19	24°35.1'	+59.9'	158.1°	23°39.4'	+60.0'	158.3°	22°43.7'	+60.0'	158.4°	21°47.8'	+60.0'	158.6°	20°51.9'	+60.0'	158.7°	19°56.0'	+60.0'	158.9°	19°00.0'	+60.0'	163.4°	19
20	25°35.1'	+59.9'	158.1°	24°39.4'	+60.0'	158.3°	23°43.6'	+60.0'	158.4°	22°47.8'	+60.0'	158.6°	21°51.9'	+60.0'	158.7°	20°56.0'	+60.0'	158.9°	20°00.0'	+60.0'	164.7°	20
21	26°35.0'	+59.9'	158.0°	25°39.4'	+60.0'	158.2°	24°43.6'	+60.0'	158.4°	23°47.8'	+60.0'	158.6°	22°51.9'	+60.0'	158.7°	21°56.0'	+60.0'	158.9°	21°00.0'	+60.0'	90.0°	21
22	27																					

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

22° 338° LHA

Latitude SAME as Declination

22° 338° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	5°33.7'	+60.0'	157.9°	4°38.1'	+60.0'	157.9°	3°42.5'	+60.0'	158.0°	2°46.9'	+60.0'	158.0°	1°51.3'	+60.0'	158.0°	0°55.6'	+60.0'	158.0°	0°00.0'	+60.0'	158.0°	0
1	6°33.7'	+60.0'	157.9°	5°38.1'	+60.0'	157.9°	4°42.5'	+60.0'	157.9°	3°46.9'	+60.0'	158.0°	2°51.3'	+60.0'	158.0°	1°55.6'	+60.0'	158.0°	1°00.0'	+60.0'	155.0°	1
2	7°33.6'	+60.0'	157.8°	6°38.0'	+60.0'	157.9°	5°42.5'	+60.0'	157.9°	4°46.9'	+60.0'	157.9°	3°51.2'	+60.0'	158.0°	2°55.6'	+60.0'	158.0°	2°00.0'	+60.0'	155.1°	2
3	8°33.6'	+60.0'	157.8°	7°38.0'	+60.0'	157.8°	6°42.4'	+60.0'	157.9°	5°46.8'	+60.0'	157.9°	4°51.2'	+60.0'	157.9°	3°55.6'	+60.0'	158.0°	3°00.0'	+60.0'	155.2°	3
4	9°33.5'	+60.0'	157.7°	8°38.0'	+60.0'	157.8°	7°42.4'	+60.0'	157.8°	6°46.8'	+60.0'	157.9°	5°51.2'	+60.0'	157.9°	4°55.6'	+60.0'	158.0°	4°00.0'	+60.0'	155.3°	4
5	10°33.5'	+60.0'	157.7°	9°37.9'	+60.0'	157.8°	8°42.4'	+60.0'	157.8°	7°46.8'	+60.0'	157.9°	6°51.2'	+60.0'	157.9°	5°55.6'	+60.0'	158.0°	5°00.0'	+60.0'	133.0°	5
6	11°33.4'	+60.0'	157.6°	10°37.9'	+60.0'	157.7°	9°42.4'	+60.0'	157.8°	8°46.8'	+60.0'	157.9°	7°51.2'	+60.0'	157.9°	6°55.6'	+60.0'	158.0°	6°00.0'	+60.0'	133.1°	6
7	12°33.4'	+60.0'	157.6°	11°37.9'	+60.0'	157.7°	10°42.4'	+60.0'	157.8°	9°46.8'	+60.0'	157.8°	8°51.2'	+60.0'	157.9°	7°55.6'	+60.0'	158.0°	7°00.0'	+60.0'	133.2°	7
8	13°33.3'	+60.0'	157.6°	12°37.8'	+60.0'	157.7°	11°42.3'	+60.0'	157.7°	10°46.8'	+60.0'	157.8°	9°51.2'	+60.0'	157.9°	8°55.6'	+60.0'	157.9°	8°00.0'	+60.0'	117.2°	8
9	14°33.3'	+60.0'	157.5°	13°37.8'	+60.0'	157.6°	12°42.3'	+60.0'	157.7°	11°46.8'	+60.0'	157.8°	10°51.2'	+60.0'	157.9°	9°55.6'	+60.0'	157.9°	9°00.0'	+60.0'	156.6°	9
10	15°33.2'	+60.0'	157.5°	14°37.8'	+60.0'	157.6°	13°42.3'	+60.0'	157.7°	12°46.8'	+60.0'	157.8°	11°51.2'	+60.0'	157.9°	10°55.6'	+60.0'	157.9°	10°00.0'	+60.0'	157.0°	10
11	16°33.2'	+59.9'	157.4°	15°37.7'	+60.0'	157.6°	14°42.3'	+60.0'	157.7°	13°46.8'	+60.0'	157.8°	12°51.2'	+60.0'	157.8°	11°55.6'	+60.0'	157.9°	11°00.0'	+60.0'	157.4°	11
12	17°33.1'	+59.9'	157.4°	16°37.7'	+60.0'	157.5°	15°42.2'	+60.0'	157.6°	14°46.7'	+60.0'	157.7°	13°51.2'	+60.0'	157.8°	12°55.6'	+60.0'	157.9°	12°00.0'	+60.0'	180.0°	12
13	18°33.1'	+59.9'	157.4°	17°37.7'	+60.0'	157.5°	16°42.2'	+60.0'	157.6°	15°46.7'	+60.0'	157.7°	14°51.2'	+60.0'	157.8°	13°55.6'	+60.0'	157.9°	13°00.0'	+60.0'	180.0°	13
14	19°33.0'	+59.9'	157.3°	18°37.6'	+60.0'	157.4°	17°42.2'	+60.0'	157.6°	16°46.7'	+60.0'	157.7°	15°51.2'	+60.0'	157.8°	14°55.6'	+60.0'	157.9°	14°00.0'	+60.0'	159.1°	14
15	20°33.0'	+59.9'	157.3°	19°37.6'	+60.0'	157.4°	18°42.2'	+60.0'	157.5°	17°46.7'	+60.0'	157.7°	16°51.2'	+60.0'	157.8°	15°55.6'	+60.0'	157.9°	15°00.0'	+60.0'	159.7°	15
16	21°32.9'	+59.9'	157.2°	20°37.6'	+60.0'	157.4°	19°42.2'	+60.0'	157.5°	18°46.7'	+60.0'	157.6°	17°51.2'	+60.0'	157.8°	16°55.6'	+60.0'	157.9°	16°00.0'	+60.0'	160.5°	16
17	22°32.9'	+59.9'	157.2°	21°37.5'	+60.0'	157.3°	20°42.1'	+60.0'	157.5°	19°46.7'	+60.0'	157.6°	18°51.2'	+60.0'	157.8°	17°55.6'	+60.0'	157.9°	17°00.0'	+60.0'	161.4°	17
18	23°32.8'	+59.9'	157.1°	22°37.5'	+60.0'	157.3°	21°42.1'	+60.0'	157.5°	20°46.7'	+60.0'	157.6°	19°51.2'	+60.0'	157.7°	18°55.6'	+60.0'	157.9°	18°00.0'	+60.0'	162.3°	18
19	24°32.8'	+59.9'	157.1°	23°37.5'	+60.0'	157.3°	22°42.1'	+60.0'	157.4°	21°46.7'	+60.0'	157.6°	20°51.2'	+60.0'	157.7°	19°55.6'	+60.0'	157.9°	19°00.0'	+60.0'	163.4°	19
20	25°32.7'	+59.9'	157.0°	24°37.4'	+60.0'	157.2°	23°42.1'	+60.0'	157.4°	22°46.6'	+60.0'	157.6°	21°51.2'	+60.0'	157.7°	20°55.6'	+60.0'	157.9°	20°00.0'	+60.0'	164.7°	20
21	26°32.6'	+59.9'	156.9°	25°37.4'	+60.0'	157.2°	24°42.0'	+60.0'	157.4°	23°46.6'	+60.0'	157.5°	22°51.1'	+60.0'	157.7°	21°55.6'	+60.0'	157.9°	21°00.0'	+60.0'	90.0°	21
22	27°32.6'	+59.9'	156.9°	26°37.3'	+60.0'	157.1°	25°42.0'	+60.0'	157.3°	24°46.6'	+60.0'	157.5°	23°51.1'	+60.0'	157.7°	22°55.6'	+60.0'	157.8°	22°00.0'	+60.0'	180.0°	22
23	28°32.5'	+59.9'	156.9°	27°37.3'	+60.0'	157.1°	26°42.0'	+60.0'	157.3°	25°46.6'	+60.0'	157.5°	24°51.1'	+60.0'	157.7°	23°55.6'	+60.0'	157.8°	23°00.0'	+60.0'	169.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	5°31.3'	+59.9'	156.9°	4°36.1'	+60.0'	156.9°	3°40.9'	+60.0'	156.9°	2°45.7'	+60.0'	157.0°	1°50.5'	+60.0'	157.0°	0°55.2'	+60.0'	157.0°	0°00.0'	+60.0'	157.0°	0
1	6°31.2'	+59.9'	156.8°	5°36.1'	+60.0'	156.9°	4°40.9'	+60.0'	156.9°	3°45.7'	+60.0'	157.0°	2°50.5'	+60.0'	157.0°	1°55.2'	+60.0'	157.0°	1°00.0'	+60.0'	155.0°	1
2	7°31.2'	+59.9'	156.8°	6°36.0'	+60.0'	156.9°	5°40.8'	+60.0'	156.9°	4°45.7'	+60.0'	156.9°	3°50.4'	+60.0'	157.0°	2°55.2'	+60.0'	157.0°	2°00.0'	+60.0'	155.1°	2
3	8°31.1'	+59.9'	156.8°	7°36.0'	+60.0'	156.8°	6°40.8'	+60.0'	156.9°	5°45.6'	+60.0'	156.9°	4°50.4'	+60.0'	156.9°	3°55.2'	+60.0'	157.0°	3°00.0'	+60.0'	155.2°	3
4	9°31.1'	+59.9'	156.7°	8°36.0'	+60.0'	156.8°	7°40.8'	+60.0'	156.8°	6°45.6'	+60.0'	156.9°	5°50.4'	+60.0'	156.9°	4°55.2'	+60.0'	157.0°	4°00.0'	+60.0'	155.3°	4
5	10°31.0'	+59.9'	156.7°	9°35.9'	+60.0'	156.7°	8°40.8'	+60.0'	156.8°	7°45.6'	+60.0'	156.9°	6°50.4'	+60.0'	156.9°	5°55.2'	+60.0'	157.0°	5°00.0'	+60.0'	133.0°	5
6	11°31.0'	+59.9'	156.6°	10°35.9'	+60.0'	156.7°	9°40.8'	+60.0'	156.8°	8°45.6'	+60.0'	156.8°	7°50.4'	+60.0'	156.9°	6°55.2'	+60.0'	157.0°	6°00.0'	+60.0'	133.1°	6
7	12°30.9'	+59.9'	156.6°	11°35.8'	+60.0'	156.7°	10°40.7'	+60.0'	156.8°	9°45.6'	+60.0'	156.8°	8°50.4'	+60.0'	156.9°	7°55.2'	+60.0'	156.9°	7°00.0'	+60.0'	133.2°	7
8	13°30.9'	+59.9'	156.6°	12°35.8'	+60.0'	156.6°	11°40.7'	+60.0'	156.7°	10°45.6'	+60.0'	156.8°	9°50.4'	+60.0'	156.9°	8°55.2'	+60.0'	156.9°	8°00.0'	+60.0'	117.2°	8
9	14°30.8'	+59.9'	156.5°	13°35.8'	+60.0'	156.6°	12°40.7'	+60.0'	156.7°	11°45.6'	+60.0'	156.8°	10°50.4'	+60.0'	156.9°	9°55.2'	+60.0'	156.9°	9°00.0'	+60.0'	156.6°	9
10	15°30.8'	+59.9'	156.5°	14°35.7'	+60.0'	156.6°	13°40.7'	+60.0'	156.7°	12°45.6'	+60.0'	156.8°	11°50.4'	+60.0'	156.8°	10°55.2'	+60.0'	156.9°	10°00.0'	+60.0'	157.0°	10
11	16°30.7'	+59.9'	156.4°	15°35.7'	+60.0'	156.5°	14°40.6'	+60.0'	156.6°	13°45.5'	+60.0'	156.7°	12°50.4'	+60.0'	156.8°	11°55.2'	+60.0'	156.9°	11°00.0'	+60.0'	157.4°	11
12	17°30.7'	+59.9'	156.4°	16°35.7'	+60.0'	156.5°	15°40.6'	+60.0'	156.6°	14°45.5'	+60.0'	156.7°	13°50.4'	+60.0'	156.8°	12°55.2'	+60.0'	156.9°	12°00.0'	+60.0'	180.0°	12
13	18°30.6'	+59.9'	156.3°	17°35.6'	+60.0'	156.5°	16°40.6'	+60.0'	156.6°	15°45.5'	+60.0'	156.7°	14°50.4'	+60.0'	156.8°	13°55.2'	+60.0'	156.9°	13°00.0'	+60.0'	180.0°	13
14	19°30.5'	+59.9'	156.3°	18°35.6'	+60.0'	156.4°	17°40.6'	+60.0'	156.6°	16°45.5'	+60.0'	156.7°	15°50.4'	+60.0'	156.8°	14°55.2'	+60.0'	156.9°	14°00.0'	+60.0'	159.1°	14
15	20°30.5'	+59.9'	156.2°	19°35.5'	+60.0'	156.4°	18°40.5'	+60.0'	156.5°	17°45.5'	+60.0'	156.7°	16°50.4'	+60.0'	156.8°	15°55.2'	+60.0'	156.9°	15°00.0'	+60.0'	159.7°	15
16	21°30.4'	+59.9'	156.2°	20°35.5'	+60.0'	156.3°	19°40.5'	+60.0'	156.5°	18°45.5'	+60.0'	156.6°	17°50.4'	+60.0'	156.8°	16°55.2'	+60.0'	156.9°	16°00.0'	+60.0'	160.5°	16
17	22°30.4'	+59.9'	156.1°	21°35.5'	+60.0'	156.3°	20°40.5'	+60.0'	156.5°	19°45.5'	+60.0'	156.6°	18°50.4'	+60.0'	156.7°	17°55.2'	+60.0'	156.9°	17°00.0'	+60.0'	161.4°	17
18	23°30.3'	+59.9'	156.1°	22°35.4'	+60.0'	156.3°	21°40.5'	+60.0'	156.4°	20°45.4'	+60.0'	156.6°	19°50.4'	+60.0'	156.7°	18°55.2'	+60.0'	156.9°	18°00.0'	+60.0'	162.3°	18
19	24°30.3'	+59.9'	156.0°	23°35.4'	+60.0'	156.2°	22°40.4'	+60.0'	156.4°	21°45.4'	+60.0'	156.6°	20°50.3'	+60.0'	156.7°	19°55.2'	+60.0'	156.9°	19°00.0'	+60.0'	163.4°	19
20	25°30.2'	+59.9'	156.0°	24°35.3'	+60.0'	156.2°	23°40.4'	+60.0'	156.4°	22°45.4'	+60.0'	156.5°	21°50.3'	+60.0'	156.7°	20°55.2'	+60.0'	156.9°	20°00.0'	+60.0'	164.7°	20
21	26°30.1'	+59.9'	155.9°	25°35.3'	+																	

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

24° 336° LHA

Latitude SAME as Declination

24° 336° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	5°28.8'	+59.9'	155.9°	4°34.0'	+60.0'	155.9°	3°39.2'	+60.0'	155.9°	2°44.4'	+60.0'	156.0°	1°49.6'	+60.0'	156.0°	0°54.8'	+60.0'	156.0°	0°00.0'	+60.0'	156.0°	0
1	6°28.7'	+59.9'	155.8°	5°34.0'	+60.0'	155.9°	4°39.2'	+60.0'	155.9°	3°44.4'	+60.0'	155.9°	2°49.6'	+60.0'	156.0°	1°54.8'	+60.0'	156.0°	1°00.0'	+60.0'	155.0°	1
2	7°28.7'	+59.9'	155.8°	6°33.9'	+60.0'	155.8°	5°39.2'	+60.0'	155.9°	4°44.4'	+60.0'	155.9°	3°49.6'	+60.0'	156.0°	2°54.8'	+60.0'	156.0°	2°00.0'	+60.0'	155.1°	2
3	8°28.6'	+59.9'	155.8°	7°33.9'	+60.0'	155.8°	6°39.1'	+60.0'	155.9°	5°44.4'	+60.0'	155.9°	4°49.6'	+60.0'	155.9°	3°54.8'	+60.0'	156.0°	3°00.0'	+60.0'	155.2°	3
4	9°28.6'	+59.9'	155.7°	8°33.9'	+60.0'	155.8°	7°39.1'	+60.0'	155.8°	6°44.4'	+60.0'	155.9°	5°49.6'	+60.0'	155.9°	4°54.8'	+60.0'	156.0°	4°00.0'	+60.0'	155.3°	4
5	10°28.5'	+59.9'	155.7°	9°33.8'	+60.0'	155.7°	8°39.1'	+60.0'	155.8°	7°44.4'	+60.0'	155.9°	6°49.6'	+60.0'	155.9°	5°54.8'	+60.0'	156.0°	5°00.0'	+60.0'	133.0°	5
6	11°28.4'	+59.9'	155.6°	10°33.8'	+60.0'	155.7°	9°39.1'	+60.0'	155.8°	8°44.3'	+60.0'	155.8°	7°49.6'	+60.0'	155.9°	6°54.8'	+60.0'	156.0°	6°00.0'	+60.0'	133.1°	6
7	12°28.4'	+59.9'	155.6°	11°33.7'	+60.0'	155.7°	10°39.0'	+60.0'	155.7°	9°44.3'	+60.0'	155.8°	8°49.6'	+60.0'	155.9°	7°54.8'	+60.0'	155.9°	7°00.0'	+60.0'	133.2°	7
8	13°28.3'	+59.9'	155.5°	12°33.7'	+60.0'	155.6°	11°39.0'	+60.0'	155.7°	10°44.3'	+60.0'	155.8°	9°49.6'	+60.0'	155.9°	8°54.8'	+60.0'	155.9°	8°00.0'	+60.0'	117.2°	8
9	14°28.3'	+59.9'	155.5°	13°33.7'	+60.0'	155.6°	12°39.0'	+60.0'	155.7°	11°44.3'	+60.0'	155.8°	10°49.6'	+60.0'	155.9°	9°54.8'	+60.0'	155.9°	9°00.0'	+60.0'	156.6°	9
10	15°28.2'	+59.9'	155.4°	14°33.6'	+60.0'	155.6°	13°39.0'	+60.0'	155.7°	12°44.3'	+60.0'	155.8°	11°49.6'	+60.0'	155.8°	10°54.8'	+60.0'	155.9°	10°00.0'	+60.0'	157.0°	10
11	16°28.2'	+59.9'	155.4°	15°33.6'	+60.0'	155.5°	14°38.9'	+60.0'	155.6°	13°44.3'	+60.0'	155.7°	12°49.6'	+60.0'	155.8°	11°54.8'	+60.0'	155.9°	11°00.0'	+60.0'	157.4°	11
12	17°28.1'	+59.9'	155.3°	16°33.5'	+60.0'	155.5°	15°38.9'	+60.0'	155.6°	14°44.3'	+60.0'	155.7°	13°49.5'	+60.0'	155.8°	12°54.8'	+60.0'	155.9°	12°00.0'	+60.0'	180.0°	12
13	18°28.0'	+59.9'	155.3°	17°33.5'	+60.0'	155.4°	16°38.9'	+60.0'	155.6°	15°44.2'	+60.0'	155.7°	14°49.5'	+60.0'	155.8°	13°54.8'	+60.0'	155.9°	13°00.0'	+60.0'	180.0°	13
14	19°28.0'	+59.9'	155.3°	18°33.5'	+60.0'	155.4°	17°38.9'	+60.0'	155.5°	16°44.2'	+60.0'	155.7°	15°49.5'	+60.0'	155.8°	14°54.8'	+60.0'	155.9°	14°00.0'	+60.0'	159.1°	14
15	20°27.9'	+59.9'	155.2°	19°33.4'	+60.0'	155.4°	18°38.8'	+60.0'	155.5°	17°44.2'	+60.0'	155.6°	16°49.5'	+60.0'	155.8°	15°54.8'	+60.0'	155.9°	15°00.0'	+60.0'	159.7°	15
16	21°27.9'	+59.9'	155.2°	20°33.4'	+60.0'	155.3°	19°38.8'	+60.0'	155.5°	18°44.2'	+60.0'	155.6°	17°49.5'	+60.0'	155.8°	16°54.8'	+60.0'	155.9°	16°00.0'	+60.0'	160.5°	16
17	22°27.8'	+59.9'	155.1°	21°33.3'	+60.0'	155.3°	20°38.8'	+60.0'	155.4°	19°44.2'	+60.0'	155.6°	18°49.5'	+60.0'	155.7°	17°54.8'	+60.0'	155.9°	17°00.0'	+60.0'	161.4°	17
18	23°27.7'	+59.9'	155.1°	22°33.3'	+60.0'	155.2°	21°38.8'	+60.0'	155.4°	20°44.2'	+60.0'	155.6°	19°49.5'	+60.0'	155.7°	18°54.8'	+60.0'	155.9°	18°00.0'	+60.0'	162.3°	18
19	24°27.7'	+59.9'	155.0°	23°33.2'	+60.0'	155.2°	22°38.7'	+60.0'	155.4°	21°44.2'	+60.0'	155.5°	20°49.5'	+60.0'	155.7°	19°54.8'	+60.0'	155.9°	19°00.0'	+60.0'	163.4°	19
20	25°27.6'	+59.9'	155.0°	24°33.2'	+60.0'	155.2°	23°38.7'	+60.0'	155.3°	22°44.1'	+60.0'	155.5°	21°49.5'	+60.0'	155.7°	20°54.8'	+60.0'	155.8°	20°00.0'	+60.0'	164.7°	20
21	26°27.5'	+59.9'	154.9°	25°33.1'	+60.0'	155.1°	24°38.7'	+60.0'	155.3°	23°44.1'	+60.0'	155.5°	22°49.5'	+60.0'	155.7°	21°54.8'	+60.0'	155.8°	21°00.0'	+60.0'	90.0°	21
22	27°27.5'	+59.9'	154.8°	26°33.1'	+60.0'	155.1°	25°38.6'	+60.0'	155.3°	24°44.1'	+60.0'	155.5°	23°49.5'	+60.0'	155.7°	22°54.8'	+60.0'	155.8°	22°00.0'	+60.0'	180.0°	22
23	28°27.4'	+59.9'	154.8°	27°33.1'	+60.0'	155.0°	26°38.6'	+60.0'	155.2°	25°44.1'	+60.0'	155.4°	24°49.5'	+60.0'	155.6°	23°54.8'	+60.0'	155.8°	23°00.0'	+60.0'	169.9°	23
Dec°	84			85			86			87			88			89			90			Dec°

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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	5°26.2'	+59.9'	154.9°	4°31.8'	+60.0'	154.9°	3°37.5'	+60.0'	154.9°	2°43.1'	+60.0'	155.0°	1°48.8'	+60.0'	155.0°	0°54.4'	+60.0'	155.0°	0°00.0'	+60.0'	155.0°	0
1	6°26.1'	+59.9'	154.8°	5°31.8'	+60.0'	154.9°	4°37.5'	+60.0'	154.9°	3°43.1'	+60.0'	154.9°	2°48.7'	+60.0'	155.0°	1°54.4'	+60.0'	155.0°	1°00.0'	+60.0'	155.0°	1
2	7°26.0'	+59.9'	154.8°	6°31.7'	+60.0'	154.8°	5°37.4'	+60.0'	154.9°	4°43.1'	+60.0'	154.9°	3°48.7'	+60.0'	155.0°	2°54.4'	+60.0'	155.0°	2°00.0'	+60.0'	155.1°	2
3	8°26.0'	+59.9'	154.7°	7°31.7'	+60.0'	154.8°	6°37.4'	+60.0'	154.9°	5°43.1'	+60.0'	154.9°	4°48.7'	+60.0'	154.9°	3°54.4'	+60.0'	155.0°	3°00.0'	+60.0'	155.2°	3
4	9°25.9'	+59.9'	154.7°	8°31.7'	+60.0'	154.8°	7°37.4'	+60.0'	154.8°	6°43.1'	+60.0'	154.9°	5°48.7'	+60.0'	154.9°	4°54.4'	+60.0'	155.0°	4°00.0'	+60.0'	155.3°	4
5	10°25.9'	+59.9'	154.7°	9°31.6'	+60.0'	154.7°	8°37.4'	+60.0'	154.8°	7°43.0'	+60.0'	154.9°	6°48.7'	+60.0'	154.9°	5°54.4'	+60.0'	155.0°	5°00.0'	+60.0'	133.0°	5
6	11°25.8'	+59.9'	154.6°	10°31.6'	+60.0'	154.7°	9°37.3'	+60.0'	154.8°	8°43.0'	+60.0'	154.8°	7°48.7'	+60.0'	154.9°	6°54.4'	+60.0'	155.0°	6°00.0'	+60.0'	133.1°	6
7	12°25.7'	+59.9'	154.6°	11°31.5'	+60.0'	154.7°	10°37.3'	+60.0'	154.7°	9°43.0'	+60.0'	154.8°	8°48.7'	+60.0'	154.9°	7°54.4'	+60.0'	154.9°	7°00.0'	+60.0'	133.2°	7
8	13°25.7'	+59.9'	154.5°	12°31.5'	+60.0'	154.6°	11°37.3'	+60.0'	154.7°	10°43.0'	+60.0'	154.8°	9°48.7'	+60.0'	154.9°	8°54.4'	+60.0'	154.9°	8°00.0'	+60.0'	117.2°	8
9	14°25.6'	+59.9'	154.5°	13°31.5'	+60.0'	154.6°	12°37.2'	+60.0'	154.7°	11°43.0'	+60.0'	154.8°	10°48.7'	+60.0'	154.9°	9°54.4'	+60.0'	154.9°	9°00.0'	+60.0'	156.6°	9
10	15°25.6'	+59.9'	154.4°	14°31.4'	+60.0'	154.5°	13°37.2'	+60.0'	154.6°	12°43.0'	+60.0'	154.7°	11°48.7'	+60.0'	154.8°	10°54.4'	+60.0'	154.9°	10°00.0'	+60.0'	157.0°	10
11	16°25.5'	+59.9'	154.4°	15°31.4'	+60.0'	154.5°	14°37.2'	+60.0'	154.6°	13°43.0'	+60.0'	154.7°	12°48.7'	+60.0'	154.8°	11°54.4'	+60.0'	154.9°	11°00.0'	+60.0'	157.4°	11
12	17°25.4'	+59.9'	154.3°	16°31.3'	+60.0'	154.5°	15°37.2'	+60.0'	154.6°	14°42.9'	+60.0'	154.7°	13°48.7'	+60.0'	154.8°	12°54.4'	+60.0'	154.9°	12°00.0'	+60.0'	180.0°	12
13	18°25.4'	+59.9'	154.3°	17°31.3'	+60.0'	154.4°	16°37.1'	+60.0'	154.5°	15°42.9'	+60.0'	154.7°	14°48.7'	+60.0'	154.8°	13°54.4'	+60.0'	154.9°	13°00.0'	+60.0'	180.0°	13
14	19°25.3'	+59.9'	154.2°	18°31.2'	+60.0'	154.4°	17°37.1'	+60.0'	154.5°	16°42.9'	+60.0'	154.6°	15°48.7'	+60.0'	154.8°	14°54.4'	+60.0'	154.9°	14°00.0'	+60.0'	159.1°	14
15	20°25.2'	+59.9'	154.2°	19°31.2'	+60.0'	154.3°	18°37.1'	+60.0'	154.5°	17°42.9'	+60.0'	154.6°	16°48.7'	+60.0'	154.8°	15°54.4'	+60.0'	154.9°	15°00.0'	+60.0'	159.7°	15
16	21°25.2'	+59.9'	154.1°	20°31.1'	+60.0'	154.3°	19°37.0'	+60.0'	154.5°	18°42.9'	+60.0'	154.6°	17°48.6'	+60.0'	154.7°	16°54.4'	+60.0'	154.9°	16°00.0'	+60.0'	160.5°	16
17	22°25.1'	+59.9'	154.1°	21°31.1'	+60.0'	154.3°	20°37.0'	+60.0'	154.4°	19°42.9'	+60.0'	154.6°	18°48.6'	+60.0'	154.7°	17°54.3'	+60.0'	154.9°	17°00.0'	+60.0'	161.4°	17
18	23°25.0'	+59.9'	154.0°	22°31.0'	+60.0'	154.2°	21°37.0'	+60.0'	154.4°	20°42.8'	+60.0'	154.6°	19°48.6'	+60.0'	154.7°	18°54.3'	+60.0'	154.9°	18°00.0'	+60.0'	162.3°	18
19	24°25.0'	+59.9'	154.0°	23°31.0'	+60.0'	154.2°	22°37.0'	+60.0'	154.3°	21°42.8'	+60.0'	154.5°	20°48.6'	+60.0'	154.7°	19°54.3'	+60.0'	154.9°	19°00.0'	+60.0'	163.4°	19
20	25°24.9'	+59.9'	153.9°	24°31.0'	+60.0'	154.1°	23°36.9'	+60.0'	154.3°	22°42.8'	+60.0'	154.5°	21°48.6'	+60.0'	154.7°	20°54.3'	+60.0'	154.8°	20°00.0'	+60.0'	164.7°	20
21	26°24.8'	+59.9'	153.9°	25°30.9'	+59.9'	154.1°	24°36.9'	+60.0'	154.3°	23°42.8'	+60.0'	154.5°	22°48.6'	+60.0'	154.7°	21°54.3'	+60.0'	154.8°	21°00.0'	+60.0'	90.0°	21
22	27																					

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

26° 334° LHA

Latitude SAME as Declination

26° 334° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	5°23.5'	+59.9'	153.9°	4°29.6'	+60.0'	153.9°	3°35.7'	+60.0'	153.9°	2°41.8'	+60.0'	154.0°	1°47.9'	+60.0'	154.0°	0°53.9'	+60.0'	154.0°	0°00.0'	+60.0'	154.0°	0
1	6°23.4'	+59.9'	153.8°	5°29.5'	+60.0'	153.9°	4°35.6'	+60.0'	153.9°	3°41.8'	+60.0'	153.9°	2°47.8'	+60.0'	154.0°	1°53.9'	+60.0'	154.0°	1°00.0'	+60.0'	155.0°	1
2	7°23.3'	+59.9'	153.8°	6°29.5'	+60.0'	153.8°	5°35.6'	+60.0'	153.9°	4°41.7'	+60.0'	153.9°	3°47.8'	+60.0'	154.0°	2°53.9'	+60.0'	154.0°	2°00.0'	+60.0'	155.1°	2
3	8°23.3'	+59.9'	153.7°	7°29.4'	+60.0'	153.8°	6°35.6'	+60.0'	153.9°	5°41.7'	+60.0'	153.9°	4°47.8'	+60.0'	153.9°	3°53.9'	+60.0'	154.0°	3°00.0'	+60.0'	155.2°	3
4	9°23.2'	+59.9'	153.7°	8°29.4'	+60.0'	153.8°	7°35.6'	+60.0'	153.8°	6°41.7'	+60.0'	153.9°	5°47.8'	+60.0'	153.9°	4°53.9'	+60.0'	154.0°	4°00.0'	+60.0'	155.3°	4
5	10°23.1'	+59.9'	153.6°	9°29.3'	+60.0'	153.7°	8°35.5'	+60.0'	153.8°	7°41.7'	+60.0'	153.9°	6°47.8'	+60.0'	153.9°	5°53.9'	+60.0'	154.0°	5°00.0'	+60.0'	133.0°	5
6	11°23.1'	+59.9'	153.6°	10°29.3'	+60.0'	153.7°	9°35.5'	+60.0'	153.8°	8°41.7'	+60.0'	153.8°	7°47.8'	+60.0'	153.9°	6°53.9'	+60.0'	154.0°	6°00.0'	+60.0'	133.1°	6
7	12°23.0'	+59.9'	153.5°	11°29.3'	+60.0'	153.6°	10°35.5'	+60.0'	153.7°	9°41.7'	+60.0'	153.8°	8°47.8'	+60.0'	153.9°	7°53.9'	+60.0'	153.9°	7°00.0'	+60.0'	133.2°	7
8	13°22.9'	+59.9'	153.5°	12°29.2'	+60.0'	153.6°	11°35.4'	+60.0'	153.7°	10°41.6'	+60.0'	153.8°	9°47.8'	+60.0'	153.9°	8°53.9'	+60.0'	153.9°	8°00.0'	+60.0'	117.2°	8
9	14°22.9'	+59.9'	153.4°	13°29.2'	+60.0'	153.6°	12°35.4'	+60.0'	153.7°	11°41.6'	+60.0'	153.8°	10°47.8'	+60.0'	153.8°	9°53.9'	+60.0'	153.9°	9°00.0'	+60.0'	156.6°	9
10	15°22.8'	+59.9'	153.4°	14°29.1'	+60.0'	153.5°	13°35.4'	+60.0'	153.6°	12°41.6'	+60.0'	153.7°	11°47.8'	+60.0'	153.8°	10°53.9'	+60.0'	153.9°	10°00.0'	+60.0'	157.0°	10
11	16°22.7'	+59.9'	153.4°	15°29.1'	+60.0'	153.5°	14°35.4'	+60.0'	153.6°	13°41.6'	+60.0'	153.7°	12°47.8'	+60.0'	153.8°	11°53.9'	+60.0'	153.9°	11°00.0'	+60.0'	157.4°	11
12	17°22.7'	+59.9'	153.3°	16°29.0'	+60.0'	153.4°	15°35.3'	+60.0'	153.6°	14°41.6'	+60.0'	153.7°	13°47.8'	+60.0'	153.8°	12°53.9'	+60.0'	153.9°	12°00.0'	+60.0'	180.0°	12
13	18°22.6'	+59.9'	153.3°	17°29.0'	+60.0'	153.4°	16°35.3'	+60.0'	153.5°	15°41.6'	+60.0'	153.7°	14°47.8'	+60.0'	153.8°	13°53.9'	+60.0'	153.9°	13°00.0'	+60.0'	180.0°	13
14	19°22.5'	+59.9'	153.2°	18°28.9'	+60.0'	153.4°	17°35.3'	+60.0'	153.5°	16°41.5'	+60.0'	153.6°	15°47.7'	+60.0'	153.8°	14°53.9'	+60.0'	153.9°	14°00.0'	+60.0'	159.1°	14
15	20°22.5'	+59.9'	153.1°	19°28.9'	+60.0'	153.3°	18°35.2'	+60.0'	153.5°	17°41.5'	+60.0'	153.6°	16°47.7'	+60.0'	153.7°	15°53.9'	+60.0'	153.9°	15°00.0'	+60.0'	159.7°	15
16	21°22.4'	+59.9'	153.1°	20°28.8'	+59.9'	153.3°	19°35.2'	+60.0'	153.4°	18°41.5'	+60.0'	153.6°	17°47.7'	+60.0'	153.7°	16°53.9'	+60.0'	153.9°	16°00.0'	+60.0'	160.5°	16
17	22°22.3'	+59.9'	153.0°	21°28.8'	+59.9'	153.2°	20°35.2'	+60.0'	153.4°	19°41.5'	+60.0'	153.6°	18°47.7'	+60.0'	153.7°	17°53.9'	+60.0'	153.9°	17°00.0'	+60.0'	161.4°	17
18	23°22.2'	+59.9'	153.0°	22°28.7'	+59.9'	153.2°	21°35.1'	+60.0'	153.4°	20°41.5'	+60.0'	153.5°	19°47.7'	+60.0'	153.7°	18°53.9'	+60.0'	153.9°	18°00.0'	+60.0'	162.3°	18
19	24°22.2'	+59.9'	152.9°	23°28.7'	+59.9'	153.1°	22°35.1'	+60.0'	153.3°	21°41.5'	+60.0'	153.5°	20°47.7'	+60.0'	153.7°	19°53.9'	+60.0'	153.8°	19°00.0'	+60.0'	163.4°	19
20	25°22.1'	+59.9'	152.9°	24°28.6'	+59.9'	153.1°	23°35.1'	+60.0'	153.3°	22°41.4'	+60.0'	153.5°	21°47.7'	+60.0'	153.7°	20°53.9'	+60.0'	153.8°	20°00.0'	+60.0'	164.7°	20
21	26°22.0'	+59.9'	152.8°	25°28.6'	+59.9'	153.0°	24°35.0'	+60.0'	153.3°	23°41.4'	+60.0'	153.5°	22°47.7'	+60.0'	153.6°	21°53.9'	+60.0'	153.8°	21°00.0'	+60.0'	90.0°	21
22	27°21.9'	+59.9'	152.8°	26°28.5'	+59.9'	153.0°	25°35.0'	+60.0'	153.2°	24°41.4'	+60.0'	153.4°	23°47.7'	+60.0'	153.6°	22°53.9'	+60.0'	153.8°	22°00.0'	+60.0'	180.0°	22
23	28°21.8'	+59.9'	152.7°	27°28.5'	+59.9'	152.9°	26°35.0'	+60.0'	153.2°	25°41.4'	+60.0'	153.4°	24°47.7'	+60.0'	153.6°	23°53.9'	+60.0'	153.8°	23°00.0'	+60.0'	169.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	5°20.6'	+59.9'	152.9°	4°27.2'	+60.0'	152.9°	3°33.8'	+60.0'	152.9°	2°40.4'	+60.0'	153.0°	1°46.9'	+60.0'	153.0°	0°53.5'	+60.0'	153.0°	0°00.0'	+60.0'	153.0°	0
1	6°20.6'	+59.9'	152.8°	5°27.2'	+60.0'	152.9°	4°33.8'	+60.0'	152.9°	3°40.3'	+60.0'	152.9°	2°46.9'	+60.0'	153.0°	1°53.5'	+60.0'	153.0°	1°00.0'	+60.0'	155.0°	1
2	7°20.5'	+59.9'	152.8°	6°27.1'	+60.0'	152.8°	5°33.7'	+60.0'	152.9°	4°40.3'	+60.0'	152.9°	3°46.9'	+60.0'	153.0°	2°53.5'	+60.0'	153.0°	2°00.0'	+60.0'	155.1°	2
3	8°20.4'	+59.9'	152.7°	7°27.1'	+60.0'	152.8°	6°33.7'	+60.0'	152.8°	5°40.3'	+60.0'	152.9°	4°46.9'	+60.0'	152.9°	3°53.5'	+60.0'	153.0°	3°00.0'	+60.0'	155.2°	3
4	9°20.4'	+59.9'	152.7°	8°27.0'	+60.0'	152.8°	7°33.7'	+60.0'	152.8°	6°40.3'	+60.0'	152.9°	5°46.9'	+60.0'	152.9°	4°53.5'	+60.0'	153.0°	4°00.0'	+60.0'	155.3°	4
5	10°20.3'	+59.9'	152.6°	9°27.0'	+60.0'	152.7°	8°33.7'	+60.0'	152.8°	7°40.3'	+60.0'	152.8°	6°46.9'	+60.0'	152.9°	5°53.5'	+60.0'	153.0°	5°00.0'	+60.0'	133.0°	5
6	11°20.2'	+59.9'	152.6°	10°26.9'	+60.0'	152.7°	9°33.6'	+60.0'	152.8°	8°40.3'	+60.0'	152.8°	7°46.9'	+60.0'	152.9°	6°53.4'	+60.0'	152.9°	6°00.0'	+60.0'	133.1°	6
7	12°20.2'	+59.9'	152.5°	11°26.9'	+60.0'	152.6°	10°33.6'	+60.0'	152.7°	9°40.2'	+60.0'	152.8°	8°46.9'	+60.0'	152.9°	7°53.4'	+60.0'	152.9°	7°00.0'	+60.0'	133.2°	7
8	13°20.1'	+59.9'	152.5°	12°26.8'	+60.0'	152.6°	11°33.6'	+60.0'	152.7°	10°40.2'	+60.0'	152.8°	9°46.9'	+60.0'	152.9°	8°53.4'	+60.0'	152.9°	8°00.0'	+60.0'	117.2°	8
9	14°20.0'	+59.9'	152.4°	13°26.8'	+60.0'	152.5°	12°33.5'	+60.0'	152.7°	11°40.2'	+60.0'	152.8°	10°46.8'	+60.0'	152.8°	9°53.4'	+60.0'	152.9°	9°00.0'	+60.0'	156.6°	9
10	15°19.9'	+59.9'	152.4°	14°26.7'	+59.9'	152.5°	13°33.5'	+60.0'	152.6°	12°40.2'	+60.0'	152.7°	11°46.8'	+60.0'	152.8°	10°53.4'	+60.0'	152.9°	10°00.0'	+60.0'	157.0°	10
11	16°19.9'	+59.9'	152.3°	15°26.7'	+59.9'	152.5°	14°33.5'	+60.0'	152.6°	13°40.2'	+60.0'	152.7°	12°46.8'	+60.0'	152.8°	11°53.4'	+60.0'	152.9°	11°00.0'	+60.0'	157.4°	11
12	17°19.8'	+59.9'	152.3°	16°26.6'	+59.9'	152.4°	15°33.4'	+60.0'	152.6°	14°40.2'	+60.0'	152.7°	13°46.8'	+60.0'	152.8°	12°53.4'	+60.0'	152.9°	12°00.0'	+60.0'	180.0°	12
13	18°19.7'	+59.9'	152.2°	17°26.6'	+59.9'	152.4°	16°33.4'	+60.0'	152.5°	15°40.1'	+60.0'	152.6°	14°46.8'	+60.0'	152.8°	13°53.4'	+60.0'	152.9°	13°00.0'	+60.0'	180.0°	13
14	19°19.6'	+59.9'	152.2°	18°26.5'	+59.9'	152.3°	17°33.4'	+60.0'	152.5°	16°40.1'	+60.0'	152.6°	15°46.8'	+60.0'	152.8°	14°53.4'	+60.0'	152.9°	14°00.0'	+60.0'	159.1°	14
15	20°19.6'	+59.9'	152.1°	19°26.5'	+59.9'	152.3°	18°33.3'	+60.0'	152.4°	17°40.1'	+60.0'	152.6°	16°46.8'	+60.0'	152.7°	15°53.4'	+60.0'	152.9°	15°00.0'	+60.0'	159.7°	15
16	21°19.5'	+59.9'	152.1°	20°26.4'	+59.9'	152.2°	19°33.3'	+60.0'	152.4°	18°40.1'	+60.0'	152.6°	17°46.8'	+60.0'	152.7°	16°53.4'	+60.0'	152.9°	16°00.0'	+60.0'	160.5°	16
17	22°19.4'	+59.9'	152.0°	21°26.4'	+59.9'	152.2°	20°33.3'	+60.0'	152.4°	19°40.1'	+60.0'	152.5°	18°46.8'	+60.0'	152.7°	17°53.4'	+60.0'	152.9°	17°00.0'	+60.0'	161.4°	17
18	23°19.3'	+59.9'	152.0°	22°26.3'	+59.9'	152.2°	21°33.2'	+60.0'	152.3°	20°40.0'	+60.0'	152.5°	19°46.8'	+60.0'	152.7°	18°53.4'	+60.0'	152.8°	18°00.0'	+60.0'	162.3°	18
19	24°19.3'	+59.9'	151.9°	23°26.3'	+59.9'	152.1°	22°33.2'	+60.0'	152.3°	21°40.0'	+60.0'	152.5°	20°46.8'	+60.0'	152.7°	19°53.4'	+60.0'	152.8°	19°00.0'	+60.0'	163.4°	19
20	25°19.2'	+59.9'	151.8°	24°26.2'	+59.9'	152.1°	23°33.2'	+60.0'	152.3°	22°40.0'	+60.0'	152.5°	21°46.8'	+60.0'	152.7°	20°53.4'	+60.0'	152.8°	20°00.0'	+60.0'	164.7°	20
21	26°19.1'	+59.9'	151.8°	25°26.2'	+59.9'	152.0°	24°33.1'	+60.0														

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

28° 332° LHA

Latitude SAME as Declination

28° 332° LHA

Dec°	84			85			86			87			88			89			90			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'	+59.9'	151.9°	4°24.8'	+59.9'	151.9°	3°31.9'	+60.0'	151.9°	2°38.9'	+60.0'	152.0°	1°45.9'	+60.0'	152.0°	0°53.0'	+60.0'	152.0°	0°00.0'	+60.0'	152.0°	0
1	6°17.7'	+59.9'	151.8°	5°24.8'	+59.9'	151.9°	4°31.8'	+60.0'	151.9°	3°38.9'	+60.0'	151.9°	2°45.9'	+60.0'	152.0°	1°53.0'	+60.0'	152.0°	1°00.0'	+60.0'	155.0°	1
2	7°17.6'	+59.9'	151.8°	6°24.7'	+59.9'	151.8°	5°31.8'	+60.0'	151.9°	4°38.9'	+60.0'	151.9°	3°45.9'	+60.0'	152.0°	2°53.0'	+60.0'	152.0°	2°00.0'	+60.0'	155.1°	2
3	8°17.5'	+59.9'	151.7°	7°24.7'	+59.9'	151.8°	6°31.8'	+60.0'	151.8°	5°38.9'	+60.0'	151.9°	4°45.9'	+60.0'	151.9°	3°53.0'	+60.0'	152.0°	3°00.0'	+60.0'	155.2°	3
4	9°17.4'	+59.9'	151.7°	8°24.6'	+59.9'	151.7°	7°31.7'	+60.0'	151.8°	6°38.8'	+60.0'	151.9°	5°45.9'	+60.0'	151.9°	4°53.0'	+60.0'	152.0°	4°00.0'	+60.0'	155.3°	4
5	10°17.4'	+59.9'	151.6°	9°24.6'	+59.9'	151.7°	8°31.7'	+60.0'	151.8°	7°38.8'	+60.0'	151.8°	6°45.9'	+60.0'	151.9°	5°53.0'	+60.0'	152.0°	5°00.0'	+60.0'	133.0°	5
6	11°17.3'	+59.9'	151.6°	10°24.5'	+59.9'	151.7°	9°31.7'	+60.0'	151.7°	8°38.8'	+60.0'	151.8°	7°45.9'	+60.0'	151.9°	6°53.0'	+60.0'	151.9°	6°00.0'	+60.0'	133.1°	6
7	12°17.2'	+59.9'	151.5°	11°24.5'	+59.9'	151.6°	10°31.6'	+60.0'	151.7°	9°38.8'	+60.0'	151.8°	8°45.9'	+60.0'	151.9°	7°53.0'	+60.0'	151.9°	7°00.0'	+60.0'	133.2°	7
8	13°17.1'	+59.9'	151.5°	12°24.4'	+59.9'	151.6°	11°31.6'	+60.0'	151.7°	10°38.8'	+60.0'	151.8°	9°45.9'	+60.0'	151.9°	8°53.0'	+60.0'	151.9°	8°00.0'	+60.0'	117.2°	8
9	14°17.1'	+59.9'	151.4°	13°24.3'	+59.9'	151.5°	12°31.6'	+60.0'	151.6°	11°38.7'	+60.0'	151.7°	10°45.9'	+60.0'	151.8°	9°53.0'	+60.0'	151.9°	9°00.0'	+60.0'	156.6°	9
10	15°17.0'	+59.9'	151.4°	14°24.3'	+59.9'	151.5°	13°31.5'	+60.0'	151.6°	12°38.7'	+60.0'	151.7°	11°45.9'	+60.0'	151.8°	10°53.0'	+60.0'	151.9°	10°00.0'	+60.0'	157.0°	10
11	16°16.9'	+59.9'	151.3°	15°24.2'	+59.9'	151.4°	14°31.5'	+60.0'	151.6°	13°38.7'	+60.0'	151.7°	12°45.9'	+60.0'	151.8°	11°53.0'	+60.0'	151.9°	11°00.0'	+60.0'	157.4°	11
12	17°16.8'	+59.9'	151.3°	16°24.2'	+59.9'	151.4°	15°31.5'	+60.0'	151.5°	14°38.7'	+60.0'	151.7°	13°45.9'	+60.0'	151.8°	12°53.0'	+60.0'	151.9°	12°00.0'	+60.0'	180.0°	12
13	18°16.7'	+59.9'	151.2°	17°24.1'	+59.9'	151.4°	16°31.4'	+60.0'	151.5°	15°38.7'	+60.0'	151.6°	14°45.8'	+60.0'	151.8°	13°52.9'	+60.0'	151.9°	13°00.0'	+60.0'	180.0°	13
14	19°16.7'	+59.9'	151.1°	18°24.1'	+59.9'	151.3°	17°31.4'	+60.0'	151.5°	16°38.7'	+60.0'	151.6°	15°45.8'	+60.0'	151.7°	14°52.9'	+60.0'	151.9°	14°00.0'	+60.0'	159.1°	14
15	20°16.6'	+59.9'	151.1°	19°24.0'	+59.9'	151.3°	18°31.4'	+60.0'	151.4°	17°38.6'	+60.0'	151.6°	16°45.8'	+60.0'	151.7°	15°52.9'	+60.0'	151.9°	15°00.0'	+60.0'	159.7°	15
16	21°16.5'	+59.9'	151.0°	20°24.0'	+59.9'	151.2°	19°31.3'	+60.0'	151.4°	18°38.6'	+60.0'	151.6°	17°45.8'	+60.0'	151.7°	16°52.9'	+60.0'	151.9°	16°00.0'	+60.0'	160.5°	16
17	22°16.4'	+59.9'	151.0°	21°23.9'	+59.9'	151.2°	20°31.3'	+60.0'	151.4°	19°38.6'	+60.0'	151.5°	18°45.8'	+60.0'	151.7°	17°52.9'	+60.0'	151.9°	17°00.0'	+60.0'	161.4°	17
18	23°16.3'	+59.9'	150.9°	22°23.8'	+59.9'	151.1°	21°31.3'	+60.0'	151.3°	20°38.6'	+60.0'	151.5°	19°45.8'	+60.0'	151.7°	18°52.9'	+60.0'	151.8°	18°00.0'	+60.0'	162.3°	18
19	24°16.2'	+59.9'	150.9°	23°23.8'	+59.9'	151.1°	22°31.2'	+60.0'	151.3°	21°38.6'	+60.0'	151.5°	20°45.8'	+60.0'	151.7°	19°52.9'	+60.0'	151.8°	19°00.0'	+60.0'	163.4°	19
20	25°16.2'	+59.9'	150.8°	24°23.7'	+59.9'	151.0°	23°31.2'	+60.0'	151.2°	22°38.5'	+60.0'	151.4°	21°45.8'	+60.0'	151.6°	20°52.9'	+60.0'	151.8°	20°00.0'	+60.0'	164.7°	20
21	26°16.1'	+59.9'	150.7°	25°23.7'	+59.9'	151.0°	24°31.1'	+60.0'	151.2°	23°38.5'	+60.0'	151.4°	22°45.8'	+60.0'	151.6°	21°52.9'	+60.0'	151.8°	21°00.0'	+60.0'	90.0°	21
22	27°16.0'	+59.9'	150.7°	26°23.6'	+59.9'	150.9°	25°31.1'	+60.0'	151.2°	24°38.5'	+60.0'	151.4°	23°45.8'	+60.0'	151.6°	22°52.9'	+60.0'	151.8°	22°00.0'	+60.0'	180.0°	22
23	28°15.9'	+59.9'	150.6°	27°23.5'	+59.9'	150.9°	26°31.1'	+60.0'	151.1°	25°38.5'	+60.0'	151.4°	24°45.8'	+60.0'	151.6°	23°52.9'	+60.0'	151.8°	23°00.0'	+60.0'	169.9°	23
Dec°	84			85			86			87			88			89			90			Dec°

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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	5°14.7'	+59.9'	150.9°	4°22.3'	+59.9'	150.9°	3°29.9'	+60.0'	150.9°	2°37.4'	+60.0'	151.0°	1°44.9'	+60.0'	151.0°	0°52.5'	+60.0'	151.0°	0°00.0'	+60.0'	151.0°	0
1	6°14.6'	+59.9'	150.8°	5°22.3'	+59.9'	150.9°	4°29.8'	+60.0'	150.9°	3°37.4'	+60.0'	150.9°	2°44.9'	+60.0'	151.0°	1°52.5'	+60.0'	151.0°	1°00.0'	+60.0'	148.2°	1
2	7°14.6'	+59.9'	150.8°	6°22.2'	+59.9'	150.8°	5°29.8'	+60.0'	150.9°	4°37.4'	+60.0'	150.9°	3°44.9'	+60.0'	151.0°	2°52.5'	+60.0'	151.0°	2°00.0'	+60.0'	155.1°	2
3	8°14.5'	+59.9'	150.7°	7°22.1'	+59.9'	150.8°	6°29.8'	+60.0'	150.8°	5°37.4'	+60.0'	150.9°	4°44.9'	+60.0'	150.9°	3°52.5'	+60.0'	151.0°	3°00.0'	+60.0'	155.2°	3
4	9°14.4'	+59.9'	150.7°	8°22.1'	+59.9'	150.7°	7°29.7'	+60.0'	150.8°	6°37.3'	+60.0'	150.9°	5°44.9'	+60.0'	150.9°	4°52.5'	+60.0'	151.0°	4°00.0'	+60.0'	155.3°	4
5	10°14.3'	+59.9'	150.6°	9°22.0'	+59.9'	150.7°	8°29.7'	+60.0'	150.8°	7°37.3'	+60.0'	150.8°	6°44.9'	+60.0'	150.9°	5°52.5'	+60.0'	151.0°	5°00.0'	+60.0'	133.0°	5
6	11°14.3'	+59.9'	150.6°	10°22.0'	+59.9'	150.6°	9°29.7'	+60.0'	150.7°	8°37.3'	+60.0'	150.8°	7°44.9'	+60.0'	150.9°	6°52.5'	+60.0'	150.9°	6°00.0'	+60.0'	133.1°	6
7	12°14.2'	+59.9'	150.5°	11°21.9'	+59.9'	150.6°	10°29.6'	+60.0'	150.7°	9°37.3'	+60.0'	150.8°	8°44.9'	+60.0'	150.9°	7°52.5'	+60.0'	150.9°	7°00.0'	+60.0'	133.2°	7
8	13°14.1'	+59.9'	150.4°	12°21.9'	+59.9'	150.6°	11°29.6'	+60.0'	150.7°	10°37.3'	+60.0'	150.8°	9°44.9'	+60.0'	150.8°	8°52.5'	+60.0'	150.9°	8°00.0'	+60.0'	117.2°	8
9	14°14.0'	+59.9'	150.4°	13°21.8'	+59.9'	150.5°	12°29.6'	+60.0'	150.6°	11°37.2'	+60.0'	150.7°	10°44.9'	+60.0'	150.8°	9°52.5'	+60.0'	150.9°	9°00.0'	+60.0'	156.6°	9
10	15°13.9'	+59.9'	150.3°	14°21.8'	+59.9'	150.5°	13°29.5'	+60.0'	150.6°	12°37.2'	+60.0'	150.7°	11°44.9'	+60.0'	150.8°	10°52.5'	+60.0'	150.9°	10°00.0'	+60.0'	157.0°	10
11	16°13.8'	+59.9'	150.3°	15°21.7'	+59.9'	150.4°	14°29.5'	+60.0'	150.6°	13°37.2'	+60.0'	150.7°	12°44.9'	+60.0'	150.8°	11°52.5'	+60.0'	150.9°	11°00.0'	+60.0'	157.4°	11
12	17°13.8'	+59.9'	150.2°	16°21.6'	+59.9'	150.4°	15°29.4'	+60.0'	150.5°	14°37.2'	+60.0'	150.7°	13°44.8'	+60.0'	150.8°	12°52.5'	+60.0'	150.9°	12°00.0'	+60.0'	180.0°	12
13	18°13.7'	+59.9'	150.2°	17°21.6'	+59.9'	150.3°	16°29.4'	+60.0'	150.5°	15°37.2'	+60.0'	150.6°	14°44.8'	+60.0'	150.8°	13°52.4'	+60.0'	150.9°	13°00.0'	+60.0'	180.0°	13
14	19°13.6'	+59.9'	150.1°	18°21.5'	+59.9'	150.3°	17°29.4'	+60.0'	150.4°	16°37.1'	+60.0'	150.6°	15°44.8'	+60.0'	150.7°	14°52.4'	+60.0'	150.9°	14°00.0'	+60.0'	159.1°	14
15	20°13.5'	+59.9'	150.1°	19°21.5'	+59.9'	150.2°	18°29.3'	+60.0'	150.4°	17°37.1'	+60.0'	150.6°	16°44.8'	+60.0'	150.7°	15°52.4'	+60.0'	150.9°	15°00.0'	+60.0'	159.7°	15
16	21°13.4'	+59.9'	150.0°	20°21.4'	+59.9'	150.2°	19°29.3'	+60.0'	150.4°	18°37.1'	+60.0'	150.5°	17°44.8'	+60.0'	150.7°	16°52.4'	+60.0'	150.9°	16°00.0'	+60.0'	160.5°	16
17	22°13.3'	+59.9'	149.9°	21°21.3'	+59.9'	150.1°	20°29.3'	+60.0'	150.3°	19°37.1'	+60.0'	150.5°	18°44.8'	+60.0'	150.7°	17°52.4'	+60.0'	150.8°	17°00.0'	+60.0'	161.4°	17
18	23°13.2'	+59.9'	149.9°	22°21.3'	+59.9'	150.1°	21°29.2'	+60.0'	150.3°	20°37.0'	+60.0'	150.5°	19°44.8'	+60.0'	150.7°	18°52.4'	+60.0'	150.8°	18°00.0'	+60.0'	162.3°	18
19	24°13.1'	+59.9'	149.8°	23°21.2'	+59.9'	150.0°	22°29.2'	+60.0'	150.3°	21°37.0'	+60.0'	150.5°	20°44.8'	+60.0'	150.6°	19°52.4'	+60.0'	150.8°	19°00.0'	+60.0'	163.4°	19
20	25°13.1'	+59.9'	149.8°	24°21.2'	+59.9'	150.0°	23°29.1'	+60.0'	150.2°	22°37.0'	+60.0'	150.4°	21°44.8'	+60.0'	150.6°	20°52.4'	+60.0'	150.8°	20°00.0'	+60.0'	164.7°	20
21	26°13.0'	+59.9'	149.7°	25°21.1'	+59.9'	149.9°	24°29.1'	+60.0'	150.2°	23°37.0'	+60.0'	150.4°	22°44.8'	+60.0'	150.6°	21°52.4'	+60.0'	150.8°	21°00.0'	+60.0'	90.0°	21
22	27																					

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

30° 330° LHA

Latitude SAME as Declination

30° 330° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	5°11.6'	+59.9'	149.9°	4°19.7'	+59.9'	149.9°	3°27.8'	+60.0'	149.9°	2°35.9'	+60.0'	150.0°	1°43.9'	+60.0'	150.0°	0°52.0'	+60.0'	150.0°	0°00.0'	+60.0'	150.0°	0
1	6°11.5'	+59.9'	149.8°	5°19.7'	+59.9'	149.9°	4°27.8'	+60.0'	149.9°	3°35.8'	+60.0'	149.9°	2°43.9'	+60.0'	150.0°	1°52.0'	+60.0'	150.0°	1°00.0'	+60.0'	148.2°	1
2	7°11.5'	+59.9'	149.8°	6°19.6'	+59.9'	149.8°	5°27.7'	+60.0'	149.9°	4°35.8'	+60.0'	149.9°	3°43.9'	+60.0'	149.9°	2°52.0'	+60.0'	150.0°	2°00.0'	+60.0'	155.1°	2
3	8°11.4'	+59.9'	149.7°	7°19.6'	+59.9'	149.8°	6°27.7'	+60.0'	149.8°	5°35.8'	+60.0'	149.9°	4°43.9'	+60.0'	149.9°	3°52.0'	+60.0'	150.0°	3°00.0'	+60.0'	155.2°	3
4	9°11.3'	+59.9'	149.7°	8°19.5'	+59.9'	149.7°	7°27.7'	+60.0'	149.8°	6°35.8'	+60.0'	149.9°	5°43.9'	+60.0'	149.9°	4°52.0'	+60.0'	150.0°	4°00.0'	+60.0'	155.3°	4
5	10°11.2'	+59.9'	149.6°	9°19.4'	+59.9'	149.7°	8°27.6'	+60.0'	149.8°	7°35.8'	+60.0'	149.8°	6°43.9'	+60.0'	149.9°	5°51.9'	+60.0'	150.0°	5°00.0'	+60.0'	133.0°	5
6	11°11.1'	+59.9'	149.5°	10°19.4'	+59.9'	149.6°	9°27.6'	+60.0'	149.7°	8°35.7'	+60.0'	149.8°	7°43.9'	+60.0'	149.9°	6°51.9'	+60.0'	149.9°	6°00.0'	+60.0'	133.1°	6
7	12°11.0'	+59.9'	149.5°	11°19.3'	+59.9'	149.6°	10°27.5'	+60.0'	149.7°	9°35.7'	+60.0'	149.8°	8°43.9'	+60.0'	149.9°	7°51.9'	+60.0'	149.9°	7°00.0'	+60.0'	133.2°	7
8	13°11.0'	+59.9'	149.4°	12°19.3'	+59.9'	149.5°	11°27.5'	+60.0'	149.7°	10°35.7'	+60.0'	149.8°	9°43.8'	+60.0'	149.8°	8°51.9'	+60.0'	149.9°	8°00.0'	+60.0'	117.2°	8
9	14°10.9'	+59.9'	149.4°	13°19.2'	+59.9'	149.5°	12°27.5'	+60.0'	149.6°	11°35.7'	+60.0'	149.7°	10°43.8'	+60.0'	149.8°	9°51.9'	+60.0'	149.9°	9°00.0'	+60.0'	156.6°	9
10	15°10.8'	+59.9'	149.3°	14°19.1'	+59.9'	149.5°	13°27.4'	+60.0'	149.6°	12°35.7'	+60.0'	149.7°	11°43.8'	+60.0'	149.8°	10°51.9'	+60.0'	149.9°	10°00.0'	+60.0'	157.0°	10
11	16°10.7'	+59.9'	149.3°	15°19.1'	+59.9'	149.4°	14°27.4'	+60.0'	149.5°	13°35.6'	+60.0'	149.7°	12°43.8'	+60.0'	149.8°	11°51.9'	+60.0'	149.9°	11°00.0'	+60.0'	157.4°	11
12	17°10.6'	+59.9'	149.2°	16°19.0'	+59.9'	149.4°	15°27.4'	+60.0'	149.5°	14°35.6'	+60.0'	149.6°	13°43.8'	+60.0'	149.8°	12°51.9'	+60.0'	149.9°	12°00.0'	+60.0'	180.0°	12
13	18°10.5'	+59.9'	149.2°	17°19.0'	+59.9'	149.3°	16°27.3'	+60.0'	149.5°	15°35.6'	+60.0'	149.6°	14°43.8'	+60.0'	149.8°	13°51.9'	+60.0'	149.9°	13°00.0'	+60.0'	180.0°	13
14	19°10.4'	+59.9'	149.1°	18°18.9'	+59.9'	149.3°	17°27.3'	+60.0'	149.4°	16°35.6'	+60.0'	149.6°	15°43.8'	+60.0'	149.7°	14°51.9'	+60.0'	149.9°	14°00.0'	+60.0'	159.1°	14
15	20°10.3'	+59.9'	149.0°	19°18.8'	+59.9'	149.2°	18°27.2'	+60.0'	149.4°	17°35.5'	+60.0'	149.6°	16°43.8'	+60.0'	149.7°	15°51.9'	+60.0'	149.9°	15°00.0'	+60.0'	159.7°	15
16	21°10.2'	+59.9'	149.0°	20°18.8'	+59.9'	149.2°	19°27.2'	+60.0'	149.4°	18°35.5'	+60.0'	149.5°	17°43.8'	+60.0'	149.7°	16°51.9'	+60.0'	149.9°	16°00.0'	+60.0'	160.5°	16
17	22°10.1'	+59.9'	148.9°	21°18.7'	+59.9'	149.1°	20°27.1'	+60.0'	149.3°	19°35.5'	+60.0'	149.5°	18°43.8'	+60.0'	149.7°	17°51.9'	+60.0'	149.8°	17°00.0'	+60.0'	161.4°	17
18	23°10.0'	+59.9'	148.9°	22°18.6'	+59.9'	149.1°	21°27.1'	+60.0'	149.3°	20°35.5'	+60.0'	149.5°	19°43.7'	+60.0'	149.7°	18°51.9'	+60.0'	149.8°	18°00.0'	+60.0'	162.3°	18
19	24°09.9'	+59.9'	148.8°	23°18.6'	+59.9'	149.0°	22°27.1'	+60.0'	149.2°	21°35.5'	+60.0'	149.4°	20°43.7'	+60.0'	149.6°	19°51.9'	+60.0'	149.8°	19°00.0'	+60.0'	163.4°	19
20	25°09.8'	+59.9'	148.7°	24°18.5'	+59.9'	149.0°	23°27.0'	+60.0'	149.2°	22°35.4'	+60.0'	149.4°	21°43.7'	+60.0'	149.6°	20°51.9'	+60.0'	149.8°	20°00.0'	+60.0'	164.7°	20
21	26°09.7'	+59.9'	148.7°	25°18.4'	+59.9'	148.9°	24°27.0'	+60.0'	149.2°	23°35.4'	+60.0'	149.4°	22°43.7'	+60.0'	149.6°	21°51.9'	+60.0'	149.8°	21°00.0'	+60.0'	90.0°	21
22	27°09.6'	+59.9'	148.6°	26°18.4'	+59.9'	148.8°	25°26.9'	+60.0'	149.1°	24°35.4'	+60.0'	149.3°	23°43.7'	+60.0'	149.6°	22°51.9'	+60.0'	149.8°	22°00.0'	+60.0'	180.0°	22
23	28°09.5'	+59.9'	148.5°	27°18.3'	+59.9'	148.8°	26°26.9'	+60.0'	149.1°	25°35.4'	+60.0'	149.3°	24°43.7'	+60.0'	149.6°	23°51.9'	+60.0'	149.8°	23°00.0'	+60.0'	169.9°	23
Dec°	84			85			86			87			88			89			90			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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	5°08.4'	+59.9'	148.9°	4°17.1'	+59.9'	148.9°	3°25.7'	+60.0'	148.9°	2°34.3'	+60.0'	149.0°	1°42.9'	+60.0'	149.0°	0°51.4'	+60.0'	149.0°	0°00.0'	+60.0'	149.0°	0
1	6°08.3'	+59.9'	148.8°	5°17.0'	+59.9'	148.9°	4°25.6'	+60.0'	148.9°	3°34.2'	+60.0'	148.9°	2°42.8'	+60.0'	149.0°	1°51.4'	+60.0'	149.0°	1°00.0'	+60.0'	148.2°	1
2	7°08.3'	+59.9'	148.8°	6°16.9'	+59.9'	148.8°	5°25.6'	+60.0'	148.9°	4°34.2'	+60.0'	148.9°	3°42.8'	+60.0'	148.9°	2°51.4'	+60.0'	149.0°	2°00.0'	+60.0'	155.1°	2
3	8°08.2'	+59.9'	148.7°	7°16.9'	+59.9'	148.8°	6°25.6'	+60.0'	148.8°	5°34.2'	+60.0'	148.9°	4°42.8'	+60.0'	148.9°	3°51.4'	+60.0'	149.0°	3°00.0'	+60.0'	155.2°	3
4	9°08.1'	+59.9'	148.6°	8°16.8'	+59.9'	148.7°	7°25.5'	+60.0'	148.8°	6°34.2'	+60.0'	148.9°	5°42.8'	+60.0'	148.9°	4°51.4'	+60.0'	149.0°	4°00.0'	+60.0'	155.3°	4
5	10°08.0'	+59.9'	148.6°	9°16.8'	+59.9'	148.7°	8°25.5'	+60.0'	148.8°	7°34.2'	+60.0'	148.8°	6°42.8'	+60.0'	148.9°	5°51.4'	+60.0'	149.0°	5°00.0'	+60.0'	133.0°	5
6	11°07.9'	+59.9'	148.5°	10°16.7'	+59.9'	148.6°	9°25.4'	+60.0'	148.7°	8°34.1'	+60.0'	148.8°	7°42.8'	+60.0'	148.9°	6°51.4'	+60.0'	148.9°	6°00.0'	+60.0'	133.1°	6
7	12°07.8'	+59.9'	148.5°	11°16.6'	+59.9'	148.6°	10°25.4'	+60.0'	148.7°	9°34.1'	+60.0'	148.8°	8°42.8'	+60.0'	148.9°	7°51.4'	+60.0'	148.9°	7°00.0'	+60.0'	133.2°	7
8	13°07.7'	+59.9'	148.4°	12°16.6'	+59.9'	148.5°	11°25.4'	+60.0'	148.6°	10°34.1'	+60.0'	148.7°	9°42.8'	+60.0'	148.8°	8°51.4'	+60.0'	148.9°	8°00.0'	+60.0'	117.2°	8
9	14°07.6'	+59.9'	148.4°	13°16.5'	+59.9'	148.5°	12°25.3'	+60.0'	148.6°	11°34.1'	+60.0'	148.7°	10°42.8'	+60.0'	148.8°	9°51.4'	+60.0'	148.9°	9°00.0'	+60.0'	156.6°	9
10	15°07.5'	+59.9'	148.3°	14°16.4'	+59.9'	148.4°	13°25.3'	+60.0'	148.6°	12°34.0'	+60.0'	148.7°	11°42.8'	+60.0'	148.8°	10°51.4'	+60.0'	148.9°	10°00.0'	+60.0'	157.0°	10
11	16°07.4'	+59.9'	148.2°	15°16.4'	+59.9'	148.4°	14°25.2'	+60.0'	148.5°	13°34.0'	+60.0'	148.7°	12°42.7'	+60.0'	148.8°	11°51.4'	+60.0'	148.9°	11°00.0'	+60.0'	157.4°	11
12	17°07.3'	+59.9'	148.2°	16°16.3'	+59.9'	148.3°	15°25.2'	+60.0'	148.5°	14°34.0'	+60.0'	148.6°	13°42.7'	+60.0'	148.8°	12°51.4'	+60.0'	148.9°	12°00.0'	+60.0'	180.0°	12
13	18°07.2'	+59.9'	148.1°	17°16.2'	+59.9'	148.3°	16°25.2'	+60.0'	148.5°	15°34.0'	+60.0'	148.6°	14°42.7'	+60.0'	148.7°	13°51.4'	+60.0'	148.9°	13°00.0'	+60.0'	180.0°	13
14	19°07.1'	+59.9'	148.1°	18°16.2'	+59.9'	148.2°	17°25.1'	+60.0'	148.4°	16°34.0'	+60.0'	148.6°	15°42.7'	+60.0'	148.7°	14°51.4'	+60.0'	148.9°	14°00.0'	+60.0'	159.1°	14
15	20°07.1'	+59.9'	148.0°	19°16.1'	+59.9'	148.2°	18°25.1'	+60.0'	148.4°	17°33.9'	+60.0'	148.5°	16°42.7'	+60.0'	148.7°	15°51.4'	+60.0'	148.9°	15°00.0'	+60.0'	159.7°	15
16	21°07.0'	+59.9'	147.9°	20°16.0'	+59.9'	148.1°	19°25.0'	+60.0'	148.3°	18°33.9'	+60.0'	148.5°	17°42.7'	+60.0'	148.7°	16°51.4'	+60.0'	148.8°	16°00.0'	+60.0'	160.5°	16
17	22°06.9'	+59.9'	147.9°	21°16.0'	+59.9'	148.1°	20°25.0'	+60.0'	148.3°	19°33.9'	+60.0'	148.5°	18°42.7'	+60.0'	148.7°	17°51.4'	+60.0'	148.8°	17°00.0'	+60.0'	161.4°	17
18	23°06.7'	+59.9'	147.8°	22°15.9'	+59.9'	148.0°	21°24.9'	+60.0'	148.3°	20°33.9'	+60.0'	148.5°	19°42.7'	+60.0'	148.6°	18°51.4'	+60.0'	148.8°	18°00.0'	+60.0'	162.3°	18
19	24°06.6'	+59.9'	147.8°	23°15.8'	+59.9'	148.0°	22°24.9'	+60.0'	148.2°	21°33.8'	+60.0'	148.4°	20°42.7'	+60.0'	148.6°	19°51.4'	+60.0'	148.8°	19°00.0'	+60.0'	163.4°	19
20	25°06.5'	+59.9'	147.7°	24°15.8'	+59.9'	147.9°	23°24.8'	+60.0'	148.2°	22°33.8'	+60.0'	148.4°	21°42.6'	+60.0'	148.6°	20°51.4'	+60.0'	148.8°	20°00.0'	+60.0'	164.7°	20
21	26°06.4'	+59.9'	147.6°	25°15.7'	+59.9'	147.9°	24°24.8'	+60.0'	148.1°	23°33.8'	+60.0'	148.4°	22°42.6'	+60.0'	148.6°	21°51.4'	+60.0'	148.8°	21°00.0'	+60.0'	90.0°	21
22	27																					

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

32° 328° LHA

Latitude SAME as Declination

32° 328° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	5°05.1'	+59.9'	147.9°	4°14.3'	+59.9'	147.9°	3°23.5'	+60.0'	147.9°	2°32.6'	+60.0'	148.0°	1°41.8'	+60.0'	148.0°	0°50.9'	+60.0'	148.0°	0°00.0'	+60.0'	148.0°	0
1	6°05.0'	+59.9'	147.8°	5°14.3'	+59.9'	147.9°	4°23.4'	+60.0'	147.9°	3°32.6'	+60.0'	147.9°	2°41.7'	+60.0'	148.0°	1°50.9'	+60.0'	148.0°	1°00.0'	+60.0'	148.2°	1
2	7°05.0'	+59.9'	147.7°	6°14.2'	+59.9'	147.8°	5°23.4'	+60.0'	147.9°	4°32.6'	+60.0'	147.9°	3°41.7'	+60.0'	147.9°	2°50.9'	+60.0'	148.0°	2°00.0'	+60.0'	142.5°	2
3	8°04.9'	+59.9'	147.7°	7°14.1'	+59.9'	147.8°	6°23.4'	+60.0'	147.8°	5°32.6'	+60.0'	147.9°	4°41.7'	+60.0'	147.9°	3°50.9'	+60.0'	148.0°	3°00.0'	+60.0'	142.6°	3
4	9°04.8'	+59.9'	147.6°	8°14.1'	+59.9'	147.7°	7°23.3'	+60.0'	147.8°	6°32.5'	+60.0'	147.9°	5°41.7'	+60.0'	147.9°	4°50.9'	+60.0'	148.0°	4°00.0'	+60.0'	155.3°	4
5	10°04.7'	+59.9'	147.6°	9°14.0'	+59.9'	147.7°	8°23.3'	+60.0'	147.8°	7°32.5'	+60.0'	147.8°	6°41.7'	+60.0'	147.9°	5°50.9'	+60.0'	147.9°	5°00.0'	+60.0'	133.0°	5
6	11°04.6'	+59.9'	147.5°	10°13.9'	+59.9'	147.6°	9°23.2'	+60.0'	147.7°	8°32.5'	+60.0'	147.8°	7°41.7'	+60.0'	147.9°	6°50.9'	+60.0'	147.9°	6°00.0'	+60.0'	133.1°	6
7	12°04.5'	+59.9'	147.5°	11°13.9'	+59.9'	147.6°	10°23.2'	+60.0'	147.7°	9°32.5'	+60.0'	147.8°	8°41.7'	+60.0'	147.9°	7°50.9'	+60.0'	147.9°	7°00.0'	+60.0'	133.2°	7
8	13°04.4'	+59.9'	147.4°	12°13.8'	+59.9'	147.5°	11°23.2'	+60.0'	147.6°	10°32.4'	+60.0'	147.7°	9°41.7'	+60.0'	147.8°	8°50.9'	+60.0'	147.9°	8°00.0'	+60.0'	117.2°	8
9	14°04.3'	+59.9'	147.3°	13°13.7'	+59.9'	147.5°	12°23.1'	+60.0'	147.6°	11°32.4'	+60.0'	147.7°	10°41.7'	+60.0'	147.8°	9°50.9'	+60.0'	147.9°	9°00.0'	+60.0'	156.6°	9
10	15°04.2'	+59.9'	147.3°	14°13.7'	+59.9'	147.4°	13°23.1'	+60.0'	147.6°	12°32.4'	+60.0'	147.7°	11°41.7'	+60.0'	147.8°	10°50.9'	+60.0'	147.9°	10°00.0'	+60.0'	157.0°	10
11	16°04.1'	+59.9'	147.2°	15°13.6'	+59.9'	147.4°	14°23.0'	+60.0'	147.5°	13°32.4'	+60.0'	147.7°	12°41.6'	+60.0'	147.8°	11°50.9'	+60.0'	147.9°	11°00.0'	+60.0'	157.4°	11
12	17°04.0'	+59.9'	147.2°	16°13.5'	+59.9'	147.3°	15°23.0'	+60.0'	147.5°	14°32.3'	+60.0'	147.6°	13°41.6'	+60.0'	147.8°	12°50.9'	+60.0'	147.9°	12°00.0'	+60.0'	180.0°	12
13	18°03.9'	+59.9'	147.1°	17°13.5'	+59.9'	147.3°	16°22.9'	+60.0'	147.4°	15°32.3'	+60.0'	147.6°	14°41.6'	+60.0'	147.7°	13°50.8'	+60.0'	147.9°	13°00.0'	+60.0'	180.0°	13
14	19°03.8'	+59.9'	147.0°	18°13.4'	+59.9'	147.2°	17°22.9'	+60.0'	147.4°	16°32.3'	+60.0'	147.6°	15°41.6'	+60.0'	147.7°	14°50.8'	+60.0'	147.9°	14°00.0'	+60.0'	159.1°	14
15	20°03.7'	+59.9'	147.0°	19°13.3'	+59.9'	147.2°	18°22.8'	+60.0'	147.4°	17°32.3'	+60.0'	147.5°	16°41.6'	+60.0'	147.7°	15°50.8'	+60.0'	147.9°	15°00.0'	+60.0'	159.7°	15
16	21°03.6'	+59.9'	146.9°	20°13.2'	+59.9'	147.1°	19°22.8'	+60.0'	147.3°	18°32.2'	+60.0'	147.5°	17°41.6'	+60.0'	147.7°	16°50.8'	+60.0'	147.8°	16°00.0'	+60.0'	160.5°	16
17	22°03.5'	+59.9'	146.9°	21°13.2'	+59.9'	147.1°	20°22.8'	+60.0'	147.3°	19°32.2'	+60.0'	147.5°	18°41.6'	+60.0'	147.7°	17°50.8'	+60.0'	147.8°	17°00.0'	+60.0'	161.4°	17
18	23°03.4'	+59.9'	146.8°	22°13.1'	+59.9'	147.0°	21°22.7'	+60.0'	147.2°	20°32.2'	+60.0'	147.4°	19°41.6'	+60.0'	147.6°	18°50.8'	+60.0'	147.8°	18°00.0'	+60.0'	162.3°	18
19	24°03.3'	+59.9'	146.7°	23°13.0'	+59.9'	147.0°	22°22.7'	+60.0'	147.2°	21°32.2'	+60.0'	147.4°	20°41.6'	+60.0'	147.6°	19°50.8'	+60.0'	147.8°	19°00.0'	+60.0'	163.4°	19
20	25°03.1'	+59.9'	146.7°	24°12.9'	+59.9'	146.9°	23°22.6'	+60.0'	147.1°	22°32.1'	+60.0'	147.4°	21°41.5'	+60.0'	147.6°	20°50.8'	+60.0'	147.8°	20°00.0'	+60.0'	164.7°	20
21	26°03.0'	+59.9'	146.6°	25°12.9'	+59.9'	146.9°	24°22.6'	+60.0'	147.1°	23°32.1'	+60.0'	147.3°	22°41.5'	+60.0'	147.6°	21°50.8'	+60.0'	147.8°	21°00.0'	+60.0'	90.0°	21
22	27°02.9'	+59.9'	146.5°	26°12.8'	+59.9'	146.8°	25°22.5'	+59.9'	147.1°	24°32.1'	+60.0'	147.3°	23°41.5'	+60.0'	147.6°	22°50.8'	+60.0'	147.8°	22°00.0'	+60.0'	180.0°	22
23	28°02.8'	+59.9'	146.4°	27°12.7'	+59.9'	146.7°	26°22.5'	+59.9'	147.0°	25°32.1'	+60.0'	147.3°	24°41.5'	+60.0'	147.5°	23°50.8'	+60.0'	147.8°	23°00.0'	+60.0'	169.9°	23
Dec°	84			85			86			87			88			89			90			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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	5°01.8'	+59.9'	146.9°	4°11.5'	+59.9'	146.9°	3°21.2'	+60.0'	146.9°	2°30.9'	+60.0'	147.0°	1°40.6'	+60.0'	147.0°	0°50.3'	+60.0'	147.0°	0°00.0'	+60.0'	147.0°	0
1	6°01.7'	+59.9'	146.8°	5°11.4'	+59.9'	146.9°	4°21.2'	+60.0'	146.9°	3°30.9'	+60.0'	146.9°	2°40.6'	+60.0'	147.0°	1°50.3'	+60.0'	147.0°	1°00.0'	+60.0'	148.2°	1
2	7°01.6'	+59.9'	146.7°	6°11.4'	+59.9'	146.8°	5°21.1'	+60.0'	146.9°	4°30.9'	+60.0'	146.9°	3°40.6'	+60.0'	146.9°	2°50.3'	+60.0'	147.0°	2°00.0'	+60.0'	142.5°	2
3	8°01.5'	+59.9'	146.7°	7°11.3'	+59.9'	146.8°	6°21.1'	+60.0'	146.8°	5°30.9'	+60.0'	146.9°	4°40.6'	+60.0'	146.9°	3°50.3'	+60.0'	147.0°	3°00.0'	+60.0'	142.6°	3
4	9°01.4'	+59.9'	146.6°	8°11.2'	+59.9'	146.7°	7°21.1'	+60.0'	146.8°	6°30.8'	+60.0'	146.8°	5°40.6'	+60.0'	146.9°	4°50.3'	+60.0'	147.0°	4°00.0'	+60.0'	155.3°	4
5	10°01.3'	+59.9'	146.6°	9°11.2'	+59.9'	146.7°	8°21.0'	+60.0'	146.7°	7°30.8'	+60.0'	146.8°	6°40.6'	+60.0'	146.9°	5°50.3'	+60.0'	146.9°	5°00.0'	+60.0'	133.0°	5
6	11°01.2'	+59.9'	146.5°	10°11.1'	+59.9'	146.6°	9°21.0'	+60.0'	146.7°	8°30.8'	+60.0'	146.8°	7°40.6'	+60.0'	146.9°	6°50.3'	+60.0'	146.9°	6°00.0'	+60.0'	133.1°	6
7	12°01.1'	+59.9'	146.4°	11°11.0'	+59.9'	146.6°	10°20.9'	+60.0'	146.7°	9°30.8'	+60.0'	146.8°	8°40.6'	+60.0'	146.8°	7°50.3'	+60.0'	146.9°	7°00.0'	+60.0'	133.2°	7
8	13°01.0'	+59.9'	146.4°	12°11.0'	+59.9'	146.5°	11°20.9'	+60.0'	146.6°	10°30.7'	+60.0'	146.7°	9°40.5'	+60.0'	146.8°	8°50.3'	+60.0'	146.9°	8°00.0'	+60.0'	117.2°	8
9	14°00.9'	+59.9'	146.3°	13°10.9'	+59.9'	146.5°	12°20.8'	+60.0'	146.6°	11°30.7'	+60.0'	146.7°	10°40.5'	+60.0'	146.8°	9°50.3'	+60.0'	146.9°	9°00.0'	+60.0'	156.6°	9
10	15°00.8'	+59.9'	146.3°	14°10.8'	+59.9'	146.4°	13°20.8'	+60.0'	146.5°	12°30.7'	+60.0'	146.7°	11°40.5'	+60.0'	146.8°	10°50.3'	+60.0'	146.9°	10°00.0'	+60.0'	157.0°	10
11	16°00.6'	+59.9'	146.2°	15°10.7'	+59.9'	146.4°	14°20.7'	+60.0'	146.5°	13°30.7'	+60.0'	146.6°	12°40.5'	+60.0'	146.8°	11°50.3'	+60.0'	146.9°	11°00.0'	+60.0'	157.4°	11
12	17°00.5'	+59.9'	146.1°	16°10.7'	+59.9'	146.3°	15°20.7'	+60.0'	146.5°	14°30.6'	+60.0'	146.6°	13°40.5'	+60.0'	146.8°	12°50.3'	+60.0'	146.9°	12°00.0'	+60.0'	180.0°	12
13	18°00.4'	+59.9'	146.1°	17°10.6'	+59.9'	146.3°	16°20.6'	+60.0'	146.4°	15°30.6'	+60.0'	146.6°	14°40.5'	+60.0'	146.7°	13°50.3'	+60.0'	146.9°	13°00.0'	+60.0'	180.0°	13
14	19°00.3'	+59.9'	146.0°	18°10.5'	+59.9'	146.2°	17°20.6'	+60.0'	146.4°	16°30.6'	+60.0'	146.6°	15°40.5'	+60.0'	146.7°	14°50.3'	+60.0'	146.9°	14°00.0'	+60.0'	159.1°	14
15	20°00.2'	+59.9'	146.0°	19°10.4'	+59.9'	146.2°	18°20.6'	+60.0'	146.3°	17°30.6'	+60.0'	146.5°	16°40.5'	+60.0'	146.7°	15°50.3'	+60.0'	146.8°	15°00.0'	+60.0'	159.7°	15
16	21°00.1'	+59.9'	145.9°	20°10.4'	+59.9'	146.1°	19°20.5'	+60.0'	146.3°	18°30.5'	+60.0'	146.5°	17°40.5'	+60.0'	146.7°	16°50.3'	+60.0'	146.8°	16°00.0'	+60.0'	160.5°	16
17	22°00.0'	+59.9'	145.8°	21°10.3'	+59.9'	146.0°	20°20.5'	+60.0'	146.3°	19°30.5'	+60.0'	146.5°	18°40.4'	+60.0'	146.6°	17°50.3'	+60.0'	146.8°	17°00.0'	+60.0'	161.4°	17
18	22°59.9'	+59.9'	145.8°	22°10.2'	+59.9'	146.0°	21°20.4'	+59.9'	146.2°	20°30.5'	+60.0'	146.4°	19°40.4'	+60.0'	146.6°	18°50.3'	+60.0'	146.8°	18°00.0'	+60.0'	162.3°	18
19	23°59.8'	+59.9'	145.7°	23°10.1'	+59.9'	145.9°	22°20.4'	+59.9'	146.2°	21°30.5'	+60.0'	146.4°	20°40.4'	+60.0'	146.6°	19°50.3'	+60.0'	146.8°	19°00.0'	+60.0'	163.4°	19
20	24°59.6'	+59.9'	145.6°	24°10.0'	+59.9'	145.9°	23°20.3'	+59.9'	146.1°	22°30.4'	+60.0'	146.4°	21°40.4'	+60.0'	146.6°	20°50.3'	+60.0'	146.8°	20°00.0'	+60.0'	164.7°	20
21	25°59.5'	+59.9'	145.6°	25°10.0'	+59.9'	145.8°	24°20.3'	+59.9'	146.1°	23°30.4'	+60.0'	146.3°	22°40.4'	+60.0'	146.6°	21°50.3'	+60.0'	146.8°	21°00.0'	+60.0		

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

34° 326° LHA

Latitude SAME as Declination

34° 326° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	4°58.3'	+59.9'	145.9°	4°08.6'	+59.9'	145.9°	3°18.9'	+60.0'	145.9°	2°29.2'	+60.0'	146.0°	1°39.5'	+60.0'	146.0°	0°49.7'	+60.0'	146.0°	0°00.0'	+60.0'	146.0°	0
1	5°58.2'	+59.9'	145.8°	5°08.5'	+59.9'	145.8°	4°18.9'	+60.0'	145.9°	3°29.2'	+60.0'	145.9°	2°39.5'	+60.0'	146.0°	1°49.7'	+60.0'	146.0°	1°00.0'	+60.0'	148.2°	1
2	6°58.1'	+59.9'	145.7°	6°08.5'	+59.9'	145.8°	5°18.8'	+60.0'	145.9°	4°29.2'	+60.0'	145.9°	3°39.5'	+60.0'	145.9°	2°49.7'	+60.0'	146.0°	2°00.0'	+60.0'	142.5°	2
3	7°58.0'	+59.9'	145.7°	7°08.4'	+59.9'	145.8°	6°18.8'	+60.0'	145.8°	5°29.1'	+60.0'	145.9°	4°39.4'	+60.0'	145.9°	3°49.7'	+60.0'	146.0°	3°00.0'	+60.0'	142.6°	3
4	8°57.9'	+59.9'	145.6°	8°08.3'	+59.9'	145.7°	7°18.7'	+60.0'	145.8°	6°29.1'	+60.0'	145.8°	5°39.4'	+60.0'	145.9°	4°49.7'	+60.0'	146.0°	4°00.0'	+60.0'	155.3°	4
5	9°57.8'	+59.9'	145.6°	9°08.3'	+59.9'	145.7°	8°18.7'	+60.0'	145.7°	7°29.1'	+60.0'	145.8°	6°39.4'	+60.0'	145.9°	5°49.7'	+60.0'	145.9°	5°00.0'	+60.0'	133.0°	5
6	10°57.7'	+59.9'	145.5°	10°08.2'	+59.9'	145.6°	9°18.6'	+60.0'	145.7°	8°29.0'	+60.0'	145.8°	7°39.4'	+60.0'	145.9°	6°49.7'	+60.0'	145.9°	6°00.0'	+60.0'	133.1°	6
7	11°57.5'	+59.9'	145.4°	11°08.1'	+59.9'	145.6°	10°18.6'	+60.0'	145.7°	9°29.0'	+60.0'	145.8°	8°39.4'	+60.0'	145.8°	7°49.7'	+60.0'	145.9°	7°00.0'	+60.0'	133.2°	7
8	12°57.4'	+59.9'	145.4°	12°08.0'	+59.9'	145.5°	11°18.5'	+60.0'	145.6°	10°29.0'	+60.0'	145.7°	9°39.4'	+60.0'	145.8°	8°49.7'	+60.0'	145.9°	8°00.0'	+60.0'	117.2°	8
9	13°57.3'	+59.9'	145.3°	13°08.0'	+59.9'	145.4°	12°18.5'	+60.0'	145.6°	11°29.0'	+60.0'	145.7°	10°39.4'	+60.0'	145.8°	9°49.7'	+60.0'	145.9°	9°00.0'	+60.0'	156.6°	9
10	14°57.2'	+59.9'	145.2°	14°07.9'	+59.9'	145.4°	13°18.5'	+60.0'	145.5°	12°28.9'	+60.0'	145.7°	11°39.4'	+60.0'	145.8°	10°49.7'	+60.0'	145.9°	10°00.0'	+60.0'	157.0°	10
11	15°57.1'	+59.9'	145.2°	15°07.8'	+59.9'	145.3°	14°18.4'	+60.0'	145.5°	13°28.9'	+60.0'	145.6°	12°39.4'	+60.0'	145.8°	11°49.7'	+60.0'	145.9°	11°00.0'	+60.0'	157.4°	11
12	16°57.0'	+59.9'	145.1°	16°07.7'	+59.9'	145.3°	15°18.4'	+60.0'	145.5°	14°28.9'	+60.0'	145.6°	13°39.3'	+60.0'	145.7°	12°49.7'	+60.0'	145.9°	12°00.0'	+60.0'	180.0°	12
13	17°56.9'	+59.9'	145.1°	17°07.6'	+59.9'	145.2°	16°18.3'	+60.0'	145.4°	15°28.9'	+60.0'	145.6°	14°39.3'	+60.0'	145.7°	13°49.7'	+60.0'	145.9°	13°00.0'	+60.0'	180.0°	13
14	18°56.8'	+59.9'	145.0°	18°07.6'	+59.9'	145.2°	17°18.3'	+59.9'	145.4°	16°28.8'	+60.0'	145.5°	15°39.3'	+60.0'	145.7°	14°49.7'	+60.0'	145.9°	14°00.0'	+60.0'	159.1°	14
15	19°56.7'	+59.9'	144.9°	19°07.5'	+59.9'	145.1°	18°18.2'	+59.9'	145.3°	17°28.8'	+60.0'	145.5°	16°39.3'	+60.0'	145.7°	15°49.7'	+60.0'	145.8°	15°00.0'	+60.0'	159.7°	15
16	20°56.6'	+59.9'	144.9°	20°07.4'	+59.9'	145.1°	19°18.2'	+59.9'	145.3°	18°28.8'	+60.0'	145.5°	17°39.3'	+60.0'	145.7°	16°49.7'	+60.0'	145.8°	16°00.0'	+60.0'	160.5°	16
17	21°56.4'	+59.9'	144.8°	21°07.3'	+59.9'	145.0°	20°18.1'	+59.9'	145.2°	19°28.7'	+60.0'	145.4°	18°39.3'	+60.0'	145.6°	17°49.7'	+60.0'	145.8°	17°00.0'	+60.0'	161.4°	17
18	22°56.3'	+59.9'	144.7°	22°07.2'	+59.9'	145.0°	21°18.0'	+59.9'	145.2°	20°28.7'	+60.0'	145.4°	19°39.3'	+60.0'	145.6°	18°49.7'	+60.0'	145.8°	18°00.0'	+60.0'	162.3°	18
19	23°56.2'	+59.9'	144.7°	23°07.2'	+59.9'	144.9°	22°18.0'	+59.9'	145.1°	21°28.7'	+60.0'	145.4°	20°39.3'	+60.0'	145.6°	19°49.7'	+60.0'	145.8°	19°00.0'	+60.0'	163.4°	19
20	24°56.1'	+59.9'	144.6°	24°07.1'	+59.9'	144.8°	23°17.9'	+59.9'	145.1°	22°28.7'	+60.0'	145.3°	21°39.2'	+60.0'	145.6°	20°49.7'	+60.0'	145.8°	20°00.0'	+60.0'	164.7°	20
21	25°55.9'	+59.9'	144.5°	25°07.0'	+59.9'	144.8°	24°17.9'	+59.9'	145.1°	23°28.6'	+60.0'	145.3°	22°39.2'	+60.0'	145.5°	21°49.7'	+60.0'	145.8°	21°00.0'	+60.0'	90.0°	21
22	26°55.8'	+59.9'	144.4°	26°06.9'	+59.9'	144.7°	25°17.8'	+59.9'	145.0°	24°28.6'	+60.0'	145.3°	23°39.2'	+60.0'	145.5°	22°49.7'	+60.0'	145.8°	22°00.0'	+60.0'	180.0°	22
23	27°55.7'	+59.9'	144.4°	27°06.8'	+59.9'	144.7°	26°17.8'	+59.9'	145.0°	25°28.6'	+60.0'	145.2°	24°39.2'	+60.0'	145.5°	23°49.7'	+60.0'	145.8°	23°00.0'	+60.0'	169.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	4°54.7'	+59.9'	144.9°	4°05.6'	+59.9'	144.9°	3°16.5'	+60.0'	144.9°	2°27.4'	+60.0'	145.0°	1°38.3'	+60.0'	145.0°	0°49.1'	+60.0'	145.0°	0°00.0'	+60.0'	145.0°	0
1	5°54.6'	+59.9'	144.8°	5°05.6'	+59.9'	144.8°	4°16.5'	+60.0'	144.9°	3°27.4'	+60.0'	144.9°	2°38.3'	+60.0'	145.0°	1°49.1'	+60.0'	145.0°	1°00.0'	+60.0'	142.5°	1
2	6°54.5'	+59.9'	144.7°	6°05.5'	+59.9'	144.8°	5°16.4'	+60.0'	144.9°	4°27.4'	+60.0'	144.9°	3°38.3'	+60.0'	144.9°	2°49.1'	+60.0'	145.0°	2°00.0'	+60.0'	142.5°	2
3	7°54.4'	+59.9'	144.7°	7°05.4'	+59.9'	144.7°	6°16.4'	+60.0'	144.8°	5°27.3'	+60.0'	144.9°	4°38.3'	+60.0'	144.9°	3°49.1'	+60.0'	145.0°	3°00.0'	+60.0'	142.6°	3
4	8°54.3'	+59.9'	144.6°	8°05.3'	+59.9'	144.7°	7°16.3'	+60.0'	144.8°	6°27.3'	+60.0'	144.8°	5°38.2'	+60.0'	144.9°	4°49.1'	+60.0'	145.0°	4°00.0'	+60.0'	155.3°	4
5	9°54.2'	+59.9'	144.5°	9°05.3'	+59.9'	144.6°	8°16.3'	+60.0'	144.7°	7°27.3'	+60.0'	144.8°	6°38.2'	+60.0'	144.9°	5°49.1'	+60.0'	144.9°	5°00.0'	+60.0'	133.0°	5
6	10°54.1'	+59.9'	144.5°	10°05.2'	+59.9'	144.6°	9°16.3'	+60.0'	144.7°	8°27.3'	+60.0'	144.8°	7°38.2'	+60.0'	144.9°	6°49.1'	+60.0'	144.9°	6°00.0'	+60.0'	133.1°	6
7	11°53.9'	+59.9'	144.4°	11°05.1'	+59.9'	144.5°	10°16.2'	+60.0'	144.6°	9°27.2'	+60.0'	144.8°	8°38.2'	+60.0'	144.8°	7°49.1'	+60.0'	144.9°	7°00.0'	+60.0'	133.2°	7
8	12°53.8'	+59.9'	144.4°	12°05.0'	+59.9'	144.5°	11°16.2'	+59.9'	144.6°	10°27.2'	+60.0'	144.7°	9°38.2'	+60.0'	144.8°	8°49.1'	+60.0'	144.9°	8°00.0'	+60.0'	117.2°	8
9	13°53.7'	+59.9'	144.3°	13°05.0'	+59.9'	144.4°	12°16.1'	+59.9'	144.6°	11°27.2'	+60.0'	144.7°	10°38.2'	+60.0'	144.8°	9°49.1'	+60.0'	144.9°	9°00.0'	+60.0'	156.6°	9
10	14°53.6'	+59.9'	144.2°	14°04.9'	+59.9'	144.4°	13°16.1'	+59.9'	144.5°	12°27.1'	+60.0'	144.7°	11°38.2'	+60.0'	144.8°	10°49.1'	+60.0'	144.9°	10°00.0'	+60.0'	157.0°	10
11	15°53.5'	+59.9'	144.2°	15°04.8'	+59.9'	144.3°	14°16.0'	+59.9'	144.5°	13°27.1'	+60.0'	144.6°	12°38.2'	+60.0'	144.8°	11°49.1'	+60.0'	144.9°	11°00.0'	+60.0'	157.4°	11
12	16°53.4'	+59.9'	144.1°	16°04.7'	+59.9'	144.3°	15°15.9'	+59.9'	144.4°	14°27.1'	+60.0'	144.6°	13°38.1'	+60.0'	144.7°	12°49.1'	+60.0'	144.9°	12°00.0'	+60.0'	180.0°	12
13	17°53.2'	+59.9'	144.0°	17°04.6'	+59.9'	144.2°	16°15.9'	+59.9'	144.4°	15°27.1'	+60.0'	144.6°	14°38.1'	+60.0'	144.7°	13°49.1'	+60.0'	144.9°	13°00.0'	+60.0'	180.0°	13
14	18°53.1'	+59.9'	144.0°	18°04.5'	+59.9'	144.2°	17°15.8'	+59.9'	144.4°	16°27.0'	+60.0'	144.5°	15°38.1'	+60.0'	144.7°	14°49.1'	+60.0'	144.9°	14°00.0'	+60.0'	159.1°	14
15	19°53.0'	+59.9'	143.9°	19°04.5'	+59.9'	144.1°	18°15.8'	+59.9'	144.3°	17°27.0'	+60.0'	144.5°	16°38.1'	+60.0'	144.7°	15°49.1'	+60.0'	144.8°	15°00.0'	+60.0'	159.7°	15
16	20°52.9'	+59.9'	143.8°	20°04.4'	+59.9'	144.1°	19°15.7'	+59.9'	144.3°	18°27.0'	+60.0'	144.5°	17°38.1'	+60.0'	144.7°	16°49.1'	+60.0'	144.8°	16°00.0'	+60.0'	160.5°	16
17	21°52.8'	+59.9'	143.8°	21°04.3'	+59.9'	144.0°	20°15.7'	+59.9'	144.2°	19°26.9'	+60.0'	144.4°	18°38.1'	+60.0'	144.6°	17°49.1'	+60.0'	144.8°	17°00.0'	+60.0'	161.4°	17
18	22°52.6'	+59.9'	143.7°	22°04.2'	+59.9'	143.9°	21°15.6'	+59.9'	144.2°	20°26.9'	+60.0'	144.4°	19°38.1'	+60.0'	144.6°	18°49.1'	+60.0'	144.8°	18°00.0'	+60.0'	162.3°	18
19	23°52.5'	+59.9'	143.6°	23°04.1'	+59.9'	143.9°	22°15.6'	+59.9'	144.1°	21°26.9'	+60.0'	144.4°	20°38.1'	+60.0'	144.6°	19°49.1'	+60.0'	144.8°	19°00.0'	+60.0'	163.4°	19
20	24°52.4'	+59.9'	143.6°	24°04.0'	+59.9'	143.8°	23°15.5'	+59.9'	144.1°	22°26.9'	+60.0'	144.3°	21°38.0'	+60.0'	144.6°	20°49.1'	+60.0'	144.8°	20°00.0'	+60.0'	164.7°	20
21	25°52.2'	+59.9'	143.5°	25°03.9'	+59																	

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

36° 324° LHA

Latitude SAME as Declination

36° 324° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	4°51.1'	+59.9'	143.9°	4°02.6'	+59.9'	143.9°	3°14.1'	+59.9'	143.9°	2°25.6'	+60.0'	144.0°	1°37.1'	+60.0'	144.0°	0°48.5'	+60.0'	144.0°	0°00.0'	+60.0'	144.0°	0
1	5°50.9'	+59.9'	143.8°	5°02.5'	+59.9'	143.8°	4°14.1'	+59.9'	143.9°	3°25.6'	+60.0'	143.9°	2°37.1'	+60.0'	144.0°	1°48.5'	+60.0'	144.0°	1°00.0'	+60.0'	142.5°	1
2	6°50.8'	+59.9'	143.7°	6°02.4'	+59.9'	143.8°	5°14.0'	+59.9'	143.9°	4°25.5'	+60.0'	143.9°	3°37.0'	+60.0'	143.9°	2°48.5'	+60.0'	144.0°	2°00.0'	+60.0'	142.5°	2
3	7°50.7'	+59.9'	143.7°	7°02.4'	+59.9'	143.7°	6°14.0'	+59.9'	143.8°	5°25.5'	+60.0'	143.9°	4°37.0'	+60.0'	143.9°	3°48.5'	+60.0'	144.0°	3°00.0'	+60.0'	142.6°	3
4	8°50.6'	+59.9'	143.6°	8°02.3'	+59.9'	143.7°	7°13.9'	+59.9'	143.8°	6°25.5'	+60.0'	143.8°	5°37.0'	+60.0'	143.9°	4°48.5'	+60.0'	144.0°	4°00.0'	+60.0'	155.3°	4
5	9°50.5'	+59.9'	143.5°	9°02.2'	+59.9'	143.6°	8°13.9'	+59.9'	143.7°	7°25.5'	+60.0'	143.8°	6°37.0'	+60.0'	143.9°	5°48.5'	+60.0'	143.9°	5°00.0'	+60.0'	133.0°	5
6	10°50.4'	+59.9'	143.5°	10°02.1'	+59.9'	143.6°	9°13.8'	+59.9'	143.7°	8°25.4'	+60.0'	143.8°	7°37.0'	+60.0'	143.9°	6°48.5'	+60.0'	143.9°	6°00.0'	+60.0'	133.1°	6
7	11°50.3'	+59.9'	143.4°	11°02.0'	+59.9'	143.5°	10°13.8'	+59.9'	143.6°	9°25.4'	+60.0'	143.7°	8°37.0'	+60.0'	143.8°	7°48.5'	+60.0'	143.9°	7°00.0'	+60.0'	133.2°	7
8	12°50.1'	+59.9'	143.3°	12°02.0'	+59.9'	143.5°	11°13.7'	+59.9'	143.6°	10°25.4'	+60.0'	143.7°	9°37.0'	+60.0'	143.8°	8°48.5'	+60.0'	143.9°	8°00.0'	+60.0'	117.2°	8
9	13°50.0'	+59.9'	143.3°	13°01.9'	+59.9'	143.4°	12°13.6'	+59.9'	143.6°	11°25.3'	+60.0'	143.7°	10°37.0'	+60.0'	143.8°	9°48.5'	+60.0'	143.9°	9°00.0'	+60.0'	156.6°	9
10	14°49.9'	+59.9'	143.2°	14°01.8'	+59.9'	143.4°	13°13.6'	+59.9'	143.5°	12°25.3'	+60.0'	143.6°	11°36.9'	+60.0'	143.8°	10°48.5'	+60.0'	143.9°	10°00.0'	+60.0'	157.0°	10
11	15°49.8'	+59.9'	143.1°	15°01.7'	+59.9'	143.3°	14°13.5'	+59.9'	143.5°	13°25.3'	+60.0'	143.6°	12°36.9'	+60.0'	143.8°	11°48.5'	+60.0'	143.9°	11°00.0'	+60.0'	157.4°	11
12	16°49.6'	+59.9'	143.1°	16°01.6'	+59.9'	143.3°	15°13.5'	+59.9'	143.4°	14°25.3'	+60.0'	143.6°	13°36.9'	+60.0'	143.7°	12°48.5'	+60.0'	143.9°	12°00.0'	+60.0'	180.0°	12
13	17°49.5'	+59.9'	143.0°	17°01.5'	+59.9'	143.2°	16°13.4'	+59.9'	143.4°	15°25.2'	+60.0'	143.6°	14°36.9'	+60.0'	143.7°	13°48.5'	+60.0'	143.9°	13°00.0'	+60.0'	180.0°	13
14	18°49.4'	+59.9'	142.9°	18°01.4'	+59.9'	143.1°	17°13.4'	+59.9'	143.3°	16°25.2'	+60.0'	143.5°	15°36.9'	+60.0'	143.7°	14°48.5'	+60.0'	143.8°	14°00.0'	+60.0'	159.1°	14
15	19°49.3'	+59.9'	142.9°	19°01.4'	+59.9'	143.1°	18°13.3'	+59.9'	143.3°	17°25.2'	+60.0'	143.5°	16°36.9'	+60.0'	143.7°	15°48.5'	+60.0'	143.8°	15°00.0'	+60.0'	159.7°	15
16	20°49.1'	+59.9'	142.8°	20°01.3'	+59.9'	143.0°	19°13.3'	+59.9'	143.2°	18°25.1'	+60.0'	143.5°	17°36.9'	+60.0'	143.6°	16°48.5'	+60.0'	143.8°	16°00.0'	+60.0'	160.5°	16
17	21°49.0'	+59.9'	142.7°	21°01.2'	+59.9'	143.0°	20°13.2'	+59.9'	143.2°	19°25.1'	+60.0'	143.4°	18°36.9'	+60.0'	143.6°	17°48.5'	+60.0'	143.8°	17°00.0'	+60.0'	161.4°	17
18	22°48.9'	+59.9'	142.7°	22°01.1'	+59.9'	142.9°	21°13.1'	+59.9'	143.2°	20°25.1'	+60.0'	143.4°	19°36.8'	+60.0'	143.6°	18°48.5'	+60.0'	143.8°	18°00.0'	+60.0'	162.3°	18
19	23°48.7'	+59.9'	142.6°	23°01.0'	+59.9'	142.9°	22°13.1'	+59.9'	143.1°	21°25.0'	+60.0'	143.3°	20°36.8'	+60.0'	143.6°	19°48.5'	+60.0'	143.8°	19°00.0'	+60.0'	163.4°	19
20	24°48.6'	+59.9'	142.5°	24°00.9'	+59.9'	142.8°	23°13.0'	+59.9'	143.1°	22°25.0'	+60.0'	143.3°	21°36.8'	+60.0'	143.6°	20°48.5'	+60.0'	143.8°	20°00.0'	+60.0'	164.7°	20
21	25°48.5'	+59.9'	142.4°	25°00.8'	+59.9'	142.7°	24°13.0'	+59.9'	143.0°	23°25.0'	+60.0'	143.3°	22°36.8'	+60.0'	143.5°	21°48.5'	+60.0'	143.8°	21°00.0'	+60.0'	90.0°	21
22	26°48.3'	+59.9'	142.4°	26°00.7'	+59.9'	142.7°	25°12.9'	+59.9'	143.0°	24°24.9'	+60.0'	143.2°	23°36.8'	+60.0'	143.5°	22°48.5'	+60.0'	143.8°	22°00.0'	+60.0'	180.0°	22
23	27°48.2'	+59.9'	142.3°	27°00.6'	+59.9'	142.6°	26°12.8'	+59.9'	142.9°	25°24.9'	+60.0'	143.2°	24°36.8'	+60.0'	143.5°	23°48.5'	+60.0'	143.7°	23°00.0'	+60.0'	169.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	4°47.3'	+59.9'	142.8°	3°59.5'	+59.9'	142.9°	3°11.6'	+59.9'	142.9°	2°23.7'	+60.0'	143.0°	1°35.8'	+60.0'	143.0°	0°47.9'	+60.0'	143.0°	0°00.0'	+60.0'	143.0°	0
1	5°47.2'	+59.9'	142.8°	4°59.4'	+59.9'	142.8°	4°11.6'	+59.9'	142.9°	3°23.7'	+60.0'	142.9°	2°35.8'	+60.0'	143.0°	1°47.9'	+60.0'	143.0°	1°00.0'	+60.0'	142.5°	1
2	6°47.1'	+59.9'	142.7°	5°59.3'	+59.9'	142.8°	5°11.5'	+59.9'	142.8°	4°23.7'	+60.0'	142.9°	3°35.8'	+60.0'	142.9°	2°47.9'	+60.0'	143.0°	2°00.0'	+60.0'	142.5°	2
3	7°47.0'	+59.9'	142.7°	6°59.2'	+59.9'	142.7°	6°11.5'	+59.9'	142.8°	5°23.6'	+60.0'	142.9°	4°35.8'	+60.0'	142.9°	3°47.9'	+60.0'	143.0°	3°00.0'	+60.0'	142.6°	3
4	8°46.8'	+59.9'	142.6°	7°59.1'	+59.9'	142.7°	7°11.4'	+59.9'	142.8°	6°23.6'	+60.0'	142.8°	5°35.8'	+60.0'	142.9°	4°47.9'	+60.0'	143.0°	4°00.0'	+60.0'	155.3°	4
5	9°46.7'	+59.9'	142.5°	8°59.1'	+59.9'	142.6°	8°11.3'	+59.9'	142.7°	7°23.6'	+60.0'	142.8°	6°35.8'	+60.0'	142.9°	5°47.9'	+60.0'	142.9°	5°00.0'	+60.0'	133.0°	5
6	10°46.6'	+59.9'	142.5°	9°59.0'	+59.9'	142.6°	9°11.3'	+59.9'	142.7°	8°23.6'	+60.0'	142.8°	7°35.7'	+60.0'	142.9°	6°47.9'	+60.0'	142.9°	6°00.0'	+60.0'	133.1°	6
7	11°46.5'	+59.9'	142.4°	10°58.9'	+59.9'	142.5°	10°11.2'	+59.9'	142.6°	9°23.5'	+60.0'	142.7°	8°35.7'	+60.0'	142.8°	7°47.9'	+60.0'	142.9°	7°00.0'	+60.0'	117.2°	7
8	12°46.3'	+59.9'	142.3°	11°58.8'	+59.9'	142.5°	11°11.2'	+59.9'	142.6°	10°23.5'	+60.0'	142.7°	9°35.7'	+60.0'	142.8°	8°47.9'	+60.0'	142.9°	8°00.0'	+60.0'	117.2°	8
9	13°46.2'	+59.9'	142.3°	12°58.7'	+59.9'	142.4°	12°11.1'	+59.9'	142.5°	11°23.5'	+60.0'	142.7°	10°35.7'	+60.0'	142.8°	9°47.9'	+60.0'	142.9°	9°00.0'	+60.0'	156.6°	9
10	14°46.1'	+59.9'	142.2°	13°58.6'	+59.9'	142.4°	13°11.1'	+59.9'	142.5°	12°23.4'	+60.0'	142.6°	11°35.7'	+60.0'	142.8°	10°47.9'	+60.0'	142.9°	10°00.0'	+60.0'	157.0°	10
11	15°46.0'	+59.9'	142.1°	14°58.5'	+59.9'	142.3°	14°11.0'	+59.9'	142.5°	13°23.4'	+60.0'	142.6°	12°35.7'	+60.0'	142.7°	11°47.9'	+60.0'	142.9°	11°00.0'	+60.0'	157.4°	11
12	16°45.8'	+59.9'	142.1°	15°58.5'	+59.9'	142.2°	15°11.0'	+59.9'	142.4°	14°23.4'	+60.0'	142.6°	13°35.7'	+60.0'	142.7°	12°47.9'	+60.0'	142.9°	12°00.0'	+60.0'	180.0°	12
13	17°45.7'	+59.9'	142.0°	16°58.4'	+59.9'	142.2°	16°10.9'	+59.9'	142.4°	15°23.3'	+60.0'	142.5°	14°35.7'	+60.0'	142.7°	13°47.9'	+60.0'	142.9°	13°00.0'	+60.0'	180.0°	13
14	18°45.6'	+59.9'	141.9°	17°58.3'	+59.9'	142.1°	17°10.8'	+59.9'	142.3°	16°23.3'	+60.0'	142.5°	15°35.6'	+60.0'	142.7°	14°47.9'	+60.0'	142.8°	14°00.0'	+60.0'	159.1°	14
15	19°45.4'	+59.9'	141.9°	18°58.2'	+59.9'	142.1°	18°10.8'	+59.9'	142.3°	17°23.3'	+60.0'	142.5°	16°35.6'	+60.0'	142.7°	15°47.9'	+60.0'	142.8°	15°00.0'	+60.0'	159.7°	15
16	20°45.3'	+59.9'	141.8°	19°58.1'	+59.9'	142.0°	19°10.7'	+59.9'	142.2°	18°23.2'	+60.0'	142.4°	17°35.6'	+60.0'	142.6°	16°47.9'	+60.0'	142.8°	16°00.0'	+60.0'	160.5°	16
17	21°45.2'	+59.9'	141.7°	20°58.0'	+59.9'	142.0°	20°10.7'	+59.9'	142.2°	19°23.2'	+60.0'	142.4°	18°35.6'	+60.0'	142.6°	17°47.9'	+60.0'	142.8°	17°00.0'	+60.0'	161.4°	17
18	22°45.0'	+59.9'	141.6°	21°57.9'	+59.9'	141.9°	21°10.6'	+59.9'	142.1°	20°23.2'	+60.0'	142.4°	19°35.6'	+60.0'	142.6°	18°47.9'	+60.0'	142.8°	18°00.0'	+60.0'	162.3°	18
19	23°44.9'	+59.9'	141.6°	22°57.8'	+59.9'	141.8°	22°10.5'	+59.9'	142.1°	21°23.1'	+60.0'	142.3°	20°35.6'	+60.0'	142.6°	19°47.9'	+60.0'	142.8°	19°00.0'	+60.0'	163.4°	19
20	24°44.7'	+59.9'	141.5°	23°57.7'	+59.9'	141.8°	23°10.5'	+59.9'	142.0°	22°23.1'	+60.0'	142.3°	21°35.6'	+60.0'	142.5°	20°47.8'	+60.0'	142.8°	20°00.0'	+60.0'	164.7°	20
21	25°44.6'	+59.9'	141.4°	24°57.6'	+59.9'	141.7°	24°10.4'	+59.9'														

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

38° 322° LHA

Latitude SAME as Declination

38° 322° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	4°43.5'	+59.9'	141.8°	3°56.3'	+59.9'	141.9°	3°09.1'	+59.9'	141.9°	2°21.8'	+60.0'	142.0°	1°34.6'	+60.0'	142.0°	0°47.3'	+60.0'	142.0°	0°00.0'	+60.0'	142.0°	0
1	5°43.4'	+59.9'	141.8°	4°56.2'	+59.9'	141.8°	4°09.0'	+59.9'	141.9°	3°21.8'	+60.0'	141.9°	2°34.5'	+60.0'	142.0°	1°47.3'	+60.0'	142.0°	1°00.0'	+60.0'	142.5°	1
2	6°43.2'	+59.9'	141.7°	5°56.1'	+59.9'	141.8°	5°09.0'	+59.9'	141.8°	4°21.8'	+60.0'	141.9°	3°34.5'	+60.0'	141.9°	2°47.3'	+60.0'	142.0°	2°00.0'	+60.0'	142.5°	2
3	7°43.1'	+59.9'	141.7°	6°56.0'	+59.9'	141.7°	6°08.9'	+59.9'	141.8°	5°21.7'	+60.0'	141.9°	4°34.5'	+60.0'	141.9°	3°47.3'	+60.0'	142.0°	3°00.0'	+60.0'	142.6°	3
4	8°43.0'	+59.9'	141.6°	7°55.9'	+59.9'	141.7°	7°08.8'	+59.9'	141.8°	6°21.7'	+60.0'	141.8°	5°34.5'	+60.0'	141.9°	4°47.3'	+60.0'	142.0°	4°00.0'	+60.0'	132.9°	4
5	9°42.9'	+59.9'	141.5°	8°55.9'	+59.9'	141.6°	8°08.8'	+59.9'	141.7°	7°21.7'	+60.0'	141.8°	6°34.5'	+60.0'	141.9°	5°47.3'	+60.0'	141.9°	5°00.0'	+60.0'	117.1°	5
6	10°42.7'	+59.9'	141.5°	9°55.8'	+59.9'	141.6°	9°08.7'	+59.9'	141.7°	8°21.6'	+60.0'	141.8°	7°34.5'	+60.0'	141.9°	6°47.3'	+60.0'	141.9°	6°00.0'	+60.0'	117.1°	6
7	11°42.6'	+59.9'	141.4°	10°55.7'	+59.9'	141.5°	10°08.7'	+59.9'	141.6°	9°21.6'	+60.0'	141.7°	8°34.5'	+60.0'	141.8°	7°47.3'	+60.0'	141.9°	7°00.0'	+60.0'	117.2°	7
8	12°42.5'	+59.9'	141.3°	11°55.6'	+59.9'	141.5°	11°08.6'	+59.9'	141.6°	10°21.6'	+60.0'	141.7°	9°34.4'	+60.0'	141.8°	8°47.3'	+60.0'	141.9°	8°00.0'	+60.0'	117.2°	8
9	13°42.3'	+59.9'	141.3°	12°55.5'	+59.9'	141.4°	12°08.6'	+59.9'	141.5°	11°21.5'	+60.0'	141.7°	10°34.4'	+60.0'	141.8°	9°47.2'	+60.0'	141.9°	9°00.0'	+60.0'	156.6°	9
10	14°42.2'	+59.9'	141.2°	13°55.4'	+59.9'	141.3°	13°08.5'	+59.9'	141.5°	12°21.5'	+60.0'	141.6°	11°34.4'	+60.0'	141.8°	10°47.2'	+60.0'	141.9°	10°00.0'	+60.0'	157.0°	10
11	15°42.1'	+59.9'	141.1°	14°55.3'	+59.9'	141.3°	14°08.4'	+59.9'	141.4°	13°21.5'	+60.0'	141.6°	12°34.4'	+60.0'	141.7°	11°47.2'	+60.0'	141.9°	11°00.0'	+60.0'	157.4°	11
12	16°41.9'	+59.9'	141.0°	15°55.2'	+59.9'	141.2°	15°08.4'	+59.9'	141.4°	14°21.4'	+60.0'	141.6°	13°34.4'	+60.0'	141.7°	12°47.2'	+60.0'	141.9°	12°00.0'	+60.0'	180.0°	12
13	17°41.8'	+59.9'	141.0°	16°55.1'	+59.9'	141.2°	16°08.3'	+59.9'	141.4°	15°21.4'	+60.0'	141.5°	14°34.4'	+60.0'	141.7°	13°47.2'	+60.0'	141.9°	13°00.0'	+60.0'	180.0°	13
14	18°41.7'	+59.9'	140.9°	17°55.0'	+59.9'	141.1°	17°08.3'	+59.9'	141.3°	16°21.4'	+60.0'	141.5°	15°34.4'	+60.0'	141.7°	14°47.2'	+60.0'	141.8°	14°00.0'	+60.0'	159.1°	14
15	19°41.5'	+59.9'	140.8°	18°54.9'	+59.9'	141.1°	18°08.2'	+59.9'	141.3°	17°21.3'	+60.0'	141.5°	16°34.3'	+60.0'	141.7°	15°47.2'	+60.0'	141.8°	15°00.0'	+60.0'	159.7°	15
16	20°41.4'	+59.9'	140.8°	19°54.8'	+59.9'	141.0°	19°08.1'	+59.9'	141.2°	18°21.3'	+60.0'	141.4°	17°34.3'	+60.0'	141.6°	16°47.2'	+60.0'	141.8°	16°00.0'	+60.0'	160.5°	16
17	21°41.2'	+59.9'	140.7°	20°54.7'	+59.9'	140.9°	20°08.1'	+59.9'	141.2°	19°21.3'	+60.0'	141.4°	18°34.3'	+60.0'	141.6°	17°47.2'	+60.0'	141.8°	17°00.0'	+60.0'	161.4°	17
18	22°41.1'	+59.9'	140.6°	21°54.6'	+59.9'	140.9°	21°08.0'	+59.9'	141.1°	20°21.2'	+60.0'	141.4°	19°34.3'	+60.0'	141.6°	18°47.2'	+60.0'	141.8°	18°00.0'	+60.0'	162.3°	18
19	23°40.9'	+59.9'	140.5°	22°54.5'	+59.9'	140.8°	22°07.9'	+59.9'	141.1°	21°21.2'	+60.0'	141.3°	20°34.3'	+60.0'	141.6°	19°47.2'	+60.0'	141.8°	19°00.0'	+60.0'	163.4°	19
20	24°40.8'	+59.8'	140.5°	23°54.4'	+59.9'	140.7°	23°07.9'	+59.9'	141.0°	22°21.2'	+60.0'	141.3°	21°34.3'	+60.0'	141.5°	20°47.2'	+60.0'	141.8°	20°00.0'	+60.0'	164.7°	20
21	25°40.6'	+59.8'	140.4°	24°54.3'	+59.9'	140.7°	24°07.8'	+59.9'	141.0°	23°21.1'	+60.0'	141.2°	22°34.2'	+60.0'	141.5°	21°47.2'	+60.0'	141.8°	21°00.0'	+60.0'	90.0°	21
22	26°40.5'	+59.8'	140.3°	25°54.2'	+59.9'	140.6°	25°07.7'	+59.9'	140.9°	24°21.0'	+60.0'	141.2°	23°34.2'	+60.0'	141.5°	22°47.2'	+60.0'	141.7°	22°00.0'	+60.0'	180.0°	22
23	27°40.3'	+59.8'	140.2°	26°54.1'	+59.9'	140.5°	26°07.7'	+59.9'	140.9°	25°21.0'	+60.0'	141.2°	24°34.2'	+60.0'	141.5°	23°47.2'	+60.0'	141.7°	23°00.0'	+60.0'	169.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	4°39.6'	+59.9'	140.8°	3°53.0'	+59.9'	140.9°	3°06.5'	+59.9'	140.9°	2°19.9'	+60.0'	141.0°	1°33.3'	+60.0'	141.0°	0°46.6'	+60.0'	141.0°	0°00.0'	+60.0'	141.0°	0
1	5°39.4'	+59.9'	140.8°	4°52.9'	+59.9'	140.8°	4°06.4'	+59.9'	140.9°	3°19.8'	+60.0'	140.9°	2°33.2'	+60.0'	141.0°	1°46.6'	+60.0'	141.0°	1°00.0'	+60.0'	142.5°	1
2	6°39.3'	+59.9'	140.7°	5°52.8'	+59.9'	140.8°	5°06.3'	+59.9'	140.8°	4°19.8'	+60.0'	140.9°	3°33.2'	+60.0'	140.9°	2°46.6'	+60.0'	141.0°	2°00.0'	+60.0'	142.5°	2
3	7°39.2'	+59.9'	140.6°	6°52.8'	+59.9'	140.7°	6°06.3'	+59.9'	140.8°	5°19.8'	+60.0'	140.9°	4°33.2'	+60.0'	140.9°	3°46.6'	+60.0'	141.0°	3°00.0'	+60.0'	142.6°	3
4	8°39.0'	+59.9'	140.6°	7°52.7'	+59.9'	140.7°	7°06.2'	+59.9'	140.8°	6°19.7'	+60.0'	140.8°	5°33.2'	+60.0'	140.9°	4°46.6'	+60.0'	141.0°	4°00.0'	+60.0'	132.9°	4
5	9°38.9'	+59.9'	140.5°	8°52.6'	+59.9'	140.6°	8°06.2'	+59.9'	140.7°	7°19.7'	+60.0'	140.8°	6°33.2'	+60.0'	140.9°	5°46.6'	+60.0'	140.9°	5°00.0'	+60.0'	117.1°	5
6	10°38.8'	+59.9'	140.4°	9°52.5'	+59.9'	140.6°	9°06.1'	+59.9'	140.7°	8°19.7'	+60.0'	140.8°	7°33.2'	+60.0'	140.9°	6°46.6'	+60.0'	140.9°	6°00.0'	+60.0'	117.1°	6
7	11°38.6'	+59.9'	140.4°	10°52.4'	+59.9'	140.5°	10°06.0'	+59.9'	140.6°	9°19.6'	+60.0'	140.7°	8°33.1'	+60.0'	140.8°	7°46.6'	+60.0'	140.9°	7°00.0'	+60.0'	117.2°	7
8	12°38.5'	+59.9'	140.3°	11°52.3'	+59.9'	140.4°	11°06.0'	+59.9'	140.6°	10°19.6'	+60.0'	140.7°	9°33.1'	+60.0'	140.8°	8°46.6'	+60.0'	140.9°	8°00.0'	+60.0'	117.2°	8
9	13°38.4'	+59.9'	140.2°	12°52.2'	+59.9'	140.4°	12°05.9'	+59.9'	140.5°	11°19.6'	+60.0'	140.7°	10°33.1'	+60.0'	140.8°	9°46.6'	+60.0'	140.9°	9°00.0'	+60.0'	156.6°	9
10	14°38.2'	+59.9'	140.2°	13°52.1'	+59.9'	140.3°	13°05.9'	+59.9'	140.5°	12°19.5'	+60.0'	140.6°	11°33.1'	+60.0'	140.8°	10°46.6'	+60.0'	140.9°	10°00.0'	+60.0'	157.0°	10
11	15°38.1'	+59.9'	140.1°	14°52.0'	+59.9'	140.3°	14°05.8'	+59.9'	140.4°	13°19.5'	+60.0'	140.6°	12°33.1'	+60.0'	140.7°	11°46.6'	+60.0'	140.9°	11°00.0'	+60.0'	157.4°	11
12	16°37.9'	+59.9'	140.0°	15°51.9'	+59.9'	140.2°	15°05.7'	+59.9'	140.4°	14°19.5'	+60.0'	140.6°	13°33.1'	+60.0'	140.7°	12°46.6'	+60.0'	140.9°	12°00.0'	+60.0'	180.0°	12
13	17°37.8'	+59.9'	140.0°	16°51.8'	+59.9'	140.2°	16°05.7'	+59.9'	140.3°	15°19.4'	+60.0'	140.5°	14°33.1'	+60.0'	140.7°	13°46.6'	+60.0'	140.8°	13°00.0'	+60.0'	180.0°	13
14	18°37.7'	+59.9'	139.9°	17°51.7'	+59.9'	140.1°	17°05.6'	+59.9'	140.3°	16°19.4'	+60.0'	140.5°	15°33.0'	+60.0'	140.7°	14°46.6'	+60.0'	140.8°	14°00.0'	+60.0'	159.1°	14
15	19°37.5'	+59.9'	139.8°	18°51.6'	+59.9'	140.0°	18°05.6'	+59.9'	140.2°	17°19.4'	+60.0'	140.4°	16°33.0'	+60.0'	140.6°	15°46.6'	+60.0'	140.8°	15°00.0'	+60.0'	159.7°	15
16	20°37.4'	+59.9'	139.7°	19°51.5'	+59.9'	140.0°	19°05.5'	+59.9'	140.2°	18°19.3'	+60.0'	140.4°	17°33.0'	+60.0'	140.6°	16°46.6'	+60.0'	140.8°	16°00.0'	+60.0'	160.5°	16
17	21°37.2'	+59.8'	139.7°	20°51.4'	+59.9'	139.9°	20°05.4'	+59.9'	140.1°	19°19.3'	+60.0'	140.4°	18°33.0'	+60.0'	140.6°	17°46.6'	+60.0'	140.8°	17°00.0'	+60.0'	161.4°	17
18	22°37.1'	+59.8'	139.6°	21°51.3'	+59.9'	139.8°	21°05.4'	+59.9'	140.1°	20°19.2'	+60.0'	140.3°	19°33.0'	+60.0'	140.6°	18°46.6'	+60.0'	140.8°	18°00.0'	+60.0'	162.3°	18
19	23°36.9'	+59.8'	139.5°	22°51.2'	+59.9'	139.8°	22°05.3'	+59.9'	140.1°	21°19.2'	+60.0'	140.3°	20°33.0'	+60.0'	140.5°	19°46.6'	+60.0'	140.8°	19°00.0'	+60.0'	163.4°	19
20	24°36.8'	+59.8'	139.4°	23°51.1'	+59.9'	139.7°	23°05.2'	+59.9'	140.0°	22°19.2'	+60.0'	140.3°	21°32.9'	+60.0'	140.5°	20°46.6'	+60.0'	140.8°	20°00.0'	+60.0'	164.7°	20
21	25°36.6'	+59.8'	139.3°	24°51.0'	+59.9'	139.6°	24°05.2'	+59.9'														

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

40° 320° LHA

Latitude SAME as Declination

40° 320° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	4°35.6'	+59.9'	139.8°	3°49.7'	+59.9'	139.9°	3°03.8'	+59.9'	139.9°	2°17.9'	+60.0'	140.0°	1°31.9'	+60.0'	140.0°	0°46.0'	+60.0'	140.0°	0°00.0'	+60.0'	140.0°	0
1	5°35.4'	+59.9'	139.8°	4°49.6'	+59.9'	139.8°	4°03.7'	+59.9'	139.9°	3°17.8'	+60.0'	139.9°	2°31.9'	+60.0'	140.0°	1°46.0'	+60.0'	140.0°	1°00.0'	+60.0'	142.5°	1
2	6°35.3'	+59.9'	139.7°	5°49.5'	+59.9'	139.8°	5°03.7'	+59.9'	139.8°	4°17.8'	+60.0'	139.9°	3°31.9'	+60.0'	139.9°	2°46.0'	+60.0'	140.0°	2°00.0'	+60.0'	142.5°	2
3	7°35.2'	+59.9'	139.6°	6°49.4'	+59.9'	139.7°	6°03.6'	+59.9'	139.8°	5°17.8'	+60.0'	139.9°	4°31.9'	+60.0'	139.9°	3°46.0'	+60.0'	140.0°	3°00.0'	+60.0'	142.6°	3
4	8°35.0'	+59.9'	139.6°	7°49.3'	+59.9'	139.7°	7°03.5'	+59.9'	139.8°	6°17.7'	+60.0'	139.8°	5°31.9'	+60.0'	139.9°	4°45.9'	+60.0'	140.0°	4°00.0'	+60.0'	132.9°	4
5	9°34.9'	+59.9'	139.5°	8°49.2'	+59.9'	139.6°	8°03.5'	+59.9'	139.7°	7°17.7'	+60.0'	139.8°	6°31.8'	+60.0'	139.9°	5°45.9'	+60.0'	139.9°	5°00.0'	+60.0'	117.1°	5
6	10°34.7'	+59.9'	139.4°	9°49.1'	+59.9'	139.6°	9°03.4'	+59.9'	139.7°	8°17.7'	+60.0'	139.8°	7°31.8'	+60.0'	139.8°	6°45.9'	+60.0'	139.9°	6°00.0'	+60.0'	117.1°	6
7	11°34.6'	+59.9'	139.4°	10°49.0'	+59.9'	139.5°	10°03.4'	+59.9'	139.6°	9°17.6'	+60.0'	139.7°	8°31.8'	+60.0'	139.8°	7°45.9'	+60.0'	139.9°	7°00.0'	+60.0'	117.2°	7
8	12°34.5'	+59.9'	139.3°	11°48.9'	+59.9'	139.4°	11°03.3'	+59.9'	139.6°	10°17.6'	+60.0'	139.7°	9°31.8'	+60.0'	139.8°	8°45.9'	+60.0'	139.9°	8°00.0'	+60.0'	117.2°	8
9	13°34.3'	+59.9'	139.2°	12°48.8'	+59.9'	139.4°	12°03.2'	+59.9'	139.5°	11°17.6'	+60.0'	139.7°	10°31.8'	+60.0'	139.8°	9°45.9'	+60.0'	139.9°	9°00.0'	+60.0'	156.6°	9
10	14°34.2'	+59.9'	139.2°	13°48.7'	+59.9'	139.3°	13°03.2'	+59.9'	139.5°	12°17.5'	+60.0'	139.6°	11°31.8'	+60.0'	139.8°	10°45.9'	+60.0'	139.9°	10°00.0'	+60.0'	157.0°	10
11	15°34.0'	+59.9'	139.1°	14°48.6'	+59.9'	139.3°	14°03.1'	+59.9'	139.4°	13°17.5'	+60.0'	139.6°	12°31.7'	+60.0'	139.7°	11°45.9'	+60.0'	139.9°	11°00.0'	+60.0'	157.4°	11
12	16°33.9'	+59.9'	139.0°	15°48.5'	+59.9'	139.2°	15°03.0'	+59.9'	139.4°	14°17.4'	+60.0'	139.5°	13°31.7'	+60.0'	139.7°	12°45.9'	+60.0'	139.9°	12°00.0'	+60.0'	180.0°	12
13	17°33.7'	+59.8'	138.9°	16°48.4'	+59.9'	139.1°	16°03.0'	+59.9'	139.3°	15°17.4'	+60.0'	139.5°	14°31.7'	+60.0'	139.7°	13°45.9'	+60.0'	139.8°	13°00.0'	+60.0'	180.0°	13
14	18°33.6'	+59.8'	138.9°	17°48.3'	+59.9'	139.1°	17°02.9'	+59.9'	139.3°	16°17.4'	+60.0'	139.5°	15°31.7'	+60.0'	139.7°	14°45.9'	+60.0'	139.8°	14°00.0'	+60.0'	159.1°	14
15	19°33.4'	+59.8'	138.8°	18°48.2'	+59.9'	139.0°	18°02.8'	+59.9'	139.2°	17°17.3'	+60.0'	139.4°	16°31.7'	+60.0'	139.6°	15°45.9'	+60.0'	139.8°	15°00.0'	+60.0'	159.7°	15
16	20°33.3'	+59.8'	138.7°	19°48.1'	+59.9'	138.9°	19°02.8'	+59.9'	139.2°	18°17.3'	+60.0'	139.4°	17°31.7'	+60.0'	139.6°	16°45.9'	+60.0'	139.8°	16°00.0'	+60.0'	160.5°	16
17	21°33.1'	+59.8'	138.6°	20°48.0'	+59.9'	138.9°	20°02.7'	+59.9'	139.1°	19°17.3'	+60.0'	139.4°	18°31.7'	+60.0'	139.6°	17°45.9'	+60.0'	139.8°	17°00.0'	+60.0'	161.4°	17
18	22°33.0'	+59.8'	138.6°	21°47.9'	+59.9'	138.8°	21°02.6'	+59.9'	139.1°	20°17.2'	+60.0'	139.3°	19°31.6'	+60.0'	139.6°	18°45.9'	+60.0'	139.8°	18°00.0'	+60.0'	162.3°	18
19	23°32.8'	+59.8'	138.5°	22°47.8'	+59.9'	138.8°	22°02.6'	+59.9'	139.0°	21°17.2'	+60.0'	139.3°	20°31.6'	+60.0'	139.5°	19°45.9'	+60.0'	139.8°	19°00.0'	+60.0'	163.4°	19
20	24°32.6'	+59.8'	138.4°	23°47.7'	+59.9'	138.7°	23°02.5'	+59.9'	139.0°	22°17.1'	+60.0'	139.2°	21°31.6'	+60.0'	139.5°	20°45.9'	+60.0'	139.8°	20°00.0'	+60.0'	164.7°	20
21	25°32.5'	+59.8'	138.3°	24°47.6'	+59.9'	138.6°	24°02.4'	+59.9'	138.9°	23°17.1'	+60.0'	139.2°	22°31.6'	+60.0'	139.5°	21°45.9'	+60.0'	139.7°	21°00.0'	+60.0'	90.0°	21
22	26°32.3'	+59.8'	138.2°	25°47.4'	+59.9'	138.6°	25°02.4'	+59.9'	138.8°	24°17.0'	+60.0'	139.2°	23°31.6'	+60.0'	139.5°	22°45.9'	+60.0'	139.7°	22°00.0'	+60.0'	180.0°	22
23	27°32.1'	+59.8'	138.1°	26°47.3'	+59.9'	138.5°	26°02.3'	+59.9'	138.8°	25°17.0'	+60.0'	139.1°	24°31.5'	+60.0'	139.4°	23°45.9'	+60.0'	139.7°	23°00.0'	+60.0'	169.9°	23
Dec°	84			85			86			87			88			89			90			Dec°

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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	4°31.5'	+59.9'	138.8°	3°46.3'	+59.9'	138.9°	3°01.1'	+59.9'	138.9°	2°15.8'	+60.0'	139.0°	1°30.6'	+60.0'	139.0°	0°45.3'	+60.0'	139.0°	0°00.0'	+60.0'	139.0°	0
1	5°31.3'	+59.9'	138.8°	4°46.2'	+59.9'	138.8°	4°01.0'	+59.9'	138.9°	3°15.8'	+60.0'	138.9°	2°30.5'	+60.0'	139.0°	1°45.3'	+60.0'	139.0°	1°00.0'	+60.0'	137.4°	1
2	6°31.2'	+59.9'	138.7°	5°46.1'	+59.9'	138.8°	5°00.9'	+59.9'	138.8°	4°15.7'	+60.0'	138.9°	3°30.5'	+60.0'	138.9°	2°45.3'	+60.0'	139.0°	2°00.0'	+60.0'	142.5°	2
3	7°31.1'	+59.9'	138.6°	6°46.0'	+59.9'	138.7°	6°00.9'	+59.9'	138.8°	5°15.7'	+60.0'	138.9°	4°30.5'	+60.0'	138.9°	3°45.3'	+60.0'	139.0°	3°00.0'	+60.0'	142.6°	3
4	8°30.9'	+59.9'	138.6°	7°45.9'	+59.9'	138.7°	7°00.8'	+59.9'	138.7°	6°15.7'	+60.0'	138.8°	5°30.5'	+60.0'	138.9°	4°45.3'	+60.0'	138.9°	4°00.0'	+60.0'	132.9°	4
5	9°30.8'	+59.9'	138.5°	8°45.8'	+59.9'	138.6°	8°00.7'	+59.9'	138.7°	7°15.6'	+60.0'	138.8°	6°30.5'	+60.0'	138.9°	5°45.3'	+60.0'	138.9°	5°00.0'	+60.0'	117.1°	5
6	10°30.6'	+59.9'	138.4°	9°45.7'	+59.9'	138.5°	9°00.7'	+59.9'	138.7°	8°15.6'	+60.0'	138.8°	7°30.5'	+60.0'	138.8°	6°45.3'	+60.0'	138.9°	6°00.0'	+60.0'	117.1°	6
7	11°30.5'	+59.9'	138.4°	10°45.6'	+59.9'	138.5°	10°00.6'	+59.9'	138.6°	9°15.6'	+60.0'	138.7°	8°30.4'	+60.0'	138.8°	7°45.3'	+60.0'	138.9°	7°00.0'	+60.0'	117.2°	7
8	12°30.3'	+59.9'	138.3°	11°45.5'	+59.9'	138.4°	11°00.6'	+59.9'	138.6°	10°15.5'	+60.0'	138.7°	9°30.4'	+60.0'	138.8°	8°45.2'	+60.0'	138.9°	8°00.0'	+60.0'	117.2°	8
9	13°30.2'	+59.8'	138.2°	12°45.4'	+59.9'	138.4°	12°00.5'	+59.9'	138.5°	11°15.5'	+60.0'	138.6°	10°30.4'	+60.0'	138.8°	9°45.2'	+60.0'	138.9°	9°00.0'	+60.0'	156.6°	9
10	14°30.0'	+59.8'	138.1°	13°45.3'	+59.9'	138.3°	13°00.4'	+59.9'	138.5°	12°15.5'	+60.0'	138.6°	11°30.4'	+60.0'	138.8°	10°45.2'	+60.0'	138.9°	10°00.0'	+60.0'	157.0°	10
11	15°29.9'	+59.8'	138.1°	14°45.2'	+59.9'	138.2°	14°00.4'	+59.9'	138.4°	13°15.4'	+60.0'	138.6°	12°30.4'	+60.0'	138.7°	11°45.2'	+60.0'	138.9°	11°00.0'	+60.0'	157.4°	11
12	16°29.7'	+59.8'	138.0°	15°45.1'	+59.9'	138.2°	15°00.3'	+59.9'	138.4°	14°15.4'	+60.0'	138.5°	13°30.4'	+60.0'	138.7°	12°45.2'	+60.0'	138.9°	12°00.0'	+60.0'	180.0°	12
13	17°29.6'	+59.8'	137.9°	16°45.0'	+59.9'	138.1°	16°00.2'	+59.9'	138.3°	15°15.3'	+60.0'	138.5°	14°30.3'	+60.0'	138.7°	13°45.2'	+60.0'	138.8°	13°00.0'	+60.0'	180.0°	13
14	18°29.4'	+59.8'	137.8°	17°44.9'	+59.9'	138.1°	17°00.2'	+59.9'	138.3°	16°15.3'	+60.0'	138.5°	15°30.3'	+60.0'	138.7°	14°45.2'	+60.0'	138.8°	14°00.0'	+60.0'	159.1°	14
15	19°29.3'	+59.8'	137.8°	18°44.7'	+59.9'	138.0°	18°00.1'	+59.9'	138.2°	17°15.3'	+60.0'	138.4°	16°30.3'	+60.0'	138.6°	15°45.2'	+60.0'	138.8°	15°00.0'	+60.0'	159.7°	15
16	20°29.1'	+59.8'	137.7°	19°44.6'	+59.9'	137.9°	19°00.0'	+59.9'	138.2°	18°15.2'	+60.0'	138.4°	17°30.3'	+60.0'	138.6°	16°45.2'	+60.0'	138.8°	16°00.0'	+60.0'	160.5°	16
17	21°28.9'	+59.8'	137.6°	20°44.5'	+59.9'	137.9°	20°00.0'	+59.9'	138.1°	19°15.2'	+60.0'	138.4°	18°30.3'	+60.0'	138.6°	17°45.2'	+60.0'	138.8°	17°00.0'	+60.0'	161.4°	17
18	22°28.8'	+59.8'	137.5°	21°44.4'	+59.9'	137.8°	20°59.9'	+59.9'	138.1°	20°15.2'	+60.0'	138.3°	19°30.3'	+60.0'	138.6°	18°45.2'	+60.0'	138.8°	18°00.0'	+60.0'	162.3°	18
19	23°28.6'	+59.8'	137.4°	22°44.3'	+59.9'	137.7°	21°59.8'	+59.9'	138.0°	21°15.1'	+60.0'	138.3°	20°30.2'	+60.0'	138.5°	19°45.2'	+60.0'	138.8°	19°00.0'	+60.0'	163.4°	19
20	24°28.4'	+59.8'	137.4°	23°44.2'	+59.9'	137.7°	22°59.7'	+59.9'	138.0°	22°15.1'	+60.0'	138.2°	21°30.2'	+60.0'	138.5°	20°45.2'	+60.0'	138.8°	20°00.0'	+60.0'	164.7°	20
21	25°28.3'	+59.8'	137.3°	24°44.1'	+59.9'	137.6°	23°59.7'	+59.9'	137.9°	23°15.0'	+60.0'	138.2°	22°30.2'	+60.0'	138.5°	21°45.2'	+60.0'	138.7°	21°00.0'	+60.0'	90.0°	21
22	26°28.																					

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

42° 318° LHA

Latitude SAME as Declination

42° 318° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	4°27.3'	+59.9'	137.8°	3°42.8'	+59.9'	137.9°	2°58.3'	+59.9'	137.9°	2°13.7'	+60.0'	138.0°	1°29.2'	+60.0'	138.0°	0°44.6'	+60.0'	138.0°	0°00.0'	+60.0'	138.0°	0
1	5°27.2'	+59.9'	137.8°	4°42.7'	+59.9'	137.8°	3°58.2'	+59.9'	137.9°	3°13.7'	+60.0'	137.9°	2°29.2'	+60.0'	138.0°	1°44.6'	+60.0'	138.0°	1°00.0'	+60.0'	137.4°	1
2	6°27.0'	+59.9'	137.7°	5°42.6'	+59.9'	137.8°	4°58.2'	+59.9'	137.8°	4°13.7'	+60.0'	137.9°	3°29.1'	+60.0'	137.9°	2°44.6'	+60.0'	138.0°	2°00.0'	+60.0'	142.5°	2
3	7°26.9'	+59.9'	137.6°	6°42.5'	+59.9'	137.7°	5°58.1'	+59.9'	137.8°	5°13.6'	+60.0'	137.9°	4°29.1'	+60.0'	137.9°	3°44.6'	+60.0'	138.0°	3°00.0'	+60.0'	142.6°	3
4	8°26.7'	+59.8'	137.6°	7°42.4'	+59.9'	137.7°	6°58.0'	+59.9'	137.7°	6°13.6'	+60.0'	137.8°	5°29.1'	+60.0'	137.9°	4°44.6'	+60.0'	137.9°	4°00.0'	+60.0'	132.9°	4
5	9°26.6'	+59.8'	137.5°	8°42.3'	+59.9'	137.6°	7°58.0'	+59.9'	137.7°	7°13.6'	+60.0'	137.8°	6°29.1'	+60.0'	137.9°	5°44.6'	+60.0'	137.9°	5°00.0'	+60.0'	117.1°	5
6	10°26.4'	+59.8'	137.4°	9°42.2'	+59.9'	137.5°	8°57.9'	+59.9'	137.6°	8°13.5'	+60.0'	137.7°	7°29.1'	+60.0'	137.8°	6°44.6'	+60.0'	137.9°	6°00.0'	+60.0'	117.1°	6
7	11°26.3'	+59.8'	137.3°	10°42.1'	+59.9'	137.5°	9°57.8'	+59.9'	137.6°	9°13.4'	+60.0'	137.7°	8°29.1'	+60.0'	137.8°	7°44.6'	+60.0'	137.9°	7°00.0'	+60.0'	117.2°	7
8	12°26.1'	+59.8'	137.3°	11°42.0'	+59.9'	137.4°	10°57.8'	+59.9'	137.6°	10°13.4'	+60.0'	137.7°	9°29.0'	+60.0'	137.8°	8°44.6'	+60.0'	137.9°	8°00.0'	+60.0'	117.2°	8
9	13°26.0'	+59.8'	137.2°	12°41.9'	+59.9'	137.4°	11°57.7'	+59.9'	137.5°	11°13.4'	+60.0'	137.6°	10°29.0'	+60.0'	137.8°	9°44.6'	+60.0'	137.9°	9°00.0'	+60.0'	156.6°	9
10	14°25.8'	+59.8'	137.1°	13°41.8'	+59.9'	137.3°	12°57.6'	+59.9'	137.5°	12°13.4'	+60.0'	137.6°	11°29.0'	+60.0'	137.7°	10°44.5'	+60.0'	137.9°	10°00.0'	+60.0'	157.0°	10
11	15°25.6'	+59.8'	137.0°	14°41.7'	+59.9'	137.2°	13°57.6'	+59.9'	137.4°	13°13.3'	+60.0'	137.6°	12°29.0'	+60.0'	137.7°	11°44.5'	+60.0'	137.9°	11°00.0'	+60.0'	157.4°	11
12	16°25.5'	+59.8'	137.0°	15°41.6'	+59.9'	137.2°	14°57.5'	+59.9'	137.4°	14°13.3'	+60.0'	137.5°	13°29.0'	+60.0'	137.7°	12°44.5'	+60.0'	137.9°	12°00.0'	+60.0'	180.0°	12
13	17°25.3'	+59.8'	136.9°	16°41.4'	+59.9'	137.1°	15°57.4'	+59.9'	137.3°	15°13.2'	+60.0'	137.5°	14°29.0'	+60.0'	137.7°	13°44.5'	+60.0'	137.8°	13°00.0'	+60.0'	180.0°	13
14	18°25.2'	+59.8'	136.8°	17°41.3'	+59.9'	137.0°	16°57.3'	+59.9'	137.3°	16°13.2'	+60.0'	137.5°	15°28.9'	+60.0'	137.6°	14°44.5'	+60.0'	137.8°	14°00.0'	+60.0'	159.1°	14
15	19°25.0'	+59.8'	136.7°	18°41.2'	+59.9'	137.0°	17°57.3'	+59.9'	137.2°	17°13.2'	+60.0'	137.4°	16°28.9'	+60.0'	137.6°	15°44.5'	+60.0'	137.8°	15°00.0'	+60.0'	159.7°	15
16	20°24.8'	+59.8'	136.7°	19°41.1'	+59.9'	136.9°	18°57.2'	+59.9'	137.2°	18°13.1'	+60.0'	137.4°	17°28.9'	+60.0'	137.6°	16°44.5'	+60.0'	137.8°	16°00.0'	+60.0'	160.5°	16
17	21°24.7'	+59.8'	136.6°	20°41.0'	+59.9'	136.8°	19°57.1'	+59.9'	137.1°	19°13.1'	+60.0'	137.3°	18°28.9'	+60.0'	137.6°	17°44.5'	+60.0'	137.8°	17°00.0'	+60.0'	161.4°	17
18	22°24.5'	+59.8'	136.5°	21°40.9'	+59.9'	136.8°	20°57.0'	+59.9'	137.0°	20°13.0'	+60.0'	137.3°	19°28.9'	+60.0'	137.5°	18°44.5'	+60.0'	137.8°	18°00.0'	+60.0'	162.3°	18
19	23°24.3'	+59.8'	136.4°	22°40.7'	+59.9'	136.7°	21°57.0'	+59.9'	137.0°	21°13.0'	+60.0'	137.3°	20°28.8'	+60.0'	137.5°	19°44.5'	+60.0'	137.8°	19°00.0'	+60.0'	163.4°	19
20	24°24.1'	+59.8'	136.3°	23°40.6'	+59.9'	136.6°	22°56.9'	+59.9'	136.9°	22°13.0'	+60.0'	137.2°	21°28.8'	+60.0'	137.5°	20°44.5'	+60.0'	137.8°	20°00.0'	+60.0'	164.7°	20
21	25°24.0'	+59.8'	136.2°	24°40.5'	+59.9'	136.6°	23°56.8'	+59.9'	136.9°	23°12.9'	+60.0'	137.2°	22°28.8'	+60.0'	137.5°	21°44.5'	+60.0'	137.7°	21°00.0'	+60.0'	90.0°	21
22	26°23.8'	+59.8'	136.2°	25°40.4'	+59.9'	136.5°	24°56.7'	+59.9'	136.8°	24°12.9'	+60.0'	137.1°	23°28.8'	+60.0'	137.4°	22°44.5'	+60.0'	137.7°	22°00.0'	+60.0'	180.0°	22
23	27°23.6'	+59.8'	136.1°	26°40.3'	+59.9'	136.4°	25°56.7'	+59.9'	136.8°	25°12.8'	+60.0'	137.1°	24°28.8'	+60.0'	137.4°	23°44.5'	+60.0'	137.7°	23°00.0'	+60.0'	169.9°	23
Dec°	84			85			86			87			88			89			90			Dec°

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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	4°23.1'	+59.8'	136.8°	3°39.3'	+59.9'	136.9°	2°55.5'	+59.9'	136.9°	2°11.6'	+60.0'	137.0°	1°27.8'	+60.0'	137.0°	0°43.9'	+60.0'	137.0°	0°00.0'	+60.0'	137.0°	0
1	5°22.9'	+59.8'	136.8°	4°39.2'	+59.9'	136.8°	3°55.4'	+59.9'	136.9°	3°11.6'	+60.0'	136.9°	2°27.7'	+60.0'	137.0°	1°43.9'	+60.0'	137.0°	1°00.0'	+60.0'	137.4°	1
2	6°22.8'	+59.8'	136.7°	5°39.1'	+59.9'	136.8°	4°55.3'	+59.9'	136.8°	4°11.5'	+60.0'	136.9°	3°27.7'	+60.0'	136.9°	2°43.9'	+60.0'	137.0°	2°00.0'	+60.0'	132.8°	2
3	7°22.6'	+59.8'	136.6°	6°39.0'	+59.9'	136.7°	5°55.3'	+59.9'	136.8°	5°11.5'	+60.0'	136.9°	4°27.7'	+60.0'	136.9°	3°43.9'	+60.0'	137.0°	3°00.0'	+60.0'	132.9°	3
4	8°22.4'	+59.8'	136.6°	7°38.8'	+59.9'	136.7°	6°55.2'	+59.9'	136.7°	6°11.5'	+60.0'	136.8°	5°27.7'	+60.0'	136.9°	4°43.9'	+60.0'	136.9°	4°00.0'	+60.0'	132.9°	4
5	9°22.3'	+59.8'	136.5°	8°38.7'	+59.9'	136.6°	7°55.1'	+59.9'	136.7°	7°11.4'	+60.0'	136.8°	6°27.7'	+60.0'	136.9°	5°43.9'	+60.0'	136.9°	5°00.0'	+60.0'	117.1°	5
6	10°22.1'	+59.8'	136.4°	9°38.6'	+59.9'	136.5°	8°55.0'	+59.9'	136.6°	8°11.4'	+60.0'	136.7°	7°27.7'	+60.0'	136.8°	6°43.9'	+60.0'	136.9°	6°00.0'	+60.0'	117.1°	6
7	11°22.0'	+59.8'	136.3°	10°38.5'	+59.9'	136.5°	9°55.0'	+59.9'	136.6°	9°11.3'	+60.0'	136.7°	8°27.6'	+60.0'	136.8°	7°43.9'	+60.0'	136.9°	7°00.0'	+60.0'	117.2°	7
8	12°21.8'	+59.8'	136.3°	11°38.4'	+59.9'	136.4°	10°54.9'	+59.9'	136.5°	10°11.3'	+60.0'	136.7°	9°27.6'	+60.0'	136.8°	8°43.8'	+60.0'	136.9°	8°00.0'	+60.0'	117.2°	8
9	13°21.7'	+59.8'	136.2°	12°38.3'	+59.9'	136.3°	11°54.8'	+59.9'	136.5°	11°11.3'	+60.0'	136.6°	10°27.6'	+60.0'	136.8°	9°43.8'	+60.0'	136.9°	9°00.0'	+60.0'	156.6°	9
10	14°21.5'	+59.8'	136.1°	13°38.2'	+59.9'	136.3°	12°54.8'	+59.9'	136.4°	12°11.2'	+60.0'	136.6°	11°27.6'	+60.0'	136.7°	10°43.8'	+60.0'	136.9°	10°00.0'	+60.0'	157.0°	10
11	15°21.3'	+59.8'	136.0°	14°38.1'	+59.9'	136.2°	13°54.7'	+59.9'	136.4°	13°11.2'	+60.0'	136.6°	12°27.6'	+60.0'	136.7°	11°43.8'	+60.0'	136.9°	11°00.0'	+60.0'	157.4°	11
12	16°21.2'	+59.8'	136.0°	15°38.0'	+59.9'	136.2°	14°54.6'	+59.9'	136.3°	14°11.1'	+60.0'	136.5°	13°27.5'	+60.0'	136.7°	12°43.8'	+60.0'	136.9°	12°00.0'	+60.0'	180.0°	12
13	17°21.0'	+59.8'	135.9°	16°37.8'	+59.9'	136.1°	15°54.5'	+59.9'	136.3°	15°11.1'	+60.0'	136.5°	14°27.5'	+60.0'	136.7°	13°43.8'	+60.0'	136.8°	13°00.0'	+60.0'	180.0°	13
14	18°20.8'	+59.8'	135.8°	17°37.7'	+59.9'	136.0°	16°54.5'	+59.9'	136.2°	16°11.1'	+60.0'	136.4°	15°27.5'	+60.0'	136.6°	14°43.8'	+60.0'	136.8°	14°00.0'	+60.0'	159.1°	14
15	19°20.7'	+59.8'	135.7°	18°37.6'	+59.9'	136.0°	17°54.4'	+59.9'	136.2°	17°11.0'	+60.0'	136.4°	16°27.5'	+60.0'	136.6°	15°43.8'	+60.0'	136.8°	15°00.0'	+60.0'	159.7°	15
16	20°20.5'	+59.8'	135.6°	19°37.5'	+59.9'	135.9°	18°54.3'	+59.9'	136.1°	18°11.0'	+60.0'	136.4°	17°27.5'	+60.0'	136.6°	16°43.8'	+60.0'	136.8°	16°00.0'	+60.0'	160.5°	16
17	21°20.3'	+59.8'	135.6°	20°37.4'	+59.9'	135.8°	19°54.2'	+59.9'	136.1°	19°10.9'	+60.0'	136.3°	18°27.5'	+60.0'	136.6°	17°43.8'	+60.0'	136.8°	17°00.0'	+60.0'	161.4°	17
18	22°20.1'	+59.8'	135.5°	21°37.3'	+59.9'	135.8°	20°54.2'	+59.9'	136.0°	20°10.9'	+60.0'	136.3°	19°27.4'	+60.0'	136.5°	18°43.8'	+60.0'	136.8°	18°00.0'	+60.0'	162.3°	18
19	23°20.0'	+59.8'	135.4°	22°37.1'	+59.9'	135.7°	21°54.1'	+59.9'	135.9°	21°10.9'	+60.0'	136.2°	20°27.4'	+60.0'	136.5°	19°43.8'	+60.0'	136.8°	19°00.0'	+60.0'	163.4°	19
20	24°19.8'	+59.8'	135.3°	23°37.0'	+59.9'	135.6°	22°54.0'	+59.9'	135.9°	22°10.8'	+60.0'	136.2°	21°27.4'	+60.0'	136.5°	20°43.8'	+60.0'	136.7°	20°00.0'	+60.0'	164.7°	20
21	25°19.6'	+59.8'	135.2°	24°36.9'	+59.9'	135.5°	23°53.9'	+59.9'	135.9°	23°10.8'	+60.0'	136.2°	22°27.4'	+60.0'	136.5°	21°43.8'	+60.0'	136.7°	21°00.0'	+60.0'	90.0°	21
22	26°19.4'</																					

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

44° 316° LHA

Latitude SAME as Declination

44° 316° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	4°18.7'	+59.8'	135.8°	3°35.7'	+59.9'	135.9°	2°52.6'	+59.9'	135.9°	2°09.5'	+60.0'	136.0°	1°26.3'	+60.0'	136.0°	0°43.2'	+60.0'	136.0°	0°00.0'	+60.0'	136.0°	0
1	5°18.6'	+59.8'	135.8°	4°35.6'	+59.9'	135.8°	3°52.5'	+59.9'	135.9°	3°09.4'	+60.0'	135.9°	2°26.3'	+60.0'	136.0°	1°43.2'	+60.0'	136.0°	1°00.0'	+60.0'	137.4°	1
2	6°18.4'	+59.8'	135.7°	5°35.4'	+59.9'	135.8°	4°52.4'	+59.9'	135.8°	4°09.4'	+60.0'	135.9°	3°26.3'	+60.0'	135.9°	2°43.2'	+60.0'	136.0°	2°00.0'	+60.0'	132.8°	2
3	7°18.3'	+59.8'	135.6°	6°35.3'	+59.9'	135.7°	5°52.4'	+59.9'	135.8°	5°09.3'	+60.0'	135.9°	4°26.3'	+60.0'	135.9°	3°43.1'	+60.0'	136.0°	3°00.0'	+60.0'	132.9°	3
4	8°18.1'	+59.8'	135.5°	7°35.2'	+59.9'	135.6°	6°52.3'	+59.9'	135.7°	6°09.3'	+60.0'	135.8°	5°26.2'	+60.0'	135.9°	4°43.1'	+60.0'	135.9°	4°00.0'	+60.0'	132.9°	4
5	9°17.9'	+59.8'	135.5°	8°35.1'	+59.9'	135.6°	7°52.2'	+59.9'	135.7°	7°09.3'	+60.0'	135.8°	6°26.2'	+60.0'	135.9°	5°43.1'	+60.0'	135.9°	5°00.0'	+60.0'	117.1°	5
6	10°17.8'	+59.8'	135.4°	9°35.0'	+59.9'	135.5°	8°52.1'	+59.9'	135.6°	8°09.2'	+60.0'	135.7°	7°26.2'	+60.0'	135.8°	6°43.1'	+60.0'	135.9°	6°00.0'	+60.0'	117.1°	6
7	11°17.6'	+59.8'	135.3°	10°34.9'	+59.9'	135.5°	9°52.1'	+59.9'	135.6°	9°09.2'	+60.0'	135.7°	8°26.2'	+60.0'	135.8°	7°43.1'	+60.0'	135.9°	7°00.0'	+60.0'	117.2°	7
8	12°17.4'	+59.8'	135.2°	11°34.8'	+59.9'	135.4°	10°52.0'	+59.9'	135.5°	10°09.1'	+60.0'	135.7°	9°26.2'	+60.0'	135.8°	8°43.1'	+60.0'	135.9°	8°00.0'	+60.0'	117.2°	8
9	13°17.3'	+59.8'	135.2°	12°34.7'	+59.9'	135.3°	11°51.9'	+59.9'	135.5°	11°09.1'	+60.0'	135.6°	10°26.2'	+60.0'	135.8°	9°43.1'	+60.0'	135.9°	9°00.0'	+60.0'	156.6°	9
10	14°17.1'	+59.8'	135.1°	13°34.5'	+59.9'	135.3°	12°51.9'	+59.9'	135.4°	12°09.0'	+60.0'	135.6°	11°26.1'	+60.0'	135.7°	10°43.1'	+60.0'	135.9°	10°00.0'	+60.0'	157.0°	10
11	15°16.9'	+59.8'	135.0°	14°34.4'	+59.9'	135.2°	13°51.8'	+59.9'	135.4°	13°09.0'	+60.0'	135.6°	12°26.1'	+60.0'	135.7°	11°43.1'	+60.0'	135.9°	11°00.0'	+60.0'	157.4°	11
12	16°16.8'	+59.8'	134.9°	15°34.3'	+59.9'	135.1°	14°51.7'	+59.9'	135.3°	14°09.0'	+60.0'	135.5°	13°26.1'	+60.0'	135.7°	12°43.1'	+60.0'	135.8°	12°00.0'	+60.0'	180.0°	12
13	17°16.6'	+59.8'	134.9°	16°34.2'	+59.9'	135.1°	15°51.6'	+59.9'	135.3°	15°08.9'	+60.0'	135.5°	14°26.1'	+60.0'	135.7°	13°43.1'	+60.0'	135.8°	13°00.0'	+60.0'	180.0°	13
14	18°16.4'	+59.8'	134.8°	17°34.1'	+59.9'	135.0°	16°51.6'	+59.9'	135.2°	16°08.9'	+60.0'	135.4°	15°26.1'	+60.0'	135.6°	14°43.1'	+60.0'	135.8°	14°00.0'	+60.0'	159.1°	14
15	19°16.2'	+59.8'	134.7°	18°33.9'	+59.9'	134.9°	17°51.5'	+59.9'	135.2°	17°08.8'	+60.0'	135.4°	16°26.0'	+60.0'	135.6°	15°43.1'	+60.0'	135.8°	15°00.0'	+60.0'	159.7°	15
16	20°16.1'	+59.8'	134.6°	19°33.8'	+59.9'	134.9°	18°51.4'	+59.9'	135.1°	18°08.8'	+60.0'	135.4°	17°26.0'	+60.0'	135.6°	16°43.1'	+60.0'	135.8°	16°00.0'	+60.0'	160.5°	16
17	21°15.9'	+59.8'	134.5°	20°33.7'	+59.9'	134.8°	19°51.3'	+59.9'	135.1°	19°08.7'	+60.0'	135.3°	18°26.0'	+60.0'	135.6°	17°43.1'	+60.0'	135.8°	17°00.0'	+60.0'	161.4°	17
18	22°15.7'	+59.8'	134.4°	21°33.6'	+59.9'	134.7°	20°51.2'	+59.9'	135.0°	20°08.7'	+60.0'	135.3°	19°26.0'	+60.0'	135.5°	18°43.1'	+60.0'	135.8°	18°00.0'	+60.0'	162.3°	18
19	23°15.5'	+59.8'	134.4°	22°33.4'	+59.9'	134.7°	21°51.2'	+59.9'	135.0°	21°08.7'	+60.0'	135.2°	20°26.0'	+60.0'	135.5°	19°43.1'	+60.0'	135.8°	19°00.0'	+60.0'	163.4°	19
20	24°15.3'	+59.8'	134.3°	23°33.3'	+59.9'	134.6°	22°51.1'	+59.9'	134.9°	22°08.6'	+60.0'	135.2°	21°25.9'	+60.0'	135.5°	20°43.1'	+60.0'	135.7°	20°00.0'	+60.0'	164.7°	20
21	25°15.1'	+59.8'	134.2°	24°33.2'	+59.9'	134.5°	23°51.0'	+59.9'	134.8°	23°08.6'	+60.0'	135.1°	22°25.9'	+60.0'	135.4°	21°43.1'	+60.0'	135.7°	21°00.0'	+60.0'	90.0°	21
22	26°14.9'	+59.8'	134.1°	25°33.0'	+59.9'	134.4°	24°50.9'	+59.9'	134.8°	24°08.5'	+60.0'	135.1°	23°25.9'	+60.0'	135.4°	22°43.1'	+60.0'	135.7°	22°00.0'	+60.0'	180.0°	22
23	27°14.7'	+59.8'	134.0°	26°32.9'	+59.9'	134.4°	25°50.8'	+59.9'	134.7°	25°08.5'	+60.0'	135.1°	24°25.9'	+60.0'	135.4°	23°43.1'	+60.0'	135.7°	23°00.0'	+60.0'	169.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	4°14.3'	+59.8'	134.8°	3°32.0'	+59.9'	134.9°	2°49.6'	+59.9'	134.9°	2°07.3'	+60.0'	135.0°	1°24.8'	+60.0'	135.0°	0°42.4'	+60.0'	135.0°	0°00.0'	+60.0'	135.0°	0
1	5°14.2'	+59.8'	134.8°	4°31.9'	+59.9'	134.8°	3°49.6'	+59.9'	134.9°	3°07.2'	+60.0'	134.9°	2°24.8'	+60.0'	135.0°	1°42.4'	+60.0'	135.0°	1°00.0'	+60.0'	132.8°	1
2	6°14.0'	+59.8'	134.7°	5°31.8'	+59.9'	134.8°	4°49.5'	+59.9'	134.8°	4°07.2'	+60.0'	134.9°	3°24.8'	+60.0'	134.9°	2°42.4'	+60.0'	135.0°	2°00.0'	+60.0'	132.8°	2
3	7°13.8'	+59.8'	134.6°	6°31.7'	+59.9'	134.7°	5°49.4'	+59.9'	134.8°	5°07.1'	+60.0'	134.8°	4°24.8'	+60.0'	134.9°	3°42.4'	+60.0'	135.0°	3°00.0'	+60.0'	132.9°	3
4	8°13.7'	+59.8'	134.5°	7°31.5'	+59.9'	134.6°	6°49.3'	+59.9'	134.7°	6°07.1'	+60.0'	134.8°	5°24.8'	+60.0'	134.9°	4°42.4'	+60.0'	134.9°	4°00.0'	+60.0'	132.9°	4
5	9°13.5'	+59.8'	134.5°	8°31.4'	+59.9'	134.6°	7°49.3'	+59.9'	134.7°	7°07.0'	+60.0'	134.8°	6°24.8'	+60.0'	134.9°	5°42.4'	+60.0'	134.9°	5°00.0'	+60.0'	117.1°	5
6	10°13.3'	+59.8'	134.4°	9°31.3'	+59.9'	134.5°	8°49.2'	+59.9'	134.6°	8°07.0'	+60.0'	134.7°	7°24.7'	+60.0'	134.8°	6°42.4'	+60.0'	134.9°	6°00.0'	+60.0'	117.1°	6
7	11°13.2'	+59.8'	134.3°	10°31.2'	+59.9'	134.5°	9°49.1'	+59.9'	134.6°	9°07.0'	+60.0'	134.7°	8°24.7'	+60.0'	134.8°	7°42.4'	+60.0'	134.9°	7°00.0'	+60.0'	117.2°	7
8	12°13.0'	+59.8'	134.2°	11°31.1'	+59.9'	134.4°	10°49.0'	+59.9'	134.5°	10°06.9'	+60.0'	134.7°	9°24.7'	+60.0'	134.8°	8°42.4'	+60.0'	134.9°	8°00.0'	+60.0'	117.2°	8
9	13°12.8'	+59.8'	134.2°	12°30.9'	+59.9'	134.3°	11°49.0'	+59.9'	134.5°	11°06.9'	+60.0'	134.6°	10°24.7'	+60.0'	134.8°	9°42.4'	+60.0'	134.9°	9°00.0'	+60.0'	156.6°	9
10	14°12.6'	+59.8'	134.1°	13°30.8'	+59.9'	134.3°	12°48.9'	+59.9'	134.4°	12°06.8'	+60.0'	134.6°	11°24.7'	+60.0'	134.7°	10°42.4'	+60.0'	134.9°	10°00.0'	+60.0'	157.0°	10
11	15°12.5'	+59.8'	134.0°	14°30.7'	+59.9'	134.2°	13°48.8'	+59.9'	134.4°	13°06.8'	+60.0'	134.5°	12°24.6'	+60.0'	134.7°	11°42.4'	+60.0'	134.9°	11°00.0'	+60.0'	157.4°	11
12	16°12.3'	+59.8'	133.9°	15°30.6'	+59.9'	134.1°	14°48.7'	+59.9'	134.3°	14°06.7'	+60.0'	134.5°	13°24.6'	+60.0'	134.7°	12°42.4'	+60.0'	134.8°	12°00.0'	+60.0'	180.0°	12
13	17°12.1'	+59.8'	133.8°	16°30.5'	+59.9'	134.1°	15°48.7'	+59.9'	134.3°	15°06.7'	+60.0'	134.5°	14°24.6'	+60.0'	134.7°	13°42.4'	+60.0'	134.8°	13°00.0'	+60.0'	180.0°	13
14	18°11.9'	+59.8'	133.8°	17°30.3'	+59.9'	134.0°	16°48.6'	+59.9'	134.2°	16°06.7'	+60.0'	134.4°	15°24.6'	+60.0'	134.6°	14°42.4'	+60.0'	134.8°	14°00.0'	+60.0'	159.1°	14
15	19°11.7'	+59.8'	133.7°	18°30.2'	+59.9'	133.9°	17°48.5'	+59.9'	134.2°	17°06.6'	+60.0'	134.4°	16°24.6'	+60.0'	134.6°	15°42.4'	+60.0'	134.8°	15°00.0'	+60.0'	159.7°	15
16	20°11.6'	+59.8'	133.6°	19°30.1'	+59.9'	133.9°	18°48.4'	+59.9'	134.1°	18°06.6'	+60.0'	134.3°	17°24.5'	+60.0'	134.6°	16°42.3'	+60.0'	134.8°	16°00.0'	+60.0'	160.5°	16
17	21°11.4'	+59.8'	133.5°	20°30.0'	+59.9'	133.8°	19°48.3'	+59.9'	134.1°	19°06.5'	+60.0'	134.3°	18°24.5'	+60.0'	134.5°	17°42.3'	+60.0'	134.8°	17°00.0'	+60.0'	161.4°	17
18	22°11.2'	+59.8'	133.4°	21°29.8'	+59.9'	133.7°	20°48.3'	+59.9'	134.0°	20°06.5'	+60.0'	134.3°	19°24.5'	+60.0'	134.5°	18°42.3'	+60.0'	134.8°	18°00.0'	+60.0'	162.3°	18
19	23°11.0'	+59.8'	133.3°	22°29.7'	+59.9'	133.6°	21°48.2'	+59.9'	133.9°	21°06.4'	+60.0'	134.2°	20°24.5'	+60.0'	134.5°	19°42.3'	+60.0'	134.8°	19°00.0'	+60.0'	163.4°	19
20	24°10.8'	+59.8'	133.3°	23°29.6'	+59.9'	133.6°	22°48.1'	+59.9'	133.9°	22°06.4'	+60.0'	134.2°	21°24.5'	+60.0'	134.5°	20°42.3'	+60.0'	134.7°	20°00.0'	+60.0'	164.7°	20
21	25°10.6'	+59.8'	133.2°	24°29.4'	+59.9'	133.5°	23°48.0'	+59.9'	1													

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

46° 314° LHA

Latitude SAME as Declination

46° 314° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	4°09.8'	+59.8'	133.8°	3°28.3'	+59.9'	133.9°	2°46.6'	+59.9'	133.9°	2°05.0'	+60.0'	134.0°	1°23.4'	+60.0'	134.0°	0°41.7'	+60.0'	134.0°	0°00.0'	+60.0'	134.0°	0
1	5°09.7'	+59.8'	133.8°	4°28.1'	+59.9'	133.8°	3°46.6'	+59.9'	133.9°	3°05.0'	+60.0'	133.9°	2°23.3'	+60.0'	134.0°	1°41.7'	+60.0'	134.0°	1°00.0'	+60.0'	132.8°	1
2	6°09.5'	+59.8'	133.7°	5°28.0'	+59.9'	133.8°	4°46.5'	+59.9'	133.8°	4°04.9'	+60.0'	133.9°	3°23.3'	+60.0'	133.9°	2°41.7'	+60.0'	134.0°	2°00.0'	+60.0'	132.8°	2
3	7°09.3'	+59.8'	133.6°	6°27.9'	+59.9'	133.7°	5°46.4'	+59.9'	133.8°	5°04.9'	+60.0'	133.8°	4°23.3'	+60.0'	133.9°	3°41.7'	+60.0'	134.0°	3°00.0'	+60.0'	132.9°	3
4	8°09.2'	+59.8'	133.5°	7°27.8'	+59.9'	133.6°	6°46.3'	+59.9'	133.7°	6°04.8'	+60.0'	133.8°	5°23.3'	+60.0'	133.9°	4°41.7'	+60.0'	133.9°	4°00.0'	+60.0'	132.9°	4
5	9°09.0'	+59.8'	133.5°	8°27.7'	+59.9'	133.6°	7°46.3'	+59.9'	133.7°	7°04.8'	+60.0'	133.8°	6°23.3'	+60.0'	133.9°	5°41.7'	+60.0'	133.9°	5°00.0'	+60.0'	117.1°	5
6	10°08.8'	+59.8'	133.4°	9°27.5'	+59.9'	133.5°	8°46.2'	+59.9'	133.6°	8°04.8'	+60.0'	133.7°	7°23.2'	+60.0'	133.8°	6°41.6'	+60.0'	133.9°	6°00.0'	+60.0'	117.1°	6
7	11°08.6'	+59.8'	133.3°	10°27.4'	+59.9'	133.4°	9°46.1'	+59.9'	133.5°	9°04.7'	+60.0'	133.7°	8°23.2'	+60.0'	133.8°	7°41.6'	+60.0'	133.9°	7°00.0'	+60.0'	117.2°	7
8	12°08.5'	+59.8'	133.2°	11°27.3'	+59.9'	133.4°	10°46.0'	+59.9'	133.5°	10°04.7'	+60.0'	133.7°	9°23.2'	+60.0'	133.8°	8°41.6'	+60.0'	133.9°	8°00.0'	+60.0'	117.2°	8
9	13°08.3'	+59.8'	133.1°	12°27.2'	+59.9'	133.3°	11°46.0'	+59.9'	133.5°	11°04.6'	+60.0'	133.6°	10°23.2'	+60.0'	133.8°	9°41.6'	+60.0'	133.9°	9°00.0'	+60.0'	156.6°	9
10	14°08.1'	+59.8'	133.1°	13°27.1'	+59.9'	133.2°	12°45.9'	+59.9'	133.4°	12°04.6'	+60.0'	133.6°	11°23.2'	+60.0'	133.7°	10°41.6'	+60.0'	133.9°	10°00.0'	+60.0'	157.0°	10
11	15°07.9'	+59.8'	133.0°	14°26.9'	+59.9'	133.2°	13°45.8'	+59.9'	133.4°	13°04.5'	+60.0'	133.5°	12°23.1'	+60.0'	133.7°	11°41.6'	+60.0'	133.9°	11°00.0'	+60.0'	157.4°	11
12	16°07.7'	+59.8'	132.9°	15°26.8'	+59.9'	133.1°	14°45.7'	+59.9'	133.3°	14°04.5'	+60.0'	133.5°	13°23.1'	+60.0'	133.7°	12°41.6'	+60.0'	133.8°	12°00.0'	+60.0'	157.9°	12
13	17°07.5'	+59.8'	132.8°	16°26.7'	+59.9'	133.0°	15°45.6'	+59.9'	133.3°	15°04.4'	+60.0'	133.5°	14°23.1'	+60.0'	133.6°	13°41.6'	+60.0'	133.8°	13°00.0'	+60.0'	158.4°	13
14	18°07.4'	+59.8'	132.7°	17°26.5'	+59.9'	133.0°	16°45.6'	+59.9'	133.2°	16°04.4'	+60.0'	133.4°	15°23.1'	+60.0'	133.6°	14°41.6'	+60.0'	133.8°	14°00.0'	+60.0'	159.1°	14
15	19°07.2'	+59.8'	132.7°	18°26.4'	+59.9'	132.9°	17°45.5'	+59.9'	133.1°	17°04.3'	+60.0'	133.4°	16°23.1'	+60.0'	133.6°	15°41.6'	+60.0'	133.8°	15°00.0'	+60.0'	159.7°	15
16	20°07.0'	+59.8'	132.6°	19°26.3'	+59.9'	132.8°	18°45.4'	+59.9'	133.1°	18°04.3'	+60.0'	133.3°	17°23.0'	+60.0'	133.6°	16°41.6'	+60.0'	133.8°	16°00.0'	+60.0'	160.5°	16
17	21°06.8'	+59.8'	132.5°	20°26.1'	+59.9'	132.8°	19°45.3'	+59.9'	133.0°	19°04.3'	+60.0'	133.3°	18°23.0'	+60.0'	133.5°	17°41.6'	+60.0'	133.8°	17°00.0'	+60.0'	161.4°	17
18	22°06.6'	+59.8'	132.4°	21°26.0'	+59.9'	132.7°	20°45.2'	+59.9'	133.0°	20°04.2'	+60.0'	133.3°	19°23.0'	+60.0'	133.5°	18°41.6'	+60.0'	133.8°	18°00.0'	+60.0'	162.3°	18
19	23°06.4'	+59.8'	132.3°	22°25.9'	+59.9'	132.6°	21°45.1'	+59.9'	132.9°	21°04.2'	+60.0'	133.2°	20°23.0'	+60.0'	133.5°	19°41.6'	+60.0'	133.7°	19°00.0'	+60.0'	163.4°	19
20	24°06.2'	+59.8'	132.2°	23°25.7'	+59.9'	132.5°	22°45.0'	+59.9'	132.9°	22°04.1'	+60.0'	133.2°	21°23.0'	+60.0'	133.5°	20°41.6'	+60.0'	133.7°	20°00.0'	+60.0'	164.7°	20
21	25°06.0'	+59.8'	132.1°	24°25.6'	+59.9'	132.5°	23°45.0'	+59.9'	132.8°	23°04.1'	+59.9'	133.1°	22°22.9'	+60.0'	133.4°	21°41.6'	+60.0'	133.7°	21°00.0'	+60.0'	90.0°	21
22	26°05.8'	+59.8'	132.0°	25°25.4'	+59.9'	132.4°	24°44.9'	+59.9'	132.7°	24°04.0'	+59.9'	133.1°	23°22.9'	+60.0'	133.4°	22°41.6'	+60.0'	133.7°	22°00.0'	+60.0'	180.0°	22
23	27°05.6'	+59.8'	131.9°	26°25.3'	+59.9'	132.3°	25°44.8'	+59.9'	132.7°	25°04.0'	+59.9'	133.0°	24°22.9'	+60.0'	133.4°	23°41.6'	+60.0'	133.7°	23°00.0'	+60.0'	169.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	4°05.3'	+59.8'	132.8°	3°24.5'	+59.9'	132.9°	2°43.6'	+59.9'	132.9°	2°02.7'	+60.0'	133.0°	1°21.8'	+60.0'	133.0°	0°40.9'	+60.0'	133.0°	0°00.0'	+60.0'	133.0°	0
1	5°05.1'	+59.8'	132.8°	4°24.3'	+59.9'	132.8°	3°43.5'	+59.9'	132.9°	3°02.7'	+60.0'	132.9°	2°21.8'	+60.0'	133.0°	1°40.9'	+60.0'	133.0°	1°00.0'	+60.0'	132.8°	1
2	6°04.9'	+59.8'	132.7°	5°24.2'	+59.9'	132.8°	4°43.5'	+59.9'	132.8°	4°02.6'	+60.0'	132.9°	3°21.8'	+60.0'	132.9°	2°40.9'	+60.0'	133.0°	2°00.0'	+60.0'	132.8°	2
3	7°04.7'	+59.8'	132.6°	6°24.1'	+59.9'	132.7°	5°43.4'	+59.9'	132.8°	5°02.6'	+60.0'	132.8°	4°21.8'	+60.0'	132.9°	3°40.9'	+60.0'	133.0°	3°00.0'	+60.0'	132.9°	3
4	8°04.6'	+59.8'	132.5°	7°24.0'	+59.9'	132.6°	6°43.3'	+59.9'	132.7°	6°02.6'	+60.0'	132.8°	5°21.8'	+60.0'	132.9°	4°40.9'	+60.0'	132.9°	4°00.0'	+60.0'	132.9°	4
5	9°04.4'	+59.8'	132.5°	8°23.8'	+59.9'	132.6°	7°43.2'	+59.9'	132.7°	7°02.5'	+60.0'	132.8°	6°21.7'	+60.0'	132.9°	5°40.9'	+60.0'	132.9°	5°00.0'	+60.0'	117.1°	5
6	10°04.2'	+59.8'	132.4°	9°23.7'	+59.9'	132.5°	8°43.1'	+59.9'	132.6°	8°02.5'	+60.0'	132.7°	7°21.7'	+60.0'	132.8°	6°40.9'	+60.0'	132.9°	6°00.0'	+60.0'	117.1°	6
7	11°04.0'	+59.8'	132.3°	10°23.6'	+59.9'	132.4°	9°43.1'	+59.9'	132.6°	9°02.4'	+60.0'	132.7°	8°21.7'	+60.0'	132.8°	7°40.9'	+60.0'	132.9°	7°00.0'	+60.0'	117.2°	7
8	12°03.8'	+59.8'	132.2°	11°23.5'	+59.9'	132.4°	10°43.0'	+59.9'	132.5°	10°02.4'	+60.0'	132.7°	9°21.7'	+60.0'	132.8°	8°40.9'	+60.0'	132.9°	8°00.0'	+60.0'	90.0°	8
9	13°03.7'	+59.8'	132.1°	12°23.3'	+59.9'	132.3°	11°42.9'	+59.9'	132.5°	11°02.3'	+60.0'	132.6°	10°21.7'	+60.0'	132.7°	9°40.9'	+60.0'	132.9°	9°00.0'	+60.0'	117.3°	9
10	14°03.5'	+59.8'	132.1°	13°23.2'	+59.9'	132.2°	12°42.8'	+59.9'	132.4°	12°02.3'	+60.0'	132.6°	11°21.6'	+60.0'	132.7°	10°40.9'	+60.0'	132.9°	10°00.0'	+60.0'	117.4°	10
11	15°03.3'	+59.8'	132.0°	14°23.1'	+59.9'	132.2°	13°42.7'	+59.9'	132.4°	13°02.2'	+60.0'	132.5°	12°21.6'	+60.0'	132.7°	11°40.9'	+60.0'	132.9°	11°00.0'	+60.0'	117.5°	11
12	16°03.1'	+59.8'	131.9°	15°23.0'	+59.9'	132.1°	14°42.6'	+59.9'	132.3°	14°02.2'	+60.0'	132.5°	13°21.6'	+60.0'	132.7°	12°40.9'	+60.0'	132.8°	12°00.0'	+60.0'	157.9°	12
13	17°02.9'	+59.8'	131.8°	16°22.8'	+59.9'	132.0°	15°42.6'	+59.9'	132.2°	15°02.1'	+60.0'	132.4°	14°21.6'	+60.0'	132.6°	13°40.9'	+60.0'	132.8°	13°00.0'	+60.0'	158.4°	13
14	18°02.7'	+59.8'	131.7°	17°22.7'	+59.9'	132.0°	16°42.5'	+59.9'	132.2°	16°02.1'	+60.0'	132.4°	15°21.5'	+60.0'	132.6°	14°40.8'	+60.0'	132.8°	14°00.0'	+60.0'	159.1°	14
15	19°02.5'	+59.8'	131.6°	18°22.6'	+59.9'	131.9°	17°42.4'	+59.9'	132.1°	17°02.0'	+60.0'	132.4°	16°21.5'	+60.0'	132.6°	15°40.8'	+60.0'	132.8°	15°00.0'	+60.0'	159.7°	15
16	20°02.3'	+59.8'	131.6°	19°22.4'	+59.9'	131.8°	18°42.3'	+59.9'	132.1°	18°02.0'	+60.0'	132.3°	17°21.5'	+60.0'	132.6°	16°40.8'	+60.0'	132.8°	16°00.0'	+60.0'	160.5°	16
17	21°02.1'	+59.8'	131.5°	20°22.3'	+59.9'	131.7°	19°42.2'	+59.9'	132.0°	19°02.0'	+60.0'	132.3°	18°21.5'	+60.0'	132.5°	17°40.8'	+60.0'	132.8°	17°00.0'	+60.0'	161.4°	17
18	22°01.9'	+59.8'	131.4°	21°22.1'	+59.9'	131.7°	20°42.1'	+59.9'	132.0°	20°01.9'	+59.9'	132.2°	19°21.5'	+60.0'	132.5°	18°40.8'	+60.0'	132.8°	18°00.0'	+60.0'	162.3°	18
19	23°01.7'	+59.8'	131.3°	22°22.0'	+59.9'	131.6°	21°42.0'	+59.9'	131.9°	21°01.9'	+59.9'	132.2°	20°21.4'	+60.0'	132.5°	19°40.8'	+60.0'	132.7°	19°00.0'	+60.0'	163.4°	19
20	24°01.5'	+59.8'	131.2°	23°21.9'	+59.9'	131.5°	22°41.9'	+59.9'	131.8°	22°01.8'	+59.9'	132.2°	21°21.4'	+60.0'	132.4°	20°40.8'	+60.0'	132.7°	20°00.0'	+60.0'	164.7°	20
21	25°01.3'	+59.8'	131.1°	24°21.7'	+59.9'	131.5°	23°41.9'	+59.9'	13													

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

48° 312° LHA

Latitude SAME as Declination

48° 312° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	4°00.6'	+59.8'	131.8°	3°20.6'	+59.9'	131.9°	2°40.5'	+59.9'	131.9°	2°00.4'	+60.0'	132.0°	1°20.3'	+60.0'	132.0°	0°40.1'	+60.0'	132.0°	0°00.0'	+60.0'	132.0°	0
1	5°00.5'	+59.8'	131.8°	4°20.5'	+59.9'	131.8°	3°40.4'	+59.9'	131.9°	3°00.4'	+60.0'	131.9°	2°20.3'	+60.0'	132.0°	1°40.1'	+60.0'	132.0°	1°00.0'	+60.0'	132.8°	1
2	6°00.3'	+59.8'	131.7°	5°20.3'	+59.9'	131.8°	4°40.4'	+59.9'	131.8°	4°00.3'	+60.0'	131.9°	3°20.2'	+60.0'	131.9°	2°40.1'	+60.0'	132.0°	2°00.0'	+60.0'	132.8°	2
3	7°00.1'	+59.8'	131.6°	6°20.2'	+59.9'	131.7°	5°40.3'	+59.9'	131.8°	5°00.3'	+60.0'	131.8°	4°20.2'	+60.0'	131.9°	3°40.1'	+60.0'	132.0°	3°00.0'	+60.0'	132.9°	3
4	8°00.0'	+59.8'	131.5°	7°20.1'	+59.9'	131.6°	6°40.2'	+59.9'	131.7°	6°00.2'	+60.0'	131.8°	5°20.2'	+60.0'	131.9°	4°40.1'	+60.0'	131.9°	4°00.0'	+60.0'	132.9°	4
5	8°59.7'	+59.8'	131.4°	8°20.0'	+59.9'	131.6°	7°40.1'	+59.9'	131.7°	7°00.2'	+60.0'	131.8°	6°20.2'	+60.0'	131.9°	5°40.1'	+60.0'	131.9°	5°00.0'	+60.0'	117.1°	5
6	9°59.5'	+59.8'	131.4°	9°19.8'	+59.9'	131.5°	8°40.0'	+59.9'	131.6°	8°00.1'	+60.0'	131.7°	7°20.2'	+60.0'	131.8°	6°40.1'	+60.0'	131.9°	6°00.0'	+60.0'	117.1°	6
7	10°59.4'	+59.8'	131.3°	10°19.7'	+59.9'	131.4°	9°39.9'	+59.9'	131.6°	9°00.1'	+60.0'	131.7°	8°20.1'	+60.0'	131.8°	7°40.1'	+60.0'	131.9°	7°00.0'	+60.0'	117.2°	7
8	11°59.2'	+59.8'	131.2°	11°19.6'	+59.9'	131.4°	10°39.9'	+59.9'	131.5°	10°00.0'	+60.0'	131.6°	9°20.1'	+60.0'	131.8°	8°40.1'	+60.0'	131.9°	8°00.0'	+60.0'	90.0°	8
9	12°59.0'	+59.8'	131.1°	12°19.4'	+59.9'	131.3°	11°39.8'	+59.9'	131.5°	11°00.0'	+60.0'	131.6°	10°20.1'	+60.0'	131.7°	9°40.1'	+60.0'	131.9°	9°00.0'	+60.0'	117.3°	9
10	13°58.8'	+59.8'	131.0°	13°19.3'	+59.9'	131.2°	12°39.7'	+59.9'	131.4°	12°00.0'	+60.0'	131.6°	11°20.1'	+60.0'	131.7°	10°40.1'	+60.0'	131.9°	10°00.0'	+60.0'	117.4°	10
11	14°58.6'	+59.8'	131.0°	14°19.2'	+59.9'	131.2°	13°39.6'	+59.9'	131.3°	13°00.0'	+60.0'	131.5°	12°20.1'	+60.0'	131.7°	11°40.1'	+60.0'	131.9°	11°00.0'	+60.0'	117.5°	11
12	15°58.4'	+59.8'	130.9°	15°19.0'	+59.9'	131.1°	14°39.5'	+59.9'	131.3°	13°59.9'	+60.0'	131.5°	13°20.0'	+60.0'	131.7°	12°40.1'	+60.0'	131.8°	12°00.0'	+60.0'	157.9°	12
13	16°58.2'	+59.8'	130.8°	16°18.9'	+59.9'	131.0°	15°39.4'	+59.9'	131.2°	14°59.8'	+60.0'	131.4°	14°20.0'	+60.0'	131.6°	13°40.1'	+60.0'	131.8°	13°00.0'	+60.0'	158.4°	13
14	17°58.0'	+59.8'	130.7°	17°18.8'	+59.9'	130.9°	16°39.4'	+59.9'	131.2°	15°59.8'	+60.0'	131.4°	15°20.0'	+60.0'	131.6°	14°40.1'	+60.0'	131.8°	14°00.0'	+60.0'	159.1°	14
15	18°57.8'	+59.8'	130.6°	18°18.6'	+59.9'	130.9°	17°39.3'	+59.9'	131.1°	16°59.7'	+60.0'	131.4°	16°20.0'	+60.0'	131.6°	15°40.1'	+60.0'	131.8°	15°00.0'	+60.0'	159.7°	15
16	19°57.6'	+59.8'	130.5°	19°18.5'	+59.9'	130.8°	18°39.2'	+59.9'	131.1°	17°59.7'	+59.9'	131.3°	17°20.0'	+60.0'	131.6°	16°40.1'	+60.0'	131.8°	16°00.0'	+60.0'	160.5°	16
17	20°57.4'	+59.8'	130.4°	20°18.3'	+59.9'	130.7°	19°39.1'	+59.9'	131.0°	18°59.6'	+59.9'	131.3°	18°19.9'	+60.0'	131.5°	17°40.1'	+60.0'	131.8°	17°00.0'	+60.0'	161.4°	17
18	21°57.2'	+59.8'	130.4°	21°18.2'	+59.9'	130.7°	20°39.0'	+59.9'	130.9°	19°59.6'	+59.9'	131.2°	19°19.9'	+60.0'	131.5°	18°40.1'	+60.0'	131.8°	18°00.0'	+60.0'	162.3°	18
19	22°57.0'	+59.8'	130.3°	22°18.1'	+59.9'	130.6°	21°38.9'	+59.9'	130.9°	20°59.5'	+59.9'	131.2°	20°19.9'	+60.0'	131.5°	19°40.0'	+60.0'	131.7°	19°00.0'	+60.0'	163.4°	19
20	23°56.7'	+59.8'	130.2°	23°17.9'	+59.8'	130.5°	22°38.8'	+59.9'	130.8°	21°59.5'	+59.9'	131.1°	21°19.9'	+60.0'	131.4°	20°40.0'	+60.0'	131.7°	20°00.0'	+60.0'	164.7°	20
21	24°56.5'	+59.8'	130.1°	24°17.8'	+59.8'	130.4°	23°38.7'	+59.9'	130.8°	22°59.4'	+59.9'	131.1°	22°19.8'	+60.0'	131.4°	21°40.0'	+60.0'	131.7°	21°00.0'	+60.0'	90.0°	21
22	25°56.3'	+59.8'	130.0°	25°17.6'	+59.8'	130.4°	24°38.6'	+59.9'	130.7°	23°59.3'	+59.9'	131.0°	23°19.8'	+60.0'	131.4°	22°40.0'	+60.0'	131.7°	22°00.0'	+60.0'	180.0°	22
23	26°56.1'	+59.8'	129.9°	26°17.4'	+59.8'	130.3°	25°38.5'	+59.9'	130.6°	24°59.3'	+59.9'	131.0°	24°19.8'	+60.0'	131.3°	23°40.0'	+60.0'	131.7°	23°00.0'	+60.0'	169.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	3°55.9'	+59.8'	130.8°	3°16.7'	+59.9'	130.9°	2°37.4'	+59.9'	130.9°	1°58.1'	+60.0'	131.0°	1°18.7'	+60.0'	131.0°	0°39.4'	+60.0'	131.0°	0°00.0'	+60.0'	131.0°	0
1	4°55.7'	+59.8'	130.8°	4°16.5'	+59.9'	130.8°	3°37.3'	+59.9'	130.9°	2°58.0'	+60.0'	130.9°	2°18.7'	+60.0'	131.0°	1°39.4'	+60.0'	131.0°	1°00.0'	+60.0'	132.8°	1
2	5°55.6'	+59.8'	130.7°	5°16.4'	+59.9'	130.8°	4°37.2'	+59.9'	130.8°	3°58.0'	+60.0'	130.9°	3°18.7'	+60.0'	130.9°	2°39.4'	+60.0'	131.0°	2°00.0'	+60.0'	132.8°	2
3	6°55.4'	+59.8'	130.6°	6°16.3'	+59.9'	130.7°	5°37.1'	+59.9'	130.8°	4°57.9'	+60.0'	130.8°	4°18.7'	+60.0'	130.9°	3°39.3'	+60.0'	131.0°	3°00.0'	+60.0'	132.9°	3
4	7°55.2'	+59.8'	130.5°	7°16.2'	+59.9'	130.6°	6°37.0'	+59.9'	130.7°	5°57.9'	+60.0'	130.8°	5°18.6'	+60.0'	130.9°	4°39.3'	+60.0'	130.9°	4°00.0'	+60.0'	132.9°	4
5	8°55.0'	+59.8'	130.4°	8°16.0'	+59.9'	130.6°	7°37.0'	+59.9'	130.7°	6°57.8'	+60.0'	130.8°	6°18.6'	+60.0'	130.9°	5°39.3'	+60.0'	130.9°	5°00.0'	+60.0'	117.1°	5
6	9°54.8'	+59.8'	130.4°	9°15.9'	+59.9'	130.5°	8°36.9'	+59.9'	130.6°	7°57.8'	+60.0'	130.7°	7°18.6'	+60.0'	130.8°	6°39.3'	+60.0'	130.9°	6°00.0'	+60.0'	117.1°	6
7	10°54.6'	+59.8'	130.3°	10°15.8'	+59.9'	130.4°	9°36.8'	+59.9'	130.6°	8°57.7'	+60.0'	130.7°	8°18.6'	+60.0'	130.8°	7°39.3'	+60.0'	130.9°	7°00.0'	+60.0'	117.2°	7
8	11°54.4'	+59.8'	130.2°	11°15.6'	+59.9'	130.4°	10°36.7'	+59.9'	130.5°	9°57.7'	+60.0'	130.6°	9°18.5'	+60.0'	130.8°	8°39.3'	+60.0'	130.9°	8°00.0'	+60.0'	90.0°	8
9	12°54.2'	+59.8'	130.1°	12°15.5'	+59.9'	130.3°	11°36.6'	+59.9'	130.4°	10°57.6'	+60.0'	130.6°	10°18.5'	+60.0'	130.7°	9°39.3'	+60.0'	130.9°	9°00.0'	+60.0'	117.3°	9
10	13°54.0'	+59.8'	130.0°	13°15.3'	+59.9'	130.2°	12°36.5'	+59.9'	130.4°	11°57.6'	+60.0'	130.6°	11°18.5'	+60.0'	130.7°	10°39.3'	+60.0'	130.9°	10°00.0'	+60.0'	117.4°	10
11	14°53.8'	+59.8'	129.9°	14°15.2'	+59.9'	130.1°	13°36.4'	+59.9'	130.3°	12°57.5'	+60.0'	130.5°	12°18.5'	+60.0'	130.7°	11°39.3'	+60.0'	130.8°	11°00.0'	+60.0'	117.5°	11
12	15°53.6'	+59.8'	129.9°	15°15.1'	+59.9'	130.1°	14°36.4'	+59.9'	130.3°	13°57.5'	+60.0'	130.5°	13°18.5'	+60.0'	130.7°	12°39.3'	+60.0'	130.8°	12°00.0'	+60.0'	157.9°	12
13	16°53.4'	+59.8'	129.8°	16°14.9'	+59.9'	130.0°	15°36.3'	+59.9'	130.2°	14°57.4'	+59.9'	130.4°	14°18.4'	+60.0'	130.6°	13°39.3'	+60.0'	130.8°	13°00.0'	+60.0'	158.4°	13
14	17°53.2'	+59.8'	129.7°	17°14.8'	+59.9'	129.9°	16°36.2'	+59.9'	130.2°	15°57.4'	+59.9'	130.4°	15°18.4'	+60.0'	130.6°	14°39.3'	+60.0'	130.8°	14°00.0'	+60.0'	159.1°	14
15	18°53.0'	+59.8'	129.6°	18°14.6'	+59.9'	129.9°	17°36.1'	+59.9'	130.1°	16°57.3'	+59.9'	130.3°	16°18.4'	+60.0'	130.6°	15°39.3'	+60.0'	130.8°	15°00.0'	+60.0'	159.7°	15
16	19°52.8'	+59.8'	129.5°	19°14.5'	+59.9'	129.8°	18°36.0'	+59.9'	130.1°	17°57.3'	+59.9'	130.3°	17°18.4'	+60.0'	130.5°	16°39.3'	+60.0'	130.8°	16°00.0'	+60.0'	160.5°	16
17	20°52.6'	+59.8'	129.4°	20°14.4'	+59.9'	129.7°	19°35.9'	+59.9'	130.0°	18°57.2'	+59.9'	130.3°	18°18.4'	+60.0'	130.5°	17°39.3'	+60.0'	130.8°	17°00.0'	+60.0'	161.4°	17
18	21°52.4'	+59.8'	129.3°	21°14.2'	+59.8'	129.6°	20°35.8'	+59.9'	129.9°	19°57.2'	+59.9'	130.2°	19°18.3'	+60.0'	130.5°	18°39.3'	+60.0'	130.7°	18°00.0'	+60.0'	162.3°	18
19	22°52.1'	+59.8'	129.2°	22°14.1'	+59.8'	129.6°	21°35.7'	+59.9'	129.9°	20°57.1'	+59.9'	130.2°	20°18.3'	+60.0'	130.5°	19°39.3'	+60.0'	130.7°	19°00.0'	+60.0'	163.4°	19
20	23°51.9'	+59.8'	129.1°	23°13.9'	+59.8'	129.5°	22°35.6'	+59.9'	129.8°	21°57.1'	+59.9'	130.1°	21°18.3'	+60.0'	130.4°	20°39.3'	+60.0'	130.7°	20°00.0'	+60.0'	164.7°	20
21	24°51.7'	+59.8'	129.1°	24°13.7'	+59.8'	129.4°	23°35.5'	+59.9'	129.7°													

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

50° 310° LHA

Latitude SAME as Declination

50° 310° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	3°51.2'	+59.8'	129.8°	3°12.7'	+59.9'	129.9°	2°34.2'	+59.9'	129.9°	1°55.7'	+60.0'	130.0°	1°17.1'	+60.0'	130.0°	0°38.6'	+60.0'	130.0°	0°00.0'	+60.0'	130.0°	0
1	4°51.0'	+59.8'	129.8°	4°12.6'	+59.9'	129.8°	3°34.1'	+59.9'	129.9°	2°55.6'	+60.0'	129.9°	2°17.1'	+60.0'	130.0°	1°38.6'	+60.0'	130.0°	1°00.0'	+60.0'	128.5°	1
2	5°50.8'	+59.8'	129.7°	5°12.4'	+59.9'	129.8°	4°34.0'	+59.9'	129.8°	3°55.6'	+60.0'	129.9°	3°17.1'	+60.0'	129.9°	2°38.6'	+60.0'	130.0°	2°00.0'	+60.0'	132.8°	2
3	6°50.6'	+59.8'	129.6°	6°12.3'	+59.9'	129.7°	5°33.9'	+59.9'	129.8°	4°55.5'	+60.0'	129.8°	4°17.1'	+60.0'	129.9°	3°38.5'	+60.0'	130.0°	3°00.0'	+60.0'	132.9°	3
4	7°50.4'	+59.8'	129.5°	7°12.2'	+59.9'	129.6°	6°33.9'	+59.9'	129.7°	5°55.5'	+60.0'	129.8°	5°17.0'	+60.0'	129.9°	4°38.5'	+60.0'	129.9°	4°00.0'	+60.0'	132.9°	4
5	8°50.2'	+59.8'	129.4°	8°12.0'	+59.9'	129.6°	7°33.8'	+59.9'	129.7°	6°55.4'	+60.0'	129.8°	6°17.0'	+60.0'	129.8°	5°38.5'	+60.0'	129.9°	5°00.0'	+60.0'	117.1°	5
6	9°50.0'	+59.8'	129.4°	9°11.9'	+59.9'	129.5°	8°33.7'	+59.9'	129.6°	7°55.4'	+60.0'	129.7°	7°17.0'	+60.0'	129.8°	6°38.5'	+60.0'	129.9°	6°00.0'	+60.0'	117.1°	6
7	10°49.8'	+59.8'	129.3°	10°11.7'	+59.9'	129.4°	9°33.6'	+59.9'	129.5°	8°55.3'	+60.0'	129.7°	8°17.0'	+60.0'	129.8°	7°38.5'	+60.0'	129.9°	7°00.0'	+60.0'	117.2°	7
8	11°49.6'	+59.8'	129.2°	11°11.6'	+59.9'	129.3°	10°33.5'	+59.9'	129.5°	9°55.3'	+60.0'	129.6°	9°17.0'	+60.0'	129.8°	8°38.5'	+60.0'	129.9°	8°00.0'	+60.0'	90.0°	8
9	12°49.4'	+59.8'	129.1°	12°11.5'	+59.9'	129.3°	11°33.4'	+59.9'	129.4°	10°55.2'	+59.9'	129.6°	10°16.9'	+60.0'	129.7°	9°38.5'	+60.0'	129.9°	9°00.0'	+60.0'	117.3°	9
10	13°49.2'	+59.8'	129.0°	13°11.3'	+59.9'	129.2°	12°33.3'	+59.9'	129.4°	11°55.2'	+59.9'	129.6°	11°16.9'	+60.0'	129.7°	10°38.5'	+60.0'	129.9°	10°00.0'	+60.0'	117.4°	10
11	14°49.0'	+59.8'	128.9°	14°11.2'	+59.9'	129.1°	13°33.2'	+59.9'	129.3°	12°55.1'	+59.9'	129.5°	12°16.9'	+60.0'	129.7°	11°38.5'	+60.0'	129.8°	11°00.0'	+60.0'	117.5°	11
12	15°48.8'	+59.8'	128.9°	15°11.0'	+59.9'	129.1°	14°33.1'	+59.9'	129.3°	13°55.1'	+59.9'	129.5°	13°16.9'	+60.0'	129.7°	12°38.5'	+60.0'	129.8°	12°00.0'	+60.0'	157.9°	12
13	16°48.6'	+59.8'	128.8°	16°10.9'	+59.9'	129.0°	15°33.0'	+59.9'	129.2°	14°55.0'	+59.9'	129.4°	14°16.8'	+60.0'	129.6°	13°38.5'	+60.0'	129.8°	13°00.0'	+60.0'	158.4°	13
14	17°48.3'	+59.8'	128.7°	17°10.7'	+59.9'	128.9°	16°33.0'	+59.9'	129.2°	15°55.0'	+59.9'	129.4°	15°16.8'	+60.0'	129.6°	14°38.5'	+60.0'	129.8°	14°00.0'	+60.0'	159.1°	14
15	18°48.1'	+59.8'	128.6°	18°10.6'	+59.9'	128.8°	17°32.9'	+59.9'	129.1°	16°54.9'	+59.9'	129.3°	16°16.8'	+60.0'	129.6°	15°38.5'	+60.0'	129.8°	15°00.0'	+60.0'	159.7°	15
16	19°47.9'	+59.8'	128.5°	19°10.5'	+59.8'	128.8°	18°32.8'	+59.9'	129.0°	17°54.9'	+59.9'	129.3°	17°16.8'	+60.0'	129.5°	16°38.5'	+60.0'	129.8°	16°00.0'	+60.0'	160.5°	16
17	20°47.7'	+59.8'	128.4°	20°10.3'	+59.8'	128.7°	19°32.7'	+59.9'	129.0°	18°54.8'	+59.9'	129.3°	18°16.7'	+60.0'	129.5°	17°38.5'	+60.0'	129.8°	17°00.0'	+60.0'	161.4°	17
18	21°47.5'	+59.8'	128.3°	21°10.1'	+59.8'	128.6°	20°32.6'	+59.9'	128.9°	19°54.8'	+59.9'	129.2°	19°16.7'	+60.0'	129.5°	18°38.5'	+60.0'	129.7°	18°00.0'	+60.0'	162.3°	18
19	22°47.2'	+59.8'	128.2°	22°10.0'	+59.8'	128.5°	21°32.5'	+59.9'	128.9°	20°54.7'	+59.9'	129.2°	20°16.7'	+60.0'	129.5°	19°38.5'	+60.0'	129.7°	19°00.0'	+60.0'	163.4°	19
20	23°47.0'	+59.8'	128.1°	23°09.8'	+59.8'	128.5°	22°32.4'	+59.9'	128.8°	21°54.7'	+59.9'	129.1°	21°16.7'	+60.0'	129.4°	20°38.5'	+60.0'	129.7°	20°00.0'	+60.0'	164.7°	20
21	24°46.8'	+59.8'	128.0°	24°09.7'	+59.8'	128.4°	23°32.3'	+59.9'	128.7°	22°54.6'	+59.9'	129.1°	22°16.6'	+60.0'	129.4°	21°38.4'	+60.0'	129.7°	21°00.0'	+60.0'	90.0°	21
22	25°46.6'	+59.8'	127.9°	25°09.5'	+59.8'	128.3°	24°32.2'	+59.9'	128.7°	23°54.5'	+59.9'	129.0°	23°16.6'	+60.0'	129.4°	22°38.4'	+60.0'	129.7°	22°00.0'	+60.0'	180.0°	22
23	26°46.3'	+59.8'	127.8°	26°09.3'	+59.8'	128.2°	25°32.1'	+59.9'	128.6°	24°54.5'	+59.9'	129.0°	24°16.6'	+60.0'	129.3°	23°38.4'	+60.0'	129.7°	23°00.0'	+60.0'	169.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	3°46.3'	+59.8'	128.8°	3°08.7'	+59.9'	128.9°	2°31.0'	+59.9'	128.9°	1°53.2'	+60.0'	129.0°	1°15.5'	+60.0'	129.0°	0°37.8'	+60.0'	129.0°	0°00.0'	+60.0'	129.0°	0
1	4°46.1'	+59.8'	128.8°	4°08.5'	+59.9'	128.8°	3°30.9'	+59.9'	128.9°	2°53.2'	+60.0'	128.9°	2°15.5'	+60.0'	129.0°	1°37.8'	+60.0'	129.0°	1°00.0'	+60.0'	128.5°	1
2	5°45.9'	+59.8'	128.7°	5°08.4'	+59.9'	128.8°	4°30.8'	+59.9'	128.8°	3°53.1'	+60.0'	128.9°	3°15.5'	+60.0'	128.9°	2°37.7'	+60.0'	129.0°	2°00.0'	+60.0'	132.8°	2
3	6°45.7'	+59.8'	128.6°	6°08.2'	+59.9'	128.7°	5°30.7'	+59.9'	128.8°	4°53.1'	+59.9'	128.8°	4°15.4'	+60.0'	128.9°	3°37.7'	+60.0'	129.0°	3°00.0'	+60.0'	132.9°	3
4	7°45.5'	+59.8'	128.5°	7°08.1'	+59.9'	128.6°	6°30.6'	+59.9'	128.7°	5°53.0'	+59.9'	128.8°	5°15.4'	+60.0'	128.9°	4°37.7'	+60.0'	128.9°	4°00.0'	+60.0'	132.9°	4
5	8°45.3'	+59.8'	128.4°	8°08.0'	+59.9'	128.6°	7°30.5'	+59.9'	128.7°	6°53.0'	+59.9'	128.8°	6°15.4'	+60.0'	128.8°	5°37.7'	+60.0'	128.9°	5°00.0'	+60.0'	117.1°	5
6	9°45.1'	+59.8'	128.4°	9°07.8'	+59.9'	128.5°	8°30.4'	+59.9'	128.6°	7°52.9'	+59.9'	128.7°	7°15.4'	+60.0'	128.8°	6°37.7'	+60.0'	128.9°	6°00.0'	+60.0'	117.1°	6
7	10°44.9'	+59.8'	128.3°	10°07.7'	+59.9'	128.4°	9°30.3'	+59.9'	128.5°	8°52.9'	+59.9'	128.7°	8°15.4'	+60.0'	128.8°	7°37.7'	+60.0'	128.9°	7°00.0'	+60.0'	117.2°	7
8	11°44.7'	+59.8'	128.2°	11°07.5'	+59.9'	128.3°	10°30.2'	+59.9'	128.5°	9°52.8'	+59.9'	128.6°	9°15.3'	+60.0'	128.8°	8°37.7'	+60.0'	128.9°	8°00.0'	+60.0'	90.0°	8
9	12°44.5'	+59.8'	128.1°	12°07.4'	+59.9'	128.3°	11°30.2'	+59.9'	128.4°	10°52.8'	+59.9'	128.6°	10°15.3'	+60.0'	128.7°	9°37.7'	+60.0'	128.9°	9°00.0'	+60.0'	117.3°	9
10	13°44.3'	+59.8'	128.0°	13°07.2'	+59.9'	128.2°	12°30.1'	+59.9'	128.4°	11°52.7'	+59.9'	128.5°	11°15.3'	+60.0'	128.7°	10°37.7'	+60.0'	128.9°	10°00.0'	+60.0'	117.4°	10
11	14°44.1'	+59.8'	127.9°	14°07.1'	+59.9'	128.1°	13°30.0'	+59.9'	128.3°	12°52.7'	+59.9'	128.5°	12°15.3'	+60.0'	128.7°	11°37.7'	+60.0'	128.8°	11°00.0'	+60.0'	117.5°	11
12	15°43.8'	+59.8'	127.8°	15°06.9'	+59.9'	128.1°	14°29.9'	+59.9'	128.3°	13°52.6'	+59.9'	128.5°	13°15.2'	+60.0'	128.7°	12°37.7'	+60.0'	128.8°	12°00.0'	+60.0'	157.9°	12
13	16°43.6'	+59.8'	127.8°	16°06.8'	+59.8'	128.0°	15°29.8'	+59.9'	128.2°	14°52.6'	+59.9'	128.4°	14°15.2'	+60.0'	128.6°	13°37.7'	+60.0'	128.8°	13°00.0'	+60.0'	158.4°	13
14	17°43.4'	+59.8'	127.7°	17°06.6'	+59.8'	127.9°	16°29.7'	+59.9'	128.1°	15°52.5'	+59.9'	128.4°	15°15.2'	+60.0'	128.6°	14°37.7'	+60.0'	128.8°	14°00.0'	+60.0'	159.1°	14
15	18°43.2'	+59.8'	127.6°	18°06.5'	+59.8'	127.8°	17°29.6'	+59.9'	128.1°	16°52.5'	+59.9'	128.3°	16°15.2'	+60.0'	128.6°	15°37.7'	+60.0'	128.8°	15°00.0'	+60.0'	159.7°	15
16	19°43.0'	+59.8'	127.5°	19°06.3'	+59.8'	127.8°	18°29.5'	+59.9'	128.0°	17°52.4'	+59.9'	128.3°	17°15.1'	+60.0'	128.5°	16°37.7'	+60.0'	128.8°	16°00.0'	+60.0'	160.5°	16
17	20°42.7'	+59.8'	127.4°	20°06.2'	+59.8'	127.7°	19°29.4'	+59.9'	128.0°	18°52.4'	+59.9'	128.2°	18°15.1'	+60.0'	128.5°	17°37.7'	+60.0'	128.8°	17°00.0'	+60.0'	161.4°	17
18	21°42.5'	+59.8'	127.3°	21°06.0'	+59.8'	127.6°	20°29.3'	+59.9'	127.9°	19°52.3'	+59.9'	128.2°	19°15.1'	+60.0'	128.5°	18°37.7'	+60.0'	128.7°	18°00.0'	+60.0'	162.3°	18
19	22°42.3'	+59.8'	127.2°	22°05.9'	+59.8'	127.5°	21°29.2'	+59.9'	127.8°	20°52.3'	+59.9'	128.1°	20°15.1'	+60.0'	128.4°	19°37.6'	+60.0'	128.7°	19°00.0'	+60.0'	163.4°	19
20	23°42.1'	+59.8'	127.1°	23°05.7'	+59.8'	127.4°	22°29.1'	+59.9'	127.8°	21°52.2'	+59.9'	128.1°	21°15.0'	+60.0'	128.4°	20°37.6'	+60.0'	128.7°	20°00.0'	+60.0'	164.7°	20
21	24°41.8'	+59.8'	127.0°	24°05.5'	+59.8'	127.4°	23°29.0'	+59.9'	127.7°</													

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

52° 308° LHA

Latitude SAME as Declination

52° 308° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	3°41.4'	+59.8'	127.8°	3°04.6'	+59.9'	127.9°	2°27.7'	+59.9'	127.9°	1°50.8'	+59.9'	128.0°	1°13.9'	+60.0'	128.0°	0°36.9'	+60.0'	128.0°	0°00.0'	+60.0'	128.0°	0
1	4°41.2'	+59.8'	127.8°	4°04.4'	+59.9'	127.8°	3°27.6'	+59.9'	127.9°	2°50.7'	+59.9'	127.9°	2°13.8'	+60.0'	128.0°	1°36.9'	+60.0'	128.0°	1°00.0'	+60.0'	128.5°	1
2	5°41.0'	+59.8'	127.7°	5°04.3'	+59.9'	127.8°	4°27.5'	+59.9'	127.8°	3°50.7'	+59.9'	127.9°	3°13.8'	+60.0'	127.9°	2°36.9'	+60.0'	128.0°	2°00.0'	+60.0'	124.5°	2
3	6°40.8'	+59.8'	127.6°	6°04.1'	+59.9'	127.7°	5°27.4'	+59.9'	127.8°	4°50.6'	+59.9'	127.8°	4°13.8'	+60.0'	127.9°	3°36.9'	+60.0'	128.0°	3°00.0'	+60.0'	124.6°	3
4	7°40.6'	+59.8'	127.5°	7°04.0'	+59.9'	127.6°	6°27.3'	+59.9'	127.7°	5°50.6'	+59.9'	127.8°	5°13.8'	+60.0'	127.9°	4°36.9'	+60.0'	127.9°	4°00.0'	+60.0'	132.9°	4
5	8°40.4'	+59.8'	127.4°	8°03.8'	+59.9'	127.5°	7°27.2'	+59.9'	127.7°	6°50.5'	+59.9'	127.8°	6°13.8'	+60.0'	127.8°	5°36.9'	+60.0'	127.9°	5°00.0'	+60.0'	117.1°	5
6	9°40.1'	+59.8'	127.3°	9°03.7'	+59.9'	127.5°	8°27.1'	+59.9'	127.6°	7°50.5'	+59.9'	127.7°	7°13.7'	+60.0'	127.8°	6°36.9'	+60.0'	127.9°	6°00.0'	+60.0'	117.1°	6
7	10°39.9'	+59.8'	127.3°	10°03.5'	+59.9'	127.4°	9°27.0'	+59.9'	127.5°	8°50.4'	+59.9'	127.7°	8°13.7'	+60.0'	127.8°	7°36.9'	+60.0'	127.9°	7°00.0'	+60.0'	117.2°	7
8	11°39.7'	+59.8'	127.2°	11°03.4'	+59.9'	127.3°	10°26.9'	+59.9'	127.5°	9°50.4'	+59.9'	127.6°	9°13.7'	+60.0'	127.8°	8°36.9'	+60.0'	127.9°	8°00.0'	+60.0'	90.0°	8
9	12°39.5'	+59.8'	127.1°	12°03.3'	+59.9'	127.3°	11°26.9'	+59.9'	127.4°	10°50.3'	+59.9'	127.6°	10°13.7'	+60.0'	127.7°	9°36.9'	+60.0'	127.9°	9°00.0'	+60.0'	117.3°	9
10	13°39.3'	+59.8'	127.0°	13°03.1'	+59.9'	127.2°	12°26.8'	+59.9'	127.4°	11°50.3'	+59.9'	127.5°	11°13.6'	+60.0'	127.7°	10°36.9'	+60.0'	127.9°	10°00.0'	+60.0'	117.4°	10
11	14°39.1'	+59.8'	126.9°	14°03.0'	+59.8'	127.1°	13°26.7'	+59.9'	127.3°	12°50.2'	+59.9'	127.5°	12°13.6'	+60.0'	127.7°	11°36.9'	+60.0'	127.8°	11°00.0'	+60.0'	117.5°	11
12	15°38.9'	+59.8'	126.8°	15°02.8'	+59.8'	127.0°	14°26.6'	+59.9'	127.3°	13°50.2'	+59.9'	127.5°	13°13.6'	+60.0'	127.6°	12°36.9'	+60.0'	127.8°	12°00.0'	+60.0'	157.9°	12
13	16°38.6'	+59.8'	126.7°	16°02.6'	+59.8'	127.0°	15°26.5'	+59.9'	127.2°	14°50.1'	+59.9'	127.4°	14°13.6'	+60.0'	127.6°	13°36.9'	+60.0'	127.8°	13°00.0'	+60.0'	158.4°	13
14	17°38.4'	+59.8'	126.6°	17°02.5'	+59.8'	126.9°	16°26.4'	+59.9'	127.1°	15°50.1'	+59.9'	127.4°	15°13.5'	+60.0'	127.6°	14°36.9'	+60.0'	127.8°	14°00.0'	+60.0'	159.1°	14
15	18°38.2'	+59.8'	126.6°	18°02.3'	+59.8'	126.8°	17°26.3'	+59.9'	127.1°	16°50.0'	+59.9'	127.3°	16°13.5'	+60.0'	127.6°	15°36.9'	+60.0'	127.8°	15°00.0'	+60.0'	159.7°	15
16	19°38.0'	+59.8'	126.5°	19°02.2'	+59.8'	126.7°	18°26.2'	+59.9'	127.0°	17°49.9'	+59.9'	127.3°	17°13.5'	+60.0'	127.5°	16°36.8'	+60.0'	127.8°	16°00.0'	+60.0'	160.5°	16
17	20°37.7'	+59.8'	126.4°	20°02.0'	+59.8'	126.7°	19°26.1'	+59.9'	127.0°	18°49.9'	+59.9'	127.2°	18°13.5'	+60.0'	127.5°	17°36.8'	+60.0'	127.8°	17°00.0'	+60.0'	161.4°	17
18	21°37.5'	+59.8'	126.3°	21°01.9'	+59.8'	126.6°	20°26.0'	+59.9'	126.9°	19°49.8'	+59.9'	127.2°	19°13.4'	+60.0'	127.5°	18°36.8'	+60.0'	127.7°	18°00.0'	+60.0'	162.3°	18
19	22°37.3'	+59.8'	126.2°	22°01.7'	+59.8'	126.5°	21°25.9'	+59.9'	126.8°	20°49.8'	+59.9'	127.1°	20°13.4'	+60.0'	127.4°	19°36.8'	+60.0'	127.7°	19°00.0'	+60.0'	163.4°	19
20	23°37.0'	+59.8'	126.1°	23°01.5'	+59.8'	126.4°	22°25.8'	+59.9'	126.8°	21°49.7'	+59.9'	127.1°	21°13.4'	+60.0'	127.4°	20°36.8'	+60.0'	127.7°	20°00.0'	+60.0'	164.7°	20
21	24°36.8'	+59.8'	126.0°	24°01.4'	+59.8'	126.3°	23°25.7'	+59.9'	126.7°	22°49.6'	+59.9'	127.0°	22°13.4'	+60.0'	127.4°	21°36.8'	+60.0'	127.7°	21°00.0'	+60.0'	90.0°	21
22	25°36.5'	+59.7'	125.9°	25°01.2'	+59.8'	126.3°	24°25.5'	+59.9'	126.6°	23°49.6'	+59.9'	127.0°	23°13.3'	+60.0'	127.3°	22°36.8'	+60.0'	127.7°	22°00.0'	+60.0'	180.0°	22
23	26°36.3'	+59.7'	125.8°	26°01.0'	+59.8'	126.2°	25°25.4'	+59.9'	126.6°	24°49.5'	+59.9'	126.9°	24°13.3'	+60.0'	127.3°	23°36.8'	+60.0'	127.7°	23°00.0'	+60.0'	169.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	3°36.4'	+59.8'	126.8°	3°00.4'	+59.9'	126.9°	2°24.4'	+59.9'	126.9°	1°48.3'	+59.9'	127.0°	1°12.2'	+60.0'	127.0°	0°36.1'	+60.0'	127.0°	0°00.0'	+60.0'	127.0°	0
1	4°36.2'	+59.8'	126.8°	4°00.3'	+59.9'	126.8°	3°24.3'	+59.9'	126.9°	2°48.2'	+59.9'	126.9°	2°12.2'	+60.0'	127.0°	1°36.1'	+60.0'	127.0°	1°00.0'	+60.0'	128.5°	1
2	5°36.0'	+59.8'	126.7°	5°00.1'	+59.9'	126.8°	4°24.2'	+59.9'	126.8°	3°48.2'	+59.9'	126.9°	3°12.2'	+60.0'	126.9°	2°36.1'	+60.0'	127.0°	2°00.0'	+60.0'	124.5°	2
3	6°35.8'	+59.8'	126.6°	6°00.0'	+59.9'	126.7°	5°24.1'	+59.9'	126.8°	4°48.1'	+59.9'	126.8°	4°12.1'	+60.0'	126.9°	3°36.1'	+60.0'	127.0°	3°00.0'	+60.0'	124.6°	3
4	7°35.6'	+59.8'	126.5°	6°59.8'	+59.9'	126.6°	6°24.0'	+59.9'	126.7°	5°48.1'	+59.9'	126.8°	5°12.1'	+60.0'	126.9°	4°36.1'	+60.0'	126.9°	4°00.0'	+60.0'	132.9°	4
5	8°35.3'	+59.8'	126.4°	7°59.7'	+59.9'	126.5°	7°23.9'	+59.9'	126.7°	6°48.0'	+59.9'	126.8°	6°12.1'	+60.0'	126.8°	5°36.1'	+60.0'	126.9°	5°00.0'	+60.0'	117.1°	5
6	9°35.1'	+59.8'	126.3°	8°59.5'	+59.9'	126.5°	8°23.8'	+59.9'	126.6°	7°48.0'	+59.9'	126.7°	7°12.1'	+60.0'	126.8°	6°36.1'	+60.0'	126.9°	6°00.0'	+60.0'	117.1°	6
7	10°34.9'	+59.8'	126.3°	9°59.4'	+59.8'	126.4°	9°23.7'	+59.9'	126.5°	8°47.9'	+59.9'	126.7°	8°12.0'	+60.0'	126.8°	7°36.1'	+60.0'	126.9°	7°00.0'	+60.0'	117.2°	7
8	11°34.7'	+59.8'	126.2°	10°59.2'	+59.8'	126.3°	10°23.6'	+59.9'	126.5°	9°47.9'	+59.9'	126.6°	9°12.0'	+60.0'	126.8°	8°36.1'	+60.0'	126.9°	8°00.0'	+60.0'	90.0°	8
9	12°34.5'	+59.8'	126.1°	11°59.1'	+59.8'	126.3°	11°23.5'	+59.9'	126.4°	10°47.8'	+59.9'	126.6°	10°12.0'	+60.0'	126.7°	9°36.1'	+60.0'	126.9°	9°00.0'	+60.0'	117.3°	9
10	13°34.3'	+59.8'	126.0°	12°58.9'	+59.8'	126.2°	12°23.4'	+59.9'	126.4°	11°47.8'	+59.9'	126.5°	11°12.0'	+60.0'	126.7°	10°36.0'	+60.0'	126.9°	10°00.0'	+60.0'	117.4°	10
11	14°34.0'	+59.8'	125.9°	13°58.8'	+59.8'	126.1°	13°23.3'	+59.9'	126.3°	12°47.7'	+59.9'	126.5°	12°11.9'	+60.0'	126.7°	11°36.0'	+60.0'	126.8°	11°00.0'	+60.0'	117.5°	11
12	15°33.8'	+59.8'	125.8°	14°58.6'	+59.8'	126.0°	14°23.2'	+59.9'	126.2°	13°47.7'	+59.9'	126.4°	13°11.9'	+60.0'	126.6°	12°36.0'	+60.0'	126.8°	12°00.0'	+60.0'	157.9°	12
13	16°33.6'	+59.8'	125.7°	15°58.4'	+59.8'	126.0°	15°23.1'	+59.9'	126.2°	14°47.6'	+59.9'	126.4°	14°11.9'	+60.0'	126.6°	13°36.0'	+60.0'	126.8°	13°00.0'	+60.0'	158.4°	13
14	17°33.3'	+59.8'	125.6°	16°58.3'	+59.8'	125.9°	16°23.0'	+59.9'	126.1°	15°47.5'	+59.9'	126.4°	15°11.9'	+60.0'	126.6°	14°36.0'	+60.0'	126.8°	14°00.0'	+60.0'	159.1°	14
15	18°33.1'	+59.8'	125.5°	17°58.1'	+59.8'	125.8°	17°22.9'	+59.9'	126.1°	16°47.5'	+59.9'	126.3°	16°11.8'	+60.0'	126.6°	15°36.0'	+60.0'	126.8°	15°00.0'	+60.0'	159.7°	15
16	19°32.9'	+59.8'	125.4°	18°58.0'	+59.8'	125.7°	18°22.8'	+59.9'	126.0°	17°47.4'	+59.9'	126.3°	17°11.8'	+60.0'	126.5°	16°36.0'	+60.0'	126.8°	16°00.0'	+60.0'	160.5°	16
17	20°32.6'	+59.8'	125.4°	19°57.8'	+59.8'	125.7°	19°22.7'	+59.9'	125.9°	18°47.4'	+59.9'	126.2°	18°11.8'	+60.0'	126.5°	17°36.0'	+60.0'	126.8°	17°00.0'	+60.0'	161.4°	17
18	21°32.4'	+59.8'	125.3°	20°57.6'	+59.8'	125.6°	20°22.6'	+59.9'	125.8°	19°47.3'	+59.9'	126.2°	19°11.8'	+60.0'	126.5°	18°36.0'	+60.0'	126.7°	18°00.0'	+60.0'	162.3°	18
19	22°32.2'	+59.8'	125.2°	21°57.5'	+59.8'	125.5°	21°22.5'	+59.9'	125.8°	20°47.2'	+59.9'	126.1°	20°11.7'	+60.0'	126.4°	19°36.0'	+60.0'	126.7°	19°00.0'	+60.0'	163.4°	19
20	23°31.9'	+59.7'	125.1°	22°57.3'	+59.8'	125.4°	22°22.4'	+59.9'	125.8°	21°47.2'	+59.9'	126.1°	21°11.7'	+60.0'	126.4°	20°36.0'	+60.0'	126.7°	20°00.0'	+60.0'	164.7°	20
21	24°31.7'	+59.7'	125.0°	23°57.1'	+59.8'	125.3°	23°22.3'	+59.9'	125.7°													

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

54° 306° LHA

Latitude SAME as Declination

54° 306° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	3°31.3'	+59.8'	125.9°	2°56.2'	+59.9'	125.9°	2°21.0'	+59.9'	125.9°	1°45.8'	+59.9'	126.0°	1°10.5'	+60.0'	126.0°	0°35.3'	+60.0'	126.0°	0°00.0'	+60.0'	126.0°	0
1	4°31.1'	+59.8'	125.8°	3°56.0'	+59.8'	125.8°	3°20.9'	+59.9'	125.9°	2°45.7'	+59.9'	125.9°	2°10.5'	+60.0'	126.0°	1°35.3'	+60.0'	126.0°	1°00.0'	+60.0'	124.5°	1
2	5°30.9'	+59.8'	125.7°	4°55.9'	+59.8'	125.8°	4°20.8'	+59.9'	125.8°	3°45.7'	+59.9'	125.9°	3°10.5'	+60.0'	125.9°	2°35.3'	+60.0'	126.0°	2°00.0'	+60.0'	124.5°	2
3	6°30.7'	+59.8'	125.6°	5°55.7'	+59.8'	125.7°	5°20.7'	+59.9'	125.8°	4°45.6'	+59.9'	125.8°	4°10.5'	+60.0'	125.9°	3°35.2'	+60.0'	126.0°	3°00.0'	+60.0'	124.6°	3
4	7°30.5'	+59.8'	125.5°	6°55.6'	+59.8'	125.6°	6°20.6'	+59.9'	125.7°	5°45.6'	+59.9'	125.8°	5°10.4'	+60.0'	125.9°	4°35.2'	+60.0'	125.9°	4°00.0'	+60.0'	132.9°	4
5	8°30.3'	+59.8'	125.4°	7°55.4'	+59.8'	125.5°	7°20.5'	+59.9'	125.6°	6°45.5'	+59.9'	125.7°	6°10.4'	+60.0'	125.8°	5°35.2'	+60.0'	125.9°	5°00.0'	+60.0'	117.1°	5
6	9°30.0'	+59.8'	125.3°	8°55.3'	+59.8'	125.5°	8°20.4'	+59.9'	125.6°	7°45.4'	+59.9'	125.7°	7°10.4'	+60.0'	125.8°	6°35.2'	+60.0'	125.9°	6°00.0'	+60.0'	117.1°	6
7	10°29.8'	+59.8'	125.2°	9°55.1'	+59.8'	125.4°	9°20.3'	+59.9'	125.5°	8°45.4'	+59.9'	125.7°	8°10.4'	+60.0'	125.8°	7°35.2'	+60.0'	125.9°	7°00.0'	+60.0'	117.2°	7
8	11°29.6'	+59.8'	125.2°	10°55.0'	+59.8'	125.3°	10°20.2'	+59.9'	125.5°	9°45.3'	+59.9'	125.6°	9°10.3'	+60.0'	125.8°	8°35.2'	+60.0'	125.9°	8°00.0'	+60.0'	90.0°	8
9	12°29.4'	+59.8'	125.1°	11°54.8'	+59.8'	125.2°	11°20.1'	+59.9'	125.4°	10°45.3'	+59.9'	125.6°	10°10.3'	+60.0'	125.7°	9°35.2'	+60.0'	125.9°	9°00.0'	+60.0'	117.3°	9
10	13°29.1'	+59.8'	125.0°	12°54.7'	+59.8'	125.2°	12°20.0'	+59.9'	125.4°	11°45.2'	+59.9'	125.5°	11°10.3'	+60.0'	125.7°	10°35.2'	+60.0'	125.9°	10°00.0'	+60.0'	117.4°	10
11	14°28.9'	+59.8'	124.9°	13°54.5'	+59.8'	125.1°	13°19.9'	+59.9'	125.3°	12°45.2'	+59.9'	125.5°	12°10.3'	+60.0'	125.7°	11°35.2'	+60.0'	125.8°	11°00.0'	+60.0'	117.5°	11
12	15°28.7'	+59.8'	124.8°	14°54.3'	+59.8'	125.0°	14°19.8'	+59.9'	125.2°	13°45.1'	+59.9'	125.4°	13°10.2'	+60.0'	125.6°	12°35.2'	+60.0'	125.8°	12°00.0'	+60.0'	157.9°	12
13	16°28.5'	+59.8'	124.7°	15°54.2'	+59.8'	124.9°	15°19.7'	+59.9'	125.2°	14°45.1'	+59.9'	125.4°	14°10.2'	+60.0'	125.6°	13°35.2'	+60.0'	125.8°	13°00.0'	+60.0'	158.4°	13
14	17°28.2'	+59.8'	124.6°	16°54.0'	+59.8'	124.9°	16°19.6'	+59.9'	125.1°	15°45.0'	+59.9'	125.4°	15°10.2'	+60.0'	125.6°	14°35.2'	+60.0'	125.8°	14°00.0'	+60.0'	159.1°	14
15	18°28.0'	+59.8'	124.5°	17°53.9'	+59.8'	124.8°	17°19.5'	+59.9'	125.1°	16°44.9'	+59.9'	125.3°	16°10.2'	+60.0'	125.5°	15°35.2'	+60.0'	125.8°	15°00.0'	+60.0'	159.7°	15
16	19°27.7'	+59.8'	124.4°	18°53.7'	+59.8'	124.7°	18°19.4'	+59.9'	125.0°	17°44.9'	+59.9'	125.3°	17°10.1'	+60.0'	125.5°	16°35.2'	+60.0'	125.8°	16°00.0'	+60.0'	160.5°	16
17	20°27.5'	+59.8'	124.3°	19°53.5'	+59.8'	124.6°	19°19.3'	+59.9'	124.9°	18°44.8'	+59.9'	125.2°	18°10.1'	+60.0'	125.5°	17°35.2'	+60.0'	125.7°	17°00.0'	+60.0'	161.4°	17
18	21°27.3'	+59.8'	124.2°	20°53.4'	+59.8'	124.6°	20°19.2'	+59.9'	124.9°	19°44.8'	+59.9'	125.2°	19°10.1'	+60.0'	125.5°	18°35.2'	+60.0'	125.7°	18°00.0'	+60.0'	162.3°	18
19	22°27.0'	+59.7'	124.1°	21°53.2'	+59.8'	124.5°	21°19.1'	+59.9'	124.8°	20°44.7'	+59.9'	125.1°	20°10.0'	+60.0'	125.4°	19°35.1'	+60.0'	125.7°	19°00.0'	+60.0'	163.4°	19
20	23°26.7'	+59.7'	124.0°	22°53.0'	+59.8'	124.4°	22°19.0'	+59.9'	124.7°	21°44.6'	+59.9'	125.1°	21°10.0'	+60.0'	125.4°	20°35.1'	+60.0'	125.7°	20°00.0'	+60.0'	164.7°	20
21	24°26.5'	+59.7'	123.9°	23°52.8'	+59.8'	124.3°	23°18.9'	+59.9'	124.6°	22°44.6'	+59.9'	125.0°	22°10.0'	+60.0'	125.4°	21°35.1'	+60.0'	125.7°	21°00.0'	+60.0'	90.0°	21
22	25°26.2'	+59.7'	123.8°	24°52.7'	+59.8'	124.2°	24°18.7'	+59.9'	124.6°	23°44.5'	+59.9'	125.0°	23°10.0'	+60.0'	125.3°	22°35.1'	+60.0'	125.7°	22°00.0'	+60.0'	180.0°	22
23	26°26.0'	+59.7'	123.7°	25°52.5'	+59.8'	124.1°	25°18.6'	+59.9'	124.5°	24°44.4'	+59.9'	124.9°	24°09.9'	+60.0'	125.3°	23°35.1'	+60.0'	125.7°	23°00.0'	+60.0'	169.9°	23
Dec°	84			85			86			87			88			89			90			Dec°

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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	3°26.2'	+59.8'	124.9°	2°51.9'	+59.8'	124.9°	2°17.6'	+59.9'	124.9°	1°43.2'	+59.9'	125.0°	1°08.8'	+60.0'	125.0°	0°34.4'	+60.0'	125.0°	0°00.0'	+60.0'	125.0°	0
1	4°26.0'	+59.8'	124.8°	3°51.8'	+59.8'	124.8°	3°17.5'	+59.9'	124.9°	2°43.2'	+59.9'	124.9°	2°08.8'	+60.0'	125.0°	1°34.4'	+60.0'	125.0°	1°00.0'	+60.0'	124.5°	1
2	5°25.8'	+59.8'	124.7°	4°51.6'	+59.8'	124.8°	4°17.4'	+59.9'	124.8°	3°43.1'	+59.9'	124.9°	3°08.8'	+60.0'	124.9°	2°34.4'	+60.0'	125.0°	2°00.0'	+60.0'	124.5°	2
3	6°25.6'	+59.8'	124.6°	5°51.5'	+59.8'	124.7°	5°17.3'	+59.9'	124.8°	4°43.0'	+59.9'	124.8°	4°08.7'	+60.0'	124.9°	3°34.4'	+60.0'	125.0°	3°00.0'	+60.0'	124.6°	3
4	7°25.3'	+59.8'	124.5°	6°51.3'	+59.8'	124.6°	6°17.2'	+59.9'	124.7°	5°43.0'	+59.9'	124.8°	5°08.7'	+60.0'	124.9°	4°34.4'	+60.0'	124.9°	4°00.0'	+60.0'	132.9°	4
5	8°25.1'	+59.8'	124.4°	7°51.2'	+59.8'	124.5°	7°17.1'	+59.9'	124.6°	6°42.9'	+59.9'	124.7°	6°08.7'	+60.0'	124.8°	5°34.4'	+60.0'	124.9°	5°00.0'	+60.0'	117.1°	5
6	9°24.9'	+59.8'	124.3°	8°51.0'	+59.8'	124.5°	8°17.0'	+59.9'	124.6°	7°42.9'	+59.9'	124.7°	7°08.7'	+60.0'	124.8°	6°34.4'	+60.0'	124.9°	6°00.0'	+60.0'	117.1°	6
7	10°24.7'	+59.8'	124.2°	9°50.8'	+59.8'	124.4°	9°16.9'	+59.9'	124.5°	8°42.8'	+59.9'	124.7°	8°08.6'	+60.0'	124.8°	7°34.4'	+60.0'	124.9°	7°00.0'	+60.0'	117.2°	7
8	11°24.4'	+59.8'	124.2°	10°50.7'	+59.8'	124.3°	10°16.8'	+59.9'	124.5°	9°42.8'	+59.9'	124.6°	9°08.6'	+60.0'	124.8°	8°34.4'	+60.0'	124.9°	8°00.0'	+60.0'	90.0°	8
9	12°24.2'	+59.8'	124.1°	11°50.5'	+59.8'	124.2°	11°16.7'	+59.9'	124.4°	10°42.7'	+59.9'	124.6°	10°08.6'	+60.0'	124.7°	9°34.4'	+60.0'	124.9°	9°00.0'	+60.0'	117.3°	9
10	13°24.0'	+59.8'	124.0°	12°50.4'	+59.8'	124.2°	12°16.6'	+59.9'	124.4°	11°42.7'	+59.9'	124.5°	11°08.6'	+60.0'	124.7°	10°34.4'	+60.0'	124.9°	10°00.0'	+60.0'	117.4°	10
11	14°23.7'	+59.8'	123.9°	13°50.2'	+59.8'	124.1°	13°16.5'	+59.9'	124.3°	12°42.6'	+59.9'	124.5°	12°08.5'	+60.0'	124.7°	11°34.3'	+60.0'	124.8°	11°00.0'	+60.0'	117.5°	11
12	15°23.5'	+59.8'	123.8°	14°50.0'	+59.8'	124.0°	14°16.4'	+59.9'	124.2°	13°42.5'	+59.9'	124.4°	13°08.5'	+60.0'	124.6°	12°34.3'	+60.0'	124.8°	12°00.0'	+60.0'	157.9°	12
13	16°23.3'	+59.8'	123.7°	15°49.9'	+59.8'	123.9°	15°16.3'	+59.9'	124.2°	14°42.5'	+59.9'	124.4°	14°08.5'	+60.0'	124.6°	13°34.3'	+60.0'	124.8°	13°00.0'	+60.0'	158.4°	13
14	17°23.0'	+59.8'	123.6°	16°49.7'	+59.8'	123.9°	16°16.2'	+59.9'	124.1°	15°42.4'	+59.9'	124.3°	15°08.5'	+60.0'	124.6°	14°34.3'	+60.0'	124.8°	14°00.0'	+60.0'	159.1°	14
15	18°22.8'	+59.8'	123.5°	17°49.5'	+59.8'	123.8°	17°16.1'	+59.9'	124.0°	16°42.4'	+59.9'	124.3°	16°08.4'	+60.0'	124.5°	15°34.3'	+60.0'	124.8°	15°00.0'	+60.0'	159.7°	15
16	19°22.5'	+59.8'	123.4°	18°49.4'	+59.8'	123.7°	18°16.0'	+59.9'	124.0°	17°42.3'	+59.9'	124.3°	17°08.4'	+60.0'	124.5°	16°34.3'	+60.0'	124.8°	16°00.0'	+60.0'	160.5°	16
17	20°22.3'	+59.7'	123.3°	19°49.2'	+59.8'	123.6°	19°15.8'	+59.9'	123.9°	18°42.2'	+59.9'	124.2°	18°08.4'	+60.0'	124.5°	17°34.3'	+60.0'	124.7°	17°00.0'	+60.0'	161.4°	17
18	21°22.0'	+59.7'	123.2°	20°49.0'	+59.8'	123.5°	20°15.7'	+59.9'	123.8°	19°42.2'	+59.9'	124.2°	19°08.4'	+60.0'	124.4°	18°34.3'	+60.0'	124.7°	18°00.0'	+60.0'	162.3°	18
19	22°21.8'	+59.7'	123.1°	21°48.8'	+59.8'	123.5°	21°15.6'	+59.9'	123.8°	20°42.1'	+59.9'	124.1°	20°08.3'	+60.0'	124.4°	19°34.3'	+60.0'	124.7°	19°00.0'	+60.0'	163.4°	19
20	23°21.5'	+59.7'	123.0°	22°48.7'	+59.8'	123.4°	22°15.5'	+59.9'	123.7°	21°42.0'	+59.9'	124.1°	21°08.3'	+60.0'	124.4°	20°34.3'	+60.0'	124.7°	20°00.0'	+60.0'	164.7°	20
21	24°21.3'	+59.7'	122.9°	23°48.5'	+59.8'	123.3°	23°15.4'	+59.9'	123.7°	22°42.0'	+59.9'	124.0°	22°08.3'	+60.0'	124.3°	21°34.3'	+60.0'	124.7°	21°00.0'	+60.0'	90.0°	21
22	25°21.0'	+59.7																				

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

56° 304° LHA

Latitude SAME as Declination

56° 304° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	3°21.1'	+59.8'	123.9°	2°47.6'	+59.8'	123.9°	2°14.1'	+59.9'	123.9°	1°40.6'	+59.9'	124.0°	1°07.1'	+60.0'	124.0°	0°33.6'	+60.0'	124.0°	0°00.0'	+60.0'	124.0°	0
1	4°20.8'	+59.8'	123.8°	3°47.5'	+59.8'	123.8°	3°14.0'	+59.9'	123.9°	2°40.6'	+59.9'	123.9°	2°07.1'	+60.0'	124.0°	1°33.5'	+60.0'	124.0°	1°00.0'	+60.0'	124.5°	1
2	5°20.6'	+59.8'	123.7°	4°47.3'	+59.8'	123.8°	4°13.9'	+59.9'	123.8°	3°40.5'	+59.9'	123.9°	3°07.0'	+60.0'	123.9°	2°33.5'	+60.0'	124.0°	2°00.0'	+60.0'	124.5°	2
3	6°20.4'	+59.8'	123.6°	5°47.1'	+59.8'	123.7°	5°13.8'	+59.9'	123.8°	4°40.5'	+59.9'	123.8°	4°07.0'	+60.0'	123.9°	3°33.5'	+60.0'	124.0°	3°00.0'	+60.0'	124.6°	3
4	7°20.1'	+59.8'	123.5°	6°47.0'	+59.8'	123.6°	6°13.7'	+59.9'	123.7°	5°40.4'	+59.9'	123.8°	5°07.0'	+60.0'	123.9°	4°33.5'	+60.0'	123.9°	4°00.0'	+60.0'	117.0°	4
5	8°19.9'	+59.8'	123.4°	7°46.8'	+59.8'	123.5°	7°13.6'	+59.9'	123.6°	6°40.3'	+59.9'	123.7°	6°07.0'	+60.0'	123.8°	5°33.5'	+60.0'	123.9°	5°00.0'	+60.0'	103.1°	5
6	9°19.7'	+59.8'	123.3°	8°46.7'	+59.8'	123.5°	8°13.5'	+59.9'	123.6°	7°40.3'	+59.9'	123.7°	7°06.9'	+60.0'	123.8°	6°33.5'	+60.0'	123.9°	6°00.0'	+60.0'	103.2°	6
7	10°19.5'	+59.8'	123.2°	9°46.5'	+59.8'	123.4°	9°13.4'	+59.9'	123.5°	8°40.2'	+59.9'	123.7°	8°06.9'	+60.0'	123.8°	7°33.5'	+60.0'	123.9°	7°00.0'	+60.0'	103.2°	7
8	11°19.2'	+59.8'	123.1°	10°46.3'	+59.8'	123.3°	10°13.3'	+59.9'	123.5°	9°40.2'	+59.9'	123.6°	9°06.9'	+60.0'	123.8°	8°33.5'	+60.0'	123.9°	8°00.0'	+60.0'	90.0°	8
9	12°19.0'	+59.8'	123.1°	11°46.2'	+59.8'	123.2°	11°13.2'	+59.9'	123.4°	10°40.1'	+59.9'	123.6°	10°06.9'	+60.0'	123.7°	9°33.5'	+60.0'	123.9°	9°00.0'	+60.0'	117.3°	9
10	13°18.7'	+59.8'	123.0°	12°46.0'	+59.8'	123.2°	12°13.1'	+59.9'	123.3°	11°40.0'	+59.9'	123.5°	11°06.8'	+60.0'	123.7°	10°33.5'	+60.0'	123.8°	10°00.0'	+60.0'	117.4°	10
11	14°18.5'	+59.8'	122.9°	13°45.8'	+59.8'	123.1°	13°13.0'	+59.9'	123.3°	12°40.0'	+59.9'	123.5°	12°06.8'	+60.0'	123.7°	11°33.5'	+60.0'	123.8°	11°00.0'	+60.0'	117.5°	11
12	15°18.3'	+59.8'	122.8°	14°45.7'	+59.8'	123.0°	14°12.9'	+59.9'	123.2°	13°39.9'	+59.9'	123.4°	13°06.8'	+60.0'	123.6°	12°33.5'	+60.0'	123.8°	12°00.0'	+60.0'	157.9°	12
13	16°18.0'	+59.8'	122.7°	15°45.5'	+59.8'	122.9°	15°12.8'	+59.9'	123.2°	14°39.9'	+59.9'	123.4°	14°06.8'	+60.0'	123.6°	13°33.5'	+60.0'	123.8°	13°00.0'	+60.0'	158.4°	13
14	17°17.8'	+59.8'	122.6°	16°45.3'	+59.8'	122.9°	16°12.7'	+59.9'	123.1°	15°39.8'	+59.9'	123.3°	15°06.7'	+60.0'	123.6°	14°33.5'	+60.0'	123.8°	14°00.0'	+60.0'	159.1°	14
15	18°17.5'	+59.7'	122.5°	17°45.2'	+59.8'	122.8°	17°12.6'	+59.9'	123.0°	16°39.7'	+59.9'	123.3°	16°06.7'	+60.0'	123.5°	15°33.5'	+60.0'	123.8°	15°00.0'	+60.0'	159.7°	15
16	19°17.3'	+59.7'	122.4°	18°45.0'	+59.8'	122.7°	18°12.5'	+59.9'	123.0°	17°39.7'	+59.9'	123.2°	17°06.7'	+60.0'	123.5°	16°33.4'	+60.0'	123.8°	16°00.0'	+60.0'	160.5°	16
17	20°17.0'	+59.7'	122.3°	19°44.8'	+59.8'	122.6°	19°12.3'	+59.9'	122.9°	18°39.6'	+59.9'	123.2°	18°06.7'	+60.0'	123.5°	17°33.4'	+60.0'	123.7°	17°00.0'	+60.0'	161.4°	17
18	21°16.8'	+59.7'	122.2°	20°44.6'	+59.8'	122.5°	20°12.2'	+59.9'	122.8°	19°39.6'	+59.9'	123.1°	19°06.6'	+60.0'	123.4°	18°33.4'	+60.0'	123.7°	18°00.0'	+60.0'	162.3°	18
19	22°16.5'	+59.7'	122.1°	21°44.5'	+59.8'	122.4°	21°12.1'	+59.9'	122.8°	20°39.5'	+59.9'	123.1°	20°06.6'	+60.0'	123.4°	19°33.4'	+60.0'	123.7°	19°00.0'	+60.0'	163.4°	19
20	23°16.2'	+59.7'	122.0°	22°44.3'	+59.8'	122.4°	22°12.0'	+59.9'	122.7°	21°39.4'	+59.9'	123.0°	21°06.6'	+60.0'	123.4°	20°33.4'	+60.0'	123.7°	20°00.0'	+60.0'	164.7°	20
21	24°16.0'	+59.7'	121.9°	23°44.1'	+59.8'	122.3°	23°11.9'	+59.9'	122.6°	22°39.4'	+59.9'	123.0°	22°06.5'	+60.0'	123.3°	21°33.4'	+60.0'	123.7°	21°00.0'	+60.0'	90.0°	21
22	25°15.7'	+59.7'	121.8°	24°43.9'	+59.8'	122.2°	24°11.8'	+59.9'	122.6°	23°39.3'	+59.9'	122.9°	23°06.5'	+60.0'	123.3°	22°33.4'	+60.0'	123.7°	22°00.0'	+60.0'	180.0°	22
23	26°15.4'	+59.7'	121.7°	25°43.7'	+59.8'	122.1°	25°11.6'	+59.9'	122.5°	24°39.2'	+59.9'	122.9°	24°06.5'	+60.0'	123.3°	23°33.4'	+60.0'	123.6°	23°00.0'	+60.0'	169.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	3°15.8'	+59.8'	122.9°	2°43.2'	+59.8'	122.9°	2°10.6'	+59.9'	122.9°	1°38.0'	+59.9'	123.0°	1°05.3'	+60.0'	123.0°	0°32.7'	+60.0'	123.0°	0°00.0'	+60.0'	123.0°	0
1	4°15.6'	+59.8'	122.8°	3°43.1'	+59.8'	122.8°	3°10.5'	+59.9'	122.9°	2°37.9'	+59.9'	122.9°	2°05.3'	+60.0'	123.0°	1°32.7'	+60.0'	123.0°	1°00.0'	+60.0'	124.5°	1
2	5°15.4'	+59.8'	122.7°	4°42.9'	+59.8'	122.8°	4°10.4'	+59.9'	122.8°	3°37.9'	+59.9'	122.9°	3°05.3'	+60.0'	122.9°	2°32.7'	+60.0'	123.0°	2°00.0'	+60.0'	124.5°	2
3	6°15.1'	+59.8'	122.6°	5°42.8'	+59.8'	122.7°	5°10.3'	+59.9'	122.8°	4°37.8'	+59.9'	122.8°	4°05.3'	+60.0'	122.9°	3°32.7'	+60.0'	123.0°	3°00.0'	+60.0'	124.6°	3
4	7°14.9'	+59.8'	122.5°	6°42.6'	+59.8'	122.6°	6°10.2'	+59.9'	122.7°	5°37.8'	+59.9'	122.8°	5°05.2'	+60.0'	122.9°	4°32.7'	+60.0'	122.9°	4°00.0'	+60.0'	117.0°	4
5	8°14.7'	+59.8'	122.4°	7°42.4'	+59.8'	122.5°	7°10.1'	+59.9'	122.6°	6°37.7'	+59.9'	122.7°	6°05.2'	+60.0'	122.8°	5°32.6'	+60.0'	122.9°	5°00.0'	+60.0'	103.1°	5
6	9°14.4'	+59.8'	122.3°	8°42.3'	+59.8'	122.5°	8°10.0'	+59.9'	122.6°	7°37.7'	+59.9'	122.7°	7°05.2'	+60.0'	122.8°	6°32.6'	+60.0'	122.9°	6°00.0'	+60.0'	103.2°	6
7	10°14.2'	+59.8'	122.2°	9°42.1'	+59.8'	122.4°	9°09.9'	+59.9'	122.5°	8°37.6'	+59.9'	122.7°	8°05.2'	+60.0'	122.8°	7°32.6'	+60.0'	122.9°	7°00.0'	+60.0'	103.2°	7
8	11°13.9'	+59.8'	122.1°	10°41.9'	+59.8'	122.3°	10°09.8'	+59.9'	122.5°	9°37.5'	+59.9'	122.6°	9°05.1'	+60.0'	122.7°	8°32.6'	+60.0'	122.9°	8°00.0'	+60.0'	90.0°	8
9	12°13.7'	+59.8'	122.1°	11°41.8'	+59.8'	122.2°	11°09.7'	+59.9'	122.4°	10°37.5'	+59.9'	122.6°	10°05.1'	+60.0'	122.7°	9°32.6'	+60.0'	122.9°	9°00.0'	+60.0'	117.3°	9
10	13°13.5'	+59.8'	122.0°	12°41.6'	+59.8'	122.2°	12°09.6'	+59.9'	122.3°	11°37.4'	+59.9'	122.5°	11°05.1'	+60.0'	122.7°	10°32.6'	+60.0'	122.8°	10°00.0'	+60.0'	117.4°	10
11	14°13.2'	+59.8'	121.9°	13°41.4'	+59.8'	122.1°	13°09.5'	+59.9'	122.3°	12°37.4'	+59.9'	122.5°	12°05.1'	+60.0'	122.7°	11°32.6'	+60.0'	122.8°	11°00.0'	+60.0'	117.5°	11
12	15°13.0'	+59.8'	121.8°	14°41.3'	+59.8'	122.0°	14°09.4'	+59.9'	122.2°	13°37.3'	+59.9'	122.4°	13°05.0'	+60.0'	122.6°	12°32.6'	+60.0'	122.8°	12°00.0'	+60.0'	157.9°	12
13	16°12.7'	+59.7'	121.7°	15°41.1'	+59.8'	121.9°	15°09.3'	+59.9'	122.2°	14°37.2'	+59.9'	122.4°	14°05.0'	+60.0'	122.6°	13°32.6'	+60.0'	122.8°	13°00.0'	+60.0'	158.4°	13
14	17°12.5'	+59.7'	121.6°	16°40.9'	+59.8'	121.8°	16°09.2'	+59.9'	122.1°	15°37.2'	+59.9'	122.3°	15°05.0'	+60.0'	122.6°	14°32.6'	+60.0'	122.8°	14°00.0'	+60.0'	159.1°	14
15	18°12.2'	+59.7'	121.5°	17°40.7'	+59.8'	121.8°	17°09.0'	+59.9'	122.0°	16°37.1'	+59.9'	122.3°	16°05.0'	+60.0'	122.5°	15°32.6'	+60.0'	122.8°	15°00.0'	+60.0'	159.7°	15
16	19°11.9'	+59.7'	121.4°	18°40.6'	+59.8'	121.7°	18°08.9'	+59.9'	122.0°	17°37.0'	+59.9'	122.2°	17°04.9'	+60.0'	122.5°	16°32.6'	+60.0'	122.8°	16°00.0'	+60.0'	160.5°	16
17	20°11.7'	+59.7'	121.3°	19°40.4'	+59.8'	121.6°	19°08.8'	+59.9'	121.9°	18°37.0'	+59.9'	122.2°	18°04.9'	+60.0'	122.5°	17°32.6'	+60.0'	122.7°	17°00.0'	+60.0'	161.4°	17
18	21°11.4'	+59.7'	121.2°	20°40.2'	+59.8'	121.5°	20°08.7'	+59.9'	121.8°	19°36.9'	+59.9'	122.1°	19°04.9'	+60.0'	122.4°	18°32.6'	+60.0'	122.7°	18°00.0'	+60.0'	162.3°	18
19	22°11.2'	+59.7'	121.1°	21°40.0'	+59.8'	121.4°	21°08.6'	+59.9'	121.8°	20°36.9'	+59.9'	122.1°	20°04.8'	+60.0'	122.4°	19°32.5'	+60.0'	122.7°	19°00.0'	+60.0'	163.4°	19
20	23°10.9'	+59.7'	121.0°	22°39.8'	+59.8'	121.3°	22°08.5'	+59.9'	121.7°	21°36.8'	+59.9'	122.0°	21°04.8'	+60.0'	122.4°	20°32.5'	+60.0'	122.7°	20°00.0'	+60.0'	164.7°	20
21	24°10.6'	+59.7'	120.9°	23°39.6'	+59.8'	121.3°	23°08.3'	+59.9'	121.6°													

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

58° 302° LHA

Latitude SAME as Declination

58° 302° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	3°10.5'	+59.8'	121.9°	2°38.8'	+59.8'	121.9°	2°07.1'	+59.9'	121.9°	1°35.4'	+59.9'	122.0°	1°03.6'	+60.0'	122.0°	0°31.8'	+60.0'	122.0°	0°00.0'	+60.0'	122.0°	0
1	4°10.3'	+59.8'	121.8°	3°38.7'	+59.8'	121.8°	3°07.0'	+59.9'	121.9°	2°35.3'	+59.9'	121.9°	2°03.6'	+60.0'	122.0°	1°31.8'	+60.0'	122.0°	1°00.0'	+60.0'	120.7°	1
2	5°10.0'	+59.8'	121.7°	4°38.5'	+59.8'	121.8°	4°06.9'	+59.9'	121.8°	3°35.2'	+59.9'	121.9°	3°03.5'	+60.0'	121.9°	2°31.8'	+60.0'	122.0°	2°00.0'	+60.0'	124.5°	2
3	6°09.8'	+59.8'	121.6°	5°38.3'	+59.8'	121.7°	5°06.8'	+59.9'	121.8°	4°35.2'	+59.9'	121.8°	4°03.5'	+60.0'	121.9°	3°31.8'	+60.0'	122.0°	3°00.0'	+60.0'	124.6°	3
4	7°09.6'	+59.8'	121.5°	6°38.2'	+59.8'	121.6°	6°06.7'	+59.9'	121.7°	5°35.1'	+59.9'	121.8°	5°03.5'	+60.0'	121.9°	4°31.8'	+60.0'	121.9°	4°00.0'	+60.0'	117.0°	4
5	8°09.3'	+59.8'	121.4°	7°38.0'	+59.8'	121.5°	7°06.6'	+59.9'	121.6°	6°35.1'	+59.9'	121.7°	6°03.4'	+60.0'	121.8°	5°31.8'	+60.0'	121.9°	5°00.0'	+60.0'	103.1°	5
6	9°09.1'	+59.8'	121.3°	8°37.8'	+59.8'	121.5°	8°06.5'	+59.9'	121.6°	7°35.0'	+59.9'	121.7°	7°03.4'	+60.0'	121.8°	6°31.8'	+60.0'	121.9°	6°00.0'	+60.0'	103.2°	6
7	10°08.8'	+59.8'	121.2°	9°37.7'	+59.8'	121.4°	9°06.4'	+59.9'	121.5°	8°34.9'	+59.9'	121.7°	8°03.4'	+60.0'	121.8°	7°31.7'	+60.0'	121.9°	7°00.0'	+60.0'	103.2°	7
8	11°08.6'	+59.8'	121.1°	10°37.5'	+59.8'	121.3°	10°06.3'	+59.9'	121.5°	9°34.9'	+59.9'	121.6°	9°03.4'	+60.0'	121.7°	8°31.7'	+60.0'	121.9°	8°00.0'	+60.0'	90.0°	8
9	12°08.4'	+59.8'	121.0°	11°37.3'	+59.8'	121.2°	11°06.1'	+59.9'	121.4°	10°34.8'	+59.9'	121.6°	10°03.3'	+60.0'	121.7°	9°31.7'	+60.0'	121.9°	9°00.0'	+60.0'	117.3°	9
10	13°08.1'	+59.7'	121.0°	12°37.2'	+59.8'	121.1°	12°06.0'	+59.9'	121.3°	11°34.8'	+59.9'	121.5°	11°03.3'	+60.0'	121.7°	10°31.7'	+60.0'	121.8°	10°00.0'	+60.0'	117.4°	10
11	14°07.9'	+59.7'	120.9°	13°37.0'	+59.8'	121.1°	13°05.9'	+59.9'	121.3°	12°34.7'	+59.9'	121.5°	12°03.3'	+60.0'	121.7°	11°31.7'	+60.0'	121.8°	11°00.0'	+60.0'	117.5°	11
12	15°07.6'	+59.7'	120.8°	14°36.8'	+59.8'	121.0°	14°05.8'	+59.9'	121.2°	13°34.6'	+59.9'	121.4°	13°03.3'	+60.0'	121.6°	12°31.7'	+60.0'	121.8°	12°00.0'	+60.0'	157.9°	12
13	16°07.3'	+59.7'	120.7°	15°36.6'	+59.8'	120.9°	15°05.7'	+59.9'	121.1°	14°34.6'	+59.9'	121.4°	14°03.2'	+60.0'	121.6°	13°31.7'	+60.0'	121.8°	13°00.0'	+60.0'	158.4°	13
14	17°07.1'	+59.7'	120.6°	16°36.5'	+59.8'	120.8°	16°05.6'	+59.9'	121.1°	15°34.5'	+59.9'	121.3°	15°03.2'	+60.0'	121.6°	14°31.7'	+60.0'	121.8°	14°00.0'	+60.0'	159.1°	14
15	18°06.8'	+59.7'	120.5°	17°36.3'	+59.8'	120.8°	17°05.5'	+59.9'	121.0°	16°34.4'	+59.9'	121.3°	16°03.2'	+60.0'	121.5°	15°31.7'	+60.0'	121.8°	15°00.0'	+60.0'	159.7°	15
16	19°06.6'	+59.7'	120.4°	18°36.1'	+59.8'	120.7°	18°05.4'	+59.9'	121.0°	17°34.4'	+59.9'	121.2°	17°03.1'	+60.0'	121.5°	16°31.7'	+60.0'	121.8°	16°00.0'	+60.0'	160.5°	16
17	20°06.3'	+59.7'	120.3°	19°35.9'	+59.8'	120.6°	19°05.2'	+59.9'	120.9°	18°34.3'	+59.9'	121.2°	18°03.1'	+60.0'	121.5°	17°31.7'	+60.0'	121.7°	17°00.0'	+60.0'	161.4°	17
18	21°06.0'	+59.7'	120.2°	20°35.7'	+59.8'	120.5°	20°05.1'	+59.9'	120.8°	19°34.2'	+59.9'	121.1°	19°03.1'	+60.0'	121.4°	18°31.7'	+60.0'	121.7°	18°00.0'	+60.0'	162.3°	18
19	22°05.8'	+59.7'	120.1°	21°35.5'	+59.8'	120.4°	21°05.0'	+59.9'	120.8°	20°34.2'	+59.9'	121.1°	20°03.1'	+60.0'	121.4°	19°31.7'	+60.0'	121.7°	19°00.0'	+60.0'	163.4°	19
20	23°05.5'	+59.7'	120.0°	22°35.3'	+59.8'	120.3°	22°04.9'	+59.9'	120.7°	21°34.1'	+59.9'	121.0°	21°03.0'	+60.0'	121.4°	20°31.7'	+60.0'	121.7°	20°00.0'	+60.0'	164.7°	20
21	24°05.2'	+59.7'	119.9°	23°35.1'	+59.8'	120.2°	23°04.8'	+59.9'	120.6°	22°34.0'	+59.9'	121.0°	22°03.0'	+60.0'	121.3°	21°31.6'	+60.0'	121.7°	21°00.0'	+60.0'	90.0°	21
22	25°04.9'	+59.7'	119.8°	24°35.0'	+59.8'	120.2°	24°04.6'	+59.9'	120.5°	23°34.0'	+59.9'	120.9°	23°03.0'	+60.0'	121.3°	22°31.6'	+60.0'	121.7°	22°00.0'	+60.0'	180.0°	22
23	26°04.6'	+59.7'	119.6°	25°34.8'	+59.8'	120.1°	25°04.5'	+59.9'	120.5°	24°33.9'	+59.9'	120.9°	24°02.9'	+60.0'	121.3°	23°31.6'	+60.0'	121.6°	23°00.0'	+60.0'	169.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	3°05.2'	+59.8'	120.9°	2°34.4'	+59.8'	120.9°	2°03.5'	+59.9'	120.9°	1°32.7'	+59.9'	121.0°	1°01.8'	+60.0'	121.0°	0°30.9'	+60.0'	121.0°	0°00.0'	+60.0'	121.0°	0
1	4°04.9'	+59.8'	120.8°	3°34.2'	+59.8'	120.8°	3°03.4'	+59.9'	120.9°	2°32.6'	+59.9'	120.9°	2°01.8'	+60.0'	121.0°	1°30.9'	+60.0'	121.0°	1°00.0'	+60.0'	120.7°	1
2	5°04.7'	+59.8'	120.7°	4°34.0'	+59.8'	120.8°	4°03.3'	+59.9'	120.8°	3°32.6'	+59.9'	120.9°	3°01.7'	+60.0'	120.9°	2°30.9'	+60.0'	121.0°	2°00.0'	+60.0'	124.5°	2
3	6°04.4'	+59.8'	120.6°	5°33.9'	+59.8'	120.7°	5°03.2'	+59.9'	120.8°	4°32.5'	+59.9'	120.8°	4°01.7'	+60.0'	120.9°	3°30.9'	+60.0'	121.0°	3°00.0'	+60.0'	124.6°	3
4	7°04.2'	+59.8'	120.5°	6°33.7'	+59.8'	120.6°	6°03.1'	+59.9'	120.7°	5°32.4'	+59.9'	120.8°	5°01.7'	+60.0'	120.9°	4°30.9'	+60.0'	120.9°	4°00.0'	+60.0'	117.0°	4
5	8°03.9'	+59.8'	120.4°	7°33.5'	+59.8'	120.5°	7°03.0'	+59.9'	120.6°	6°32.4'	+59.9'	120.7°	6°01.7'	+60.0'	120.8°	5°30.9'	+60.0'	120.9°	5°00.0'	+60.0'	103.1°	5
6	9°03.7'	+59.8'	120.3°	8°33.4'	+59.8'	120.5°	8°02.9'	+59.9'	120.6°	7°32.3'	+59.9'	120.7°	7°01.6'	+60.0'	120.8°	6°30.9'	+60.0'	120.9°	6°00.0'	+60.0'	103.2°	6
7	10°03.5'	+59.8'	120.2°	9°33.2'	+59.8'	120.4°	9°02.8'	+59.9'	120.5°	8°32.2'	+59.9'	120.6°	8°01.6'	+60.0'	120.8°	7°30.9'	+60.0'	120.9°	7°00.0'	+60.0'	103.2°	7
8	11°03.2'	+59.7'	120.1°	10°33.0'	+59.8'	120.3°	10°02.7'	+59.9'	120.5°	9°32.2'	+59.9'	120.6°	9°01.6'	+60.0'	120.7°	8°30.8'	+60.0'	120.9°	8°00.0'	+60.0'	90.0°	8
9	12°02.9'	+59.7'	120.0°	11°32.8'	+59.8'	120.2°	11°02.6'	+59.9'	120.4°	10°32.1'	+59.9'	120.6°	10°01.6'	+60.0'	120.7°	9°30.8'	+60.0'	120.9°	9°00.0'	+60.0'	117.3°	9
10	13°02.7'	+59.7'	119.9°	12°32.7'	+59.8'	120.1°	12°02.4'	+59.9'	120.3°	11°32.1'	+59.9'	120.5°	11°01.5'	+60.0'	120.7°	10°30.8'	+60.0'	120.8°	10°00.0'	+60.0'	117.4°	10
11	14°02.4'	+59.7'	119.9°	13°32.5'	+59.8'	120.1°	13°02.3'	+59.9'	120.3°	12°32.0'	+59.9'	120.5°	12°01.5'	+60.0'	120.7°	11°30.8'	+60.0'	120.8°	11°00.0'	+60.0'	117.5°	11
12	15°02.2'	+59.7'	119.8°	14°32.3'	+59.8'	120.0°	14°02.2'	+59.9'	120.2°	13°31.9'	+59.9'	120.4°	13°01.5'	+60.0'	120.6°	12°30.8'	+60.0'	120.8°	12°00.0'	+60.0'	157.9°	12
13	16°01.9'	+59.7'	119.7°	15°32.1'	+59.8'	119.9°	15°02.1'	+59.9'	120.1°	14°31.9'	+59.9'	120.4°	14°01.4'	+60.0'	120.6°	13°30.8'	+60.0'	120.8°	13°00.0'	+60.0'	158.4°	13
14	17°01.7'	+59.7'	119.6°	16°31.9'	+59.8'	119.8°	16°02.0'	+59.9'	120.1°	15°31.8'	+59.9'	120.3°	15°01.4'	+60.0'	120.6°	14°30.8'	+60.0'	120.8°	14°00.0'	+60.0'	159.1°	14
15	18°01.4'	+59.7'	119.5°	17°31.8'	+59.8'	119.7°	17°01.9'	+59.9'	120.0°	16°31.7'	+59.9'	120.3°	16°01.4'	+60.0'	120.5°	15°30.8'	+60.0'	120.8°	15°00.0'	+60.0'	159.7°	15
16	19°01.1'	+59.7'	119.4°	18°31.6'	+59.8'	119.7°	18°01.8'	+59.9'	119.9°	17°31.7'	+59.9'	120.2°	17°01.4'	+60.0'	120.5°	16°30.8'	+60.0'	120.7°	16°00.0'	+60.0'	160.5°	16
17	20°00.9'	+59.7'	119.3°	19°31.4'	+59.8'	119.6°	19°01.6'	+59.9'	119.9°	18°31.6'	+59.9'	120.2°	18°01.3'	+60.0'	120.5°	17°30.8'	+60.0'	120.7°	17°00.0'	+60.0'	161.4°	17
18	21°00.6'	+59.7'	119.2°	20°31.2'	+59.8'	119.5°	20°01.5'	+59.9'	119.8°	19°31.5'	+59.9'	120.1°	19°01.3'	+60.0'	120.4°	18°30.8'	+60.0'	120.7°	18°00.0'	+60.0'	162.3°	18
19	22°00.3'	+59.7'	119.1°	21°31.0'	+59.8'	119.4°	21°01.4'	+59.9'	119.7°	20°31.5'	+59.9'	120.1°	20°01.3'	+60.0'	120.4°	19°30.8'	+60.0'	120.7°	19°00.0'	+60.0'	163.4°	19
20	23°00.0'	+59.7'	119.0°	22°30.8'	+59.8'	119.3°	22°01.3'	+59.9'	119.7°	21°31.4'	+59.9'	120.0°	21°01.2'	+60.0'	120.4°	20°30.8'	+60.0'	120.7°	20°00.0'	+60.0'	164.7°	20
21	23°59.7'	+59.7'	118.8°	23°30.6'	+59.8'	119.2°	23°01.1'	+59.9'	119.6°													

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

60° 300° LHA

Latitude SAME as Declination

60° 300° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	2°59.8'	+59.8'	119.9°	2°29.9'	+59.8'	119.9°	2°00.0'	+59.9'	119.9°	1°30.0'	+59.9'	120.0°	1°00.0'	+60.0'	120.0°	0°30.0'	+60.0'	120.0°	0°00.0'	+60.0'	120.0°	0
1	3°59.5'	+59.8'	119.8°	3°29.7'	+59.8'	119.8°	2°59.8'	+59.9'	119.9°	2°29.9'	+59.9'	119.9°	2°00.0'	+60.0'	120.0°	1°30.0'	+60.0'	120.0°	1°00.0'	+60.0'	120.7°	1
2	4°59.3'	+59.8'	119.7°	4°29.5'	+59.8'	119.8°	3°59.7'	+59.9'	119.8°	3°29.8'	+59.9'	119.9°	3°00.0'	+60.0'	119.9°	2°30.0'	+60.0'	120.0°	2°00.0'	+60.0'	117.0°	2
3	5°59.0'	+59.8'	119.6°	5°29.3'	+59.8'	119.7°	4°59.6'	+59.9'	119.8°	4°29.8'	+59.9'	119.8°	4°00.0'	+60.0'	119.9°	3°30.0'	+60.0'	120.0°	3°00.0'	+60.0'	117.0°	3
4	6°58.8'	+59.7'	119.5°	6°29.2'	+59.8'	119.6°	5°59.5'	+59.9'	119.7°	5°29.7'	+59.9'	119.8°	4°59.9'	+60.0'	119.9°	4°30.0'	+60.0'	119.9°	4°00.0'	+60.0'	117.0°	4
5	7°58.5'	+59.7'	119.4°	7°29.0'	+59.8'	119.5°	6°59.4'	+59.9'	119.6°	6°29.7'	+59.9'	119.7°	5°59.9'	+60.0'	119.8°	5°30.0'	+60.0'	119.9°	5°00.0'	+60.0'	103.1°	5
6	8°58.3'	+59.7'	119.3°	8°28.8'	+59.8'	119.4°	7°59.3'	+59.9'	119.6°	7°29.6'	+59.9'	119.7°	6°59.8'	+60.0'	119.8°	6°30.0'	+60.0'	119.9°	6°00.0'	+60.0'	103.2°	6
7	9°58.0'	+59.7'	119.2°	9°28.6'	+59.8'	119.4°	8°59.2'	+59.9'	119.5°	8°29.5'	+59.9'	119.6°	7°59.8'	+60.0'	119.8°	7°30.0'	+60.0'	119.9°	7°00.0'	+60.0'	103.2°	7
8	10°57.7'	+59.7'	119.1°	10°28.5'	+59.8'	119.3°	9°59.0'	+59.9'	119.5°	9°29.5'	+59.9'	119.6°	8°59.8'	+60.0'	119.7°	8°29.9'	+60.0'	119.9°	8°00.0'	+60.0'	90.0°	8
9	11°57.5'	+59.7'	119.0°	11°28.3'	+59.8'	119.2°	10°58.9'	+59.9'	119.4°	10°29.4'	+59.9'	119.6°	9°59.7'	+60.0'	119.7°	9°29.9'	+60.0'	119.9°	9°00.0'	+60.0'	117.3°	9
10	12°57.2'	+59.7'	118.9°	12°28.1'	+59.8'	119.1°	11°58.8'	+59.9'	119.3°	11°29.3'	+59.9'	119.5°	10°59.7'	+60.0'	119.7°	10°29.9'	+60.0'	119.8°	10°00.0'	+60.0'	117.4°	10
11	13°57.0'	+59.7'	118.8°	13°27.9'	+59.8'	119.1°	12°58.7'	+59.9'	119.3°	12°29.3'	+59.9'	119.5°	11°59.7'	+60.0'	119.6°	11°29.9'	+60.0'	119.8°	11°00.0'	+60.0'	117.5°	11
12	14°56.7'	+59.7'	118.7°	14°27.7'	+59.8'	119.0°	13°58.6'	+59.9'	119.2°	13°29.2'	+59.9'	119.4°	12°59.7'	+60.0'	119.6°	12°29.9'	+60.0'	119.8°	12°00.0'	+60.0'	157.9°	12
13	15°56.4'	+59.7'	118.6°	15°27.6'	+59.8'	118.9°	14°58.5'	+59.9'	119.1°	14°29.1'	+59.9'	119.4°	13°59.6'	+60.0'	119.6°	13°29.9'	+60.0'	119.8°	13°00.0'	+60.0'	158.4°	13
14	16°56.2'	+59.7'	118.6°	16°27.4'	+59.8'	118.8°	15°58.3'	+59.9'	119.1°	15°29.1'	+59.9'	119.3°	14°59.6'	+60.0'	119.6°	14°29.9'	+60.0'	119.8°	14°00.0'	+60.0'	159.1°	14
15	17°55.9'	+59.7'	118.5°	17°27.2'	+59.8'	118.7°	16°58.2'	+59.9'	119.0°	16°29.0'	+59.9'	119.3°	15°59.6'	+60.0'	119.5°	15°29.9'	+60.0'	119.8°	15°00.0'	+60.0'	159.7°	15
16	18°55.6'	+59.7'	118.4°	18°27.0'	+59.8'	118.6°	17°58.1'	+59.9'	118.9°	17°28.9'	+59.9'	119.2°	16°59.5'	+60.0'	119.5°	16°29.9'	+60.0'	119.7°	16°00.0'	+60.0'	160.5°	16
17	19°55.4'	+59.7'	118.2°	19°26.8'	+59.8'	118.6°	18°58.0'	+59.9'	118.9°	18°28.9'	+59.9'	119.2°	17°59.5'	+60.0'	119.5°	17°29.9'	+60.0'	119.7°	17°00.0'	+60.0'	161.4°	17
18	20°55.1'	+59.7'	118.1°	20°26.6'	+59.8'	118.5°	19°57.9'	+59.9'	118.8°	19°28.8'	+59.9'	119.1°	18°59.5'	+60.0'	119.4°	18°29.9'	+60.0'	119.7°	18°00.0'	+60.0'	162.3°	18
19	21°54.8'	+59.7'	118.0°	21°26.4'	+59.8'	118.4°	20°57.7'	+59.9'	118.7°	20°28.7'	+59.9'	119.1°	19°59.4'	+60.0'	119.4°	19°29.9'	+60.0'	119.7°	19°00.0'	+60.0'	163.4°	19
20	22°54.5'	+59.7'	117.9°	22°26.2'	+59.8'	118.3°	21°57.6'	+59.9'	118.7°	21°28.7'	+59.9'	119.0°	20°59.4'	+60.0'	119.4°	20°29.9'	+60.0'	119.7°	20°00.0'	+60.0'	164.7°	20
21	23°54.2'	+59.7'	117.8°	23°26.0'	+59.8'	118.2°	22°57.5'	+59.9'	118.6°	22°28.6'	+59.9'	119.0°	21°59.4'	+60.0'	119.3°	21°29.8'	+60.0'	119.7°	21°00.0'	+60.0'	90.0°	21
22	24°53.9'	+59.7'	117.7°	24°25.8'	+59.8'	118.1°	23°57.4'	+59.9'	118.5°	23°28.5'	+59.9'	118.9°	22°59.4'	+60.0'	119.3°	22°29.8'	+60.0'	119.6°	22°00.0'	+60.0'	180.0°	22
23	25°53.6'	+59.7'	117.6°	25°25.6'	+59.8'	118.0°	24°57.2'	+59.9'	118.4°	24°28.5'	+59.9'	118.9°	23°59.3'	+60.0'	119.2°	23°29.8'	+60.0'	119.6°	23°00.0'	+60.0'	169.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	2°54.3'	+59.7'	118.9°	2°25.3'	+59.8'	118.9°	1°56.3'	+59.9'	118.9°	1°27.2'	+59.9'	119.0°	0°58.2'	+60.0'	119.0°	0°29.1'	+60.0'	119.0°	0°00.0'	+60.0'	119.0°	0
1	3°54.0'	+59.7'	118.8°	3°25.1'	+59.8'	118.8°	2°56.2'	+59.9'	118.9°	2°27.2'	+59.9'	118.9°	1°58.1'	+60.0'	119.0°	1°29.1'	+60.0'	119.0°	1°00.0'	+60.0'	120.7°	1
2	4°53.8'	+59.7'	118.7°	4°25.0'	+59.8'	118.8°	3°56.1'	+59.9'	118.8°	3°27.1'	+59.9'	118.9°	2°58.1'	+60.0'	118.9°	2°29.1'	+60.0'	119.0°	2°00.0'	+60.0'	117.0°	2
3	5°53.5'	+59.7'	118.6°	5°24.8'	+59.8'	118.7°	4°55.9'	+59.9'	118.8°	4°27.0'	+59.9'	118.8°	3°58.1'	+60.0'	118.9°	3°29.1'	+60.0'	119.0°	3°00.0'	+60.0'	117.0°	3
4	6°53.3'	+59.7'	118.5°	6°24.6'	+59.8'	118.6°	5°55.8'	+59.9'	118.7°	5°27.0'	+59.9'	118.8°	4°58.1'	+60.0'	118.9°	4°29.1'	+60.0'	118.9°	4°00.0'	+60.0'	117.0°	4
5	7°53.0'	+59.7'	118.4°	7°24.4'	+59.8'	118.5°	6°55.7'	+59.9'	118.6°	6°26.9'	+59.9'	118.7°	5°58.0'	+60.0'	118.8°	5°29.1'	+60.0'	118.9°	5°00.0'	+60.0'	103.1°	5
6	8°52.8'	+59.7'	118.3°	8°24.2'	+59.8'	118.4°	7°55.6'	+59.9'	118.6°	7°26.9'	+59.9'	118.7°	6°58.0'	+60.0'	118.8°	6°29.0'	+60.0'	118.9°	6°00.0'	+60.0'	103.2°	6
7	9°52.5'	+59.7'	118.2°	9°24.1'	+59.8'	118.4°	8°55.5'	+59.9'	118.5°	8°26.8'	+59.9'	118.6°	7°58.0'	+60.0'	118.8°	7°29.0'	+60.0'	118.9°	7°00.0'	+60.0'	103.2°	7
8	10°52.2'	+59.7'	118.1°	10°23.9'	+59.8'	118.3°	9°55.4'	+59.9'	118.4°	9°26.7'	+59.9'	118.6°	8°57.9'	+60.0'	118.7°	8°29.0'	+60.0'	118.9°	8°00.0'	+60.0'	90.0°	8
9	11°52.0'	+59.7'	118.0°	11°23.7'	+59.8'	118.2°	10°55.3'	+59.9'	118.4°	10°26.7'	+59.9'	118.5°	9°57.9'	+60.0'	118.7°	9°29.0'	+60.0'	118.9°	9°00.0'	+60.0'	117.3°	9
10	12°51.7'	+59.7'	117.9°	12°23.5'	+59.8'	118.1°	11°55.1'	+59.9'	118.3°	11°26.6'	+59.9'	118.5°	10°57.9'	+60.0'	118.7°	10°29.0'	+60.0'	118.8°	10°00.0'	+60.0'	117.4°	10
11	13°51.5'	+59.7'	117.8°	13°23.3'	+59.8'	118.1°	12°55.0'	+59.9'	118.3°	12°26.5'	+59.9'	118.5°	11°57.9'	+60.0'	118.6°	11°29.0'	+60.0'	118.8°	11°00.0'	+60.0'	117.5°	11
12	14°51.2'	+59.7'	117.7°	14°23.2'	+59.8'	118.0°	13°54.9'	+59.9'	118.2°	13°26.5'	+59.9'	118.4°	12°57.8'	+60.0'	118.6°	12°29.0'	+60.0'	118.8°	12°00.0'	+60.0'	157.9°	12
13	15°50.9'	+59.7'	117.6°	15°23.0'	+59.8'	117.9°	14°54.8'	+59.9'	118.1°	14°26.4'	+59.9'	118.4°	13°57.8'	+60.0'	118.6°	13°29.0'	+60.0'	118.8°	13°00.0'	+60.0'	158.4°	13
14	16°50.6'	+59.7'	117.5°	16°22.8'	+59.8'	117.8°	15°54.7'	+59.9'	118.1°	15°26.3'	+59.9'	118.3°	14°57.8'	+60.0'	118.5°	14°29.0'	+60.0'	118.8°	14°00.0'	+60.0'	159.1°	14
15	17°50.4'	+59.7'	117.4°	17°22.6'	+59.8'	117.7°	16°54.5'	+59.9'	118.0°	16°26.3'	+59.9'	118.3°	15°57.7'	+60.0'	118.5°	15°29.0'	+60.0'	118.8°	15°00.0'	+60.0'	159.7°	15
16	18°50.1'	+59.7'	117.3°	18°22.4'	+59.8'	117.6°	17°54.4'	+59.9'	117.9°	17°26.2'	+59.9'	118.2°	16°57.7'	+60.0'	118.5°	16°29.0'	+60.0'	118.7°	16°00.0'	+60.0'	160.5°	16
17	19°49.8'	+59.7'	117.2°	19°22.2'	+59.8'	117.6°	18°54.3'	+59.9'	117.9°	18°26.1'	+59.9'	118.2°	17°57.7'	+60.0'	118.4°	17°29.0'	+60.0'	118.7°	17°00.0'	+60.0'	161.4°	17
18	20°49.5'	+59.7'	117.1°	20°22.0'	+59.8'	117.5°	19°54.2'	+59.9'	117.8°	19°26.1'	+59.9'	118.1°	18°57.6'	+60.0'	118.4°	18°29.0'	+60.0'	118.7°	18°00.0'	+60.0'	162.3°	18
19	21°49.2'	+59.7'	117.0°	21°21.8'	+59.8'	117.4°	20°54.0'	+59.9'	117.7°	20°26.0'	+59.9'	118.1°	19°57.6'	+60.0'	118.4°	19°28.9'	+60.0'	118.7°	19°00.0'	+60.0'	163.4°	19
20	22°48.9'	+59.7'	116.9°	22°21.6'	+59.8'	117.3°	21°53.9'	+59.9'	117.7°	21°25.9'	+59.9'	118.0°	20°57.6'	+60.0'	118.3°	20°28.9'	+60.0'	118.7°	20°00.0'	+60.0'	164.7°	20
21	23°48.6'	+59.7'	116.8°	23°21.4'	+59.8'	117.2°	22°53.8'	+59.9'	117.6°	22°2												

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

62° 298° LHA

Latitude SAME as Declination

62° 298° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	2°48.8'	+59.7'	117.9°	2°20.7'	+59.8'	117.9°	1°52.6'	+59.9'	117.9°	1°24.5'	+59.9'	118.0°	0°56.3'	+60.0'	118.0°	0°28.2'	+60.0'	118.0°	0°00.0'	+60.0'	118.0°	0
1	3°48.5'	+59.7'	117.8°	3°20.5'	+59.8'	117.8°	2°52.5'	+59.9'	117.9°	2°24.4'	+59.9'	117.9°	1°56.3'	+60.0'	118.0°	1°28.2'	+60.0'	118.0°	1°00.0'	+60.0'	116.9°	1
2	4°48.3'	+59.7'	117.7°	4°20.3'	+59.8'	117.8°	3°52.4'	+59.9'	117.8°	3°24.3'	+59.9'	117.9°	2°56.3'	+60.0'	117.9°	2°28.2'	+60.0'	118.0°	2°00.0'	+60.0'	117.0°	2
3	5°48.0'	+59.7'	117.6°	5°20.2'	+59.8'	117.7°	4°52.3'	+59.9'	117.8°	4°24.3'	+59.9'	117.8°	3°56.2'	+60.0'	117.9°	3°28.1'	+60.0'	118.0°	3°00.0'	+60.0'	117.0°	3
4	6°47.7'	+59.7'	117.5°	6°20.0'	+59.8'	117.6°	5°52.1'	+59.9'	117.7°	5°24.2'	+59.9'	117.8°	4°56.2'	+60.0'	117.9°	4°28.1'	+60.0'	117.9°	4°00.0'	+60.0'	117.0°	4
5	7°47.5'	+59.7'	117.4°	7°19.8'	+59.8'	117.5°	6°52.0'	+59.9'	117.6°	6°24.2'	+59.9'	117.7°	5°56.2'	+60.0'	117.8°	5°28.1'	+60.0'	117.9°	5°00.0'	+60.0'	103.1°	5
6	8°47.2'	+59.7'	117.3°	8°19.6'	+59.8'	117.4°	7°51.9'	+59.9'	117.6°	7°24.1'	+59.9'	117.7°	6°56.2'	+60.0'	117.8°	6°28.1'	+60.0'	117.9°	6°00.0'	+60.0'	103.2°	6
7	9°47.0'	+59.7'	117.2°	9°19.4'	+59.8'	117.4°	8°51.8'	+59.9'	117.5°	8°24.0'	+59.9'	117.6°	7°56.1'	+60.0'	117.8°	7°28.1'	+60.0'	117.9°	7°00.0'	+60.0'	103.2°	7
8	10°46.7'	+59.7'	117.1°	10°19.3'	+59.8'	117.3°	9°51.7'	+59.9'	117.4°	9°24.0'	+59.9'	117.6°	8°56.1'	+60.0'	117.7°	8°28.1'	+60.0'	117.9°	8°00.0'	+60.0'	90.0°	8
9	11°46.4'	+59.7'	117.0°	11°19.1'	+59.8'	117.2°	10°51.6'	+59.9'	117.4°	10°23.9'	+59.9'	117.5°	9°56.1'	+60.0'	117.7°	9°28.1'	+60.0'	117.9°	9°00.0'	+60.0'	117.3°	9
10	12°46.2'	+59.7'	116.9°	12°18.9'	+59.8'	117.1°	11°51.4'	+59.9'	117.3°	11°23.8'	+59.9'	117.5°	10°56.0'	+60.0'	117.7°	10°28.1'	+60.0'	117.8°	10°00.0'	+60.0'	117.4°	10
11	13°45.9'	+59.7'	116.8°	13°18.7'	+59.8'	117.0°	12°51.3'	+59.9'	117.3°	12°23.8'	+59.9'	117.5°	11°56.0'	+60.0'	117.6°	11°28.1'	+60.0'	117.8°	11°00.0'	+60.0'	117.5°	11
12	14°45.6'	+59.7'	116.7°	14°18.5'	+59.8'	117.0°	13°51.2'	+59.9'	117.2°	13°23.7'	+59.9'	117.4°	12°56.0'	+60.0'	117.6°	12°28.1'	+60.0'	117.8°	12°00.0'	+60.0'	157.9°	12
13	15°45.3'	+59.7'	116.6°	15°18.3'	+59.8'	116.9°	14°51.1'	+59.9'	117.1°	14°23.6'	+59.9'	117.4°	13°55.9'	+60.0'	117.6°	13°28.1'	+60.0'	117.8°	13°00.0'	+60.0'	158.4°	13
14	16°45.1'	+59.7'	116.5°	16°18.1'	+59.8'	116.8°	15°51.0'	+59.9'	117.1°	15°23.6'	+59.9'	117.3°	14°55.9'	+60.0'	117.5°	14°28.1'	+60.0'	117.8°	14°00.0'	+60.0'	159.1°	14
15	17°44.8'	+59.7'	116.4°	17°17.9'	+59.8'	116.7°	16°50.8'	+59.9'	117.0°	16°23.5'	+59.9'	117.3°	15°55.9'	+60.0'	117.5°	15°28.1'	+60.0'	117.8°	15°00.0'	+60.0'	159.7°	15
16	18°44.5'	+59.7'	116.3°	18°17.7'	+59.8'	116.6°	17°50.7'	+59.9'	116.9°	17°23.4'	+59.9'	117.2°	16°55.9'	+60.0'	117.5°	16°28.0'	+60.0'	117.7°	16°00.0'	+60.0'	90.0°	16
17	19°44.2'	+59.7'	116.2°	19°17.5'	+59.8'	116.5°	18°50.6'	+59.9'	116.9°	18°23.3'	+59.9'	117.2°	17°55.8'	+60.0'	117.4°	17°28.0'	+60.0'	117.7°	17°00.0'	+60.0'	90.0°	17
18	20°43.9'	+59.7'	116.1°	20°17.3'	+59.8'	116.5°	19°50.5'	+59.9'	116.8°	19°23.3'	+59.9'	117.1°	18°55.8'	+60.0'	117.4°	18°28.0'	+60.0'	117.7°	18°00.0'	+60.0'	90.0°	18
19	21°43.6'	+59.7'	116.0°	21°17.1'	+59.8'	116.4°	20°50.3'	+59.9'	116.7°	20°23.2'	+59.9'	117.0°	19°55.8'	+60.0'	117.4°	19°28.0'	+60.0'	117.7°	19°00.0'	+60.0'	90.0°	19
20	22°43.3'	+59.7'	115.9°	22°16.9'	+59.8'	116.3°	21°50.2'	+59.9'	116.6°	21°23.1'	+59.9'	117.0°	20°55.7'	+60.0'	117.3°	20°28.0'	+60.0'	117.7°	20°00.0'	+60.0'	90.0°	20
21	23°43.0'	+59.7'	115.8°	23°16.7'	+59.8'	116.2°	22°50.1'	+59.9'	116.6°	22°23.1'	+59.9'	116.9°	21°55.7'	+60.0'	117.3°	21°28.0'	+60.0'	117.7°	21°00.0'	+60.0'	90.0°	21
22	24°42.7'	+59.7'	115.7°	24°16.5'	+59.8'	116.1°	23°49.9'	+59.9'	116.5°	23°23.0'	+59.9'	116.9°	22°55.7'	+60.0'	117.3°	22°28.0'	+60.0'	117.6°	22°00.0'	+60.0'	90.0°	22
23	25°42.4'	+59.7'	115.6°	25°16.3'	+59.8'	116.0°	24°49.8'	+59.9'	116.4°	24°22.9'	+59.9'	116.8°	23°55.6'	+60.0'	117.2°	23°28.0'	+60.0'	117.6°	23°00.0'	+60.0'	169.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	2°43.2'	+59.7'	116.9°	2°16.1'	+59.8'	116.9°	1°48.9'	+59.9'	116.9°	1°21.7'	+59.9'	117.0°	0°54.5'	+60.0'	117.0°	0°27.2'	+60.0'	117.0°	0°00.0'	+60.0'	117.0°	0
1	3°42.9'	+59.7'	116.8°	3°15.9'	+59.8'	116.8°	2°48.8'	+59.9'	116.9°	2°21.6'	+59.9'	116.9°	1°54.4'	+60.0'	117.0°	1°27.2'	+60.0'	117.0°	1°00.0'	+60.0'	116.9°	1
2	4°42.7'	+59.7'	116.7°	4°15.7'	+59.8'	116.8°	3°48.7'	+59.9'	116.8°	3°21.6'	+59.9'	116.9°	2°54.4'	+60.0'	116.9°	2°27.2'	+60.0'	117.0°	2°00.0'	+60.0'	117.0°	2
3	5°42.4'	+59.7'	116.6°	5°15.5'	+59.8'	116.7°	4°48.5'	+59.9'	116.8°	4°21.5'	+59.9'	116.8°	3°54.4'	+60.0'	116.9°	3°27.2'	+60.0'	116.9°	3°00.0'	+60.0'	117.0°	3
4	6°42.1'	+59.7'	116.5°	6°15.3'	+59.8'	116.6°	5°48.4'	+59.9'	116.7°	5°21.4'	+59.9'	116.8°	4°54.4'	+60.0'	116.9°	4°27.2'	+60.0'	116.9°	4°00.0'	+60.0'	117.0°	4
5	7°41.9'	+59.7'	116.4°	7°15.1'	+59.8'	116.5°	6°48.3'	+59.9'	116.6°	6°21.4'	+59.9'	116.7°	5°54.3'	+60.0'	116.8°	5°27.2'	+60.0'	116.9°	5°00.0'	+60.0'	103.1°	5
6	8°41.6'	+59.7'	116.3°	8°15.0'	+59.8'	116.4°	7°48.2'	+59.9'	116.6°	7°21.3'	+59.9'	116.7°	6°54.3'	+60.0'	116.8°	6°27.2'	+60.0'	116.9°	6°00.0'	+60.0'	103.2°	6
7	9°41.3'	+59.7'	116.2°	9°14.8'	+59.8'	116.4°	8°48.1'	+59.9'	116.5°	8°21.2'	+59.9'	116.6°	7°54.3'	+60.0'	116.8°	7°27.2'	+60.0'	116.9°	7°00.0'	+60.0'	103.2°	7
8	10°41.1'	+59.7'	116.1°	10°14.6'	+59.8'	116.3°	9°47.9'	+59.9'	116.4°	9°21.2'	+59.9'	116.6°	8°54.2'	+60.0'	116.7°	8°27.2'	+60.0'	116.9°	8°00.0'	+60.0'	90.0°	8
9	11°40.8'	+59.7'	116.0°	11°14.4'	+59.8'	116.2°	10°47.8'	+59.9'	116.4°	10°21.1'	+59.9'	116.5°	9°54.2'	+60.0'	116.7°	9°27.2'	+60.0'	116.9°	9°00.0'	+60.0'	117.3°	9
10	12°40.5'	+59.7'	115.9°	12°14.2'	+59.8'	116.1°	11°47.7'	+59.9'	116.3°	11°21.0'	+59.9'	116.5°	10°54.2'	+60.0'	116.7°	10°27.2'	+60.0'	116.8°	10°00.0'	+60.0'	117.4°	10
11	13°40.3'	+59.7'	115.8°	13°14.0'	+59.8'	116.0°	12°47.6'	+59.9'	116.2°	12°21.0'	+59.9'	116.4°	11°54.1'	+60.0'	116.6°	11°27.2'	+60.0'	116.8°	11°00.0'	+60.0'	117.5°	11
12	14°40.0'	+59.7'	115.7°	14°13.8'	+59.8'	116.0°	13°47.5'	+59.9'	116.2°	13°20.9'	+59.9'	116.4°	12°54.1'	+60.0'	116.6°	12°27.1'	+60.0'	116.8°	12°00.0'	+60.0'	157.9°	12
13	15°39.7'	+59.7'	115.6°	15°13.6'	+59.8'	115.9°	14°47.3'	+59.9'	116.1°	14°20.8'	+59.9'	116.3°	13°54.1'	+60.0'	116.6°	13°27.1'	+60.0'	116.8°	13°00.0'	+60.0'	158.4°	13
14	16°39.4'	+59.7'	115.5°	16°13.4'	+59.8'	115.8°	15°47.2'	+59.9'	116.0°	15°20.8'	+59.9'	116.3°	14°54.1'	+60.0'	116.5°	14°27.1'	+60.0'	116.8°	14°00.0'	+60.0'	159.1°	14
15	17°39.1'	+59.7'	115.4°	17°13.2'	+59.8'	115.7°	16°47.1'	+59.9'	116.0°	16°20.7'	+59.9'	116.2°	15°54.0'	+60.0'	116.5°	15°27.1'	+60.0'	116.8°	15°00.0'	+60.0'	90.0°	15
16	18°38.8'	+59.7'	115.3°	18°13.0'	+59.8'	115.6°	17°47.0'	+59.9'	115.9°	17°20.6'	+59.9'	116.2°	16°54.0'	+60.0'	116.5°	16°27.1'	+60.0'	116.7°	16°00.0'	+60.0'	90.0°	16
17	19°38.6'	+59.7'	115.2°	19°12.8'	+59.8'	115.5°	18°46.8'	+59.9'	115.8°	18°20.5'	+59.9'	116.1°	17°54.0'	+60.0'	116.4°	17°27.1'	+60.0'	116.7°	17°00.0'	+60.0'	90.0°	17
18	20°38.3'	+59.7'	115.1°	20°12.6'	+59.8'	115.4°	19°46.7'	+59.9'	115.8°	19°20.5'	+59.9'	116.1°	18°53.9'	+60.0'	116.4°	18°27.1'	+60.0'	116.7°	18°00.0'	+60.0'	90.0°	18
19	21°38.0'	+59.7'	115.0°	21°12.4'	+59.8'	115.4°	20°46.6'	+59.9'	115.7°	20°20.4'	+59.9'	116.0°	19°53.9'	+60.0'	116.4°	19°27.1'	+60.0'	116.7°	19°00.0'	+60.0'	90.0°	19
20	22°37.7'	+59.7'	114.9°	22°12.2'	+59.8'	115.3°	21°46.4'	+59.9'	115.6°	21°20.3'	+59.9'	116.0°	20°53.9'	+60.0'	116.3°	20°27.1'	+60.0'	116.7°	20°00.0'	+60.0'	90.0°	20
21	23°37.3'	+59.7'	114.8°	23°12.0'	+59.8'	115.2°	22°46.3'	+59.9'	115.6°	22°20.2'	+59.9											

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

64° 296° LHA

Latitude SAME as Declination

64° 296° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	2°37.6'	+59.7'	115.9°	2°11.4'	+59.8'	115.9°	1°45.1'	+59.9'	115.9°	1°18.9'	+59.9'	116.0°	0°52.6'	+60.0'	116.0°	0°26.3'	+60.0'	116.0°	0°00.0'	+60.0'	116.0°	0
1	3°37.3'	+59.7'	115.8°	3°11.2'	+59.8'	115.8°	2°45.0'	+59.9'	115.9°	2°18.8'	+59.9'	115.9°	1°52.6'	+60.0'	116.0°	1°26.3'	+60.0'	116.0°	1°00.0'	+60.0'	116.9°	1
2	4°37.0'	+59.7'	115.7°	4°11.0'	+59.8'	115.8°	3°44.9'	+59.9'	115.8°	3°18.7'	+59.9'	115.9°	2°52.5'	+60.0'	115.9°	2°26.3'	+60.0'	116.0°	2°00.0'	+60.0'	117.0°	2
3	5°36.8'	+59.7'	115.6°	5°10.8'	+59.8'	115.7°	4°44.8'	+59.9'	115.8°	4°18.7'	+59.9'	115.8°	3°52.5'	+60.0'	115.9°	3°26.3'	+60.0'	115.9°	3°00.0'	+60.0'	117.0°	3
4	6°36.5'	+59.7'	115.5°	6°10.6'	+59.8'	115.6°	5°44.7'	+59.9'	115.7°	5°18.6'	+59.9'	115.8°	4°52.5'	+60.0'	115.9°	4°26.3'	+60.0'	115.9°	4°00.0'	+60.0'	117.0°	4
5	7°36.2'	+59.7'	115.4°	7°10.4'	+59.8'	115.5°	6°44.5'	+59.9'	115.6°	6°18.5'	+59.9'	115.7°	5°52.4'	+60.0'	115.8°	5°26.3'	+60.0'	115.9°	5°00.0'	+60.0'	103.1°	5
6	8°36.0'	+59.7'	115.3°	8°10.3'	+59.8'	115.4°	7°44.4'	+59.9'	115.6°	7°18.5'	+59.9'	115.7°	6°52.4'	+60.0'	115.8°	6°26.3'	+60.0'	115.9°	6°00.0'	+60.0'	103.2°	6
7	9°35.7'	+59.7'	115.2°	9°10.1'	+59.8'	115.4°	8°44.3'	+59.9'	115.5°	8°18.4'	+59.9'	115.6°	7°52.4'	+60.0'	115.8°	7°26.2'	+60.0'	115.9°	7°00.0'	+60.0'	103.2°	7
8	10°35.4'	+59.7'	115.1°	10°09.9'	+59.8'	115.3°	9°44.2'	+59.9'	115.4°	9°18.3'	+59.9'	115.6°	8°52.4'	+60.0'	115.7°	8°26.2'	+60.0'	115.9°	8°00.0'	+60.0'	90.0°	8
9	11°35.1'	+59.7'	115.0°	11°09.7'	+59.8'	115.2°	10°44.1'	+59.9'	115.4°	10°18.3'	+59.9'	115.5°	9°52.3'	+60.0'	115.7°	9°26.2'	+60.0'	115.9°	9°00.0'	+60.0'	117.3°	9
10	12°34.9'	+59.7'	114.9°	12°09.5'	+59.8'	115.1°	11°43.9'	+59.9'	115.3°	11°18.2'	+59.9'	115.5°	10°52.3'	+60.0'	115.7°	10°26.2'	+60.0'	115.8°	10°00.0'	+60.0'	117.4°	10
11	13°34.6'	+59.7'	114.8°	13°09.3'	+59.8'	115.0°	12°43.8'	+59.9'	115.2°	12°18.1'	+59.9'	115.4°	11°52.3'	+60.0'	115.6°	11°26.2'	+60.0'	115.8°	11°00.0'	+60.0'	117.5°	11
12	14°34.3'	+59.7'	114.7°	14°09.1'	+59.8'	115.0°	13°43.7'	+59.9'	115.2°	13°18.1'	+59.9'	115.4°	12°52.2'	+60.0'	115.6°	12°26.2'	+60.0'	115.8°	12°00.0'	+60.0'	157.9°	12
13	15°34.0'	+59.7'	114.6°	15°08.9'	+59.8'	114.9°	14°43.6'	+59.9'	115.1°	14°18.0'	+59.9'	115.3°	13°52.2'	+60.0'	115.6°	13°26.2'	+60.0'	115.8°	13°00.0'	+60.0'	158.4°	13
14	16°33.7'	+59.7'	114.5°	16°08.7'	+59.8'	114.8°	15°43.4'	+59.9'	115.0°	15°17.9'	+59.9'	115.3°	14°52.2'	+60.0'	115.5°	14°26.2'	+60.0'	115.8°	14°00.0'	+60.0'	159.1°	14
15	17°33.4'	+59.7'	114.4°	17°08.5'	+59.8'	114.7°	16°43.3'	+59.9'	115.0°	16°17.9'	+59.9'	115.2°	15°52.1'	+60.0'	115.5°	15°26.2'	+60.0'	115.8°	15°00.0'	+60.0'	90.0°	15
16	18°33.2'	+59.7'	114.3°	18°08.3'	+59.8'	114.6°	17°43.2'	+59.9'	114.9°	17°17.8'	+59.9'	115.2°	16°52.1'	+60.0'	115.5°	16°26.2'	+60.0'	115.7°	16°00.0'	+60.0'	90.0°	16
17	19°32.9'	+59.7'	114.2°	19°08.1'	+59.8'	114.5°	18°43.1'	+59.9'	114.8°	18°17.7'	+59.9'	115.1°	17°52.1'	+60.0'	115.4°	17°26.2'	+60.0'	115.7°	17°00.0'	+60.0'	90.0°	17
18	20°32.6'	+59.7'	114.1°	20°07.9'	+59.8'	114.4°	19°42.9'	+59.9'	114.8°	19°17.6'	+59.9'	115.1°	18°52.0'	+60.0'	115.4°	18°26.2'	+60.0'	115.7°	18°00.0'	+60.0'	90.0°	18
19	21°32.3'	+59.7'	114.0°	21°07.7'	+59.8'	114.3°	20°42.8'	+59.9'	114.7°	20°17.6'	+59.9'	115.0°	19°52.0'	+60.0'	115.4°	19°26.2'	+60.0'	115.7°	19°00.0'	+60.0'	90.0°	19
20	22°31.9'	+59.7'	113.9°	22°07.5'	+59.8'	114.3°	21°42.6'	+59.9'	114.6°	21°17.5'	+59.9'	115.0°	20°52.0'	+60.0'	115.3°	20°26.1'	+60.0'	115.7°	20°00.0'	+60.0'	90.0°	20
21	23°31.6'	+59.7'	113.8°	23°07.3'	+59.8'	114.2°	22°42.5'	+59.9'	114.5°	22°17.4'	+59.9'	114.9°	21°51.9'	+60.0'	115.3°	21°26.1'	+60.0'	115.7°	21°00.0'	+60.0'	90.0°	21
22	24°31.3'	+59.7'	113.7°	24°07.0'	+59.8'	114.1°	23°42.4'	+59.9'	114.5°	23°17.3'	+59.9'	114.9°	22°51.9'	+60.0'	115.3°	22°26.1'	+60.0'	115.6°	22°00.0'	+60.0'	90.0°	22
23	25°31.0'	+59.7'	113.5°	25°06.8'	+59.8'	114.0°	24°42.2'	+59.9'	114.4°	24°17.2'	+59.9'	114.8°	23°51.9'	+60.0'	115.2°	23°26.1'	+60.0'	115.6°	23°00.0'	+60.0'	169.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	2°31.9'	+59.7'	114.9°	2°06.7'	+59.8'	114.9°	1°41.4'	+59.9'	114.9°	1°16.0'	+59.9'	115.0°	0°50.7'	+60.0'	115.0°	0°25.4'	+60.0'	115.0°	0°00.0'	+60.0'	115.0°	0
1	3°31.6'	+59.7'	114.8°	3°06.5'	+59.8'	114.8°	2°41.2'	+59.9'	114.9°	2°16.0'	+59.9'	114.9°	1°50.7'	+60.0'	115.0°	1°25.3'	+60.0'	115.0°	1°00.0'	+60.0'	113.4°	1
2	4°31.4'	+59.7'	114.7°	4°06.3'	+59.8'	114.8°	3°41.1'	+59.9'	114.8°	3°15.9'	+59.9'	114.9°	2°50.6'	+60.0'	114.9°	2°25.3'	+60.0'	115.0°	2°00.0'	+60.0'	117.0°	2
3	5°31.1'	+59.7'	114.6°	5°06.1'	+59.8'	114.7°	4°41.0'	+59.9'	114.8°	4°15.8'	+59.9'	114.8°	3°50.6'	+60.0'	114.9°	3°25.3'	+60.0'	114.9°	3°00.0'	+60.0'	117.0°	3
4	6°30.8'	+59.7'	114.5°	6°05.9'	+59.8'	114.6°	5°40.9'	+59.9'	114.7°	5°15.8'	+59.9'	114.8°	4°50.6'	+60.0'	114.9°	4°25.3'	+60.0'	114.9°	4°00.0'	+60.0'	117.0°	4
5	7°30.6'	+59.7'	114.4°	7°05.7'	+59.8'	114.5°	6°40.8'	+59.9'	114.6°	6°15.7'	+59.9'	114.7°	5°50.6'	+60.0'	114.8°	5°25.3'	+60.0'	114.9°	5°00.0'	+60.0'	103.1°	5
6	8°30.3'	+59.7'	114.3°	8°05.5'	+59.8'	114.4°	7°40.6'	+59.9'	114.6°	7°15.6'	+59.9'	114.7°	6°50.5'	+60.0'	114.8°	6°25.3'	+60.0'	114.9°	6°00.0'	+60.0'	103.2°	6
7	9°30.0'	+59.7'	114.2°	9°05.3'	+59.8'	114.4°	8°40.5'	+59.9'	114.5°	8°15.6'	+59.9'	114.6°	7°50.5'	+60.0'	114.8°	7°25.3'	+60.0'	114.9°	7°00.0'	+60.0'	103.2°	7
8	10°29.7'	+59.7'	114.1°	10°05.1'	+59.8'	114.3°	9°40.4'	+59.9'	114.4°	9°15.5'	+59.9'	114.6°	8°50.5'	+60.0'	114.7°	8°25.3'	+60.0'	114.9°	8°00.0'	+60.0'	90.0°	8
9	11°29.4'	+59.7'	114.0°	11°04.9'	+59.8'	114.2°	10°40.3'	+59.9'	114.4°	10°15.4'	+59.9'	114.5°	9°50.4'	+60.0'	114.7°	9°25.3'	+60.0'	114.9°	9°00.0'	+60.0'	117.3°	9
10	12°29.2'	+59.7'	113.9°	12°04.7'	+59.8'	114.1°	11°40.1'	+59.9'	114.3°	11°15.4'	+59.9'	114.5°	10°50.4'	+60.0'	114.7°	10°25.3'	+60.0'	114.8°	10°00.0'	+60.0'	117.4°	10
11	13°28.9'	+59.7'	113.8°	13°04.5'	+59.8'	114.0°	12°40.0'	+59.9'	114.2°	12°15.3'	+59.9'	114.4°	11°50.4'	+60.0'	114.6°	11°25.3'	+60.0'	114.8°	11°00.0'	+60.0'	117.5°	11
12	14°28.6'	+59.7'	113.7°	14°04.3'	+59.8'	113.9°	13°39.9'	+59.9'	114.2°	13°15.2'	+59.9'	114.4°	12°50.3'	+60.0'	114.6°	12°25.3'	+60.0'	114.8°	12°00.0'	+60.0'	157.9°	12
13	15°28.3'	+59.7'	113.6°	15°04.1'	+59.8'	113.9°	14°39.8'	+59.9'	114.1°	14°15.1'	+59.9'	114.3°	13°50.3'	+60.0'	114.6°	13°25.3'	+60.0'	114.8°	13°00.0'	+60.0'	158.4°	13
14	16°28.0'	+59.7'	113.5°	16°03.9'	+59.8'	113.8°	15°39.6'	+59.9'	114.0°	15°15.1'	+59.9'	114.3°	14°50.3'	+60.0'	114.5°	14°25.2'	+60.0'	114.8°	14°00.0'	+60.0'	159.1°	14
15	17°27.7'	+59.7'	113.4°	17°03.7'	+59.8'	113.7°	16°39.5'	+59.9'	114.0°	16°15.0'	+59.9'	114.2°	15°50.2'	+60.0'	114.5°	15°25.2'	+60.0'	114.8°	15°00.0'	+60.0'	90.0°	15
16	18°27.4'	+59.7'	113.3°	18°03.5'	+59.8'	113.6°	17°39.4'	+59.9'	113.9°	17°14.9'	+59.9'	114.2°	16°50.2'	+60.0'	114.5°	16°25.2'	+60.0'	114.7°	16°00.0'	+60.0'	90.0°	16
17	19°27.1'	+59.7'	113.2°	19°03.3'	+59.8'	113.5°	18°39.2'	+59.9'	113.8°	18°14.9'	+59.9'	114.1°	17°50.2'	+60.0'	114.4°	17°25.2'	+60.0'	114.7°	17°00.0'	+60.0'	90.0°	17
18	20°26.8'	+59.7'	113.1°	20°03.1'	+59.8'	113.4°	19°39.1'	+59.9'	113.8°	19°14.8'	+59.9'	114.1°	18°50.1'	+60.0'	114.4°	18°25.2'	+60.0'	114.7°	18°00.0'	+60.0'	90.0°	18
19	21°26.5'	+59.7'	113.0°	21°02.9'	+59.8'	113.3°	20°39.0'	+59.9'	113.7°	20°14.7'	+59.9'	114.0°	19°50.1'	+60.0'	114.4°	19°25.2'	+60.0'	114.7°	19°00.0'	+60.0'	90.0°	19
20	22°26.2'	+59.7'	112.9°	22°02.7'	+59.8'	113.2°	21°38.8'	+59.9'	113.6°	21°14.6'	+59.9'	114.0°	20°50.1'	+60.0'	114.3°	20°25.2'	+60.0'	114.7°	20°00.0'	+60.0'	90.0°	20
21	23°25.9'	+59.7'	112.8°	23°02.5'	+59.8'	113.2°	22°38.7'	+59.9'	113.5°	22°14.5'	+59.9'</											

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

66° 294° LHA

Latitude SAME as Declination

66° 294° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	2°26.2'	+59.7'	113.9°	2°01.9'	+59.8'	113.9°	1°37.6'	+59.9'	113.9°	1°13.2'	+59.9'	114.0°	0°48.8'	+60.0'	114.0°	0°24.4'	+60.0'	114.0°	0°00.0'	+60.0'	114.0°	0
1	3°25.9'	+59.7'	113.8°	3°01.7'	+59.8'	113.8°	2°37.4'	+59.9'	113.9°	2°13.1'	+59.9'	113.9°	1°48.8'	+60.0'	114.0°	1°24.4'	+60.0'	114.0°	1°00.0'	+60.0'	113.4°	1
2	4°25.7'	+59.7'	113.7°	4°01.5'	+59.8'	113.8°	3°37.3'	+59.9'	113.8°	3°13.0'	+59.9'	113.9°	2°48.7'	+60.0'	113.9°	2°24.4'	+60.0'	114.0°	2°00.0'	+60.0'	117.0°	2
3	5°25.4'	+59.7'	113.6°	5°01.3'	+59.8'	113.7°	4°37.2'	+59.9'	113.8°	4°13.0'	+59.9'	113.8°	3°48.7'	+60.0'	113.9°	3°24.4'	+60.0'	113.9°	3°00.0'	+60.0'	117.0°	3
4	6°25.1'	+59.7'	113.5°	6°01.1'	+59.8'	113.6°	5°37.1'	+59.9'	113.7°	5°12.9'	+59.9'	113.8°	4°48.7'	+60.0'	113.9°	4°24.4'	+60.0'	113.9°	4°00.0'	+60.0'	117.0°	4
5	7°24.8'	+59.7'	113.4°	7°00.9'	+59.8'	113.5°	6°36.9'	+59.9'	113.6°	6°12.8'	+59.9'	113.7°	5°48.6'	+60.0'	113.8°	5°24.4'	+60.0'	113.9°	5°00.0'	+60.0'	103.1°	5
6	8°24.5'	+59.7'	113.3°	8°00.7'	+59.8'	113.4°	7°36.8'	+59.9'	113.6°	7°12.8'	+59.9'	113.7°	6°48.6'	+60.0'	113.8°	6°24.4'	+60.0'	113.9°	6°00.0'	+60.0'	103.2°	6
7	9°24.3'	+59.7'	113.2°	9°00.5'	+59.8'	113.4°	8°36.7'	+59.9'	113.5°	8°12.7'	+59.9'	113.6°	7°48.6'	+60.0'	113.8°	7°24.3'	+60.0'	113.9°	7°00.0'	+60.0'	103.2°	7
8	10°24.0'	+59.7'	113.1°	10°00.3'	+59.8'	113.3°	9°36.6'	+59.9'	113.4°	9°12.6'	+59.9'	113.6°	8°48.6'	+60.0'	113.7°	8°24.3'	+60.0'	113.9°	8°00.0'	+60.0'	90.0°	8
9	11°23.7'	+59.7'	113.0°	11°00.2'	+59.8'	113.2°	10°36.4'	+59.9'	113.4°	10°12.6'	+59.9'	113.5°	9°48.5'	+60.0'	113.7°	9°24.3'	+60.0'	113.9°	9°00.0'	+60.0'	117.3°	9
10	12°23.4'	+59.7'	112.9°	12°00.0'	+59.8'	113.1°	11°36.3'	+59.9'	113.3°	11°12.5'	+59.9'	113.5°	10°48.5'	+60.0'	113.7°	10°24.3'	+60.0'	113.8°	10°00.0'	+60.0'	117.4°	10
11	13°23.1'	+59.7'	112.8°	12°59.8'	+59.8'	113.0°	12°36.2'	+59.9'	113.2°	12°12.4'	+59.9'	113.4°	11°48.5'	+60.0'	113.6°	11°24.3'	+60.0'	113.8°	11°00.0'	+60.0'	117.5°	11
12	14°22.8'	+59.7'	112.7°	13°59.6'	+59.8'	112.9°	13°36.1'	+59.9'	113.2°	13°12.3'	+59.9'	113.4°	12°48.4'	+60.0'	113.6°	12°24.3'	+60.0'	113.8°	12°00.0'	+60.0'	157.9°	12
13	15°22.5'	+59.7'	112.6°	14°59.3'	+59.8'	112.9°	14°35.9'	+59.9'	113.1°	14°12.3'	+59.9'	113.3°	13°48.4'	+60.0'	113.6°	13°24.3'	+60.0'	113.8°	13°00.0'	+60.0'	158.4°	13
14	16°22.2'	+59.7'	112.5°	15°59.1'	+59.8'	112.8°	15°35.8'	+59.9'	113.0°	15°12.2'	+59.9'	113.3°	14°48.4'	+60.0'	113.5°	14°24.3'	+60.0'	113.8°	14°00.0'	+60.0'	159.1°	14
15	17°21.9'	+59.7'	112.4°	16°58.9'	+59.8'	112.7°	16°35.7'	+59.9'	113.0°	16°12.1'	+59.9'	113.2°	15°48.3'	+60.0'	113.5°	15°24.3'	+60.0'	113.8°	15°00.0'	+60.0'	90.0°	15
16	18°21.6'	+59.7'	112.3°	17°58.7'	+59.8'	112.6°	17°35.5'	+59.9'	112.9°	17°12.0'	+59.9'	113.2°	16°48.3'	+60.0'	113.5°	16°24.3'	+60.0'	113.7°	16°00.0'	+60.0'	90.0°	16
17	19°21.3'	+59.7'	112.2°	18°58.5'	+59.8'	112.5°	18°35.4'	+59.9'	112.8°	18°12.0'	+59.9'	113.1°	17°48.3'	+60.0'	113.4°	17°24.3'	+60.0'	113.7°	17°00.0'	+60.0'	90.0°	17
18	20°21.0'	+59.7'	112.1°	19°58.3'	+59.8'	112.4°	19°35.3'	+59.9'	112.7°	19°11.9'	+59.9'	113.1°	18°48.2'	+60.0'	113.4°	18°24.3'	+60.0'	113.7°	18°00.0'	+60.0'	90.0°	18
19	21°20.7'	+59.7'	112.0°	20°58.1'	+59.8'	112.3°	20°35.1'	+59.9'	112.7°	20°11.8'	+59.9'	113.0°	19°48.2'	+60.0'	113.4°	19°24.3'	+60.0'	113.7°	19°00.0'	+60.0'	90.0°	19
20	22°20.4'	+59.7'	111.9°	21°57.9'	+59.8'	112.2°	21°35.0'	+59.9'	112.6°	21°11.7'	+59.9'	113.0°	20°48.2'	+60.0'	113.3°	20°24.2'	+60.0'	113.7°	20°00.0'	+60.0'	90.0°	20
21	23°20.1'	+59.7'	111.7°	22°57.6'	+59.8'	112.1°	22°34.8'	+59.9'	112.5°	22°11.7'	+59.9'	112.9°	21°48.1'	+60.0'	113.3°	21°24.2'	+60.0'	113.6°	21°00.0'	+60.0'	90.0°	21
22	24°19.7'	+59.7'	111.6°	23°57.4'	+59.8'	112.0°	23°34.7'	+59.9'	112.5°	23°11.6'	+59.9'	112.9°	22°48.1'	+60.0'	113.2°	22°24.2'	+60.0'	113.6°	22°00.0'	+60.0'	90.0°	22
23	25°19.4'	+59.7'	111.5°	24°57.2'	+59.8'	112.0°	24°34.5'	+59.9'	112.4°	24°11.5'	+59.9'	112.8°	23°48.1'	+60.0'	113.2°	23°24.2'	+60.0'	113.6°	23°00.0'	+60.0'	169.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	2°20.4'	+59.7'	112.9°	1°57.1'	+59.8'	112.9°	1°33.7'	+59.9'	112.9°	1°10.3'	+59.9'	113.0°	0°46.9'	+60.0'	113.0°	0°23.4'	+60.0'	113.0°	0°00.0'	+60.0'	113.0°	0
1	3°20.2'	+59.7'	112.8°	2°56.9'	+59.8'	112.8°	2°33.6'	+59.9'	112.9°	2°10.2'	+59.9'	112.9°	1°46.8'	+60.0'	113.0°	1°23.4'	+60.0'	113.0°	1°00.0'	+60.0'	113.4°	1
2	4°19.9'	+59.7'	112.7°	3°56.7'	+59.8'	112.8°	3°33.5'	+59.9'	112.8°	3°10.2'	+59.9'	112.9°	2°46.8'	+60.0'	112.9°	2°23.4'	+60.0'	113.0°	2°00.0'	+60.0'	109.9°	2
3	5°19.6'	+59.7'	112.6°	4°56.5'	+59.8'	112.7°	4°33.3'	+59.9'	112.8°	4°10.1'	+59.9'	112.8°	3°46.8'	+60.0'	112.9°	3°23.4'	+60.0'	112.9°	3°00.0'	+60.0'	109.9°	3
4	6°19.3'	+59.7'	112.5°	5°56.3'	+59.8'	112.6°	5°33.2'	+59.9'	112.7°	5°10.0'	+59.9'	112.8°	4°46.8'	+60.0'	112.9°	4°23.4'	+60.0'	112.9°	4°00.0'	+60.0'	117.0°	4
5	7°19.0'	+59.7'	112.4°	6°56.1'	+59.8'	112.5°	6°33.1'	+59.9'	112.6°	6°10.0'	+59.9'	112.7°	5°46.7'	+60.0'	112.8°	5°23.4'	+60.0'	112.9°	5°00.0'	+60.0'	103.1°	5
6	8°18.8'	+59.7'	112.3°	7°55.9'	+59.8'	112.4°	7°33.0'	+59.9'	112.5°	7°09.9'	+59.9'	112.7°	6°46.7'	+60.0'	112.8°	6°23.4'	+60.0'	112.9°	6°00.0'	+60.0'	103.2°	6
7	9°18.5'	+59.7'	112.2°	8°55.7'	+59.8'	112.4°	8°32.8'	+59.9'	112.6°	8°09.8'	+59.9'	112.6°	7°46.7'	+60.0'	112.8°	7°23.4'	+60.0'	112.9°	7°00.0'	+60.0'	103.2°	7
8	10°18.2'	+59.7'	112.1°	9°55.5'	+59.8'	112.3°	9°32.7'	+59.9'	112.4°	9°09.7'	+59.9'	112.6°	8°46.6'	+60.0'	112.7°	8°23.4'	+60.0'	112.9°	8°00.0'	+60.0'	90.0°	8
9	11°17.9'	+59.7'	112.0°	10°55.3'	+59.8'	112.2°	10°32.6'	+59.9'	112.4°	10°09.7'	+59.9'	112.5°	9°46.6'	+60.0'	112.7°	9°23.4'	+60.0'	112.9°	9°00.0'	+60.0'	117.3°	9
10	12°17.6'	+59.7'	111.9°	11°55.1'	+59.8'	112.1°	11°32.5'	+59.9'	112.3°	11°09.6'	+59.9'	112.5°	10°46.6'	+60.0'	112.7°	10°23.4'	+60.0'	112.8°	10°00.0'	+60.0'	117.4°	10
11	13°17.3'	+59.7'	111.8°	12°54.9'	+59.8'	112.0°	12°32.3'	+59.9'	112.2°	12°09.5'	+59.9'	112.4°	11°46.5'	+60.0'	112.6°	11°23.4'	+60.0'	112.8°	11°00.0'	+60.0'	117.5°	11
12	14°17.0'	+59.7'	111.7°	13°54.7'	+59.8'	111.9°	13°32.2'	+59.9'	112.2°	13°09.5'	+59.9'	112.4°	12°46.5'	+60.0'	112.6°	12°23.3'	+60.0'	112.8°	12°00.0'	+60.0'	157.9°	12
13	15°16.7'	+59.7'	111.6°	14°54.5'	+59.8'	111.9°	14°32.1'	+59.9'	112.1°	14°09.4'	+59.9'	112.3°	13°46.5'	+60.0'	112.6°	13°23.3'	+60.0'	112.8°	13°00.0'	+60.0'	158.4°	13
14	16°16.4'	+59.7'	111.5°	15°54.3'	+59.8'	111.8°	15°31.9'	+59.9'	112.0°	15°09.3'	+59.9'	112.3°	14°46.4'	+60.0'	112.5°	14°23.3'	+60.0'	112.8°	14°00.0'	+60.0'	159.1°	14
15	17°16.1'	+59.7'	111.4°	16°54.1'	+59.8'	111.7°	16°31.8'	+59.9'	112.0°	16°09.2'	+59.9'	112.2°	15°46.4'	+60.0'	112.5°	15°23.3'	+60.0'	112.7°	15°00.0'	+60.0'	90.0°	15
16	18°15.8'	+59.7'	111.3°	17°53.9'	+59.8'	111.6°	17°31.7'	+59.9'	111.9°	17°09.2'	+59.9'	112.2°	16°46.4'	+60.0'	112.5°	16°23.3'	+60.0'	112.7°	16°00.0'	+60.0'	90.0°	16
17	19°15.5'	+59.7'	111.2°	18°53.7'	+59.8'	111.5°	18°31.5'	+59.9'	111.8°	18°09.1'	+59.9'	112.1°	17°46.3'	+60.0'	112.4°	17°23.3'	+60.0'	112.7°	17°00.0'	+60.0'	90.0°	17
18	20°15.2'	+59.7'	111.1°	19°53.4'	+59.8'	111.4°	19°31.4'	+59.9'	111.7°	19°09.0'	+59.9'	112.1°	18°46.3'	+60.0'	112.4°	18°23.3'	+60.0'	112.7°	18°00.0'	+60.0'	90.0°	18
19	21°14.9'	+59.7'	111.0°	20°53.2'	+59.8'	111.3°	20°31.2'	+59.9'	111.7°	20°08.9'	+59.9'	112.0°	19°46.3'	+60.0'	112.4°	19°23.3'	+60.0'	112.7°	19°00.0'	+60.0'	90.0°	19
20	22°14.5'	+59.7'	110.8°	21°53.0'	+59.8'	111.2°	21°31.1'	+59.9'	111.6°	21°08.8'	+59.9'	112.0°	20°46.2'	+60.0'	112.3°	20°23.3'	+60.0'	112.7°	20°00.0'	+60.0'	90.0°	20
21	23°14.2'	+59.7'	110.7°	22°52.8'	+59.8'	111.1°	22°31.0'	+59.9'	111.5°	22°08.8'	+59.9'											

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

68° 292° LHA

Latitude SAME as Declination

68° 292° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	2°14.6'	+59.7'	111.9°	1°52.3'	+59.8'	111.9°	1°29.8'	+59.9'	112.0°	1°07.4'	+59.9'	112.0°	0°44.9'	+60.0'	112.0°	0°22.5'	+60.0'	112.0°	0°00.0'	+60.0'	112.0°	0
1	3°14.4'	+59.7'	111.8°	2°52.1'	+59.8'	111.8°	2°29.7'	+59.9'	111.9°	2°07.3'	+59.9'	111.9°	1°44.9'	+60.0'	112.0°	1°22.5'	+60.0'	112.0°	1°00.0'	+60.0'	113.4°	1
2	4°14.1'	+59.7'	111.7°	3°51.9'	+59.8'	111.8°	3°29.6'	+59.9'	111.8°	3°07.3'	+59.9'	111.9°	2°44.9'	+60.0'	111.9°	2°22.5'	+60.0'	112.0°	2°00.0'	+60.0'	109.9°	2
3	5°13.8'	+59.7'	111.6°	4°51.7'	+59.8'	111.7°	4°29.5'	+59.9'	111.8°	4°07.2'	+59.9'	111.8°	3°44.9'	+60.0'	111.9°	3°22.5'	+60.0'	111.9°	3°00.0'	+60.0'	109.9°	3
4	6°13.5'	+59.7'	111.5°	5°51.5'	+59.8'	111.6°	5°29.3'	+59.9'	111.7°	5°07.1'	+59.9'	111.8°	4°44.8'	+60.0'	111.9°	4°22.4'	+60.0'	111.9°	4°00.0'	+60.0'	117.0°	4
5	7°13.2'	+59.7'	111.4°	6°51.3'	+59.8'	111.5°	6°29.2'	+59.9'	111.6°	6°07.0'	+59.9'	111.7°	5°44.8'	+60.0'	111.8°	5°22.4'	+60.0'	111.9°	5°00.0'	+60.0'	103.1°	5
6	8°12.9'	+59.7'	111.3°	7°51.1'	+59.8'	111.4°	7°29.1'	+59.9'	111.6°	7°07.0'	+59.9'	111.7°	6°44.8'	+60.0'	111.8°	6°22.4'	+60.0'	111.9°	6°00.0'	+60.0'	103.2°	6
7	9°12.6'	+59.7'	111.2°	8°50.9'	+59.8'	111.4°	8°29.0'	+59.9'	111.5°	8°06.9'	+59.9'	111.6°	7°44.7'	+60.0'	111.8°	7°22.4'	+60.0'	111.9°	7°00.0'	+60.0'	103.2°	7
8	10°12.4'	+59.7'	111.1°	9°50.7'	+59.8'	111.3°	9°28.8'	+59.9'	111.4°	9°06.8'	+59.9'	111.6°	8°44.7'	+60.0'	111.7°	8°22.4'	+60.0'	111.9°	8°00.0'	+60.0'	90.0°	8
9	11°12.1'	+59.7'	111.0°	10°50.5'	+59.8'	111.2°	10°28.7'	+59.9'	111.4°	10°06.8'	+59.9'	111.5°	9°44.7'	+60.0'	111.7°	9°22.4'	+60.0'	111.8°	9°00.0'	+60.0'	117.3°	9
10	12°11.8'	+59.7'	110.9°	11°50.3'	+59.8'	111.1°	11°28.6'	+59.9'	111.3°	11°06.7'	+59.9'	111.5°	10°44.6'	+60.0'	111.7°	10°22.4'	+60.0'	111.8°	10°00.0'	+60.0'	117.4°	10
11	13°11.5'	+59.7'	110.8°	12°50.1'	+59.8'	111.0°	12°28.4'	+59.9'	111.2°	12°06.6'	+59.9'	111.4°	11°44.6'	+60.0'	111.6°	11°22.4'	+60.0'	111.8°	11°00.0'	+60.0'	117.5°	11
12	14°11.2'	+59.7'	110.7°	13°49.9'	+59.8'	110.9°	13°28.3'	+59.9'	111.2°	13°06.5'	+59.9'	111.4°	12°44.6'	+60.0'	111.6°	12°22.4'	+60.0'	111.8°	12°00.0'	+60.0'	157.9°	12
13	15°10.9'	+59.7'	110.6°	14°49.6'	+59.8'	110.8°	14°28.2'	+59.9'	111.1°	14°06.5'	+59.9'	111.3°	13°44.5'	+60.0'	111.6°	13°22.4'	+60.0'	111.8°	13°00.0'	+60.0'	158.4°	13
14	16°10.6'	+59.7'	110.5°	15°49.4'	+59.8'	110.8°	15°28.0'	+59.9'	111.0°	15°06.4'	+59.9'	111.3°	14°44.5'	+60.0'	111.5°	14°22.4'	+60.0'	111.8°	14°00.0'	+60.0'	159.1°	14
15	17°10.3'	+59.7'	110.4°	16°49.2'	+59.8'	110.7°	16°27.9'	+59.9'	111.0°	16°06.3'	+59.9'	111.2°	15°44.5'	+60.0'	111.5°	15°22.4'	+60.0'	111.7°	15°00.0'	+60.0'	90.0°	15
16	18°09.9'	+59.7'	110.3°	17°49.0'	+59.8'	110.6°	17°27.8'	+59.9'	110.9°	17°06.2'	+59.9'	111.2°	16°44.4'	+60.0'	111.5°	16°22.3'	+60.0'	111.7°	16°00.0'	+60.0'	90.0°	16
17	19°09.6'	+59.7'	110.2°	18°48.8'	+59.8'	110.5°	18°27.6'	+59.9'	110.8°	18°06.2'	+59.9'	111.1°	17°44.4'	+60.0'	111.4°	17°22.3'	+60.0'	111.7°	17°00.0'	+60.0'	90.0°	17
18	20°09.3'	+59.7'	110.1°	19°48.6'	+59.8'	110.4°	19°27.5'	+59.9'	110.7°	19°06.1'	+59.9'	111.1°	18°44.4'	+60.0'	111.4°	18°22.3'	+60.0'	111.7°	18°00.0'	+60.0'	90.0°	18
19	21°09.0'	+59.7'	110.0°	20°48.3'	+59.8'	110.3°	20°27.3'	+59.9'	110.7°	20°06.0'	+59.9'	111.0°	19°44.3'	+60.0'	111.3°	19°22.3'	+60.0'	111.7°	19°00.0'	+60.0'	90.0°	19
20	22°08.7'	+59.7'	109.8°	21°48.1'	+59.8'	110.2°	21°27.2'	+59.9'	110.6°	21°05.9'	+59.9'	111.0°	20°44.3'	+60.0'	111.3°	20°22.3'	+60.0'	111.7°	20°00.0'	+60.0'	90.0°	20
21	23°08.3'	+59.7'	109.7°	22°47.9'	+59.8'	110.1°	22°27.1'	+59.9'	110.5°	22°05.8'	+59.9'	110.9°	21°44.3'	+60.0'	111.3°	21°22.3'	+60.0'	111.6°	21°00.0'	+60.0'	90.0°	21
22	24°08.0'	+59.7'	109.6°	23°47.7'	+59.8'	110.0°	23°26.9'	+59.8'	110.4°	23°05.8'	+59.9'	110.8°	22°44.2'	+60.0'	111.2°	22°22.3'	+60.0'	111.6°	22°00.0'	+60.0'	90.0°	22
23	25°07.7'	+59.7'	109.5°	24°47.4'	+59.8'	109.9°	24°26.8'	+59.8'	110.4°	24°05.7'	+59.9'	110.8°	23°44.2'	+60.0'	111.2°	23°22.3'	+60.0'	111.6°	23°00.0'	+60.0'	169.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	2°08.8'	+59.7'	110.9°	1°47.4'	+59.8'	110.9°	1°25.9'	+59.9'	111.0°	1°04.5'	+59.9'	111.0°	0°43.0'	+60.0'	111.0°	0°21.5'	+60.0'	111.0°	0°00.0'	+60.0'	111.0°	0
1	3°08.5'	+59.7'	110.8°	2°47.2'	+59.8'	110.8°	2°25.8'	+59.9'	110.9°	2°04.4'	+59.9'	110.9°	1°43.0'	+60.0'	111.0°	1°21.5'	+60.0'	111.0°	1°00.0'	+60.0'	109.9°	1
2	4°08.2'	+59.7'	110.7°	3°47.0'	+59.8'	110.8°	3°25.7'	+59.9'	110.8°	3°04.3'	+59.9'	110.9°	2°42.9'	+60.0'	110.9°	2°21.5'	+60.0'	111.0°	2°00.0'	+60.0'	109.9°	2
3	5°07.9'	+59.7'	110.6°	4°46.8'	+59.8'	110.7°	4°25.6'	+59.9'	110.8°	4°04.3'	+59.9'	110.8°	3°42.9'	+60.0'	110.9°	3°21.5'	+60.0'	110.9°	3°00.0'	+60.0'	109.9°	3
4	6°07.7'	+59.7'	110.5°	5°46.6'	+59.8'	110.6°	5°25.4'	+59.9'	110.7°	5°04.2'	+59.9'	110.8°	4°42.9'	+60.0'	110.9°	4°21.5'	+60.0'	110.9°	4°00.0'	+60.0'	117.0°	4
5	7°07.4'	+59.7'	110.4°	6°46.4'	+59.8'	110.5°	6°25.3'	+59.9'	110.6°	6°04.1'	+59.9'	110.7°	5°42.8'	+60.0'	110.8°	5°21.5'	+60.0'	110.9°	5°00.0'	+60.0'	103.1°	5
6	8°07.1'	+59.7'	110.3°	7°46.2'	+59.8'	110.4°	7°25.2'	+59.9'	110.6°	7°04.0'	+59.9'	110.7°	6°42.8'	+60.0'	110.8°	6°21.5'	+60.0'	110.9°	6°00.0'	+60.0'	103.2°	6
7	9°06.8'	+59.7'	110.2°	8°46.0'	+59.8'	110.4°	8°25.0'	+59.9'	110.5°	8°04.0'	+59.9'	110.6°	7°42.8'	+60.0'	110.8°	7°21.4'	+60.0'	110.9°	7°00.0'	+60.0'	103.2°	7
8	10°06.5'	+59.7'	110.1°	9°45.8'	+59.8'	110.3°	9°24.9'	+59.9'	110.4°	9°03.9'	+59.9'	110.6°	8°42.7'	+60.0'	110.7°	8°21.4'	+60.0'	110.9°	8°00.0'	+60.0'	90.0°	8
9	11°06.2'	+59.7'	110.0°	10°45.6'	+59.8'	110.2°	10°24.8'	+59.9'	110.4°	10°03.8'	+59.9'	110.5°	9°42.7'	+60.0'	110.7°	9°21.4'	+60.0'	110.8°	9°00.0'	+60.0'	117.3°	9
10	12°05.9'	+59.7'	109.9°	11°45.4'	+59.8'	110.1°	11°24.7'	+59.9'	110.3°	11°03.8'	+59.9'	110.5°	10°42.7'	+60.0'	110.7°	10°21.4'	+60.0'	110.8°	10°00.0'	+60.0'	117.4°	10
11	13°05.6'	+59.7'	109.8°	12°45.2'	+59.8'	110.0°	12°24.5'	+59.9'	110.2°	12°03.7'	+59.9'	110.4°	11°42.6'	+60.0'	110.6°	11°21.4'	+60.0'	110.8°	11°00.0'	+60.0'	117.5°	11
12	14°05.3'	+59.7'	109.7°	13°45.0'	+59.8'	109.9°	13°24.4'	+59.9'	110.2°	13°03.6'	+59.9'	110.4°	12°42.6'	+60.0'	110.6°	12°21.4'	+60.0'	110.8°	12°00.0'	+60.0'	157.9°	12
13	15°05.0'	+59.7'	109.6°	14°44.7'	+59.8'	109.8°	14°24.3'	+59.9'	110.1°	14°03.5'	+59.9'	110.3°	13°42.6'	+60.0'	110.6°	13°21.4'	+60.0'	110.8°	13°00.0'	+60.0'	158.4°	13
14	16°04.7'	+59.7'	109.5°	15°44.5'	+59.8'	109.8°	15°24.1'	+59.9'	110.0°	15°03.5'	+59.9'	110.3°	14°42.5'	+60.0'	110.5°	14°21.4'	+60.0'	110.8°	14°00.0'	+60.0'	159.1°	14
15	17°04.4'	+59.7'	109.4°	16°44.3'	+59.8'	109.7°	16°24.0'	+59.9'	109.9°	16°03.4'	+59.9'	110.2°	15°42.5'	+60.0'	110.5°	15°21.4'	+60.0'	110.7°	15°00.0'	+60.0'	90.0°	15
16	18°04.0'	+59.7'	109.3°	17°44.1'	+59.8'	109.6°	17°23.8'	+59.9'	109.9°	17°03.3'	+59.9'	110.2°	16°42.5'	+60.0'	110.5°	16°21.4'	+60.0'	110.7°	16°00.0'	+60.0'	90.0°	16
17	19°03.7'	+59.7'	109.2°	18°43.9'	+59.8'	109.5°	18°23.7'	+59.9'	109.8°	18°03.2'	+59.9'	110.1°	17°42.4'	+60.0'	110.4°	17°21.4'	+60.0'	110.7°	17°00.0'	+60.0'	90.0°	17
18	20°03.4'	+59.7'	109.1°	19°43.6'	+59.8'	109.4°	19°23.6'	+59.9'	109.7°	19°03.1'	+59.9'	110.1°	18°42.4'	+60.0'	110.4°	18°21.4'	+60.0'	110.7°	18°00.0'	+60.0'	90.0°	18
19	21°03.1'	+59.7'	108.9°	20°43.4'	+59.8'	109.3°	20°23.4'	+59.9'	109.7°	20°03.1'	+59.9'	110.0°	19°42.4'	+60.0'	110.3°	19°21.3'	+60.0'	110.7°	19°00.0'	+60.0'	90.0°	19
20	22°02.7'	+59.7'	108.8°	21°43.2'	+59.8'	109.2°	21°23.3'	+59.9'	109.6°	21°03.0'	+59.9'	109.9°	20°42.3'	+60.0'	110.3°	20°21.3'	+60.0'	110.7°	20°00.0'	+60.0'	90.0°	20
21	23°02.4'	+59.7'	108.7°	22°43.0'	+59.8'	109.1°	22°23.1'	+59.8'	109.5°	22°02.9'	+59.9'											

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

70° 290° LHA

Latitude SAME as Declination

70° 290° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	2°02.9'	+59.7'	109.9°	1°42.5'	+59.8'	109.9°	1°22.0'	+59.9'	110.0°	1°01.5'	+59.9'	110.0°	0°41.0'	+60.0'	110.0°	0°20.5'	+60.0'	110.0°	0°00.0'	+60.0'	110.0°	0
1	3°02.6'	+59.7'	109.8°	2°42.3'	+59.8'	109.8°	2°21.9'	+59.9'	109.9°	2°01.5'	+59.9'	109.9°	1°41.0'	+60.0'	110.0°	1°20.5'	+60.0'	110.0°	1°00.0'	+60.0'	109.9°	1
2	4°02.3'	+59.7'	109.7°	3°42.1'	+59.8'	109.8°	3°21.8'	+59.9'	109.8°	3°01.4'	+59.9'	109.9°	2°41.0'	+60.0'	109.9°	2°20.5'	+60.0'	110.0°	2°00.0'	+60.0'	109.9°	2
3	5°02.1'	+59.7'	109.6°	4°41.9'	+59.8'	109.7°	4°21.6'	+59.9'	109.8°	4°01.3'	+59.9'	109.8°	3°40.9'	+60.0'	109.9°	3°20.5'	+60.0'	109.9°	3°00.0'	+60.0'	109.9°	3
4	6°01.8'	+59.7'	109.5°	5°41.7'	+59.8'	109.6°	5°21.5'	+59.9'	109.7°	5°01.2'	+59.9'	109.8°	4°40.9'	+60.0'	109.9°	4°20.5'	+60.0'	109.9°	4°00.0'	+60.0'	117.0°	4
5	7°01.5'	+59.7'	109.4°	6°41.5'	+59.8'	109.5°	6°21.4'	+59.9'	109.6°	6°01.2'	+59.9'	109.7°	5°40.9'	+60.0'	109.8°	5°20.5'	+60.0'	109.9°	5°00.0'	+60.0'	103.1°	5
6	8°01.2'	+59.7'	109.3°	7°41.3'	+59.8'	109.4°	7°21.2'	+59.9'	109.6°	7°01.1'	+59.9'	109.7°	6°40.8'	+60.0'	109.8°	6°20.5'	+60.0'	109.9°	6°00.0'	+60.0'	103.2°	6
7	9°00.9'	+59.7'	109.2°	8°41.1'	+59.8'	109.4°	8°21.1'	+59.9'	109.5°	8°01.0'	+59.9'	109.6°	7°40.8'	+60.0'	109.8°	7°20.5'	+60.0'	109.9°	7°00.0'	+60.0'	90.0°	7
8	10°00.6'	+59.7'	109.1°	9°40.9'	+59.8'	109.3°	9°21.0'	+59.9'	109.4°	9°01.0'	+59.9'	109.6°	8°40.8'	+60.0'	109.7°	8°20.5'	+60.0'	109.9°	8°00.0'	+60.0'	90.0°	8
9	11°00.3'	+59.7'	109.0°	10°40.7'	+59.8'	109.2°	10°20.8'	+59.9'	109.4°	10°00.9'	+59.9'	109.5°	9°40.7'	+60.0'	109.7°	9°20.4'	+60.0'	109.8°	9°00.0'	+60.0'	117.3°	9
10	12°00.0'	+59.7'	108.9°	11°40.4'	+59.8'	109.1°	11°20.7'	+59.9'	109.3°	11°00.8'	+59.9'	109.5°	10°40.7'	+60.0'	109.7°	10°20.4'	+60.0'	109.8°	10°00.0'	+60.0'	117.4°	10
11	12°59.7'	+59.7'	108.8°	12°40.2'	+59.8'	109.0°	12°20.6'	+59.9'	109.2°	12°00.7'	+59.9'	109.4°	11°40.7'	+60.0'	109.6°	11°20.4'	+60.0'	109.8°	11°00.0'	+60.0'	117.5°	11
12	13°59.4'	+59.7'	108.7°	13°40.0'	+59.8'	108.9°	13°20.4'	+59.9'	109.2°	13°00.7'	+59.9'	109.4°	12°40.6'	+60.0'	109.6°	12°20.4'	+60.0'	109.8°	12°00.0'	+60.0'	157.9°	12
13	14°59.1'	+59.7'	108.6°	14°39.8'	+59.8'	108.8°	14°20.3'	+59.9'	109.1°	14°00.6'	+59.9'	109.3°	13°40.6'	+60.0'	109.6°	13°20.4'	+60.0'	109.8°	13°00.0'	+60.0'	158.4°	13
14	15°58.7'	+59.7'	108.5°	15°39.6'	+59.8'	108.8°	15°20.2'	+59.9'	109.0°	15°00.5'	+59.9'	109.3°	14°40.6'	+60.0'	109.5°	14°20.4'	+60.0'	109.8°	14°00.0'	+60.0'	159.1°	14
15	16°58.4'	+59.7'	108.4°	16°39.4'	+59.8'	108.7°	16°20.0'	+59.9'	108.9°	16°00.4'	+59.9'	109.2°	15°40.5'	+60.0'	109.5°	15°20.4'	+60.0'	109.7°	15°00.0'	+60.0'	90.0°	15
16	17°58.1'	+59.7'	108.3°	17°39.1'	+59.8'	108.6°	17°19.9'	+59.9'	108.9°	17°00.3'	+59.9'	109.2°	16°40.5'	+60.0'	109.4°	16°20.4'	+60.0'	109.7°	16°00.0'	+60.0'	90.0°	16
17	18°57.8'	+59.7'	108.2°	18°38.9'	+59.8'	108.5°	18°19.7'	+59.9'	108.8°	18°00.3'	+59.9'	109.1°	17°40.5'	+60.0'	109.4°	17°20.4'	+60.0'	109.7°	17°00.0'	+60.0'	90.0°	17
18	19°57.5'	+59.7'	108.0°	19°38.7'	+59.8'	108.4°	19°19.6'	+59.9'	108.7°	19°00.2'	+59.9'	109.1°	18°40.4'	+60.0'	109.4°	18°20.4'	+60.0'	109.7°	18°00.0'	+60.0'	90.0°	18
19	20°57.1'	+59.7'	107.9°	20°38.5'	+59.8'	108.3°	20°19.5'	+59.9'	108.7°	20°00.1'	+59.9'	109.0°	19°40.4'	+60.0'	109.3°	19°20.4'	+60.0'	109.7°	19°00.0'	+60.0'	90.0°	19
20	21°56.8'	+59.7'	107.8°	21°38.2'	+59.8'	108.2°	21°19.3'	+59.9'	108.6°	21°00.0'	+59.9'	108.9°	20°40.4'	+60.0'	109.3°	20°20.4'	+60.0'	109.7°	20°00.0'	+60.0'	90.0°	20
21	22°56.5'	+59.7'	107.7°	22°38.0'	+59.8'	108.1°	22°19.2'	+59.9'	108.5°	22°00.0'	+59.9'	108.9°	21°40.3'	+60.0'	109.3°	21°20.3'	+60.0'	109.6°	21°00.0'	+60.0'	90.0°	21
22	23°56.1'	+59.6'	107.6°	23°37.8'	+59.8'	108.0°	23°19.0'	+59.8'	108.4°	22°59.8'	+59.9'	108.8°	22°40.3'	+60.0'	109.2°	22°20.3'	+60.0'	109.6°	22°00.0'	+60.0'	90.0°	22
23	24°55.8'	+59.6'	107.5°	24°37.5'	+59.8'	107.9°	24°18.9'	+59.8'	108.3°	23°59.8'	+59.9'	108.8°	23°40.2'	+60.0'	109.2°	23°20.3'	+60.0'	109.6°	23°00.0'	+60.0'	169.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	1°57.0'	+59.7'	108.9°	1°37.6'	+59.8'	108.9°	1°18.1'	+59.9'	109.0°	0°58.6'	+59.9'	109.0°	0°39.1'	+60.0'	109.0°	0°19.5'	+60.0'	109.0°	0°00.0'	+60.0'	109.0°	0
1	2°56.7'	+59.7'	108.8°	2°37.4'	+59.8'	108.9°	2°17.9'	+59.9'	108.9°	1°58.5'	+59.9'	108.9°	1°39.0'	+60.0'	109.0°	1°19.5'	+60.0'	109.0°	1°00.0'	+60.0'	109.9°	1
2	3°56.4'	+59.7'	108.7°	3°37.2'	+59.8'	108.8°	3°17.8'	+59.9'	108.8°	2°58.4'	+59.9'	108.9°	2°39.0'	+60.0'	108.9°	2°19.5'	+60.0'	109.0°	2°00.0'	+60.0'	109.9°	2
3	4°56.1'	+59.7'	108.6°	4°36.9'	+59.8'	108.7°	4°17.7'	+59.9'	108.8°	3°58.4'	+59.9'	108.8°	3°39.0'	+60.0'	108.9°	3°19.5'	+60.0'	108.9°	3°00.0'	+60.0'	109.9°	3
4	5°55.8'	+59.7'	108.5°	5°36.7'	+59.8'	108.6°	5°17.6'	+59.9'	108.7°	4°58.3'	+59.9'	108.8°	4°38.9'	+60.0'	108.9°	4°19.5'	+60.0'	108.9°	4°00.0'	+60.0'	103.1°	4
5	6°55.5'	+59.7'	108.4°	6°36.5'	+59.8'	108.5°	6°17.4'	+59.9'	108.6°	5°58.2'	+59.9'	108.7°	5°38.9'	+60.0'	108.9°	5°19.5'	+60.0'	108.9°	5°00.0'	+60.0'	90.0°	5
6	7°55.2'	+59.7'	108.3°	7°36.3'	+59.8'	108.4°	7°17.3'	+59.9'	108.6°	6°58.1'	+59.9'	108.7°	6°38.9'	+60.0'	108.8°	6°19.5'	+60.0'	108.9°	6°00.0'	+60.0'	90.0°	6
7	8°54.9'	+59.7'	108.2°	8°36.1'	+59.8'	108.4°	8°17.2'	+59.9'	108.5°	7°58.1'	+59.9'	108.6°	7°38.8'	+60.0'	108.8°	7°19.5'	+60.0'	108.9°	7°00.0'	+60.0'	90.0°	7
8	9°54.6'	+59.7'	108.1°	9°35.9'	+59.8'	108.3°	9°17.0'	+59.9'	108.4°	8°58.0'	+59.9'	108.6°	8°38.8'	+60.0'	108.7°	8°19.5'	+60.0'	108.9°	8°00.0'	+60.0'	90.0°	8
9	10°54.3'	+59.7'	108.0°	10°35.7'	+59.8'	108.2°	10°16.9'	+59.9'	108.4°	9°57.9'	+59.9'	108.5°	9°38.8'	+60.0'	108.7°	9°19.5'	+60.0'	108.8°	9°00.0'	+60.0'	117.3°	9
10	11°54.0'	+59.7'	107.9°	11°35.5'	+59.8'	108.1°	11°16.8'	+59.9'	108.3°	10°57.8'	+59.9'	108.5°	10°38.7'	+60.0'	108.7°	10°19.5'	+60.0'	108.8°	10°00.0'	+60.0'	117.4°	10
11	12°53.7'	+59.7'	107.8°	12°35.3'	+59.8'	108.0°	12°16.6'	+59.9'	108.2°	11°57.8'	+59.9'	108.4°	11°38.7'	+60.0'	108.6°	11°19.4'	+60.0'	108.8°	11°00.0'	+60.0'	117.5°	11
12	13°53.4'	+59.7'	107.7°	13°35.1'	+59.8'	107.9°	13°16.5'	+59.9'	108.1°	12°57.7'	+59.9'	108.4°	12°38.7'	+60.0'	108.6°	12°19.4'	+60.0'	108.8°	12°00.0'	+60.0'	157.9°	12
13	14°53.1'	+59.7'	107.6°	14°34.8'	+59.8'	107.8°	14°16.3'	+59.9'	108.1°	13°57.6'	+59.9'	108.3°	13°38.6'	+60.0'	108.6°	13°19.4'	+60.0'	108.8°	13°00.0'	+60.0'	158.4°	13
14	15°52.8'	+59.7'	107.5°	15°34.6'	+59.8'	107.7°	15°16.2'	+59.9'	108.0°	14°57.5'	+59.9'	108.3°	14°38.6'	+60.0'	108.5°	14°19.4'	+60.0'	108.8°	14°00.0'	+60.0'	159.1°	14
15	16°52.5'	+59.7'	107.4°	16°34.4'	+59.8'	107.7°	16°16.1'	+59.9'	107.9°	15°57.4'	+59.9'	108.2°	15°38.6'	+60.0'	108.5°	15°19.4'	+60.0'	108.7°	15°00.0'	+60.0'	90.0°	15
16	17°52.1'	+59.7'	107.3°	17°34.2'	+59.8'	107.6°	17°15.9'	+59.9'	107.9°	16°57.4'	+59.9'	108.2°	16°38.5'	+60.0'	108.4°	16°19.4'	+60.0'	108.7°	16°00.0'	+60.0'	90.0°	16
17	18°51.8'	+59.7'	107.2°	18°34.0'	+59.8'	107.5°	18°15.8'	+59.9'	107.8°	17°57.3'	+59.9'	108.1°	17°38.5'	+60.0'	108.4°	17°19.4'	+60.0'	108.7°	17°00.0'	+60.0'	90.0°	17
18	19°51.5'	+59.7'	107.0°	19°33.7'	+59.8'	107.4°	19°15.6'	+59.9'	107.7°	18°57.2'	+59.9'	108.0°	18°38.5'	+60.0'	108.4°	18°19.4'	+60.0'	108.7°	18°00.0'	+60.0'	90.0°	18
19	20°51.1'	+59.7'	106.9°	20°33.5'	+59.8'	107.3°	20°15.5'	+59.9'	107.6°	19°57.1'	+59.9'	108.0°	19°38.4'	+60.0'	108.3°	19°19.4'	+60.0'	108.7°	19°00.0'	+60.0'	90.0°	19
20	21°50.8'	+59.7'	106.8°	21°33.3'	+59.8'	107.2°	21°15.3'	+59.8'	107.6°	20°57.0'	+59.9'	107.9°	20°38.4'	+60.0'	108.3°	20°19.4'	+60.0'	108.7°	20°00.0'	+60.0'	90.0°	20
21	22°50.5'	+59.7'	106.7°	22°33.0'	+59.8'	107.1°	22°15.2'	+59.8'	107.5°	21°57.0'	+59.9'	107.										

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

72° 288° LHA

Latitude SAME as Declination

72° 288° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	1°51.1'	+59.7'	107.9°	1°32.6'	+59.8'	107.9°	1°14.1'	+59.9'	108.0°	0°55.6'	+59.9'	108.0°	0°37.1'	+60.0'	108.0°	0°18.5'	+60.0'	108.0°	0°00.0'	+60.0'	108.0°	0
1	2°50.8'	+59.7'	107.8°	2°32.4'	+59.8'	107.9°	2°14.0'	+59.9'	107.9°	1°55.5'	+59.9'	107.9°	1°37.0'	+60.0'	108.0°	1°18.5'	+60.0'	108.0°	1°00.0'	+60.0'	106.5°	1
2	3°50.5'	+59.7'	107.7°	3°32.2'	+59.8'	107.8°	3°13.8'	+59.9'	107.8°	2°55.5'	+59.9'	107.9°	2°37.0'	+60.0'	107.9°	2°18.5'	+60.0'	108.0°	2°00.0'	+60.0'	109.9°	2
3	4°50.2'	+59.7'	107.6°	4°32.0'	+59.8'	107.7°	4°13.7'	+59.9'	107.8°	3°55.4'	+59.9'	107.8°	3°37.0'	+60.0'	107.9°	3°18.5'	+60.0'	107.9°	3°00.0'	+60.0'	109.9°	3
4	5°49.9'	+59.7'	107.5°	5°31.8'	+59.8'	107.6°	5°13.6'	+59.9'	107.7°	4°55.3'	+59.9'	107.8°	4°36.9'	+60.0'	107.9°	4°18.5'	+60.0'	107.9°	4°00.0'	+60.0'	103.1°	4
5	6°49.6'	+59.7'	107.4°	6°31.6'	+59.8'	107.5°	6°13.4'	+59.9'	107.6°	5°55.2'	+59.9'	107.7°	5°36.9'	+60.0'	107.8°	5°18.5'	+60.0'	107.9°	5°00.0'	+60.0'	90.0°	5
6	7°49.3'	+59.7'	107.3°	7°31.4'	+59.8'	107.4°	7°13.3'	+59.9'	107.6°	6°55.2'	+59.9'	107.7°	6°36.9'	+60.0'	107.8°	6°18.5'	+60.0'	107.9°	6°00.0'	+60.0'	90.0°	6
7	8°49.0'	+59.7'	107.2°	8°31.1'	+59.8'	107.4°	8°13.2'	+59.9'	107.5°	7°55.1'	+59.9'	107.6°	7°36.8'	+60.0'	107.8°	7°18.5'	+60.0'	107.9°	7°00.0'	+60.0'	90.0°	7
8	9°48.7'	+59.7'	107.1°	9°30.9'	+59.8'	107.3°	9°13.0'	+59.9'	107.4°	8°55.0'	+59.9'	107.6°	8°36.8'	+60.0'	107.7°	8°18.5'	+60.0'	107.9°	8°00.0'	+60.0'	90.0°	8
9	10°48.3'	+59.7'	107.0°	10°30.7'	+59.8'	107.2°	10°12.9'	+59.9'	107.4°	9°54.9'	+59.9'	107.5°	9°36.8'	+60.0'	107.7°	9°18.5'	+60.0'	107.8°	9°00.0'	+60.0'	117.3°	9
10	11°48.0'	+59.7'	106.9°	11°30.5'	+59.8'	107.1°	11°12.8'	+59.9'	107.3°	10°54.8'	+59.9'	107.5°	10°36.7'	+60.0'	107.7°	10°18.5'	+60.0'	107.8°	10°00.0'	+60.0'	117.4°	10
11	12°47.7'	+59.7'	106.8°	12°30.3'	+59.8'	107.0°	12°12.6'	+59.9'	107.2°	11°54.8'	+59.9'	107.4°	11°36.7'	+60.0'	107.6°	11°18.4'	+60.0'	107.8°	11°00.0'	+60.0'	117.5°	11
12	13°47.4'	+59.7'	106.7°	13°30.1'	+59.8'	106.9°	13°12.5'	+59.9'	107.1°	12°54.7'	+59.9'	107.4°	12°36.7'	+60.0'	107.6°	12°18.4'	+60.0'	107.8°	12°00.0'	+60.0'	157.9°	12
13	14°47.1'	+59.7'	106.6°	14°29.8'	+59.8'	106.8°	14°12.4'	+59.9'	107.1°	13°54.6'	+59.9'	107.3°	13°36.6'	+60.0'	107.5°	13°18.4'	+60.0'	107.8°	13°00.0'	+60.0'	158.4°	13
14	15°46.8'	+59.7'	106.5°	15°29.6'	+59.8'	106.7°	15°12.2'	+59.9'	107.0°	14°54.5'	+59.9'	107.3°	14°36.6'	+60.0'	107.5°	14°18.4'	+60.0'	107.8°	14°00.0'	+60.0'	159.1°	14
15	16°46.5'	+59.7'	106.4°	16°29.4'	+59.8'	106.7°	16°12.1'	+59.9'	106.9°	15°54.5'	+59.9'	107.2°	15°36.6'	+60.0'	107.5°	15°18.4'	+60.0'	107.7°	15°00.0'	+60.0'	90.0°	15
16	17°46.1'	+59.7'	106.3°	17°29.2'	+59.8'	106.6°	17°11.9'	+59.9'	106.9°	16°54.4'	+59.9'	107.2°	16°36.5'	+60.0'	107.4°	16°18.4'	+60.0'	107.7°	16°00.0'	+60.0'	90.0°	16
17	18°45.8'	+59.7'	106.1°	18°28.9'	+59.8'	106.5°	18°11.8'	+59.9'	106.8°	17°54.3'	+59.9'	107.1°	17°36.5'	+60.0'	107.4°	17°18.4'	+60.0'	107.7°	17°00.0'	+60.0'	90.0°	17
18	19°45.5'	+59.7'	106.0°	19°28.7'	+59.8'	106.4°	19°11.6'	+59.9'	106.7°	18°54.2'	+59.9'	107.0°	18°36.5'	+60.0'	107.4°	18°18.4'	+60.0'	107.7°	18°00.0'	+60.0'	90.0°	18
19	20°45.1'	+59.7'	105.9°	20°28.5'	+59.8'	106.3°	20°11.5'	+59.8'	106.6°	19°54.1'	+59.9'	107.0°	19°36.4'	+60.0'	107.3°	19°18.4'	+60.0'	107.7°	19°00.0'	+60.0'	90.0°	19
20	21°44.8'	+59.7'	105.8°	21°28.2'	+59.8'	106.2°	21°11.3'	+59.8'	106.6°	20°54.0'	+59.9'	106.9°	20°36.4'	+60.0'	107.3°	20°18.4'	+60.0'	107.7°	20°00.0'	+60.0'	90.0°	20
21	22°44.4'	+59.6'	105.7°	22°28.0'	+59.8'	106.1°	22°11.2'	+59.8'	106.5°	21°54.0'	+59.9'	106.9°	21°36.3'	+60.0'	107.3°	21°18.4'	+60.0'	107.6°	21°00.0'	+60.0'	90.0°	21
22	23°44.1'	+59.6'	105.6°	23°27.8'	+59.8'	106.0°	23°11.0'	+59.8'	106.4°	22°53.9'	+59.9'	106.8°	22°36.3'	+60.0'	107.2°	22°18.3'	+60.0'	107.6°	22°00.0'	+60.0'	90.0°	22
23	24°43.7'	+59.6'	105.5°	24°27.5'	+59.7'	105.9°	24°10.9'	+59.8'	106.3°	23°53.8'	+59.9'	106.8°	23°36.3'	+60.0'	107.2°	23°18.3'	+60.0'	107.6°	23°00.0'	+60.0'	169.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	1°45.1'	+59.7'	106.9°	1°27.6'	+59.8'	106.9°	1°10.1'	+59.9'	107.0°	0°52.6'	+59.9'	107.0°	0°35.1'	+60.0'	107.0°	0°17.5'	+60.0'	107.0°	0°00.0'	+60.0'	107.0°	0
1	2°44.8'	+59.7'	106.8°	2°27.4'	+59.8'	106.9°	2°10.0'	+59.9'	106.9°	1°52.5'	+59.9'	106.9°	1°35.0'	+60.0'	107.0°	1°17.5'	+60.0'	107.0°	1°00.0'	+60.0'	106.5°	1
2	3°44.5'	+59.7'	106.7°	3°27.2'	+59.8'	106.8°	3°09.8'	+59.9'	106.8°	2°52.5'	+59.9'	106.9°	2°35.0'	+60.0'	106.9°	2°17.5'	+60.0'	107.0°	2°00.0'	+60.0'	109.9°	2
3	4°44.2'	+59.7'	106.6°	4°27.0'	+59.8'	106.7°	4°09.7'	+59.9'	106.8°	3°52.4'	+59.9'	106.8°	3°35.0'	+60.0'	106.9°	3°17.5'	+60.0'	106.9°	3°00.0'	+60.0'	109.9°	3
4	5°43.9'	+59.7'	106.5°	5°26.8'	+59.8'	106.6°	5°09.6'	+59.9'	106.7°	4°52.3'	+59.9'	106.8°	4°34.9'	+60.0'	106.9°	4°17.5'	+60.0'	106.9°	4°00.0'	+60.0'	103.1°	4
5	6°43.6'	+59.7'	106.4°	6°26.6'	+59.8'	106.5°	6°09.4'	+59.9'	106.6°	5°52.2'	+59.9'	106.7°	5°34.9'	+60.0'	106.8°	5°17.5'	+60.0'	106.9°	5°00.0'	+60.0'	90.0°	5
6	7°43.3'	+59.7'	106.3°	7°26.3'	+59.8'	106.4°	7°09.3'	+59.9'	106.6°	6°52.2'	+59.9'	106.7°	6°34.9'	+60.0'	106.8°	6°17.5'	+60.0'	106.9°	6°00.0'	+60.0'	90.0°	6
7	8°43.0'	+59.7'	106.2°	8°26.1'	+59.8'	106.4°	8°09.2'	+59.9'	106.5°	7°52.1'	+59.9'	106.6°	7°34.8'	+60.0'	106.8°	7°17.5'	+60.0'	106.9°	7°00.0'	+60.0'	90.0°	7
8	9°42.6'	+59.7'	106.1°	9°25.9'	+59.8'	106.3°	9°09.0'	+59.9'	106.4°	8°52.0'	+59.9'	106.6°	8°34.8'	+60.0'	106.7°	8°17.5'	+60.0'	106.9°	8°00.0'	+60.0'	90.0°	8
9	10°42.3'	+59.7'	106.0°	10°25.7'	+59.8'	106.2°	10°08.9'	+59.9'	106.4°	9°51.9'	+59.9'	106.5°	9°34.8'	+60.0'	106.7°	9°17.5'	+60.0'	106.8°	9°00.0'	+60.0'	117.3°	9
10	11°42.0'	+59.7'	105.9°	11°25.5'	+59.8'	106.1°	11°08.8'	+59.9'	106.3°	10°51.8'	+59.9'	106.5°	10°34.7'	+60.0'	106.7°	10°17.5'	+60.0'	106.8°	10°00.0'	+60.0'	117.4°	10
11	12°41.7'	+59.7'	105.8°	12°25.3'	+59.8'	106.0°	12°08.6'	+59.9'	106.2°	11°51.8'	+59.9'	106.4°	11°34.7'	+60.0'	106.6°	11°17.4'	+60.0'	106.8°	11°00.0'	+60.0'	117.5°	11
12	13°41.4'	+59.7'	105.7°	13°25.1'	+59.8'	105.9°	13°08.5'	+59.9'	106.1°	12°51.7'	+59.9'	106.4°	12°34.7'	+60.0'	106.6°	12°17.4'	+60.0'	106.8°	12°00.0'	+60.0'	157.9°	12
13	14°41.1'	+59.7'	105.6°	14°24.8'	+59.8'	105.8°	14°08.3'	+59.9'	106.1°	13°51.6'	+59.9'	106.3°	13°34.6'	+60.0'	106.5°	13°17.4'	+60.0'	106.8°	13°00.0'	+60.0'	158.4°	13
14	15°40.7'	+59.7'	105.5°	15°24.6'	+59.8'	105.7°	15°08.2'	+59.9'	106.0°	14°51.5'	+59.9'	106.3°	14°34.6'	+60.0'	106.5°	14°17.4'	+60.0'	106.8°	14°00.0'	+60.0'	159.1°	14
15	16°40.4'	+59.7'	105.4°	16°24.4'	+59.8'	105.7°	16°08.1'	+59.9'	105.9°	15°51.4'	+59.9'	106.2°	15°34.6'	+60.0'	106.5°	15°17.4'	+60.0'	106.7°	15°00.0'	+60.0'	90.0°	15
16	17°40.1'	+59.7'	105.3°	17°24.2'	+59.8'	105.6°	17°07.9'	+59.9'	105.9°	16°51.4'	+59.9'	106.2°	16°34.5'	+60.0'	106.4°	16°17.4'	+60.0'	106.7°	16°00.0'	+60.0'	90.0°	16
17	18°39.8'	+59.7'	105.1°	18°23.9'	+59.8'	105.5°	18°07.8'	+59.9'	105.8°	17°51.3'	+59.9'	106.1°	17°34.5'	+60.0'	106.4°	17°17.4'	+60.0'	106.7°	17°00.0'	+60.0'	90.0°	17
18	19°39.4'	+59.7'	105.0°	19°23.7'	+59.8'	105.4°	19°07.6'	+59.8'	105.7°	18°51.2'	+59.9'	106.0°	18°34.5'	+60.0'	106.4°	18°17.4'	+60.0'	106.7°	18°00.0'	+60.0'	90.0°	18
19	20°39.1'	+59.7'	104.9°	20°23.5'	+59.8'	105.3°	20°07.5'	+59.8'	105.6°	19°51.1'	+59.9'	106.0°	19°34.4'	+60.0'	106.3°	19°17.4'	+60.0'	106.7°	19°00.0'	+60.0'	90.0°	19
20	21°38.7'	+59.6'	104.8°	21°23.2'	+59.8'	105.2°	21°07.3'	+59.8'	105.6°	20°51.0'	+59.9'	105.9°	20°34.4'	+60.0'	106.3°	20°17.4'	+60.0'	106.6°	20°00.0'	+60.0'	90.0°	20
21	22°38.4'	+59.6'	104.7°	22°23.0'	+59.8'	105.1°	22°07.2'	+59.8'	105.5°	21°50.9'	+59.9'	105.9°										

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

74° 286° LHA

Latitude SAME as Declination

74° 286° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	1°39.1'	+59.7'	105.9°	1°22.6'	+59.8'	105.9°	1°06.1'	+59.9'	106.0°	0°49.6'	+59.9'	106.0°	0°33.1'	+60.0'	106.0°	0°16.5'	+60.0'	106.0°	0°00.0'	+60.0'	106.0°	0
1	2°38.8'	+59.7'	105.8°	2°22.4'	+59.8'	105.9°	2°06.0'	+59.9'	105.9°	1°49.5'	+59.9'	105.9°	1°33.0'	+60.0'	106.0°	1°16.5'	+60.0'	106.0°	1°00.0'	+60.0'	106.5°	1
2	3°38.5'	+59.7'	105.7°	3°22.2'	+59.8'	105.8°	3°05.8'	+59.9'	105.8°	2°49.4'	+59.9'	105.9°	2°33.0'	+60.0'	105.9°	2°16.5'	+60.0'	106.0°	2°00.0'	+60.0'	103.1°	2
3	4°38.1'	+59.7'	105.6°	4°22.0'	+59.8'	105.7°	4°05.7'	+59.9'	105.8°	3°49.4'	+59.9'	105.8°	3°33.0'	+60.0'	105.9°	3°16.5'	+60.0'	105.9°	3°00.0'	+60.0'	103.1°	3
4	5°37.8'	+59.7'	105.5°	5°21.7'	+59.8'	105.6°	5°05.6'	+59.9'	105.7°	4°49.3'	+59.9'	105.8°	4°32.9'	+60.0'	105.9°	4°16.5'	+60.0'	105.9°	4°00.0'	+60.0'	103.1°	4
5	6°37.5'	+59.7'	105.4°	6°21.5'	+59.8'	105.5°	6°05.4'	+59.9'	105.6°	5°49.2'	+59.9'	105.7°	5°32.9'	+60.0'	105.8°	5°16.5'	+60.0'	105.9°	5°00.0'	+60.0'	90.0°	5
6	7°37.2'	+59.7'	105.3°	7°21.3'	+59.8'	105.4°	7°05.3'	+59.9'	105.6°	6°49.1'	+59.9'	105.7°	6°32.9'	+60.0'	105.8°	6°16.5'	+60.0'	105.9°	6°00.0'	+60.0'	90.0°	6
7	8°36.9'	+59.7'	105.2°	8°21.1'	+59.8'	105.4°	8°05.2'	+59.9'	105.5°	7°49.1'	+59.9'	105.6°	7°32.8'	+60.0'	105.8°	7°16.5'	+60.0'	105.9°	7°00.0'	+60.0'	90.0°	7
8	9°36.6'	+59.7'	105.1°	9°20.9'	+59.8'	105.3°	9°05.0'	+59.9'	105.4°	8°49.0'	+59.9'	105.6°	8°32.8'	+60.0'	105.7°	8°16.5'	+60.0'	105.9°	8°00.0'	+60.0'	90.0°	8
9	10°36.3'	+59.7'	105.0°	10°20.7'	+59.8'	105.2°	10°04.9'	+59.9'	105.4°	9°48.9'	+59.9'	105.5°	9°32.8'	+60.0'	105.7°	9°16.5'	+60.0'	105.8°	9°00.0'	+60.0'	117.3°	9
10	11°36.0'	+59.7'	104.9°	11°20.5'	+59.8'	105.1°	11°04.7'	+59.9'	105.3°	10°48.8'	+59.9'	105.5°	10°32.7'	+60.0'	105.7°	10°16.5'	+60.0'	105.8°	10°00.0'	+60.0'	117.4°	10
11	12°35.7'	+59.7'	104.8°	12°20.2'	+59.8'	105.0°	12°04.6'	+59.9'	105.2°	11°48.7'	+59.9'	105.4°	11°32.7'	+60.0'	105.6°	11°16.4'	+60.0'	105.8°	11°00.0'	+60.0'	117.5°	11
12	13°35.3'	+59.7'	104.7°	13°20.0'	+59.8'	104.9°	13°04.5'	+59.9'	105.1°	12°48.7'	+59.9'	105.4°	12°32.7'	+60.0'	105.6°	12°16.4'	+60.0'	105.8°	12°00.0'	+60.0'	157.9°	12
13	14°35.0'	+59.7'	104.6°	14°19.8'	+59.8'	104.8°	14°04.3'	+59.9'	105.1°	13°48.6'	+59.9'	105.3°	13°32.6'	+60.0'	105.5°	13°16.4'	+60.0'	105.8°	13°00.0'	+60.0'	158.4°	13
14	15°34.7'	+59.7'	104.5°	15°19.6'	+59.8'	104.7°	15°04.2'	+59.9'	105.0°	14°48.5'	+59.9'	105.3°	14°32.6'	+60.0'	105.5°	14°16.4'	+60.0'	105.8°	14°00.0'	+60.0'	159.1°	14
15	16°34.4'	+59.7'	104.4°	16°19.3'	+59.8'	104.6°	16°04.0'	+59.9'	104.9°	15°48.4'	+59.9'	105.2°	15°32.6'	+60.0'	105.5°	15°16.4'	+60.0'	105.7°	15°00.0'	+60.0'	90.0°	15
16	17°34.0'	+59.7'	104.3°	17°19.1'	+59.8'	104.6°	17°03.9'	+59.9'	104.9°	16°48.3'	+59.9'	105.1°	16°32.5'	+60.0'	105.4°	16°16.4'	+60.0'	105.7°	16°00.0'	+60.0'	90.0°	16
17	18°33.7'	+59.7'	104.1°	18°18.9'	+59.8'	104.5°	18°03.7'	+59.8'	104.8°	17°48.3'	+59.9'	105.1°	17°32.5'	+60.0'	105.4°	17°16.4'	+60.0'	105.7°	17°00.0'	+60.0'	90.0°	17
18	19°33.4'	+59.7'	104.0°	19°18.6'	+59.8'	104.4°	19°03.6'	+59.8'	104.7°	18°48.2'	+59.9'	105.0°	18°32.4'	+60.0'	105.4°	18°16.4'	+60.0'	105.7°	18°00.0'	+60.0'	90.0°	18
19	20°33.0'	+59.7'	103.9°	20°18.4'	+59.8'	104.3°	20°03.4'	+59.8'	104.6°	19°48.1'	+59.9'	105.0°	19°32.4'	+60.0'	105.3°	19°16.4'	+60.0'	105.7°	19°00.0'	+60.0'	90.0°	19
20	21°32.7'	+59.6'	103.8°	21°18.2'	+59.8'	104.2°	21°03.3'	+59.8'	104.6°	20°48.0'	+59.9'	104.9°	20°32.4'	+60.0'	105.3°	20°16.4'	+60.0'	105.6°	20°00.0'	+60.0'	90.0°	20
21	22°32.3'	+59.6'	103.7°	22°17.9'	+59.8'	104.1°	22°03.1'	+59.8'	104.5°	21°47.9'	+59.9'	104.9°	21°32.3'	+60.0'	105.3°	21°16.4'	+60.0'	105.6°	21°00.0'	+60.0'	90.0°	21
22	23°31.9'	+59.6'	103.6°	23°17.7'	+59.7'	104.0°	23°03.0'	+59.8'	104.4°	22°47.8'	+59.9'	104.8°	22°32.3'	+60.0'	105.2°	22°16.3'	+60.0'	105.6°	22°00.0'	+60.0'	90.0°	22
23	24°31.6'	+59.6'	103.4°	24°17.4'	+59.7'	103.9°	24°02.8'	+59.8'	104.3°	23°47.7'	+59.9'	104.7°	23°32.2'	+60.0'	105.2°	23°16.3'	+60.0'	105.6°	23°00.0'	+60.0'	169.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	1°33.0'	+59.7'	104.9°	1°17.6'	+59.8'	104.9°	1°02.1'	+59.9'	105.0°	0°46.6'	+59.9'	105.0°	0°31.1'	+60.0'	105.0°	0°15.5'	+60.0'	105.0°	0°00.0'	+60.0'	105.0°	0
1	2°32.7'	+59.7'	104.8°	2°17.3'	+59.8'	104.9°	2°01.9'	+59.9'	104.9°	1°46.5'	+59.9'	104.9°	1°31.0'	+60.0'	105.0°	1°15.5'	+60.0'	105.0°	1°00.0'	+60.0'	106.5°	1
2	3°32.4'	+59.7'	104.7°	3°17.1'	+59.8'	104.8°	3°01.8'	+59.9'	104.8°	2°46.4'	+59.9'	104.9°	2°31.0'	+60.0'	104.9°	2°15.5'	+60.0'	105.0°	2°00.0'	+60.0'	103.1°	2
3	4°32.1'	+59.7'	104.6°	4°16.9'	+59.8'	104.7°	4°01.7'	+59.9'	104.8°	3°46.3'	+59.9'	104.8°	3°30.9'	+60.0'	104.9°	3°15.5'	+60.0'	104.9°	3°00.0'	+60.0'	103.1°	3
4	5°31.8'	+59.7'	104.5°	5°16.7'	+59.8'	104.6°	5°01.5'	+59.9'	104.7°	4°46.3'	+59.9'	104.8°	4°30.9'	+60.0'	104.9°	4°15.5'	+60.0'	104.9°	4°00.0'	+60.0'	103.1°	4
5	6°31.5'	+59.7'	104.4°	6°16.5'	+59.8'	104.5°	6°01.4'	+59.9'	104.6°	5°46.2'	+59.9'	104.7°	5°30.9'	+60.0'	104.8°	5°15.5'	+60.0'	104.9°	5°00.0'	+60.0'	90.0°	5
6	7°31.2'	+59.7'	104.3°	7°16.3'	+59.8'	104.4°	7°01.2'	+59.9'	104.6°	6°46.1'	+59.9'	104.7°	6°30.8'	+60.0'	104.8°	6°15.5'	+60.0'	104.9°	6°00.0'	+60.0'	90.0°	6
7	8°30.9'	+59.7'	104.2°	8°16.1'	+59.8'	104.4°	8°01.1'	+59.9'	104.5°	7°46.0'	+59.9'	104.6°	7°30.8'	+60.0'	104.8°	7°15.5'	+60.0'	104.9°	7°00.0'	+60.0'	90.0°	7
8	9°30.5'	+59.7'	104.1°	9°15.8'	+59.8'	104.3°	9°01.0'	+59.9'	104.4°	8°45.9'	+59.9'	104.6°	8°30.8'	+60.0'	104.7°	8°15.5'	+60.0'	104.9°	8°00.0'	+60.0'	90.0°	8
9	10°30.2'	+59.7'	104.0°	10°15.6'	+59.8'	104.2°	10°00.8'	+59.9'	104.4°	9°45.9'	+59.9'	104.5°	9°30.7'	+60.0'	104.7°	9°15.5'	+60.0'	104.8°	9°00.0'	+60.0'	117.3°	9
10	11°29.9'	+59.7'	103.9°	11°15.4'	+59.8'	104.1°	11°00.7'	+59.9'	104.3°	10°45.8'	+59.9'	104.5°	10°30.7'	+60.0'	104.7°	10°15.4'	+60.0'	104.8°	10°00.0'	+60.0'	117.4°	10
11	12°29.6'	+59.7'	103.8°	12°15.2'	+59.8'	104.0°	12°00.5'	+59.9'	104.2°	11°45.7'	+59.9'	104.4°	11°30.7'	+60.0'	104.6°	11°15.4'	+60.0'	104.8°	11°00.0'	+60.0'	117.5°	11
12	13°29.3'	+59.7'	103.7°	13°14.9'	+59.8'	103.9°	13°00.4'	+59.9'	104.1°	12°45.6'	+59.9'	104.4°	12°30.6'	+60.0'	104.6°	12°15.4'	+60.0'	104.8°	12°00.0'	+60.0'	157.9°	12
13	14°28.9'	+59.7'	103.6°	14°14.7'	+59.8'	103.8°	14°00.3'	+59.9'	104.1°	13°45.5'	+59.9'	104.3°	13°30.6'	+60.0'	104.5°	13°15.4'	+60.0'	104.8°	13°00.0'	+60.0'	158.4°	13
14	15°28.6'	+59.7'	103.5°	15°14.5'	+59.8'	103.7°	15°00.1'	+59.9'	104.0°	14°45.5'	+59.9'	104.3°	14°30.6'	+60.0'	104.5°	14°15.4'	+60.0'	104.8°	14°00.0'	+60.0'	159.1°	14
15	16°28.3'	+59.7'	103.4°	16°14.3'	+59.8'	103.6°	16°00.0'	+59.9'	103.9°	15°45.4'	+59.9'	104.2°	15°30.5'	+60.0'	104.5°	15°15.4'	+60.0'	104.7°	15°00.0'	+60.0'	90.0°	15
16	17°27.9'	+59.7'	103.2°	17°14.0'	+59.8'	103.6°	16°59.8'	+59.9'	103.9°	16°45.3'	+59.9'	104.1°	16°30.5'	+60.0'	104.4°	16°15.4'	+60.0'	104.7°	16°00.0'	+60.0'	90.0°	16
17	18°27.6'	+59.7'	103.1°	18°13.8'	+59.8'	103.5°	17°59.7'	+59.8'	103.8°	17°45.2'	+59.9'	104.1°	17°30.5'	+60.0'	104.4°	17°15.4'	+60.0'	104.7°	17°00.0'	+60.0'	90.0°	17
18	19°27.3'	+59.7'	103.0°	19°13.6'	+59.8'	103.4°	18°59.5'	+59.8'	103.7°	18°45.1'	+59.9'	104.0°	18°30.4'	+60.0'	104.4°	18°15.4'	+60.0'	104.7°	18°00.0'	+60.0'	90.0°	18
19	20°26.9'	+59.6'	102.9°	20°13.3'	+59.8'	103.3°	19°59.4'	+59.8'	103.6°	19°45.0'	+59.9'	104.0°	19°30.4'	+60.0'	104.3°	19°15.4'	+60.0'	104.7°	19°00.0'	+60.0'	90.0°	19
20	21°26.6'	+59.6'	102.8°	21°13.1'	+59.8'	103.2°	20°59.2'	+59.8'	103.6°	20°45.0'	+59.9'	103.9°	20°30.3'	+60.0'	104.3°	20°15.4'	+60.0'	104.6°	20°00.0'	+60.0'	90.0°	20
21	22°26.2'	+59.6'	102.7°	22°12.8'	+59.7'	103.1°	21°59.0'	+59.8'	103.5°	21°44.9'	+59.9'	103.9°										

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

76° 284° LHA

Latitude SAME as Declination

76° 284° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	1°26.9'	+59.7'	103.9°	1°12.5'	+59.8'	103.9°	0°58.0'	+59.9'	104.0°	0°43.5'	+59.9'	104.0°	0°29.0'	+60.0'	104.0°	0°14.5'	+60.0'	104.0°	0°00.0'	+60.0'	104.0°	0
1	2°26.6'	+59.7'	103.8°	2°12.3'	+59.8'	103.9°	1°57.9'	+59.9'	103.9°	1°43.4'	+59.9'	103.9°	1°29.0'	+60.0'	104.0°	1°14.5'	+60.0'	104.0°	1°00.0'	+60.0'	103.1°	1
2	3°26.3'	+59.7'	103.7°	3°12.1'	+59.8'	103.8°	2°57.7'	+59.9'	103.8°	2°43.4'	+59.9'	103.9°	2°29.0'	+60.0'	103.9°	2°14.5'	+60.0'	104.0°	2°00.0'	+60.0'	103.1°	2
3	4°26.0'	+59.7'	103.6°	4°11.8'	+59.8'	103.7°	3°57.6'	+59.9'	103.8°	3°43.3'	+59.9'	103.8°	3°28.9'	+60.0'	103.9°	3°14.5'	+60.0'	103.9°	3°00.0'	+60.0'	103.1°	3
4	5°25.7'	+59.7'	103.5°	5°11.6'	+59.8'	103.6°	4°57.5'	+59.9'	103.7°	4°43.2'	+59.9'	103.8°	4°28.9'	+60.0'	103.9°	4°14.5'	+60.0'	103.9°	4°00.0'	+60.0'	103.1°	4
5	6°25.4'	+59.7'	103.4°	6°11.4'	+59.8'	103.5°	5°57.3'	+59.9'	103.6°	5°43.1'	+59.9'	103.7°	5°28.9'	+60.0'	103.8°	5°14.5'	+60.0'	103.9°	5°00.0'	+60.0'	90.0°	5
6	7°25.1'	+59.7'	103.3°	7°11.2'	+59.8'	103.4°	6°57.2'	+59.9'	103.6°	6°43.1'	+59.9'	103.7°	6°28.8'	+60.0'	103.8°	6°14.5'	+60.0'	103.9°	6°00.0'	+60.0'	90.0°	6
7	8°24.8'	+59.7'	103.2°	8°11.0'	+59.8'	103.4°	7°57.0'	+59.9'	103.5°	7°43.0'	+59.9'	103.6°	7°28.8'	+60.0'	103.8°	7°14.5'	+60.0'	103.9°	7°00.0'	+60.0'	90.0°	7
8	9°24.4'	+59.7'	103.1°	9°10.8'	+59.8'	103.3°	8°56.9'	+59.9'	103.4°	8°42.9'	+59.9'	103.6°	8°28.7'	+60.0'	103.7°	8°14.4'	+60.0'	103.9°	8°00.0'	+60.0'	90.0°	8
9	10°24.1'	+59.7'	103.0°	10°10.5'	+59.8'	103.2°	9°56.8'	+59.9'	103.4°	9°42.8'	+59.9'	103.5°	9°28.7'	+60.0'	103.7°	9°14.4'	+60.0'	103.8°	9°00.0'	+60.0'	117.3°	9
10	11°23.8'	+59.7'	102.9°	11°10.3'	+59.8'	103.1°	10°56.6'	+59.9'	103.3°	10°42.7'	+59.9'	103.5°	10°28.7'	+60.0'	103.6°	10°14.4'	+60.0'	103.8°	10°00.0'	+60.0'	117.4°	10
11	12°23.5'	+59.7'	102.8°	12°10.1'	+59.8'	103.0°	11°56.5'	+59.9'	103.2°	11°42.7'	+59.9'	103.4°	11°28.6'	+60.0'	103.6°	11°14.4'	+60.0'	103.8°	11°00.0'	+60.0'	117.5°	11
12	13°23.2'	+59.7'	102.7°	13°09.9'	+59.8'	102.9°	12°56.3'	+59.9'	103.1°	12°42.6'	+59.9'	103.4°	12°28.6'	+60.0'	103.6°	12°14.4'	+60.0'	103.8°	12°00.0'	+60.0'	157.9°	12
13	14°22.8'	+59.7'	102.6°	14°09.6'	+59.8'	102.8°	13°56.2'	+59.9'	103.1°	13°42.5'	+59.9'	103.3°	13°28.6'	+60.0'	103.5°	13°14.4'	+60.0'	103.8°	13°00.0'	+60.0'	158.4°	13
14	15°22.5'	+59.7'	102.5°	15°09.4'	+59.8'	102.7°	14°56.0'	+59.9'	103.0°	14°42.4'	+59.9'	103.3°	14°28.5'	+60.0'	103.5°	14°14.4'	+60.0'	103.8°	14°00.0'	+60.0'	159.1°	14
15	16°22.2'	+59.7'	102.4°	16°09.2'	+59.8'	102.6°	15°55.9'	+59.9'	102.9°	15°42.3'	+59.9'	103.2°	15°28.5'	+60.0'	103.5°	15°14.4'	+60.0'	103.7°	15°00.0'	+60.0'	90.0°	15
16	17°21.8'	+59.7'	102.2°	17°08.9'	+59.8'	102.6°	16°55.7'	+59.8'	102.8°	16°42.3'	+59.9'	103.1°	16°28.5'	+60.0'	103.4°	16°14.4'	+60.0'	103.7°	16°00.0'	+60.0'	90.0°	16
17	18°21.5'	+59.7'	102.1°	18°08.7'	+59.8'	102.5°	17°55.6'	+59.8'	102.8°	17°42.2'	+59.9'	103.1°	17°28.4'	+60.0'	103.4°	17°14.4'	+60.0'	103.7°	17°00.0'	+60.0'	90.0°	17
18	19°21.1'	+59.7'	102.0°	19°08.5'	+59.8'	102.4°	18°55.4'	+59.8'	102.7°	18°42.1'	+59.9'	103.0°	18°28.4'	+60.0'	103.4°	18°14.4'	+60.0'	103.7°	18°00.0'	+60.0'	90.0°	18
19	20°20.8'	+59.6'	101.9°	20°08.2'	+59.8'	102.3°	19°55.3'	+59.8'	102.6°	19°42.0'	+59.9'	103.0°	19°28.3'	+60.0'	103.3°	19°14.3'	+60.0'	103.7°	19°00.0'	+60.0'	90.0°	19
20	21°20.4'	+59.6'	101.8°	21°08.0'	+59.8'	102.2°	20°55.1'	+59.8'	102.5°	20°41.9'	+59.9'	102.9°	20°28.3'	+60.0'	103.3°	20°14.3'	+60.0'	103.6°	20°00.0'	+60.0'	90.0°	20
21	22°20.1'	+59.6'	101.7°	22°07.7'	+59.7'	102.1°	21°55.0'	+59.8'	102.5°	21°41.8'	+59.9'	102.9°	21°28.3'	+60.0'	103.2°	21°14.3'	+60.0'	103.6°	21°00.0'	+60.0'	90.0°	21
22	23°19.7'	+59.6'	101.6°	23°07.5'	+59.7'	102.0°	22°54.8'	+59.8'	102.4°	22°41.7'	+59.9'	102.8°	22°28.2'	+60.0'	103.2°	22°14.3'	+60.0'	103.6°	22°00.0'	+60.0'	90.0°	22
23	24°19.3'	+59.6'	101.4°	24°07.2'	+59.7'	101.9°	23°54.6'	+59.8'	102.3°	23°41.6'	+59.9'	102.7°	23°28.2'	+60.0'	103.2°	23°14.3'	+60.0'	103.6°	23°00.0'	+60.0'	169.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	1°20.8'	+59.7'	102.9°	1°07.4'	+59.8'	103.0°	0°53.9'	+59.9'	103.0°	0°40.5'	+59.9'	103.0°	0°27.0'	+60.0'	103.0°	0°13.5'	+60.0'	103.0°	0°00.0'	+60.0'	103.0°	0
1	2°20.5'	+59.7'	102.8°	2°07.2'	+59.8'	102.9°	1°53.8'	+59.9'	102.9°	1°40.4'	+59.9'	102.9°	1°27.0'	+60.0'	103.0°	1°13.5'	+60.0'	103.0°	1°00.0'	+60.0'	103.1°	1
2	3°20.2'	+59.7'	102.7°	3°07.0'	+59.8'	102.8°	2°53.7'	+59.9'	102.8°	2°40.3'	+59.9'	102.9°	2°26.9'	+60.0'	102.9°	2°13.5'	+60.0'	103.0°	2°00.0'	+60.0'	103.1°	2
3	4°19.9'	+59.7'	102.6°	4°06.8'	+59.8'	102.7°	3°53.5'	+59.9'	102.8°	3°40.2'	+59.9'	102.8°	3°26.9'	+60.0'	102.9°	3°13.5'	+60.0'	102.9°	3°00.0'	+60.0'	103.1°	3
4	5°19.6'	+59.7'	102.5°	5°06.5'	+59.8'	102.6°	4°53.4'	+59.9'	102.7°	4°40.2'	+59.9'	102.8°	4°26.8'	+60.0'	102.9°	4°13.5'	+60.0'	102.9°	4°00.0'	+60.0'	103.1°	4
5	6°19.3'	+59.7'	102.4°	6°06.3'	+59.8'	102.5°	5°53.2'	+59.9'	102.6°	5°40.1'	+59.9'	102.7°	5°26.8'	+60.0'	102.8°	5°13.5'	+60.0'	102.9°	5°00.0'	+60.0'	90.0°	5
6	7°19.0'	+59.7'	102.3°	7°06.1'	+59.8'	102.4°	6°53.1'	+59.9'	102.6°	6°40.0'	+59.9'	102.7°	6°26.8'	+60.0'	102.8°	6°13.4'	+60.0'	102.9°	6°00.0'	+60.0'	90.0°	6
7	8°18.6'	+59.7'	102.2°	8°05.9'	+59.8'	102.4°	7°53.0'	+59.9'	102.5°	7°39.9'	+59.9'	102.6°	7°26.7'	+60.0'	102.8°	7°13.4'	+60.0'	102.9°	7°00.0'	+60.0'	90.0°	7
8	9°18.3'	+59.7'	102.1°	9°05.7'	+59.8'	102.3°	8°52.8'	+59.9'	102.4°	8°39.8'	+59.9'	102.6°	8°26.7'	+60.0'	102.7°	8°13.4'	+60.0'	102.9°	8°00.0'	+60.0'	62.8°	8
9	10°18.0'	+59.7'	102.0°	10°05.4'	+59.8'	102.2°	9°52.7'	+59.9'	102.4°	9°39.8'	+59.9'	102.5°	9°26.7'	+60.0'	102.7°	9°13.4'	+60.0'	102.8°	9°00.0'	+60.0'	117.3°	9
10	11°17.7'	+59.7'	101.9°	11°05.2'	+59.8'	102.1°	10°52.5'	+59.9'	102.3°	10°39.7'	+59.9'	102.5°	10°26.6'	+60.0'	102.6°	10°13.4'	+60.0'	102.8°	10°00.0'	+60.0'	90.0°	10
11	12°17.3'	+59.7'	101.8°	12°05.0'	+59.8'	102.0°	11°52.4'	+59.9'	102.2°	11°39.6'	+59.9'	102.4°	11°26.6'	+60.0'	102.6°	11°13.4'	+60.0'	102.8°	11°00.0'	+60.0'	90.0°	11
12	13°17.0'	+59.7'	101.7°	13°04.8'	+59.8'	101.9°	12°52.3'	+59.9'	102.1°	12°39.5'	+59.9'	102.4°	12°26.6'	+60.0'	102.6°	12°13.4'	+60.0'	102.8°	12°00.0'	+60.0'	117.6°	12
13	14°16.7'	+59.7'	101.6°	14°04.5'	+59.8'	101.8°	13°52.1'	+59.9'	102.1°	13°39.4'	+59.9'	102.3°	13°26.5'	+60.0'	102.5°	13°13.4'	+60.0'	102.8°	13°00.0'	+60.0'	117.7°	13
14	15°16.4'	+59.7'	101.5°	15°04.3'	+59.8'	101.7°	14°52.0'	+59.9'	102.0°	14°39.4'	+59.9'	102.3°	14°26.5'	+60.0'	102.5°	14°13.4'	+60.0'	102.8°	14°00.0'	+60.0'	62.2°	14
15	16°16.0'	+59.7'	101.4°	16°04.1'	+59.8'	101.6°	15°51.8'	+59.8'	101.9°	15°39.3'	+59.9'	102.2°	15°26.5'	+60.0'	102.5°	15°13.4'	+60.0'	102.7°	15°00.0'	+60.0'	90.0°	15
16	17°15.7'	+59.7'	101.2°	17°03.8'	+59.8'	101.5°	16°51.7'	+59.8'	101.8°	16°39.2'	+59.9'	102.1°	16°26.4'	+60.0'	102.4°	16°13.4'	+60.0'	102.7°	16°00.0'	+60.0'	90.0°	16
17	18°15.3'	+59.7'	101.1°	18°03.6'	+59.8'	101.5°	17°51.5'	+59.8'	101.8°	17°39.1'	+59.9'	102.1°	17°26.4'	+60.0'	102.4°	17°13.3'	+60.0'	102.7°	17°00.0'	+60.0'	90.0°	17
18	19°15.0'	+59.6'	101.0°	19°03.3'	+59.8'	101.4°	18°51.3'	+59.8'	101.7°	18°39.0'	+59.9'	102.0°	18°26.3'	+60.0'	102.4°	18°13.3'	+60.0'	102.7°	18°00.0'	+60.0'	90.0°	18
19	20°14.6'	+59.6'	100.9°	20°03.1'	+59.8'	101.3°	19°51.2'	+59.8'	101.6°	19°38.9'	+59.9'	102.0°	19°26.3'	+60.0'	102.3°	19°13.3'	+60.0'	102.7°	19°00.0'	+60.0'	90.0°	19
20	21°14.3'	+59.6'	100.8°	21°02.9'	+59.7'	101.2°	20°51.0'	+59.8'	101.5°	20°38.8'	+59.9'	101.9°	20°26.3'	+60.0'	102.3°	20°13.3'	+60.0'	102.6°	20°00.0'	+60.0'	90.0°	20
21	22°13.9'	+59.6'	100.7°	22°02.6'	+59.7'	101.1°	21°50.9'	+59.8'	101.5°	21°38.7'	+59.9'	101.9°	21									

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

78° 282° LHA

Latitude SAME as Declination

78° 282° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	1°14.7'	+59.7'	101.9°	1°02.3'	+59.8'	102.0°	0°49.9'	+59.9'	102.0°	0°37.4'	+59.9'	102.0°	0°24.9'	+60.0'	102.0°	0°12.5'	+60.0'	102.0°	0°00.0'	+60.0'	102.0°	0
1	2°14.4'	+59.7'	101.8°	2°02.1'	+59.8'	101.9°	1°49.7'	+59.9'	101.9°	1°37.3'	+59.9'	101.9°	1°24.9'	+60.0'	102.0°	1°12.5'	+60.0'	102.0°	1°00.0'	+60.0'	103.1°	1
2	3°14.1'	+59.7'	101.7°	3°01.9'	+59.8'	101.8°	2°49.6'	+59.9'	101.8°	2°37.3'	+59.9'	101.9°	2°24.9'	+60.0'	101.9°	2°12.5'	+60.0'	102.0°	2°00.0'	+60.0'	103.1°	2
3	4°13.8'	+59.7'	101.6°	4°01.6'	+59.8'	101.7°	3°49.4'	+59.9'	101.8°	3°37.2'	+59.9'	101.8°	3°24.8'	+60.0'	101.9°	3°12.4'	+60.0'	101.9°	3°00.0'	+60.0'	103.1°	3
4	5°13.5'	+59.7'	101.5°	5°01.4'	+59.8'	101.6°	4°49.3'	+59.9'	101.7°	4°37.1'	+59.9'	101.8°	4°24.8'	+60.0'	101.9°	4°12.4'	+60.0'	101.9°	4°00.0'	+60.0'	103.1°	4
5	6°13.1'	+59.7'	101.4°	6°01.2'	+59.8'	101.5°	5°49.2'	+59.9'	101.6°	5°37.0'	+59.9'	101.7°	5°24.8'	+60.0'	101.8°	5°12.4'	+60.0'	101.9°	5°00.0'	+60.0'	90.0°	5
6	7°12.8'	+59.7'	101.3°	7°01.0'	+59.8'	101.4°	6°49.0'	+59.9'	101.6°	6°36.9'	+59.9'	101.7°	6°24.7'	+60.0'	101.8°	6°12.4'	+60.0'	101.9°	6°00.0'	+60.0'	90.0°	6
7	8°12.5'	+59.7'	101.2°	8°00.8'	+59.8'	101.4°	7°48.9'	+59.9'	101.5°	7°36.8'	+59.9'	101.6°	7°24.7'	+60.0'	101.8°	7°12.4'	+60.0'	101.9°	7°00.0'	+60.0'	90.0°	7
8	9°12.2'	+59.7'	101.1°	9°00.5'	+59.8'	101.3°	8°48.7'	+59.9'	101.4°	8°36.8'	+59.9'	101.6°	8°24.7'	+60.0'	101.7°	8°12.4'	+60.0'	101.9°	8°00.0'	+60.0'	62.8°	8
9	10°11.9'	+59.7'	101.0°	10°00.3'	+59.8'	101.2°	9°48.6'	+59.9'	101.4°	9°36.7'	+59.9'	101.5°	9°24.6'	+60.0'	101.7°	9°12.4'	+60.0'	101.8°	9°00.0'	+60.0'	117.3°	9
10	11°11.5'	+59.7'	100.9°	11°00.1'	+59.8'	101.1°	10°48.4'	+59.9'	101.3°	10°36.6'	+59.9'	101.5°	10°24.6'	+60.0'	101.6°	10°12.4'	+60.0'	101.8°	10°00.0'	+60.0'	90.0°	10
11	12°11.2'	+59.7'	100.8°	11°59.9'	+59.8'	101.0°	11°48.3'	+59.9'	101.2°	11°36.5'	+59.9'	101.4°	11°24.6'	+60.0'	101.6°	11°12.4'	+60.0'	101.8°	11°00.0'	+60.0'	90.0°	11
12	13°10.9'	+59.7'	100.7°	12°59.6'	+59.8'	100.9°	12°48.2'	+59.9'	101.1°	12°36.4'	+59.9'	101.4°	12°24.5'	+60.0'	101.6°	12°12.4'	+60.0'	101.8°	12°00.0'	+60.0'	117.6°	12
13	14°10.5'	+59.7'	100.6°	13°59.4'	+59.8'	100.8°	13°48.0'	+59.9'	101.1°	13°36.4'	+59.9'	101.3°	13°24.5'	+60.0'	101.5°	13°12.4'	+60.0'	101.8°	13°00.0'	+60.0'	117.7°	13
14	15°10.2'	+59.7'	100.5°	14°59.2'	+59.8'	100.7°	14°47.9'	+59.8'	101.0°	14°36.3'	+59.9'	101.3°	14°24.4'	+60.0'	101.5°	14°12.3'	+60.0'	101.8°	14°00.0'	+60.0'	62.2°	14
15	16°09.9'	+59.7'	100.4°	15°58.9'	+59.8'	100.6°	15°47.7'	+59.8'	100.9°	15°36.2'	+59.9'	101.2°	15°24.4'	+60.0'	101.5°	15°12.3'	+60.0'	101.7°	15°00.0'	+60.0'	90.0°	15
16	17°09.5'	+59.7'	100.2°	16°58.7'	+59.8'	100.5°	16°47.6'	+59.8'	100.8°	16°36.1'	+59.9'	101.1°	16°24.4'	+60.0'	101.4°	16°12.3'	+60.0'	101.7°	16°00.0'	+60.0'	90.0°	16
17	18°09.2'	+59.6'	100.1°	17°58.4'	+59.8'	100.5°	17°47.4'	+59.8'	100.8°	17°36.0'	+59.9'	101.1°	17°24.3'	+60.0'	101.4°	17°12.3'	+60.0'	101.7°	17°00.0'	+60.0'	90.0°	17
18	19°08.8'	+59.6'	100.0°	18°58.2'	+59.8'	100.4°	18°47.2'	+59.8'	100.7°	18°35.9'	+59.9'	101.0°	18°24.3'	+60.0'	101.4°	18°12.3'	+60.0'	101.7°	18°00.0'	+60.0'	90.0°	18
19	20°08.5'	+59.6'	99.9°	19°58.0'	+59.8'	100.3°	19°47.1'	+59.8'	100.6°	19°35.8'	+59.9'	101.0°	19°24.3'	+60.0'	101.3°	19°12.3'	+60.0'	101.7°	19°00.0'	+60.0'	90.0°	19
20	21°08.1'	+59.6'	99.8°	20°57.7'	+59.7'	100.2°	20°46.9'	+59.8'	100.5°	20°35.8'	+59.9'	100.9°	20°24.2'	+60.0'	101.3°	20°12.3'	+60.0'	101.6°	20°00.0'	+60.0'	90.0°	20
21	22°07.7'	+59.6'	99.7°	21°57.5'	+59.7'	100.1°	21°46.8'	+59.8'	100.5°	21°35.7'	+59.9'	100.9°	21°24.2'	+60.0'	101.2°	21°12.3'	+60.0'	101.6°	21°00.0'	+60.0'	90.0°	21
22	23°07.4'	+59.6'	99.5°	22°57.2'	+59.7'	100.0°	22°46.6'	+59.8'	100.4°	22°35.6'	+59.9'	100.8°	22°24.1'	+60.0'	101.2°	22°12.3'	+60.0'	101.6°	22°00.0'	+60.0'	90.0°	22
23	24°07.0'	+59.6'	99.4°	23°56.9'	+59.7'	99.9°	23°46.4'	+59.8'	100.3°	23°35.5'	+59.9'	100.7°	23°24.1'	+60.0'	101.2°	23°12.3'	+60.0'	101.6°	23°00.0'	+60.0'	169.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	1°08.6'	+59.7'	100.9°	0°57.2'	+59.8'	101.0°	0°45.8'	+59.9'	101.0°	0°34.3'	+59.9'	101.0°	0°22.9'	+60.0'	101.0°	0°11.4'	+60.0'	101.0°	0°00.0'	+60.0'	101.0°	0
1	2°08.3'	+59.7'	100.8°	1°57.0'	+59.8'	100.9°	1°45.6'	+59.9'	100.9°	1°34.3'	+59.9'	100.9°	1°22.9'	+60.0'	101.0°	1°11.4'	+60.0'	101.0°	1°00.0'	+60.0'	99.8°	1
2	3°07.9'	+59.7'	100.7°	2°56.7'	+59.8'	100.8°	2°45.5'	+59.9'	100.8°	2°34.2'	+59.9'	100.9°	2°22.8'	+60.0'	100.9°	2°11.4'	+60.0'	101.0°	2°00.0'	+60.0'	103.1°	2
3	4°07.6'	+59.7'	100.6°	3°56.5'	+59.8'	100.7°	3°45.3'	+59.9'	100.8°	3°34.1'	+59.9'	100.8°	3°22.8'	+60.0'	100.9°	3°11.4'	+60.0'	100.9°	3°00.0'	+60.0'	103.1°	3
4	5°07.3'	+59.7'	100.5°	4°56.3'	+59.8'	100.6°	4°45.2'	+59.9'	100.7°	4°34.0'	+59.9'	100.8°	4°22.8'	+60.0'	100.9°	4°11.4'	+60.0'	100.9°	4°00.0'	+60.0'	103.1°	4
5	6°07.0'	+59.7'	100.4°	5°56.1'	+59.8'	100.5°	5°45.1'	+59.9'	100.6°	5°33.9'	+59.9'	100.7°	5°22.7'	+60.0'	100.8°	5°11.4'	+60.0'	100.9°	5°00.0'	+60.0'	90.0°	5
6	7°06.7'	+59.7'	100.3°	6°55.8'	+59.8'	100.4°	6°44.9'	+59.9'	100.6°	6°33.9'	+59.9'	100.7°	6°22.7'	+60.0'	100.8°	6°11.4'	+60.0'	100.9°	6°00.0'	+60.0'	90.0°	6
7	8°06.3'	+59.7'	100.2°	7°55.6'	+59.8'	100.4°	7°44.8'	+59.9'	100.5°	7°33.8'	+59.9'	100.6°	7°22.6'	+60.0'	100.8°	7°11.4'	+60.0'	100.9°	7°00.0'	+60.0'	90.0°	7
8	9°06.0'	+59.7'	100.1°	8°55.4'	+59.8'	100.3°	8°44.6'	+59.9'	100.4°	8°33.7'	+59.9'	100.6°	8°22.6'	+60.0'	100.7°	8°11.4'	+60.0'	100.9°	8°00.0'	+60.0'	62.8°	8
9	10°05.7'	+59.7'	100.0°	9°55.2'	+59.8'	100.2°	9°44.5'	+59.9'	100.4°	9°33.6'	+59.9'	100.5°	9°22.6'	+60.0'	100.7°	9°11.4'	+60.0'	100.8°	9°00.0'	+60.0'	117.3°	9
10	11°05.4'	+59.7'	99.9°	10°54.9'	+59.8'	100.1°	10°44.3'	+59.9'	100.3°	10°33.5'	+59.9'	100.5°	10°22.5'	+60.0'	100.6°	10°11.4'	+60.0'	100.8°	10°00.0'	+60.0'	90.0°	10
11	12°05.0'	+59.7'	99.8°	11°54.7'	+59.8'	100.0°	11°44.2'	+59.9'	100.2°	11°33.4'	+59.9'	100.4°	11°22.5'	+60.0'	100.6°	11°11.3'	+60.0'	100.8°	11°00.0'	+60.0'	90.0°	11
12	13°04.7'	+59.7'	99.7°	12°54.5'	+59.8'	99.9°	12°44.0'	+59.9'	100.1°	12°33.4'	+59.9'	100.4°	12°22.5'	+60.0'	100.6°	12°11.3'	+60.0'	100.8°	12°00.0'	+60.0'	117.6°	12
13	14°04.4'	+59.7'	99.6°	13°54.3'	+59.8'	99.8°	13°43.9'	+59.9'	100.1°	13°33.3'	+59.9'	100.3°	13°22.4'	+60.0'	100.5°	13°11.3'	+60.0'	100.8°	13°00.0'	+60.0'	117.7°	13
14	15°04.0'	+59.7'	99.5°	14°54.0'	+59.8'	99.7°	14°43.7'	+59.8'	100.0°	14°33.2'	+59.9'	100.2°	14°22.4'	+60.0'	100.5°	14°11.3'	+60.0'	100.8°	14°00.0'	+60.0'	62.2°	14
15	16°03.7'	+59.7'	99.4°	15°53.8'	+59.8'	99.6°	15°43.6'	+59.8'	99.9°	15°33.1'	+59.9'	100.2°	15°22.4'	+60.0'	100.5°	15°11.3'	+60.0'	100.7°	15°00.0'	+60.0'	90.0°	15
16	17°03.3'	+59.7'	99.2°	16°53.5'	+59.8'	99.5°	16°43.4'	+59.8'	99.8°	16°33.0'	+59.9'	100.1°	16°22.3'	+60.0'	100.4°	16°11.3'	+60.0'	100.7°	16°00.0'	+60.0'	90.0°	16
17	18°03.0'	+59.6'	99.1°	17°53.3'	+59.8'	99.5°	17°43.3'	+59.8'	99.8°	17°32.9'	+59.9'	100.1°	17°22.3'	+60.0'	100.4°	17°11.3'	+60.0'	100.7°	17°00.0'	+60.0'	90.0°	17
18	19°02.6'	+59.6'	99.0°	18°53.1'	+59.8'	99.4°	18°43.1'	+59.8'	99.7°	18°32.9'	+59.9'	100.0°	18°22.2'	+60.0'	100.4°	18°11.3'	+60.0'	100.7°	18°00.0'	+60.0'	90.0°	18
19	20°02.3'	+59.6'	98.9°	19°52.8'	+59.7'	99.3°	19°43.0'	+59.8'	99.6°	19°32.8'	+59.9'	100.0°	19°22.2'	+60.0'	100.3°	19°11.3'	+60.0'	100.7°	19°00.0'	+60.0'	90.0°	19
20	21°01.9'	+59.6'	98.8°	20°52.6'	+59.7'	99.2°	20°42.8'	+59.8'	99.5°	20°32.7'	+59.9'	99.9°	20°22.2'	+60.0'	100.3°	20°11.3'	+60.0'	100.6°	20°00.0'	+60.0'	90.0°	20
21	22°01.6'	+59.6'	98.7°	21°52.3'	+59.7'	99.1°	21°42.6'	+59.8'	99.5°	21°32.6'	+59.9'	99.9°	21°22.1'	+60.0'	100.2°	21°11.3'	+					

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

80° 280° LHA

Latitude SAME as Declination

80° 280° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	1°02.4'	+59.7'	99.9°	0°52.0'	+59.8'	100.0°	0°41.6'	+59.9'	100.0°	0°31.2'	+59.9'	100.0°	0°20.8'	+60.0'	100.0°	0°10.4'	+60.0'	100.0°	0°00.0'	+60.0'	100.0°	0
1	2°02.1'	+59.7'	99.8°	1°51.8'	+59.8'	99.9°	1°41.5'	+59.9'	99.9°	1°31.2'	+59.9'	99.9°	1°20.8'	+60.0'	100.0°	1°10.4'	+60.0'	100.0°	1°00.0'	+60.0'	99.8°	1
2	3°01.8'	+59.7'	99.7°	2°51.6'	+59.8'	99.8°	2°41.4'	+59.9'	99.8°	2°31.1'	+59.9'	99.9°	2°20.8'	+60.0'	99.9°	2°10.4'	+60.0'	100.0°	2°00.0'	+60.0'	103.1°	2
3	4°01.4'	+59.7'	99.6°	3°51.4'	+59.8'	99.7°	3°41.2'	+59.9'	99.8°	3°31.0'	+59.9'	99.8°	3°20.7'	+60.0'	99.9°	3°10.4'	+60.0'	99.9°	3°00.0'	+60.0'	103.1°	3
4	5°01.1'	+59.7'	99.5°	4°51.1'	+59.8'	99.6°	4°41.1'	+59.9'	99.7°	4°30.9'	+59.9'	99.8°	4°20.7'	+60.0'	99.9°	4°10.4'	+60.0'	99.9°	4°00.0'	+60.0'	103.1°	4
5	6°00.8'	+59.7'	99.4°	5°50.9'	+59.8'	99.5°	5°40.9'	+59.9'	99.6°	5°30.8'	+59.9'	99.7°	5°20.7'	+60.0'	99.8°	5°10.4'	+60.0'	99.9°	5°00.0'	+60.0'	90.0°	5
6	7°00.5'	+59.7'	99.3°	6°50.7'	+59.8'	99.4°	6°40.8'	+59.9'	99.6°	6°30.8'	+59.9'	99.7°	6°20.6'	+60.0'	99.8°	6°10.4'	+60.0'	99.9°	6°00.0'	+60.0'	90.0°	6
7	8°00.2'	+59.7'	99.2°	7°50.5'	+59.8'	99.4°	7°40.6'	+59.9'	99.5°	7°30.7'	+59.9'	99.6°	7°20.6'	+60.0'	99.8°	7°10.4'	+60.0'	99.9°	7°00.0'	+60.0'	90.0°	7
8	8°59.8'	+59.7'	99.1°	8°50.2'	+59.8'	99.3°	8°40.5'	+59.9'	99.4°	8°30.6'	+59.9'	99.6°	8°20.5'	+60.0'	99.7°	8°10.3'	+60.0'	99.9°	8°00.0'	+60.0'	62.8°	8
9	9°59.5'	+59.7'	99.0°	9°50.0'	+59.8'	99.2°	9°40.4'	+59.9'	99.4°	9°30.5'	+59.9'	99.5°	9°20.5'	+60.0'	99.7°	9°10.3'	+60.0'	99.8°	9°00.0'	+60.0'	117.3°	9
10	10°59.2'	+59.7'	98.9°	10°49.8'	+59.8'	99.1°	10°40.2'	+59.9'	99.3°	10°30.4'	+59.9'	99.5°	10°20.5'	+60.0'	99.6°	10°10.3'	+60.0'	99.8°	10°00.0'	+60.0'	90.0°	10
11	11°58.8'	+59.7'	98.8°	11°49.6'	+59.8'	99.0°	11°40.1'	+59.9'	99.2°	11°30.4'	+59.9'	99.4°	11°20.4'	+60.0'	99.6°	11°10.3'	+60.0'	99.8°	11°00.0'	+60.0'	90.0°	11
12	12°58.5'	+59.7'	98.7°	12°49.3'	+59.8'	98.9°	12°39.9'	+59.9'	99.1°	12°30.3'	+59.9'	99.4°	12°20.4'	+60.0'	99.6°	12°10.3'	+60.0'	99.8°	12°00.0'	+60.0'	117.6°	12
13	13°58.2'	+59.7'	98.6°	13°49.1'	+59.8'	98.8°	13°39.8'	+59.8'	99.1°	13°30.2'	+59.9'	99.3°	13°20.4'	+60.0'	99.5°	13°10.3'	+60.0'	99.8°	13°00.0'	+60.0'	117.7°	13
14	14°57.8'	+59.7'	98.5°	14°48.9'	+59.8'	98.7°	14°39.6'	+59.8'	99.0°	14°30.1'	+59.9'	99.2°	14°20.3'	+60.0'	99.5°	14°10.3'	+60.0'	99.8°	14°00.0'	+60.0'	62.2°	14
15	15°57.5'	+59.7'	98.4°	15°48.6'	+59.8'	98.6°	15°39.5'	+59.8'	98.9°	15°30.0'	+59.9'	99.2°	15°20.3'	+60.0'	99.5°	15°10.3'	+60.0'	99.7°	15°00.0'	+60.0'	90.0°	15
16	16°57.1'	+59.6'	98.2°	16°48.4'	+59.8'	98.5°	16°39.3'	+59.8'	98.8°	16°29.9'	+59.9'	99.1°	16°20.3'	+60.0'	99.4°	16°10.3'	+60.0'	99.7°	16°00.0'	+60.0'	90.0°	16
17	17°56.8'	+59.6'	98.1°	17°48.1'	+59.8'	98.5°	17°39.2'	+59.8'	98.8°	17°29.8'	+59.9'	99.1°	17°20.2'	+60.0'	99.4°	17°10.3'	+60.0'	99.7°	17°00.0'	+60.0'	90.0°	17
18	18°56.4'	+59.6'	98.0°	18°47.9'	+59.8'	98.4°	18°39.0'	+59.8'	98.7°	18°29.8'	+59.9'	99.0°	18°20.2'	+60.0'	99.4°	18°10.3'	+60.0'	99.7°	18°00.0'	+60.0'	90.0°	18
19	19°56.1'	+59.6'	97.9°	19°47.6'	+59.7'	98.3°	19°38.8'	+59.8'	98.6°	19°29.7'	+59.9'	99.0°	19°20.1'	+60.0'	99.3°	19°10.2'	+60.0'	99.7°	19°00.0'	+60.0'	90.0°	19
20	20°55.7'	+59.6'	97.8°	20°47.4'	+59.7'	98.2°	20°38.7'	+59.8'	98.5°	20°29.6'	+59.9'	98.9°	20°20.1'	+60.0'	99.3°	20°10.2'	+60.0'	99.6°	20°00.0'	+60.0'	90.0°	20
21	21°55.3'	+59.6'	97.7°	21°47.1'	+59.7'	98.1°	21°38.5'	+59.8'	98.4°	21°29.5'	+59.9'	98.8°	21°20.1'	+60.0'	99.2°	21°10.2'	+60.0'	99.6°	21°00.0'	+60.0'	90.0°	21
22	22°55.0'	+59.6'	97.5°	22°46.9'	+59.7'	98.0°	22°38.3'	+59.8'	98.5°	22°29.4'	+59.9'	98.8°	22°20.0'	+60.0'	99.2°	22°10.2'	+60.0'	99.6°	22°00.0'	+60.0'	90.0°	22
23	23°54.6'	+59.6'	97.4°	23°46.6'	+59.7'	97.9°	23°38.2'	+59.8'	98.3°	23°29.3'	+59.9'	98.7°	23°20.0'	+60.0'	99.2°	23°10.2'	+60.0'	99.6°	23°00.0'	+60.0'	169.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	0°56.2'	+59.7'	99.0°	0°46.9'	+59.8'	99.0°	0°37.5'	+59.9'	99.0°	0°28.1'	+59.9'	99.0°	0°18.8'	+60.0'	99.0°	0°09.4'	+60.0'	99.0°	0°00.0'	+60.0'	99.0°	0
1	1°55.9'	+59.7'	98.8°	1°46.6'	+59.8'	98.9°	1°37.4'	+59.9'	98.9°	1°28.1'	+59.9'	98.9°	1°18.7'	+60.0'	99.0°	1°09.4'	+60.0'	99.0°	1°00.0'	+60.0'	99.8°	1
2	2°55.6'	+59.7'	98.7°	2°46.4'	+59.8'	98.8°	2°37.2'	+59.9'	98.8°	2°28.0'	+59.9'	98.9°	2°18.7'	+60.0'	98.9°	2°09.4'	+60.0'	99.0°	2°00.0'	+60.0'	96.5°	2
3	3°55.3'	+59.7'	98.6°	3°46.2'	+59.8'	98.7°	3°37.1'	+59.9'	98.8°	3°27.9'	+59.9'	98.8°	3°18.7'	+60.0'	98.9°	3°09.4'	+60.0'	98.9°	3°00.0'	+60.0'	96.5°	3
4	4°54.9'	+59.7'	98.5°	4°46.0'	+59.8'	98.6°	4°36.9'	+59.9'	98.7°	4°27.8'	+59.9'	98.8°	4°18.6'	+60.0'	98.9°	4°09.3'	+60.0'	98.9°	4°00.0'	+60.0'	103.1°	4
5	5°54.6'	+59.7'	98.4°	5°45.8'	+59.8'	98.5°	5°36.8'	+59.9'	98.6°	5°27.7'	+59.9'	98.7°	5°18.6'	+60.0'	98.8°	5°09.3'	+60.0'	98.9°	5°00.0'	+60.0'	90.0°	5
6	6°54.3'	+59.7'	98.3°	6°45.5'	+59.8'	98.4°	6°36.7'	+59.9'	98.6°	6°27.7'	+59.9'	98.7°	6°18.6'	+60.0'	98.8°	6°09.3'	+60.0'	98.9°	6°00.0'	+60.0'	90.0°	6
7	7°54.0'	+59.7'	98.2°	7°45.3'	+59.8'	98.4°	7°36.5'	+59.9'	98.5°	7°27.6'	+59.9'	98.6°	7°18.5'	+60.0'	98.8°	7°09.3'	+60.0'	98.9°	7°00.0'	+60.0'	90.0°	7
8	8°53.6'	+59.7'	98.1°	8°45.1'	+59.8'	98.3°	8°36.4'	+59.9'	98.4°	8°27.5'	+59.9'	98.6°	8°18.5'	+60.0'	98.7°	8°09.3'	+60.0'	98.9°	8°00.0'	+60.0'	62.8°	8
9	9°53.3'	+59.7'	98.0°	9°44.8'	+59.8'	98.2°	9°36.2'	+59.9'	98.4°	9°27.4'	+59.9'	98.5°	9°18.4'	+60.0'	98.7°	9°09.3'	+60.0'	98.8°	9°00.0'	+60.0'	117.3°	9
10	10°53.0'	+59.7'	97.9°	10°44.6'	+59.8'	98.1°	10°36.1'	+59.9'	98.3°	10°27.3'	+59.9'	98.5°	10°18.4'	+60.0'	98.6°	10°09.3'	+60.0'	98.8°	10°00.0'	+60.0'	90.0°	10
11	11°52.6'	+59.7'	97.8°	11°44.4'	+59.8'	98.0°	11°35.9'	+59.9'	98.2°	11°27.3'	+59.9'	98.4°	11°18.4'	+60.0'	98.6°	11°09.3'	+60.0'	98.8°	11°00.0'	+60.0'	90.0°	11
12	12°52.3'	+59.7'	97.7°	12°44.2'	+59.8'	97.9°	12°35.8'	+59.8'	98.1°	12°27.2'	+59.9'	98.4°	12°18.3'	+60.0'	98.6°	12°09.3'	+60.0'	98.8°	12°00.0'	+60.0'	117.6°	12
13	13°52.0'	+59.7'	97.6°	13°43.9'	+59.8'	97.8°	13°35.6'	+59.8'	98.1°	13°27.1'	+59.9'	98.3°	13°18.3'	+60.0'	98.5°	13°09.3'	+60.0'	98.8°	13°00.0'	+60.0'	117.7°	13
14	14°51.6'	+59.7'	97.5°	14°43.7'	+59.8'	97.7°	14°35.5'	+59.8'	98.0°	14°27.0'	+59.9'	98.2°	14°18.3'	+60.0'	98.5°	14°09.3'	+60.0'	98.8°	14°00.0'	+60.0'	62.2°	14
15	15°51.3'	+59.7'	97.4°	15°43.4'	+59.8'	97.6°	15°35.3'	+59.8'	97.9°	15°26.9'	+59.9'	98.2°	15°18.2'	+60.0'	98.5°	15°09.2'	+60.0'	98.7°	15°00.0'	+60.0'	90.0°	15
16	16°50.9'	+59.6'	97.2°	16°43.2'	+59.8'	97.5°	16°35.2'	+59.8'	97.8°	16°26.8'	+59.9'	98.1°	16°18.2'	+60.0'	98.4°	16°09.2'	+60.0'	98.7°	16°00.0'	+60.0'	90.0°	16
17	17°50.6'	+59.6'	97.1°	17°43.0'	+59.8'	97.5°	17°35.0'	+59.8'	97.8°	17°26.7'	+59.9'	98.1°	17°18.1'	+60.0'	98.4°	17°09.2'	+60.0'	98.7°	17°00.0'	+60.0'	90.0°	17
18	18°50.2'	+59.6'	97.0°	18°42.7'	+59.8'	97.4°	18°34.9'	+59.8'	97.7°	18°26.6'	+59.9'	98.0°	18°18.1'	+60.0'	98.4°	18°09.2'	+60.0'	98.7°	18°00.0'	+60.0'	90.0°	18
19	19°49.9'	+59.6'	96.9°	19°42.5'	+59.7'	97.3°	19°34.7'	+59.8'	97.6°	19°26.6'	+59.9'	98.0°	19°18.1'	+60.0'	98.3°	19°09.2'	+60.0'	98.7°	19°00.0'	+60.0'	90.0°	19
20	20°49.5'	+59.6'	96.8°	20°42.2'	+59.7'	97.2°	20°34.5'	+59.8'	97.5°	20°26.5'	+59.9'	97.9°	20°18.0'	+60.0'	98.3°	20°09.2'	+60.0'	98.6°	20°00.0'	+60.0'	90.0°	20
21	21°49.1'	+59.6'	96.7°	21°41.9'	+59.7'	97.1°	21°34.4'	+59.8'	97.5°	21°26.4'	+59.9'	97.8°	21°18.0'	+60.0'	98.2°	21°09.2'	+60.0'	98.6°	21°00.0'	+60.0'	90.0°	21
22	22°48.7'	+59.6'	96.5°	22°41.7'	+59.7'	97.0°	22°34.2'	+59.8'	97.4°	22°26.3'	+59.9'	97.8°	22°17.9'	+60.0'	98.2°	22°09.2'	+6					

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

82° 278° LHA

Latitude SAME as Declination

82° 278° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	0°50.0'	+59.7'	98.0°	0°41.7'	+59.8'	98.0°	0°33.4'	+59.9'	98.0°	0°25.0'	+59.9'	98.0°	0°16.7'	+60.0'	98.0°	0°08.3'	+60.0'	98.0°	0°00.0'	+60.0'	98.0°	0
1	1°49.4'	+59.7'	97.9°	1°41.5'	+59.8'	97.9°	1°33.2'	+59.9'	97.9°	1°25.0'	+59.9'	97.9°	1°16.7'	+60.0'	98.0°	1°08.3'	+60.0'	98.0°	1°00.0'	+60.0'	96.5°	1
2	2°49.4'	+59.7'	97.7°	2°41.3'	+59.8'	97.8°	2°33.1'	+59.9'	97.8°	2°24.9'	+59.9'	97.9°	2°16.6'	+60.0'	97.9°	2°08.3'	+60.0'	98.0°	2°00.0'	+60.0'	96.5°	2
3	3°49.0'	+59.7'	97.6°	3°41.0'	+59.8'	97.7°	3°32.9'	+59.9'	97.8°	3°24.8'	+59.9'	97.8°	3°16.6'	+60.0'	97.9°	3°08.3'	+60.0'	97.9°	3°00.0'	+60.0'	96.5°	3
4	4°48.7'	+59.7'	97.5°	4°40.8'	+59.8'	97.6°	4°32.8'	+59.9'	97.7°	4°24.7'	+59.9'	97.8°	4°16.6'	+60.0'	97.9°	4°08.3'	+60.0'	97.9°	4°00.0'	+60.0'	103.1°	4
5	5°48.4'	+59.7'	97.4°	5°40.6'	+59.8'	97.5°	5°32.7'	+59.9'	97.6°	5°24.6'	+59.9'	97.7°	5°16.5'	+60.0'	97.8°	5°08.3'	+60.0'	97.9°	5°00.0'	+60.0'	90.0°	5
6	6°48.1'	+59.7'	97.3°	6°40.3'	+59.8'	97.4°	6°32.5'	+59.9'	97.6°	6°24.6'	+59.9'	97.7°	6°16.5'	+60.0'	97.8°	6°08.3'	+60.0'	97.9°	6°00.0'	+60.0'	90.0°	6
7	7°47.7'	+59.7'	97.2°	7°40.1'	+59.8'	97.4°	7°32.4'	+59.9'	97.5°	7°24.5'	+59.9'	97.6°	7°16.4'	+60.0'	97.8°	7°08.3'	+60.0'	97.9°	7°00.0'	+60.0'	90.0°	7
8	8°47.4'	+59.7'	97.1°	8°39.9'	+59.8'	97.3°	8°32.2'	+59.9'	97.4°	8°24.4'	+59.9'	97.6°	8°16.4'	+60.0'	97.7°	8°08.3'	+60.0'	97.9°	8°00.0'	+60.0'	62.8°	8
9	9°47.1'	+59.7'	97.0°	9°39.7'	+59.8'	97.2°	9°32.1'	+59.9'	97.4°	9°24.3'	+59.9'	97.5°	9°16.4'	+60.0'	97.7°	9°08.3'	+60.0'	97.8°	9°00.0'	+60.0'	117.3°	9
10	10°46.7'	+59.7'	96.9°	10°39.4'	+59.8'	97.1°	10°31.9'	+59.9'	97.3°	10°24.2'	+59.9'	97.5°	10°16.3'	+60.0'	97.6°	10°08.3'	+60.0'	97.8°	10°00.0'	+60.0'	90.0°	10
11	11°46.4'	+59.7'	96.8°	11°39.2'	+59.8'	97.0°	11°31.8'	+59.9'	97.2°	11°24.1'	+59.9'	97.4°	11°16.3'	+60.0'	97.6°	11°08.3'	+60.0'	97.8°	11°00.0'	+60.0'	90.0°	11
12	12°46.1'	+59.7'	96.7°	12°39.0'	+59.8'	96.9°	12°31.6'	+59.8'	97.1°	12°24.1'	+59.9'	97.4°	12°16.3'	+60.0'	97.6°	12°08.2'	+60.0'	97.8°	12°00.0'	+60.0'	117.6°	12
13	13°45.7'	+59.7'	96.6°	13°38.7'	+59.8'	96.8°	13°31.5'	+59.8'	97.1°	13°24.0'	+59.9'	97.3°	13°16.2'	+60.0'	97.5°	13°08.2'	+60.0'	97.8°	13°00.0'	+60.0'	117.7°	13
14	14°45.4'	+59.7'	96.5°	14°38.5'	+59.8'	96.7°	14°31.3'	+59.8'	97.0°	14°23.9'	+59.9'	97.2°	14°16.2'	+60.0'	97.5°	14°08.2'	+60.0'	97.8°	14°00.0'	+60.0'	62.2°	14
15	15°45.0'	+59.7'	96.4°	15°38.3'	+59.8'	96.6°	15°31.2'	+59.8'	96.9°	15°23.8'	+59.9'	97.2°	15°16.1'	+60.0'	97.5°	15°08.2'	+60.0'	97.7°	15°00.0'	+60.0'	90.0°	15
16	16°44.7'	+59.6'	96.2°	16°38.0'	+59.8'	96.5°	16°31.0'	+59.8'	96.8°	16°23.7'	+59.9'	97.1°	16°16.1'	+60.0'	97.4°	16°08.2'	+60.0'	97.7°	16°00.0'	+60.0'	90.0°	16
17	17°44.3'	+59.6'	96.1°	17°37.8'	+59.8'	96.5°	17°30.9'	+59.8'	96.8°	17°23.6'	+59.9'	97.1°	17°16.1'	+60.0'	97.4°	17°08.2'	+60.0'	97.7°	17°00.0'	+60.0'	90.0°	17
18	18°44.0'	+59.6'	96.0°	18°37.5'	+59.7'	96.4°	18°30.7'	+59.8'	96.7°	18°23.5'	+59.9'	97.0°	18°16.0'	+60.0'	97.4°	18°08.2'	+60.0'	97.7°	18°00.0'	+60.0'	90.0°	18
19	19°43.6'	+59.6'	95.9°	19°37.3'	+59.7'	96.3°	19°30.5'	+59.8'	96.6°	19°23.4'	+59.9'	97.0°	19°16.0'	+60.0'	97.3°	19°08.2'	+60.0'	97.7°	19°00.0'	+60.0'	90.0°	19
20	20°43.3'	+59.6'	95.8°	20°37.0'	+59.7'	96.2°	20°30.4'	+59.8'	96.5°	20°23.4'	+59.9'	96.9°	20°15.9'	+60.0'	97.3°	20°08.2'	+60.0'	97.6°	20°00.0'	+60.0'	90.0°	20
21	21°42.9'	+59.6'	95.7°	21°36.8'	+59.7'	96.1°	21°30.2'	+59.8'	96.5°	21°23.3'	+59.9'	96.8°	21°15.9'	+60.0'	97.2°	21°08.2'	+60.0'	97.6°	21°00.0'	+60.0'	90.0°	21
22	22°42.5'	+59.6'	95.5°	22°36.5'	+59.7'	96.0°	22°30.0'	+59.8'	96.4°	22°23.0'	+59.9'	96.8°	22°15.9'	+60.0'	97.2°	22°08.1'	+60.0'	97.6°	22°00.0'	+60.0'	90.0°	22
23	23°42.1'	+59.6'	95.4°	23°36.2'	+59.7'	95.9°	23°29.9'	+59.8'	96.3°	23°23.1'	+59.9'	96.7°	23°15.8'	+60.0'	97.2°	23°08.1'	+60.0'	97.6°	23°00.0'	+60.0'	169.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	0°43.8'	+59.7'	97.0°	0°36.5'	+59.8'	97.0°	0°29.2'	+59.9'	97.0°	0°21.9'	+59.9'	97.0°	0°14.6'	+60.0'	97.0°	0°07.3'	+60.0'	97.0°	0°00.0'	+60.0'	97.0°	0
1	1°43.5'	+59.7'	96.9°	1°36.3'	+59.8'	96.9°	1°29.1'	+59.9'	96.9°	1°21.8'	+59.9'	96.9°	1°14.6'	+60.0'	97.0°	1°07.3'	+60.0'	97.0°	1°00.0'	+60.0'	96.5°	1
2	2°43.1'	+59.7'	96.8°	2°36.1'	+59.8'	96.8°	2°28.9'	+59.9'	96.8°	2°21.8'	+59.9'	96.9°	2°14.5'	+60.0'	96.9°	2°07.3'	+60.0'	97.0°	2°00.0'	+60.0'	96.5°	2
3	3°42.8'	+59.7'	96.7°	3°35.8'	+59.8'	96.7°	3°28.8'	+59.9'	96.8°	3°21.7'	+59.9'	96.8°	3°14.5'	+60.0'	96.9°	3°07.3'	+60.0'	96.9°	3°00.0'	+60.0'	96.5°	3
4	4°42.5'	+59.7'	96.5°	4°35.6'	+59.8'	96.6°	4°28.6'	+59.9'	96.7°	4°21.6'	+59.9'	96.8°	4°14.5'	+60.0'	96.9°	4°07.3'	+60.0'	96.9°	4°00.0'	+60.0'	103.1°	4
5	5°42.2'	+59.7'	96.4°	5°35.4'	+59.8'	96.5°	5°28.5'	+59.9'	96.6°	5°21.5'	+59.9'	96.7°	5°14.4'	+60.0'	96.8°	5°07.3'	+60.0'	96.9°	5°00.0'	+60.0'	90.0°	5
6	6°41.8'	+59.7'	96.3°	6°35.2'	+59.8'	96.5°	6°28.4'	+59.9'	96.6°	6°21.4'	+59.9'	96.7°	6°14.4'	+60.0'	96.8°	6°07.3'	+60.0'	96.9°	6°00.0'	+60.0'	90.0°	6
7	7°41.5'	+59.7'	96.2°	7°34.9'	+59.8'	96.4°	7°28.2'	+59.9'	96.5°	7°21.4'	+59.9'	96.6°	7°14.4'	+60.0'	96.8°	7°07.2'	+60.0'	96.9°	7°00.0'	+60.0'	90.0°	7
8	8°41.2'	+59.7'	96.1°	8°34.7'	+59.8'	96.3°	8°28.1'	+59.9'	96.4°	8°21.3'	+59.9'	96.6°	8°14.3'	+60.0'	96.7°	8°07.2'	+60.0'	96.9°	8°00.0'	+60.0'	62.8°	8
9	9°40.8'	+59.7'	96.0°	9°34.5'	+59.8'	96.2°	9°27.9'	+59.9'	96.4°	9°21.2'	+59.9'	96.5°	9°14.3'	+60.0'	96.7°	9°07.2'	+60.0'	96.8°	9°00.0'	+60.0'	117.3°	9
10	10°40.5'	+59.7'	95.9°	10°34.2'	+59.8'	96.1°	10°27.8'	+59.9'	96.3°	10°21.1'	+59.9'	96.5°	10°14.3'	+60.0'	96.6°	10°07.2'	+60.0'	96.8°	10°00.0'	+60.0'	90.0°	10
11	11°40.2'	+59.7'	95.8°	11°34.0'	+59.8'	96.0°	11°27.6'	+59.8'	96.2°	11°21.0'	+59.9'	96.4°	11°14.2'	+60.0'	96.6°	11°07.2'	+60.0'	96.8°	11°00.0'	+60.0'	90.0°	11
12	12°39.8'	+59.7'	95.7°	12°33.8'	+59.8'	95.9°	12°27.5'	+59.8'	96.1°	12°20.9'	+59.9'	96.4°	12°14.2'	+60.0'	96.6°	12°07.2'	+60.0'	96.8°	12°00.0'	+60.0'	117.6°	12
13	13°39.5'	+59.7'	95.6°	13°33.5'	+59.8'	95.8°	13°27.3'	+59.8'	96.1°	13°20.9'	+59.9'	96.3°	13°14.1'	+60.0'	96.5°	13°07.2'	+60.0'	96.8°	13°00.0'	+60.0'	117.7°	13
14	14°39.2'	+59.7'	95.5°	14°33.3'	+59.8'	95.7°	14°27.2'	+59.8'	96.0°	14°20.8'	+59.9'	96.2°	14°14.1'	+60.0'	96.5°	14°07.2'	+60.0'	96.8°	14°00.0'	+60.0'	62.2°	14
15	15°38.8'	+59.6'	95.4°	15°33.1'	+59.8'	95.6°	15°27.0'	+59.8'	95.9°	15°20.7'	+59.9'	96.2°	15°14.1'	+60.0'	96.5°	15°07.2'	+60.0'	96.7°	15°00.0'	+60.0'	90.0°	15
16	16°38.5'	+59.6'	95.3°	16°32.8'	+59.8'	95.5°	16°26.9'	+59.8'	95.8°	16°20.6'	+59.9'	96.1°	16°14.0'	+60.0'	96.4°	16°07.2'	+60.0'	96.7°	16°00.0'	+60.0'	90.0°	16
17	17°38.1'	+59.6'	95.1°	17°32.6'	+59.8'	95.5°	17°26.7'	+59.8'	95.8°	17°20.5'	+59.9'	96.1°	17°14.0'	+60.0'	96.4°	17°07.2'	+60.0'	96.7°	17°00.0'	+60.0'	90.0°	17
18	18°37.7'	+59.6'	95.0°	18°32.3'	+59.7'	95.4°	18°26.5'	+59.8'	95.7°	18°20.4'	+59.9'	96.0°	18°14.0'	+60.0'	96.4°	18°07.1'	+60.0'	96.7°	18°00.0'	+60.0'	90.0°	18
19	19°37.4'	+59.6'	94.9°	19°32.1'	+59.7'	95.3°	19°26.4'	+59.8'	95.6°	19°20.3'	+59.9'	96.0°	19°13.9'	+60.0'	96.3°	19°07.1'	+60.0'	96.7°	19°00.0'	+60.0'	90.0°	19
20	20°37.0'	+59.6'	94.8°	20°31.8'	+59.7'	95.2°	20°26.2'	+59.8'	95.5°	20°20.2'	+59.9'	95.9°	20°13.9'	+60.0'	96.3°	20°07.1'	+60.0'	96.6°	20°00.0'	+60.0'	90.0°	20
21	21°36.6'	+59.6'	94.7°	21°31.5'	+59.7'	95.1°	21°26.0'	+59.8'	95.5°	21°20.1'	+59.9'	95.8°	21°13.8'	+60.0'	96.2°	21°07.1'	+60.0'	96.6°	21°00.0'	+60.0'	90.0°	21
22	22°36.3'	+59.6'	94.5°	22°31.3'	+59.7'	95.0°	22°25.9'	+59.8'	95.4°	22°20.0'	+59.9'	95.8°	22°13.8'	+60.0'	96.2°	22°07.1'	+60.0'	96.				

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

84° 276° LHA

Latitude SAME as Declination

84° 276° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	0°37.6'	+59.7'	96.0°	0°31.3'	+59.8'	96.0°	0°25.1'	+59.9'	96.0°	0°18.8'	+59.9'	96.0°	0°12.5'	+60.0'	96.0°	0°06.3'	+60.0'	96.0°	0°00.0'	+60.0'	96.0°	0
1	1°37.2'	+59.7'	95.9°	1°31.1'	+59.8'	95.9°	1°24.9'	+59.9'	95.9°	1°18.7'	+59.9'	95.9°	1°12.5'	+60.0'	96.0°	1°06.3'	+60.0'	96.0°	1°00.0'	+60.0'	96.5°	1
2	2°36.9'	+59.7'	95.8°	2°30.9'	+59.8'	95.8°	2°24.8'	+59.9'	95.8°	2°18.6'	+59.9'	95.9°	2°12.5'	+60.0'	95.9°	2°06.3'	+60.0'	96.0°	2°00.0'	+60.0'	96.5°	2
3	3°36.6'	+59.7'	95.7°	3°30.6'	+59.8'	95.7°	3°24.6'	+59.9'	95.8°	3°18.6'	+59.9'	95.8°	3°12.4'	+60.0'	95.9°	3°06.2'	+60.0'	95.9°	3°00.0'	+60.0'	96.5°	3
4	4°36.3'	+59.7'	95.6°	4°30.4'	+59.8'	95.6°	4°24.5'	+59.9'	95.7°	4°18.5'	+59.9'	95.8°	4°12.4'	+60.0'	95.9°	4°06.2'	+60.0'	95.9°	4°00.0'	+60.0'	90.0°	4
5	5°35.9'	+59.7'	95.4°	5°30.2'	+59.8'	95.5°	5°24.3'	+59.9'	95.6°	5°18.4'	+59.9'	95.7°	5°12.4'	+60.0'	95.8°	5°06.2'	+60.0'	95.9°	5°00.0'	+60.0'	76.9°	5
6	6°35.6'	+59.7'	95.3°	6°30.0'	+59.8'	95.5°	6°24.2'	+59.9'	95.6°	6°18.3'	+59.9'	95.7°	6°12.3'	+60.0'	95.8°	6°06.2'	+60.0'	95.9°	6°00.0'	+60.0'	76.8°	6
7	7°35.3'	+59.7'	95.2°	7°29.7'	+59.8'	95.4°	7°24.0'	+59.9'	95.5°	7°18.2'	+59.9'	95.6°	7°12.3'	+60.0'	95.8°	7°06.2'	+60.0'	95.9°	7°00.0'	+60.0'	76.8°	7
8	8°34.9'	+59.7'	95.1°	8°29.5'	+59.8'	95.3°	8°23.9'	+59.9'	95.4°	8°18.2'	+59.9'	95.6°	8°12.2'	+60.0'	95.7°	8°06.2'	+60.0'	95.9°	8°00.0'	+60.0'	62.8°	8
9	9°34.6'	+59.7'	95.0°	9°29.3'	+59.8'	95.2°	9°23.8'	+59.9'	95.4°	9°18.1'	+59.9'	95.5°	9°12.2'	+60.0'	95.7°	9°06.2'	+60.0'	95.8°	9°00.0'	+60.0'	117.3°	9
10	10°34.3'	+59.7'	94.9°	10°29.0'	+59.8'	95.1°	10°23.6'	+59.9'	95.3°	10°18.0'	+59.9'	95.5°	10°12.2'	+60.0'	95.6°	10°06.2'	+60.0'	95.8°	10°00.0'	+60.0'	90.0°	10
11	11°33.9'	+59.7'	94.8°	11°28.8'	+59.8'	95.0°	11°23.5'	+59.8'	95.2°	11°17.9'	+59.9'	95.4°	11°12.1'	+60.0'	95.6°	11°06.2'	+60.0'	95.8°	11°00.0'	+60.0'	90.0°	11
12	12°33.6'	+59.7'	94.7°	12°28.6'	+59.8'	94.9°	12°23.3'	+59.8'	95.1°	12°17.8'	+59.9'	95.4°	12°12.1'	+60.0'	95.6°	12°06.2'	+60.0'	95.8°	12°00.0'	+60.0'	117.6°	12
13	13°33.3'	+59.7'	94.6°	13°28.3'	+59.8'	94.8°	13°23.2'	+59.8'	95.1°	13°17.7'	+59.9'	95.3°	13°12.1'	+60.0'	95.5°	13°06.2'	+60.0'	95.8°	13°00.0'	+60.0'	117.7°	13
14	14°32.9'	+59.7'	94.5°	14°28.1'	+59.8'	94.7°	14°23.0'	+59.8'	95.0°	14°17.6'	+59.9'	95.2°	14°12.0'	+60.0'	95.5°	14°06.1'	+60.0'	95.8°	14°00.0'	+60.0'	62.2°	14
15	15°32.6'	+59.6'	94.4°	15°27.8'	+59.8'	94.6°	15°22.8'	+59.8'	94.9°	15°17.6'	+59.9'	95.2°	15°12.0'	+60.0'	95.5°	15°06.1'	+60.0'	95.7°	15°00.0'	+60.0'	90.0°	15
16	16°32.2'	+59.6'	94.3°	16°27.6'	+59.8'	94.5°	16°22.7'	+59.8'	94.8°	16°17.5'	+59.9'	95.1°	16°11.9'	+60.0'	95.4°	16°06.1'	+60.0'	95.7°	16°00.0'	+60.0'	90.0°	16
17	17°31.8'	+59.6'	94.1°	17°27.4'	+59.8'	94.5°	17°22.5'	+59.8'	94.8°	17°17.4'	+59.9'	95.1°	17°11.9'	+60.0'	95.4°	17°06.1'	+60.0'	95.7°	17°00.0'	+60.0'	90.0°	17
18	18°31.5'	+59.6'	94.0°	18°27.1'	+59.7'	94.4°	18°22.4'	+59.8'	94.7°	18°17.3'	+59.9'	95.0°	18°11.9'	+60.0'	95.3°	18°06.1'	+60.0'	95.7°	18°00.0'	+60.0'	90.0°	18
19	19°31.1'	+59.6'	93.9°	19°26.9'	+59.7'	94.3°	19°22.2'	+59.8'	94.6°	19°17.2'	+59.9'	95.0°	19°11.8'	+60.0'	95.3°	19°06.1'	+60.0'	95.7°	19°00.0'	+60.0'	90.0°	19
20	20°30.8'	+59.6'	93.8°	20°26.6'	+59.7'	94.2°	20°22.0'	+59.8'	94.5°	20°17.1'	+59.9'	94.9°	20°11.8'	+60.0'	95.3°	20°06.1'	+60.0'	95.6°	20°00.0'	+60.0'	90.0°	20
21	21°30.4'	+59.6'	93.7°	21°26.3'	+59.7'	94.1°	21°21.9'	+59.8'	94.5°	21°17.0'	+59.9'	94.8°	21°11.7'	+60.0'	95.2°	21°06.1'	+60.0'	95.6°	21°00.0'	+60.0'	90.0°	21
22	22°30.0'	+59.6'	93.6°	22°26.1'	+59.7'	94.0°	22°21.7'	+59.8'	94.4°	22°16.9'	+59.9'	94.8°	22°11.7'	+60.0'	95.2°	22°06.1'	+60.0'	95.6°	22°00.0'	+60.0'	90.0°	22
23	23°29.6'	+59.6'	93.4°	23°25.8'	+59.7'	93.9°	23°21.5'	+59.8'	94.3°	23°16.8'	+59.9'	94.7°	23°11.7'	+60.0'	95.2°	23°06.1'	+60.0'	95.6°	23°00.0'	+60.0'	169.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	0°31.3'	+59.7'	95.0°	0°26.1'	+59.8'	95.0°	0°20.9'	+59.9'	95.0°	0°15.7'	+59.9'	95.0°	0°10.5'	+60.0'	95.0°	0°05.2'	+60.0'	95.0°	0°00.0'	+60.0'	95.0°	0
1	1°31.0'	+59.7'	94.9°	1°25.9'	+59.8'	94.9°	1°20.8'	+59.9'	94.9°	1°15.6'	+59.9'	94.9°	1°10.4'	+60.0'	95.0°	1°05.2'	+60.0'	95.0°	1°00.0'	+60.0'	96.5°	1
2	2°30.7'	+59.7'	94.8°	2°25.7'	+59.8'	94.8°	2°20.6'	+59.9'	94.8°	2°15.5'	+59.9'	94.9°	2°10.4'	+60.0'	94.9°	2°05.2'	+60.0'	95.0°	2°00.0'	+60.0'	96.5°	2
3	3°30.3'	+59.7'	94.7°	3°25.4'	+59.8'	94.7°	3°20.5'	+59.9'	94.8°	3°15.4'	+59.9'	94.8°	3°10.3'	+60.0'	94.9°	3°05.2'	+60.0'	94.9°	3°00.0'	+60.0'	96.5°	3
4	4°30.0'	+59.7'	94.6°	4°25.2'	+59.8'	94.6°	4°20.3'	+59.9'	94.7°	4°15.4'	+59.9'	94.8°	4°10.3'	+60.0'	94.9°	4°05.2'	+60.0'	94.9°	4°00.0'	+60.0'	90.0°	4
5	5°29.7'	+59.7'	94.5°	5°25.0'	+59.8'	94.5°	5°20.2'	+59.9'	94.6°	5°15.3'	+59.9'	94.7°	5°10.3'	+60.0'	94.8°	5°05.2'	+60.0'	94.9°	5°00.0'	+60.0'	76.9°	5
6	6°29.4'	+59.7'	94.3°	6°24.7'	+59.8'	94.5°	6°20.0'	+59.9'	94.6°	6°15.2'	+59.9'	94.7°	6°10.2'	+60.0'	94.8°	6°05.2'	+60.0'	94.9°	6°00.0'	+60.0'	76.8°	6
7	7°29.0'	+59.7'	94.2°	7°24.5'	+59.8'	94.4°	7°19.9'	+59.9'	94.5°	7°15.1'	+59.9'	94.6°	7°10.2'	+60.0'	94.8°	7°05.2'	+60.0'	94.9°	7°00.0'	+60.0'	76.8°	7
8	8°28.7'	+59.7'	94.1°	8°24.3'	+59.8'	94.3°	8°19.7'	+59.9'	94.4°	8°15.0'	+59.9'	94.6°	8°10.2'	+60.0'	94.7°	8°05.2'	+60.0'	94.9°	8°00.0'	+60.0'	62.8°	8
9	9°28.4'	+59.7'	94.0°	9°24.1'	+59.8'	94.2°	9°19.6'	+59.9'	94.4°	9°14.9'	+59.9'	94.5°	9°10.1'	+60.0'	94.7°	9°05.1'	+60.0'	94.8°	9°00.0'	+60.0'	117.3°	9
10	10°28.0'	+59.7'	93.9°	10°23.8'	+59.8'	94.1°	10°19.4'	+59.8'	94.3°	10°14.9'	+59.9'	94.5°	10°10.1'	+60.0'	94.6°	10°05.1'	+60.0'	94.8°	10°00.0'	+60.0'	90.0°	10
11	11°27.7'	+59.7'	93.8°	11°23.6'	+59.8'	94.0°	11°19.3'	+59.8'	94.2°	11°14.8'	+59.9'	94.4°	11°10.1'	+60.0'	94.6°	11°05.1'	+60.0'	94.8°	11°00.0'	+60.0'	90.0°	11
12	12°27.3'	+59.7'	93.7°	12°23.3'	+59.8'	93.9°	12°19.1'	+59.8'	94.1°	12°14.7'	+59.9'	94.4°	12°10.0'	+60.0'	94.6°	12°05.1'	+60.0'	94.8°	12°00.0'	+60.0'	117.6°	12
13	13°27.0'	+59.7'	93.6°	13°23.1'	+59.8'	93.8°	13°19.0'	+59.8'	94.1°	13°14.6'	+59.9'	94.3°	13°10.0'	+60.0'	94.5°	13°05.1'	+60.0'	94.8°	13°00.0'	+60.0'	117.7°	13
14	14°26.6'	+59.7'	93.5°	14°22.9'	+59.8'	93.7°	14°18.8'	+59.8'	94.0°	14°14.5'	+59.9'	94.2°	14°09.9'	+60.0'	94.5°	14°05.1'	+60.0'	94.8°	14°00.0'	+60.0'	62.2°	14
15	15°26.3'	+59.6'	93.4°	15°22.6'	+59.8'	93.6°	15°18.7'	+59.8'	93.9°	15°14.4'	+59.9'	94.2°	15°09.9'	+60.0'	94.5°	15°05.1'	+60.0'	94.7°	15°00.0'	+60.0'	90.0°	15
16	16°25.9'	+59.6'	93.3°	16°22.4'	+59.8'	93.6°	16°18.5'	+59.8'	93.8°	16°14.3'	+59.9'	94.1°	16°09.9'	+60.0'	94.4°	16°05.1'	+60.0'	94.7°	16°00.0'	+60.0'	90.0°	16
17	17°25.6'	+59.6'	93.1°	17°22.1'	+59.7'	93.5°	17°18.4'	+59.8'	93.8°	17°14.2'	+59.9'	94.1°	17°09.8'	+60.0'	94.4°	17°05.1'	+60.0'	94.7°	17°00.0'	+60.0'	90.0°	17
18	18°25.2'	+59.6'	93.0°	18°21.9'	+59.7'	93.4°	18°18.2'	+59.8'	93.7°	18°14.2'	+59.9'	94.0°	18°09.8'	+60.0'	94.3°	18°05.1'	+60.0'	94.7°	18°00.0'	+60.0'	90.0°	18
19	19°24.9'	+59.6'	92.9°	19°21.6'	+59.7'	93.3°	19°18.0'	+59.8'	93.6°	19°14.1'	+59.9'	94.0°	19°09.7'	+60.0'	94.3°	19°05.1'	+60.0'	94.7°	19°00.0'	+60.0'	90.0°	19
20	20°24.5'	+59.6'	92.8°	20°21.4'	+59.7'	93.2°	20°17.9'	+59.8'	93.5°	20°14.0'	+59.9'	93.9°	20°09.7'	+60.0'	94.3°	20°05.0'	+60.0'	94.6°	20°00.0'	+60.0'	90.0°	20
21	21°24.1'	+59.6'	92.7°	21°21.1'	+59.7'	93.1°	21°17.7'	+59.8'	93.5°	21°13.9'	+59.9'	93.8°	21°09.7'	+60.0'	94.2°	21°05.0'	+60.0'	94.6°	21°00.0'	+60.0'	90.0°	21
22	22°23.7'	+59.6'	92.6°	22°20.9'	+59.7'	93.0°	22°17.5'	+59.8'	93.4°	22°13.8'	+59.9'	93.8°	22°09.6'	+60.0'	94.2°	22°05.0'	+60.0'	94.6°				

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

86° 274° LHA

Latitude SAME as Declination

86° 274° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	0°25.1'+59.7'	94.0°		0°20.9'+59.8'	94.0°		0°16.7'+59.9'	94.0°		0°12.6'+59.9'	94.0°		0°08.4'+60.0'	94.0°		0°04.2'+60.0'	94.0°		0°00.0'+60.0'	94.0°		0
1	1°24.7'+59.7'	93.9°		1°20.7'+59.8'	93.9°		1°16.6'+59.9'	93.9°		1°12.5'+59.9'	93.9°		1°08.3'+60.0'	94.0°		1°04.2'+60.0'	94.0°		1°00.0'+60.0'	93.2°		1
2	2°24.4'+59.7'	93.8°		2°20.4'+59.8'	93.8°		2°16.4'+59.9'	93.9°		2°12.4'+59.9'	93.9°		2°08.3'+60.0'	93.9°		2°04.2'+60.0'	94.0°		2°00.0'+60.0'	96.5°		2
3	3°24.1'+59.7'	93.7°		3°20.2'+59.8'	93.7°		3°16.3'+59.9'	93.8°		3°12.3'+59.9'	93.8°		3°08.3'+60.0'	93.9°		3°04.2'+60.0'	93.9°		3°00.0'+60.0'	96.5°		3
4	4°23.8'+59.7'	93.6°		4°20.0'+59.8'	93.6°		4°16.1'+59.9'	93.7°		4°12.2'+59.9'	93.8°		4°08.2'+60.0'	93.9°		4°04.1'+60.0'	93.9°		4°00.0'+60.0'	90.0°		4
5	5°23.4'+59.7'	93.5°		5°19.8'+59.8'	93.5°		5°16.0'+59.9'	93.6°		5°12.1'+59.9'	93.7°		5°08.2'+60.0'	93.8°		5°04.1'+60.0'	93.9°		5°00.0'+60.0'	76.9°		5
6	6°23.1'+59.7'	93.3°		6°19.5'+59.8'	93.5°		6°15.9'+59.9'	93.6°		6°12.1'+59.9'	93.7°		6°08.1'+60.0'	93.8°		6°04.1'+60.0'	93.9°		6°00.0'+60.0'	76.8°		6
7	7°22.8'+59.7'	93.2°		7°19.3'+59.8'	93.4°		7°15.7'+59.9'	93.5°		7°12.0'+59.9'	93.6°		7°08.1'+60.0'	93.8°		7°04.1'+60.0'	93.9°		7°00.0'+60.0'	76.8°		7
8	8°22.4'+59.7'	93.1°		8°19.1'+59.8'	93.3°		8°15.6'+59.9'	93.4°		8°11.9'+59.9'	93.6°		8°08.1'+60.0'	93.7°		8°04.1'+60.0'	93.9°		8°00.0'+60.0'	62.8°		8
9	9°22.1'+59.7'	93.0°		9°18.8'+59.8'	93.2°		9°15.4'+59.9'	93.4°		9°11.8'+59.9'	93.5°		9°08.0'+60.0'	93.7°		9°04.1'+60.0'	93.8°		9°00.0'+60.0'	117.3°		9
10	10°21.8'+59.7'	92.9°		10°18.6'+59.8'	93.1°		10°15.3'+59.8'	93.3°		10°11.7'+59.9'	93.5°		10°08.0'+60.0'	93.6°		10°04.1'+60.0'	93.8°		10°00.0'+60.0'	90.0°		10
11	11°21.4'+59.7'	92.8°		11°18.4'+59.8'	93.0°		11°15.1'+59.8'	93.2°		11°11.6'+59.9'	93.4°		11°08.0'+60.0'	93.6°		11°04.1'+60.0'	93.8°		11°00.0'+60.0'	90.0°		11
12	12°21.1'+59.7'	92.7°		12°18.1'+59.8'	92.9°		12°15.0'+59.8'	93.1°		12°11.6'+59.9'	93.4°		12°07.9'+60.0'	93.6°		12°04.1'+60.0'	93.8°		12°00.0'+60.0'	117.6°		12
13	13°20.7'+59.7'	92.6°		13°17.9'+59.8'	92.8°		13°14.8'+59.8'	93.1°		13°11.5'+59.9'	93.3°		13°07.9'+60.0'	93.5°		13°04.1'+60.0'	93.8°		13°00.0'+60.0'	117.7°		13
14	14°20.4'+59.6'	92.5°		14°17.7'+59.8'	92.7°		14°14.6'+59.8'	93.0°		14°11.4'+59.9'	93.2°		14°07.8'+60.0'	93.5°		14°04.1'+60.0'	93.8°		14°00.0'+60.0'	62.2°		14
15	15°20.0'+59.6'	92.4°		15°17.4'+59.8'	92.6°		15°14.5'+59.8'	92.9°		15°11.3'+59.9'	93.2°		15°07.8'+60.0'	93.5°		15°04.0'+60.0'	93.7°		15°00.0'+60.0'	90.0°		15
16	16°19.7'+59.6'	92.3°		16°17.2'+59.8'	92.6°		16°14.3'+59.8'	92.8°		16°11.2'+59.9'	93.1°		16°07.8'+60.0'	93.4°		16°04.0'+60.0'	93.7°		16°00.0'+60.0'	90.0°		16
17	17°19.3'+59.6'	92.1°		17°16.9'+59.7'	92.5°		17°14.2'+59.8'	92.8°		17°11.1'+59.9'	93.1°		17°07.7'+60.0'	93.4°		17°04.0'+60.0'	93.7°		17°00.0'+60.0'	90.0°		17
18	18°19.0'+59.6'	92.0°		18°16.7'+59.7'	92.4°		18°14.0'+59.8'	92.7°		18°11.0'+59.9'	93.0°		18°07.7'+60.0'	93.3°		18°04.0'+60.0'	93.7°		18°00.0'+60.0'	90.0°		18
19	19°18.6'+59.6'	91.9°		19°16.4'+59.7'	92.3°		19°13.9'+59.8'	92.6°		19°10.9'+59.9'	93.0°		19°07.7'+60.0'	93.3°		19°04.0'+60.0'	93.7°		19°00.0'+60.0'	90.0°		19
20	20°18.2'+59.6'	91.8°		20°16.2'+59.7'	92.2°		20°13.7'+59.8'	92.5°		20°10.8'+59.9'	92.9°		20°07.6'+60.0'	93.3°		20°04.0'+60.0'	93.6°		20°00.0'+60.0'	90.0°		20
21	21°17.9'+59.6'	91.7°		21°15.9'+59.7'	92.1°		21°13.5'+59.8'	92.4°		21°10.7'+59.9'	92.8°		21°07.6'+60.0'	93.2°		21°04.0'+60.0'	93.6°		21°00.0'+60.0'	90.0°		21
22	22°17.5'+59.6'	91.6°		22°15.6'+59.7'	92.0°		22°13.4'+59.8'	92.5°		22°10.7'+59.9'	92.8°		22°07.5'+60.0'	93.2°		22°04.0'+60.0'	93.6°		22°00.0'+60.0'	90.0°		22
23	23°17.1'+59.6'	91.4°		23°15.4'+59.7'	91.9°		23°13.2'+59.8'	92.3°		23°10.6'+59.9'	92.7°		23°07.5'+60.0'	93.2°		23°04.0'+60.0'	93.6°		23°00.0'+60.0'	169.9°		23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	0°18.8'+59.7'	93.0°		0°15.7'+59.8'	93.0°		0°12.6'+59.9'	93.0°		0°09.4'+59.9'	93.0°		0°06.3'+60.0'	93.0°		0°03.1'+60.0'	93.0°		0°00.0'+60.0'	93.0°		0
1	1°18.5'+59.7'	92.9°		1°15.5'+59.8'	92.9°		1°12.4'+59.9'	92.9°		1°09.3'+59.9'	92.9°		1°06.2'+60.0'	93.0°		1°03.1'+60.0'	93.0°		1°00.0'+60.0'	93.2°		1
2	2°18.2'+59.7'	92.8°		2°15.2'+59.8'	92.8°		2°12.3'+59.9'	92.9°		2°09.3'+59.9'	92.9°		2°06.2'+60.0'	92.9°		2°03.1'+60.0'	93.0°		2°00.0'+60.0'	90.0°		2
3	3°17.8'+59.7'	92.7°		3°15.0'+59.8'	92.7°		3°12.1'+59.9'	92.8°		3°09.2'+59.9'	92.8°		3°06.2'+60.0'	92.9°		3°03.1'+60.0'	92.9°		3°00.0'+60.0'	90.0°		3
4	4°17.5'+59.7'	92.6°		4°14.8'+59.8'	92.6°		4°12.0'+59.9'	92.7°		4°09.1'+59.9'	92.8°		4°06.1'+60.0'	92.9°		4°03.1'+60.0'	92.9°		4°00.0'+60.0'	90.0°		4
5	5°17.2'+59.7'	92.5°		5°14.5'+59.8'	92.6°		5°11.8'+59.9'	92.6°		5°09.0'+59.9'	92.7°		5°06.1'+60.0'	92.8°		5°03.1'+60.0'	92.9°		5°00.0'+60.0'	76.9°		5
6	6°16.8'+59.7'	92.4°		6°14.3'+59.8'	92.5°		6°11.7'+59.9'	92.6°		6°08.9'+59.9'	92.7°		6°06.1'+60.0'	92.8°		6°03.1'+60.0'	92.9°		6°00.0'+60.0'	76.8°		6
7	7°16.5'+59.7'	92.2°		7°14.1'+59.8'	92.4°		7°11.5'+59.9'	92.5°		7°08.8'+59.9'	92.6°		7°06.0'+60.0'	92.8°		7°03.1'+60.0'	92.9°		7°00.0'+60.0'	76.8°		7
8	8°16.2'+59.7'	92.1°		8°13.8'+59.8'	92.3°		8°11.4'+59.9'	92.4°		8°08.8'+59.9'	92.6°		8°06.0'+60.0'	92.7°		8°03.1'+60.0'	92.9°		8°00.0'+60.0'	62.8°		8
9	9°15.8'+59.7'	92.0°		9°13.6'+59.8'	92.2°		9°11.2'+59.8'	92.4°		9°08.7'+59.9'	92.5°		9°05.9'+60.0'	92.7°		9°03.1'+60.0'	92.8°		9°00.0'+60.0'	117.3°		9
10	10°15.5'+59.7'	91.9°		10°13.4'+59.8'	92.1°		10°11.1'+59.8'	92.3°		10°08.6'+59.9'	92.5°		10°05.9'+60.0'	92.6°		10°03.0'+60.0'	92.8°		10°00.0'+60.0'	90.0°		10
11	11°15.2'+59.7'	91.8°		11°13.1'+59.8'	92.0°		11°10.9'+59.8'	92.2°		11°08.5'+59.9'	92.4°		11°05.9'+60.0'	92.6°		11°03.0'+60.0'	92.8°		11°00.0'+60.0'	90.0°		11
12	12°14.8'+59.7'	91.7°		12°12.9'+59.8'	91.9°		12°10.8'+59.8'	92.1°		12°08.4'+59.9'	92.4°		12°05.8'+60.0'	92.6°		12°03.0'+60.0'	92.8°		12°00.0'+60.0'	117.6°		12
13	13°14.5'+59.7'	91.6°		13°12.7'+59.8'	91.8°		13°10.6'+59.8'	92.1°		13°08.3'+59.9'	92.3°		13°05.8'+60.0'	92.5°		13°03.0'+60.0'	92.8°		13°00.0'+60.0'	117.7°		13
14	14°14.1'+59.6'	91.5°		14°12.4'+59.8'	91.7°		14°10.5'+59.8'	92.0°		14°08.2'+59.9'	92.2°		14°05.8'+60.0'	92.5°		14°03.0'+60.0'	92.8°		14°00.0'+60.0'	62.2°		14
15	15°13.8'+59.6'	91.4°		15°12.2'+59.8'	91.7°		15°10.3'+59.8'	91.9°		15°08.2'+59.9'	92.2°		15°05.7'+60.0'	92.5°		15°03.0'+60.0'	92.7°		15°00.0'+60.0'	90.0°		15
16	16°13.4'+59.6'	91.3°		16°11.9'+59.8'	91.6°		16°10.2'+59.8'	91.8°		16°08.1'+59.9'	92.1°		16°05.7'+60.0'	92.4°		16°03.0'+60.0'	92.7°		16°00.0'+60.0'	90.0°		16
17	17°13.1'+59.6'	91.2°		17°11.7'+59.7'	91.5°		17°10.0'+59.8'	91.8°		17°08.0'+59.9'	92.1°		17°05.6'+60.0'	92.4°		17°03.0'+60.0'	92.7°		17°00.0'+60.0'	90.0°		17
18	18°12.7'+59.6'	91.0°		18°11.4'+59.7'	91.4°		18°09.8'+59.8'	91.7°		18°07.9'+59.9'	92.0°		18°05.6'+60.0'	92.3°		18°03.0'+60.0'	92.7°		18°00.0'+60.0'	90.0°		18
19	19°12.3'+59.6'	90.9°		19°11.2'+59.7'	91.3°		19°09.7'+59.8'	91.6°		19°07.8'+59.9'	92.0°		19°05.6'+60.0'	92.3°		19°03.0'+60.0'	92.7°		19°00.0'+60.0'	90.0°		19
20	20°12.0'+59.6'	90.8°		20°10.9'+59.7'	91.2°		20°09.5'+59.8'	91.5°		20°07.7'+59.9'	91.9°		20°05.5'+60.0'	92.3°		20°02.9'+60.0'	92.6°		20°00.0'+60.0'	90.0°		20
21	21°11.6'+59.6'	90.7°		21°10.7'+59.7'	91.1°		21°09.3'+59.8'	91.5°		21°07.6'+59.9'	91.8°		21°05.5'+60.0'	92.2°		21°02.9'+60.0'	92.6°		21°00.0'+60.0'	90.0°		21
22	22°11.2'+59.6'	90.6°		22°10.4'+59.7'	91.0°		22°09.2'+59.8'	91.4°		22°07.5'+59.9'	91.8°		22°05.4'+60.0'	92.2°		22°02.9'+60.0'	92.6°					

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

88° 272° LHA

Latitude SAME as Declination

88° 272° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	0°12.5'	+59.7'	92.0°	0°10.5'	+59.8'	92.0°	0°08.4'	+59.9'	92.0°	0°06.3'	+59.9'	92.0°	0°04.2'	+60.0'	92.0°	0°02.1'	+60.0'	92.0°	0°00.0'	+60.0'	92.0°	0
1	1°12.2'	+59.7'	91.9°	1°10.2'	+59.8'	91.9°	1°08.2'	+59.9'	91.9°	1°06.2'	+59.9'	91.9°	1°04.2'	+60.0'	92.0°	1°02.1'	+60.0'	92.0°	1°00.0'	+60.0'	93.2°	1
2	2°11.9'	+59.7'	91.8°	2°10.0'	+59.8'	91.8°	2°08.1'	+59.9'	91.9°	2°06.1'	+59.9'	91.9°	2°04.1'	+60.0'	91.9°	2°02.1'	+60.0'	92.0°	2°00.0'	+60.0'	90.0°	2
3	3°11.6'	+59.7'	91.7°	3°09.8'	+59.8'	91.7°	3°07.9'	+59.9'	91.8°	3°06.0'	+59.9'	91.8°	3°04.1'	+60.0'	91.9°	3°02.1'	+60.0'	91.9°	3°00.0'	+60.0'	90.0°	3
4	4°11.2'	+59.7'	91.6°	4°09.5'	+59.8'	91.6°	4°07.8'	+59.9'	91.7°	4°05.9'	+59.9'	91.8°	4°04.0'	+60.0'	91.9°	4°02.1'	+60.0'	91.9°	4°00.0'	+60.0'	90.0°	4
5	5°10.9'	+59.7'	91.5°	5°09.3'	+59.8'	91.6°	5°07.6'	+59.9'	91.6°	5°05.9'	+59.9'	91.7°	5°04.0'	+60.0'	91.8°	5°02.0'	+60.0'	91.9°	5°00.0'	+60.0'	76.9°	5
6	6°10.6'	+59.7'	91.4°	6°09.1'	+59.8'	91.5°	6°07.5'	+59.9'	91.6°	6°05.8'	+59.9'	91.7°	6°04.0'	+60.0'	91.8°	6°02.0'	+60.0'	91.9°	6°00.0'	+60.0'	76.8°	6
7	7°10.2'	+59.7'	91.3°	7°08.9'	+59.8'	91.4°	7°07.3'	+59.9'	91.5°	7°05.7'	+59.9'	91.6°	7°03.9'	+60.0'	91.8°	7°02.0'	+60.0'	91.9°	7°00.0'	+60.0'	76.8°	7
8	8°09.9'	+59.7'	91.1°	8°08.6'	+59.8'	91.3°	8°07.2'	+59.9'	91.4°	8°05.6'	+59.9'	91.6°	8°03.9'	+60.0'	91.7°	8°02.0'	+60.0'	91.9°	8°00.0'	+60.0'	62.8°	8
9	9°09.6'	+59.7'	91.0°	9°08.4'	+59.8'	91.2°	9°07.0'	+59.8'	91.4°	9°05.5'	+59.9'	91.5°	9°03.9'	+60.0'	91.7°	9°02.0'	+60.0'	91.8°	9°00.0'	+60.0'	117.3°	9
10	10°09.2'	+59.7'	90.9°	10°08.2'	+59.8'	91.1°	10°06.9'	+59.8'	91.3°	10°05.4'	+59.9'	91.5°	10°03.8'	+60.0'	91.6°	10°02.0'	+60.0'	91.8°	10°00.0'	+60.0'	90.0°	10
11	11°08.9'	+59.7'	90.8°	11°07.9'	+59.8'	91.0°	11°06.7'	+59.8'	91.2°	11°05.4'	+59.9'	91.4°	11°03.8'	+60.0'	91.6°	11°02.0'	+60.0'	91.8°	11°00.0'	+60.0'	90.0°	11
12	12°08.5'	+59.7'	90.7°	12°07.7'	+59.8'	90.9°	12°06.6'	+59.8'	91.1°	12°05.3'	+59.9'	91.4°	12°03.7'	+60.0'	91.6°	12°02.0'	+60.0'	91.8°	12°00.0'	+60.0'	117.6°	12
13	13°08.2'	+59.7'	90.6°	13°07.4'	+59.8'	90.8°	13°06.4'	+59.8'	91.1°	13°05.2'	+59.9'	91.3°	13°03.7'	+60.0'	91.5°	13°02.0'	+60.0'	91.8°	13°00.0'	+60.0'	117.7°	13
14	14°07.8'	+59.6'	90.5°	14°07.2'	+59.8'	90.7°	14°06.3'	+59.8'	91.0°	14°05.1'	+59.9'	91.2°	14°03.7'	+60.0'	91.5°	14°02.0'	+60.0'	91.8°	14°00.0'	+60.0'	62.2°	14
15	15°07.5'	+59.6'	90.4°	15°07.0'	+59.8'	90.7°	15°06.1'	+59.8'	90.9°	15°05.0'	+59.9'	91.2°	15°03.6'	+60.0'	91.5°	15°02.0'	+60.0'	91.7°	15°00.0'	+60.0'	90.0°	15
16	16°07.1'	+59.6'	90.3°	16°06.7'	+59.8'	90.6°	16°06.0'	+59.8'	90.8°	16°04.9'	+59.9'	91.1°	16°03.6'	+60.0'	91.4°	16°01.9'	+60.0'	91.7°	16°00.0'	+60.0'	90.0°	16
17	17°06.8'	+59.6'	90.2°	17°06.5'	+59.7'	90.5°	17°05.8'	+59.8'	90.8°	17°04.8'	+59.9'	91.1°	17°03.5'	+60.0'	91.4°	17°01.9'	+60.0'	91.7°	17°00.0'	+60.0'	90.0°	17
18	18°06.4'	+59.6'	90.0°	18°06.2'	+59.7'	90.4°	18°05.6'	+59.8'	90.7°	18°04.7'	+59.9'	91.0°	18°03.5'	+60.0'	91.3°	18°01.9'	+60.0'	91.7°	18°00.0'	+60.0'	90.0°	18
19	19°06.1'	+59.6'	89.9°	19°06.0'	+59.7'	90.3°	19°05.5'	+59.8'	90.6°	19°04.7'	+59.9'	91.0°	19°03.5'	+60.0'	91.3°	19°01.9'	+60.0'	91.7°	19°00.0'	+60.0'	90.0°	19
20	20°05.7'	+59.6'	89.8°	20°05.7'	+59.7'	90.2°	20°05.3'	+59.8'	90.5°	20°04.6'	+59.9'	90.9°	20°03.4'	+60.0'	91.3°	20°01.9'	+60.0'	91.6°	20°00.0'	+60.0'	90.0°	20
21	21°05.3'	+59.6'	89.7°	21°05.4'	+59.7'	90.1°	21°05.2'	+59.8'	90.4°	21°04.5'	+59.9'	90.8°	21°03.4'	+60.0'	91.2°	21°01.9'	+60.0'	91.6°	21°00.0'	+60.0'	90.0°	21
22	22°04.9'	+59.6'	89.6°	22°05.2'	+59.7'	90.0°	22°05.0'	+59.8'	90.5°	22°04.4'	+59.9'	90.8°	22°03.3'	+60.0'	91.2°	22°01.9'	+60.0'	91.6°	22°00.0'	+60.0'	90.0°	22
23	23°04.5'	+59.6'	89.4°	23°04.9'	+59.7'	89.9°	23°04.8'	+59.8'	90.3°	23°04.3'	+59.9'	90.7°	23°03.3'	+60.0'	91.2°	23°01.9'	+60.0'	91.6°	23°00.0'	+60.0'	169.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	0°06.3'	+59.7'	91.0°	0°05.2'	+59.8'	91.0°	0°04.2'	+59.9'	91.0°	0°03.1'	+59.9'	91.0°	0°02.1'	+60.0'	91.0°	0°01.0'	+60.0'	91.0°	0°00.0'	+60.0'	91.0°	0
1	1°05.9'	+59.7'	90.9°	1°05.0'	+59.8'	90.9°	1°04.0'	+59.9'	90.9°	1°03.1'	+59.9'	90.9°	1°02.1'	+60.0'	91.0°	1°01.0'	+60.0'	91.0°	1°00.0'	+60.0'	90.0°	1
2	2°05.6'	+59.7'	90.8°	2°04.8'	+59.8'	90.8°	2°03.9'	+59.9'	90.9°	2°03.0'	+59.9'	90.9°	2°02.0'	+60.0'	90.9°	2°01.0'	+60.0'	91.0°	2°00.0'	+60.0'	90.0°	2
3	3°05.3'	+59.7'	90.7°	3°04.5'	+59.8'	90.7°	3°03.7'	+59.9'	90.8°	3°02.9'	+59.9'	90.8°	3°02.0'	+60.0'	90.9°	3°01.0'	+60.0'	90.9°	3°00.0'	+60.0'	90.0°	3
4	4°05.0'	+59.7'	90.6°	4°04.3'	+59.8'	90.6°	4°03.6'	+59.9'	90.7°	4°02.8'	+59.9'	90.8°	4°01.9'	+60.0'	90.9°	4°01.0'	+60.0'	90.9°	4°00.0'	+60.0'	90.0°	4
5	5°04.6'	+59.7'	90.5°	5°04.1'	+59.8'	90.6°	5°03.5'	+59.9'	90.6°	5°02.7'	+59.9'	90.7°	5°01.9'	+60.0'	90.8°	5°01.0'	+60.0'	90.9°	5°00.0'	+60.0'	76.9°	5
6	6°04.3'	+59.7'	90.4°	6°03.9'	+59.8'	90.5°	6°03.3'	+59.9'	90.6°	6°02.6'	+59.9'	90.7°	6°01.9'	+60.0'	90.8°	6°01.0'	+60.0'	90.9°	6°00.0'	+60.0'	76.8°	6
7	7°04.0'	+59.7'	90.3°	7°03.6'	+59.8'	90.4°	7°03.2'	+59.9'	90.5°	7°02.6'	+59.9'	90.6°	7°01.8'	+60.0'	90.8°	7°01.0'	+60.0'	90.9°	7°00.0'	+60.0'	76.8°	7
8	8°03.6'	+59.7'	90.2°	8°03.4'	+59.8'	90.3°	8°03.0'	+59.9'	90.4°	8°02.5'	+59.9'	90.6°	8°01.8'	+60.0'	90.7°	8°01.0'	+60.0'	90.9°	8°00.0'	+60.0'	62.8°	8
9	9°03.3'	+59.7'	90.0°	9°03.2'	+59.8'	90.2°	9°02.9'	+59.8'	90.4°	9°02.4'	+59.9'	90.5°	9°01.8'	+60.0'	90.7°	9°01.0'	+60.0'	90.8°	9°00.0'	+60.0'	117.3°	9
10	10°03.0'	+59.7'	89.9°	10°02.9'	+59.8'	90.1°	10°02.7'	+59.8'	90.3°	10°02.3'	+59.9'	90.5°	10°01.7'	+60.0'	90.6°	10°01.0'	+60.0'	90.8°	10°00.0'	+60.0'	90.0°	10
11	11°02.6'	+59.7'	89.8°	11°02.7'	+59.8'	90.0°	11°02.6'	+59.8'	90.2°	11°02.2'	+59.9'	90.4°	11°01.7'	+60.0'	90.6°	11°00.9'	+60.0'	90.8°	11°00.0'	+60.0'	90.0°	11
12	12°02.3'	+59.7'	89.7°	12°02.4'	+59.8'	89.9°	12°02.4'	+59.8'	90.1°	12°02.1'	+59.9'	90.4°	12°01.6'	+60.0'	90.6°	12°00.9'	+60.0'	90.8°	12°00.0'	+60.0'	117.6°	12
13	13°01.9'	+59.7'	89.6°	13°02.2'	+59.8'	89.8°	13°02.3'	+59.8'	90.1°	13°02.1'	+59.9'	90.3°	13°01.6'	+60.0'	90.5°	13°00.9'	+60.0'	90.8°	13°00.0'	+60.0'	117.7°	13
14	14°01.6'	+59.6'	89.5°	14°02.0'	+59.8'	89.8°	14°02.1'	+59.8'	90.0°	14°02.0'	+59.9'	90.3°	14°01.6'	+60.0'	90.5°	14°00.9'	+60.0'	90.8°	14°00.0'	+60.0'	62.2°	14
15	15°01.2'	+59.6'	89.4°	15°01.7'	+59.8'	89.7°	15°01.9'	+59.8'	89.9°	15°01.9'	+59.9'	90.2°	15°01.5'	+60.0'	90.5°	15°00.9'	+60.0'	90.7°	15°00.0'	+60.0'	90.0°	15
16	16°00.9'	+59.6'	89.3°	16°01.5'	+59.8'	89.6°	16°01.8'	+59.8'	89.9°	16°01.8'	+59.9'	90.1°	16°01.5'	+60.0'	90.4°	16°00.9'	+60.0'	90.7°	16°00.0'	+60.0'	90.0°	16
17	17°00.5'	+59.6'	89.2°	17°01.2'	+59.7'	89.5°	17°01.6'	+59.8'	89.8°	17°01.7'	+59.9'	90.1°	17°01.5'	+60.0'	90.4°	17°00.9'	+60.0'	90.7°	17°00.0'	+60.0'	90.0°	17
18	18°00.2'	+59.6'	89.0°	18°01.0'	+59.7'	89.4°	18°01.5'	+59.8'	89.7°	18°01.6'	+59.9'	90.0°	18°01.4'	+60.0'	90.3°	18°00.9'	+60.0'	90.7°	18°00.0'	+60.0'	90.0°	18
19	18°59.8'	+59.6'	88.9°	19°00.7'	+59.7'	89.3°	19°01.3'	+59.8'	89.6°	19°01.5'	+59.9'	90.0°	19°01.4'	+60.0'	90.3°	19°00.9'	+60.0'	90.7°	19°00.0'	+60.0'	90.0°	19
20	19°59.4'	+59.6'	88.8°	20°00.5'	+59.7'	89.2°	20°01.1'	+59.8'	89.5°	20°01.4'	+59.9'	89.9°	20°01.3'	+60.0'	90.3°	20°00.9'	+60.0'	90.6°	20°00.0'	+60.0'	90.0°	20
21	20°59.0'	+59.6'	88.7°	21°00.2'	+59.7'	89.1°	21°01.0'	+59.8'	89.5°	21°01.3'	+59.9'	89.8°	21°01.3'	+60.0'	90.2°	21°00.8'	+60.0'	90.6°	21°00.0'	+60.0'	90.0°	21
22	21°58.7'	+59.6'	88.6°	22°00.0'	+59.7'	89.0°	22°00.8'	+59.8'	89.4°	22°01.2'	+59.9'	89.8°	22°01.2'	+60.0'	90.2°	22°00.8'	+60.0'	90.6°				

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

90° 270° LHA

Latitude CONTRARY or SAME as Declination

90° 270° LHA

Dec°	84			85			86			87			88			89			90			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'	+59.7'	90.0°	0°00.0'	+59.8'	90.0°	0°00.0'	+59.9'	90.0°	0°00.0'	+59.9'	90.0°	0°00.0'	+60.0'	90.0°	0°00.0'	+60.0'	90.0°	0°00.0'	+60.0'	90.0°	0
1	0°59.7'	+59.7'	89.9°	0°59.8'	+59.8'	89.9°	0°59.9'	+59.9'	89.9°	1°00.0'	+59.9'	89.9°	1°00.0'	+60.0'	90.0°	1°00.0'	+60.0'	90.0°	1°00.0'	+60.0'	90.0°	1
2	1°59.3'	+59.7'	89.8°	1°59.5'	+59.8'	89.8°	1°59.7'	+59.9'	89.9°	1°59.8'	+59.9'	89.9°	2°00.0'	+60.0'	89.9°	2°00.0'	+60.0'	90.0°	2°00.0'	+60.0'	90.0°	2
3	2°59.0'	+59.7'	89.7°	2°59.3'	+59.8'	89.7°	2°59.6'	+59.9'	89.8°	2°59.8'	+59.9'	89.8°	2°59.9'	+60.0'	89.9°	3°00.0'	+60.0'	89.9°	3°00.0'	+60.0'	90.0°	3
4	3°58.7'	+59.7'	89.6°	3°59.1'	+59.8'	89.7°	3°59.4'	+59.9'	89.7°	3°59.7'	+59.9'	89.8°	3°59.9'	+60.0'	89.9°	4°00.0'	+60.0'	89.9°	4°00.0'	+60.0'	90.0°	4
5	4°58.4'	+59.7'	89.5°	4°58.9'	+59.8'	89.6°	4°59.3'	+59.9'	89.7°	4°59.6'	+59.9'	89.7°	4°59.8'	+60.0'	89.8°	5°00.0'	+60.0'	89.9°	5°00.0'	+60.0'	76.9°	5
6	5°58.0'	+59.7'	89.4°	5°58.6'	+59.8'	89.5°	5°59.1'	+59.9'	89.6°	5°59.5'	+59.9'	89.7°	5°59.8'	+60.0'	89.8°	6°00.0'	+60.0'	89.9°	6°00.0'	+60.0'	76.8°	6
7	6°57.7'	+59.7'	89.3°	6°58.4'	+59.8'	89.4°	6°59.0'	+59.9'	89.5°	6°59.4'	+59.9'	89.6°	6°59.7'	+60.0'	89.8°	7°00.0'	+60.0'	89.9°	7°00.0'	+60.0'	76.8°	7
8	7°57.4'	+59.7'	89.2°	7°58.2'	+59.8'	89.3°	7°58.8'	+59.9'	89.4°	7°59.3'	+59.9'	89.6°	7°59.7'	+60.0'	89.7°	8°00.0'	+60.0'	89.9°	8°00.0'	+60.0'	62.8°	8
9	8°57.0'	+59.7'	89.1°	8°57.9'	+59.8'	89.2°	8°58.7'	+59.8'	89.4°	8°59.3'	+59.9'	89.5°	8°59.7'	+60.0'	89.7°	9°00.0'	+60.0'	89.8°	9°00.0'	+60.0'	117.3°	9
10	9°56.7'	+59.7'	88.9°	9°57.7'	+59.8'	89.1°	9°58.5'	+59.8'	89.3°	9°59.2'	+59.9'	89.5°	9°59.6'	+60.0'	89.6°	10°00.0'	+60.0'	89.8°	10°00.0'	+60.0'	90.0°	10
11	10°56.3'	+59.7'	88.8°	10°57.5'	+59.8'	89.0°	10°58.4'	+59.8'	89.2°	10°59.1'	+59.9'	89.4°	10°59.6'	+60.0'	89.6°	10°59.9'	+60.0'	89.8°	11°00.0'	+60.0'	90.0°	11
12	11°56.0'	+59.7'	88.7°	11°57.2'	+59.8'	88.9°	11°58.2'	+59.8'	89.2°	11°59.0'	+59.9'	89.4°	11°59.6'	+60.0'	89.6°	11°59.9'	+60.0'	89.8°	12°00.0'	+60.0'	117.6°	12
13	12°55.7'	+59.7'	88.6°	12°57.0'	+59.8'	88.8°	12°58.1'	+59.8'	89.1°	12°58.9'	+59.9'	89.3°	12°59.5'	+60.0'	89.5°	12°59.9'	+60.0'	89.8°	13°00.0'	+60.0'	117.7°	13
14	13°55.3'	+59.6'	88.5°	13°56.7'	+59.8'	88.8°	13°57.9'	+59.8'	89.0°	13°58.8'	+59.9'	89.3°	13°59.5'	+60.0'	89.5°	13°59.9'	+60.0'	89.8°	14°00.0'	+60.0'	62.2°	14
15	14°55.0'	+59.6'	88.4°	14°56.5'	+59.8'	88.7°	14°57.8'	+59.8'	88.9°	14°58.7'	+59.9'	89.2°	14°59.4'	+60.0'	89.5°	14°59.9'	+60.0'	89.7°	15°00.0'	+60.0'	90.0°	15
16	15°54.6'	+59.6'	88.3°	15°56.2'	+59.8'	88.6°	15°57.6'	+59.8'	88.9°	15°58.6'	+59.9'	89.1°	15°59.4'	+60.0'	89.4°	15°59.8'	+60.0'	89.7°	16°00.0'	+60.0'	90.0°	16
17	16°54.2'	+59.6'	88.2°	16°56.0'	+59.7'	88.5°	16°57.4'	+59.8'	88.8°	16°58.6'	+59.9'	89.1°	16°59.4'	+60.0'	89.4°	16°59.8'	+60.0'	89.7°	17°00.0'	+60.0'	90.0°	17
18	17°53.9'	+59.6'	88.1°	17°55.8'	+59.7'	88.4°	17°57.3'	+59.8'	88.7°	17°58.5'	+59.9'	89.0°	17°59.3'	+60.0'	89.4°	17°59.8'	+60.0'	89.7°	18°00.0'	+60.0'	90.0°	18
19	18°53.5'	+59.6'	87.9°	18°55.5'	+59.7'	88.3°	18°57.1'	+59.8'	88.6°	18°58.4'	+59.9'	89.0°	18°59.3'	+60.0'	89.3°	18°59.8'	+60.0'	89.7°	19°00.0'	+60.0'	90.0°	19
20	19°53.1'	+59.6'	87.8°	19°55.2'	+59.7'	88.2°	19°57.0'	+59.8'	88.5°	19°58.3'	+59.9'	88.9°	19°59.2'	+60.0'	89.3°	19°59.8'	+60.0'	89.6°	20°00.0'	+60.0'	90.0°	20
21	20°52.8'	+59.6'	87.7°	20°55.0'	+59.7'	88.1°	20°56.8'	+59.8'	88.4°	20°58.2'	+59.9'	88.8°	20°59.2'	+60.0'	89.2°	20°59.8'	+60.0'	89.6°	21°00.0'	+60.0'	90.0°	21
22	21°52.4'	+59.6'	87.6°	21°54.7'	+59.7'	88.0°	21°56.6'	+59.8'	88.5°	21°58.1'	+59.9'	88.8°	21°59.2'	+60.0'	89.2°	21°59.8'	+60.0'	89.6°	22°00.0'	+60.0'	90.0°	22
23	22°52.0'	+59.6'	87.5°	22°54.4'	+59.7'	87.9°	22°56.4'	+59.8'	88.3°	22°58.0'	+59.9'	88.7°	22°59.1'	+60.0'	89.2°	22°59.8'	+60.0'	89.6°	23°00.0'	+60.0'	169.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	<u>0°06.3'</u>	<u>-59.7'</u>	<u>91.0°</u>	<u>0°05.2'</u>	<u>-59.8'</u>	<u>91.0°</u>	<u>0°04.2'</u>	<u>-59.9'</u>	<u>91.0°</u>	<u>0°03.1'</u>	<u>-59.9'</u>	<u>91.0°</u>	<u>0°02.1'</u>	<u>-60.0'</u>	<u>91.0°</u>	<u>0°01.0'</u>	<u>-60.0'</u>	<u>91.0°</u>	<u>0°00.0'</u>	<u>-60.0'</u>	<u>91.0°</u>	0
1	0°53.4'	+59.7'	88.9°	0°54.5'	+59.8'	88.9°	0°55.7'	+59.9'	88.9°	0°56.8'	+59.9'	88.9°	0°57.9'	+60.0'	89.0°	0°58.9'	+60.0'	89.0°	1°00.0'	+60.0'	90.0°	1
2	1°53.1'	+59.7'	88.8°	1°54.3'	+59.8'	88.8°	1°55.5'	+59.9'	88.9°	1°56.7'	+59.9'	88.9°	1°57.8'	+60.0'	88.9°	1°58.9'	+60.0'	89.0°	2°00.0'	+60.0'	90.0°	2
3	2°52.7'	+59.7'	88.7°	2°54.1'	+59.8'	88.7°	2°55.4'	+59.9'	88.8°	2°56.6'	+59.9'	88.8°	2°57.8'	+60.0'	88.9°	2°58.9'	+60.0'	88.9°	3°00.0'	+60.0'	90.0°	3
4	3°52.4'	+59.7'	88.6°	3°53.9'	+59.8'	88.7°	3°55.2'	+59.9'	88.7°	3°56.5'	+59.9'	88.8°	3°57.8'	+60.0'	88.9°	3°58.9'	+60.0'	88.9°	4°00.0'	+60.0'	90.0°	4
5	4°52.1'	+59.7'	88.5°	4°53.6'	+59.8'	88.6°	4°55.1'	+59.9'	88.7°	4°56.4'	+59.9'	88.7°	4°57.7'	+60.0'	88.8°	4°58.9'	+60.0'	88.9°	5°00.0'	+60.0'	76.9°	5
6	5°51.8'	+59.7'	88.4°	5°53.4'	+59.8'	88.5°	5°54.9'	+59.9'	88.6°	5°56.4'	+59.9'	88.7°	5°57.7'	+60.0'	88.8°	5°58.9'	+60.0'	88.9°	6°00.0'	+60.0'	76.8°	6
7	6°51.4'	+59.7'	88.3°	6°53.2'	+59.8'	88.4°	6°54.8'	+59.9'	88.5°	6°56.3'	+59.9'	88.6°	6°57.6'	+60.0'	88.8°	6°58.9'	+60.0'	88.9°	7°00.0'	+60.0'	76.8°	7
8	7°51.1'	+59.7'	88.2°	7°52.9'	+59.8'	88.3°	7°54.6'	+59.9'	88.4°	7°56.2'	+59.9'	88.6°	7°57.6'	+60.0'	88.7°	7°58.9'	+60.0'	88.9°	8°00.0'	+60.0'	62.8°	8
9	8°50.7'	+59.7'	88.1°	8°52.7'	+59.8'	88.2°	8°54.5'	+59.8'	88.4°	8°56.1'	+59.9'	88.5°	8°57.6'	+60.0'	88.7°	8°58.9'	+60.0'	88.8°	9°00.0'	+60.0'	117.3°	9
10	9°50.4'	+59.7'	88.0°	9°52.5'	+59.8'	88.1°	9°54.3'	+59.8'	88.3°	9°56.0'	+59.9'	88.5°	9°57.5'	+60.0'	88.6°	9°58.9'	+60.0'	88.8°	10°00.0'	+60.0'	90.0°	10
11	10°50.1'	+59.7'	87.8°	10°52.2'	+59.8'	88.0°	10°54.2'	+59.8'	88.2°	10°55.9'	+59.9'	88.4°	10°57.5'	+60.0'	88.6°	10°58.9'	+60.0'	88.8°	11°00.0'	+60.0'	90.0°	11
12	11°49.7'	+59.7'	87.7°	11°52.0'	+59.8'	87.9°	11°54.0'	+59.8'	88.2°	11°55.9'	+59.9'	88.4°	11°57.5'	+60.0'	88.6°	11°58.8'	+60.0'	88.8°	12°00.0'	+60.0'	117.6°	12
13	12°49.4'	+59.7'	87.6°	12°51.8'	+59.8'	87.9°	12°53.9'	+59.8'	88.1°	12°55.8'	+59.9'	88.3°	12°57.4'	+60.0'	88.5°	12°58.8'	+60.0'	88.8°	13°00.0'	+60.0'	117.7°	13
14	13°49.0'	+59.6'	87.5°	13°51.5'	+59.8'	87.8°	13°53.7'	+59.8'	88.0°	13°55.7'	+59.9'	88.3°	13°57.4'	+60.0'	88.5°	13°58.8'	+60.0'	88.8°	14°00.0'	+60.0'	62.2°	14
15	14°48.7'	+59.6'	87.4°	14°51.3'	+59.8'	87.7°	14°53.6'	+59.8'	87.9°	14°55.6'	+59.9'	88.2°	14°57.3'	+60.0'	88.5°	14°58.8'	+60.0'	88.7°	15°00.0'	+60.0'	90.0°	15
16	15°48.3'	+59.6'	87.3°	15°51.0'	+59.8'	87.6°	15°53.4'	+59.8'	87.9°	15°55.5'	+59.9'	88.1°	15°57.3'	+60.0'	88.4°	15°58.8'	+60.0'	88.7°	16°00.0'	+60.0'	90.0°	16
17	16°48.0'	+59.6'	87.2°	16°50.8'	+59.7'	87.5°	16°53.3'	+59.8'	87.8°	16°55.4'	+59.9'	88.1°	16°57.3'	+60.0'	88.4°	16°58.8'	+60.0'	88.7°	17°00.0'	+60.0'	90.0°	17
18	17°47.6'	+59.6'	87.1°	17°50.5'	+59.7'	87.4°	17°53.1'	+59.8'	87.7°	17°55.3'	+59.9'	88.0°	17°57.2'	+60.0'	88.4°	17°58.8'	+60.0'	88.7°	18°00.0'	+60.0'	90.0°	18
19	18°47.3'	+59.6'	86.9°	18°50.3'	+59.7'	87.3°	18°52.9'	+59.8'	87.6°	18°55.2'	+59.9'	88.0°	18°57.2'	+60.0'	88.3°	18°58.8'	+60.0'	88.7°	19°00.0'	+60.0'	90.0°	19
20	19°46.9'	+59.6'	86.8°	19°50.0'	+59.7'	87.2°	19°52.8'	+59.8'	87.5°	19°55.1'	+59.9'	87.9°	19°57.1'	+60.0'	88.3°	19°58.8'	+60.0'	88.6°	20°00.0'	+60.0'	90.0°	20
21	20°46.5'	+59.6'	86.7°	20°49.8'	+59.7'	87.1°	20°52.6'	+59.8'	87.5°	20°55.1'	+59.9'	87.9°	20°57.1'	+60.0'	88.2°	20°58.8'	+60.0'	88.6°	21°00.0'	+60.0'	90.0°	21
22	21°46.1'	+59.6'	86.6°	21°49.5'	+59.7'	87.0°	21°52.4'	+59.8'	87.4°	21°5												

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

88° 272° LHA

Latitude CONTRARY to Declination

88° 272° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	0°12.5'	-59.7'	92.0°	0°10.5'	-59.8'	92.0°	0°08.4'	-59.9'	92.0°	0°06.3'	-59.9'	92.0°	0°04.2'	-60.0'	92.0°	0°02.1'	-60.0'	92.0°	0°00.0'	-60.0'	92.0°	0
1	0°47.1'	+59.7'	87.9°	0°49.3'	+59.8'	87.9°	0°51.5'	+59.9'	87.9°	0°53.6'	+59.9'	88.0°	0°55.8'	+60.0'	88.0°	0°57.9'	+60.0'	88.0°	1°00.0'	+60.0'	86.8°	1
2	1°46.8'	+59.7'	87.8°	1°49.1'	+59.8'	87.8°	1°51.3'	+59.9'	87.9°	1°53.6'	+59.9'	87.9°	1°55.7'	+60.0'	87.9°	1°57.9'	+60.0'	88.0°	2°00.0'	+60.0'	90.0°	2
3	2°46.5'	+59.7'	87.7°	2°48.9'	+59.8'	87.7°	2°51.2'	+59.9'	87.8°	2°53.5'	+59.9'	87.8°	2°55.7'	+60.0'	87.9°	2°57.9'	+60.0'	87.9°	3°00.0'	+60.0'	90.0°	3
4	3°46.1'	+59.7'	87.6°	3°48.6'	+59.8'	87.7°	3°51.0'	+59.9'	87.7°	3°53.4'	+59.9'	87.8°	3°55.7'	+60.0'	87.9°	3°57.9'	+60.0'	87.9°	4°00.0'	+60.0'	90.0°	4
5	4°45.8'	+59.7'	87.5°	4°48.4'	+59.8'	87.6°	4°50.9'	+59.9'	87.7°	4°53.3'	+59.9'	87.7°	4°55.6'	+60.0'	87.8°	4°57.9'	+60.0'	87.9°	5°00.0'	+60.0'	76.9°	5
6	5°45.5'	+59.7'	87.4°	5°48.2'	+59.8'	87.5°	5°50.8'	+59.9'	87.6°	5°53.2'	+59.9'	87.7°	5°55.6'	+60.0'	87.8°	5°57.9'	+60.0'	87.9°	6°00.0'	+60.0'	76.8°	6
7	6°45.2'	+59.7'	87.3°	6°47.9'	+59.8'	87.4°	6°50.6'	+59.9'	87.5°	6°53.1'	+59.9'	87.6°	6°55.6'	+60.0'	87.8°	6°57.8'	+60.0'	87.9°	7°00.0'	+60.0'	76.8°	7
8	7°44.8'	+59.7'	87.2°	7°47.7'	+59.8'	87.3°	7°50.5'	+59.9'	87.4°	7°53.1'	+59.9'	87.6°	7°55.5'	+60.0'	87.7°	7°57.8'	+60.0'	87.9°	8°00.0'	+60.0'	62.8°	8
9	8°44.5'	+59.7'	87.1°	8°47.5'	+59.8'	87.2°	8°50.3'	+59.9'	87.4°	8°53.0'	+59.9'	87.5°	8°55.5'	+60.0'	87.7°	8°57.8'	+60.0'	87.8°	9°00.0'	+60.0'	117.3°	9
10	9°44.1'	+59.7'	87.0°	9°47.2'	+59.8'	87.1°	9°50.2'	+59.8'	87.3°	9°52.9'	+59.9'	87.5°	9°55.4'	+60.0'	87.6°	9°57.8'	+60.0'	87.8°	10°00.0'	+60.0'	90.0°	10
11	10°43.8'	+59.7'	86.8°	10°47.0'	+59.8'	87.0°	10°50.0'	+59.8'	87.2°	10°52.8'	+59.9'	87.4°	10°55.4'	+60.0'	87.6°	10°57.8'	+60.0'	87.8°	11°00.0'	+60.0'	90.0°	11
12	11°43.5'	+59.7'	86.7°	11°46.8'	+59.8'	86.9°	11°49.9'	+59.8'	87.2°	11°52.7'	+59.9'	87.4°	11°55.4'	+60.0'	87.6°	11°57.8'	+60.0'	87.8°	12°00.0'	+60.0'	117.6°	12
13	12°43.1'	+59.7'	86.6°	12°46.5'	+59.8'	86.9°	12°49.7'	+59.8'	87.1°	12°52.6'	+59.9'	87.3°	12°55.3'	+60.0'	87.5°	12°57.8'	+60.0'	87.8°	13°00.0'	+60.0'	117.7°	13
14	13°42.8'	+59.7'	86.5°	13°46.3'	+59.8'	86.8°	13°49.5'	+59.8'	87.0°	13°52.5'	+59.9'	87.3°	13°55.3'	+60.0'	87.5°	13°57.8'	+60.0'	87.8°	14°00.0'	+60.0'	62.2°	14
15	14°42.4'	+59.6'	86.4°	14°46.0'	+59.8'	86.7°	14°49.4'	+59.8'	86.9°	14°52.5'	+59.9'	87.2°	14°55.3'	+60.0'	87.5°	14°57.8'	+60.0'	87.7°	15°00.0'	+60.0'	90.0°	15
16	15°42.1'	+59.6'	86.3°	15°45.8'	+59.8'	86.6°	15°49.2'	+59.8'	86.9°	15°52.4'	+59.9'	87.1°	15°55.2'	+60.0'	87.4°	15°57.8'	+60.0'	87.7°	16°00.0'	+60.0'	90.0°	16
17	16°41.7'	+59.6'	86.2°	16°45.6'	+59.7'	86.5°	16°49.1'	+59.8'	86.8°	16°52.3'	+59.9'	87.1°	16°55.2'	+60.0'	87.4°	16°57.7'	+60.0'	87.7°	17°00.0'	+60.0'	90.0°	17
18	17°41.4'	+59.6'	86.1°	17°45.3'	+59.7'	86.4°	17°48.9'	+59.8'	86.7°	17°52.2'	+59.9'	87.0°	17°55.1'	+60.0'	87.4°	17°57.7'	+60.0'	87.7°	18°00.0'	+60.0'	90.0°	18
19	18°41.0'	+59.6'	86.0°	18°45.1'	+59.7'	86.3°	18°48.8'	+59.8'	86.6°	18°52.1'	+59.9'	87.0°	18°55.1'	+60.0'	87.3°	18°57.7'	+60.0'	87.7°	19°00.0'	+60.0'	90.0°	19
20	19°40.6'	+59.6'	85.8°	19°44.8'	+59.7'	86.2°	19°48.6'	+59.8'	86.6°	19°52.0'	+59.9'	86.9°	19°55.1'	+60.0'	87.3°	19°57.7'	+60.0'	87.6°	20°00.0'	+60.0'	90.0°	20
21	20°40.3'	+59.6'	85.7°	20°44.5'	+59.7'	86.1°	20°48.4'	+59.8'	86.5°	20°51.9'	+59.9'	86.9°	20°55.0'	+60.0'	87.2°	20°57.7'	+60.0'	87.6°	21°00.0'	+60.0'	90.0°	21
22	21°39.9'	+59.6'	85.6°	21°44.3'	+59.7'	86.0°	21°48.3'	+59.8'	86.4°	21°51.8'	+59.9'	86.8°	21°55.0'	+60.0'	87.2°	21°57.7'	+60.0'	87.6°	22°00.0'	+60.0'	90.0°	22
23	22°39.5'	+59.6'	85.5°	22°44.0'	+59.7'	85.9°	22°48.1'	+59.8'	86.3°	22°51.7'	+59.9'	86.7°	22°54.9'	+60.0'	87.2°	22°57.7'	+60.0'	87.6°	23°00.0'	+60.0'	169.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	0°18.8'	-59.7'	93.0°	0°15.7'	-59.8'	93.0°	0°12.6'	-59.9'	93.0°	0°09.4'	-59.9'	93.0°	0°06.3'	-60.0'	93.0°	0°03.1'	-60.0'	93.0°	0°00.0'	-60.0'	93.0°	0
1	0°40.9'	+59.7'	86.9°	0°44.1'	+59.8'	86.9°	0°47.3'	+59.9'	86.9°	0°50.5'	+59.9'	87.0°	0°53.7'	+60.0'	87.0°	0°56.9'	+60.0'	87.0°	1°00.0'	+60.0'	86.8°	1
2	1°40.5'	+59.7'	86.8°	1°43.9'	+59.8'	86.8°	1°47.2'	+59.9'	86.9°	1°50.4'	+59.9'	86.9°	1°53.6'	+60.0'	86.9°	1°56.8'	+60.0'	87.0°	2°00.0'	+60.0'	90.0°	2
3	2°40.2'	+59.7'	86.7°	2°43.6'	+59.8'	86.8°	2°47.0'	+59.9'	86.8°	2°50.3'	+59.9'	86.8°	2°53.6'	+60.0'	86.9°	2°56.8'	+60.0'	86.9°	3°00.0'	+60.0'	90.0°	3
4	3°39.9'	+59.7'	86.6°	3°43.4'	+59.8'	86.7°	3°46.9'	+59.9'	86.7°	3°50.3'	+59.9'	86.8°	3°53.6'	+60.0'	86.9°	3°56.8'	+60.0'	86.9°	4°00.0'	+60.0'	90.0°	4
5	4°39.6'	+59.6'	86.5°	4°43.2'	+59.8'	86.6°	4°46.7'	+59.9'	86.7°	4°50.2'	+59.9'	86.7°	4°53.5'	+60.0'	86.8°	4°56.8'	+60.0'	86.9°	5°00.0'	+60.0'	76.9°	5
6	5°39.2'	+59.7'	86.4°	5°42.9'	+59.8'	86.5°	5°46.6'	+59.9'	86.6°	5°50.1'	+59.9'	86.7°	5°53.5'	+60.0'	86.8°	5°56.8'	+60.0'	86.9°	6°00.0'	+60.0'	76.8°	6
7	6°38.9'	+59.7'	86.3°	6°42.7'	+59.8'	86.4°	6°46.4'	+59.9'	86.5°	6°50.0'	+59.9'	86.6°	6°53.5'	+60.0'	86.8°	6°56.8'	+60.0'	86.9°	7°00.0'	+60.0'	76.8°	7
8	7°38.6'	+59.7'	86.2°	7°42.5'	+59.8'	86.3°	7°46.3'	+59.9'	86.4°	7°49.9'	+59.9'	86.6°	7°53.4'	+60.0'	86.7°	7°56.8'	+60.0'	86.9°	8°00.0'	+60.0'	62.8°	8
9	8°38.2'	+59.7'	86.1°	8°42.3'	+59.8'	86.2°	8°46.1'	+59.9'	86.4°	8°49.8'	+59.9'	86.5°	8°53.4'	+60.0'	86.7°	8°56.8'	+60.0'	86.8°	9°00.0'	+60.0'	117.3°	9
10	9°37.9'	+59.7'	86.0°	9°42.0'	+59.8'	86.1°	9°46.0'	+59.8'	86.3°	9°49.8'	+59.9'	86.5°	9°53.4'	+60.0'	86.6°	9°56.8'	+60.0'	86.8°	10°00.0'	+60.0'	90.0°	10
11	10°37.5'	+59.7'	85.9°	10°41.8'	+59.8'	86.0°	10°45.8'	+59.8'	86.2°	10°49.7'	+59.9'	86.4°	10°53.3'	+60.0'	86.6°	10°56.8'	+60.0'	86.8°	11°00.0'	+60.0'	90.0°	11
12	11°37.2'	+59.7'	85.7°	11°41.5'	+59.8'	86.0°	11°45.7'	+59.8'	86.2°	11°49.6'	+59.9'	86.4°	11°53.3'	+60.0'	86.6°	11°56.7'	+60.0'	86.8°	12°00.0'	+60.0'	117.6°	12
13	12°36.9'	+59.7'	85.6°	12°41.3'	+59.8'	85.9°	12°45.5'	+59.8'	86.1°	12°49.5'	+59.9'	86.3°	12°53.2'	+60.0'	86.5°	12°56.7'	+60.0'	86.8°	13°00.0'	+60.0'	117.7°	13
14	13°36.5'	+59.7'	85.5°	13°41.1'	+59.8'	85.8°	13°45.4'	+59.8'	86.0°	13°49.4'	+59.9'	86.3°	13°53.2'	+60.0'	86.5°	13°56.7'	+60.0'	86.8°	14°00.0'	+60.0'	62.2°	14
15	14°36.2'	+59.6'	85.4°	14°40.8'	+59.8'	85.7°	14°45.2'	+59.8'	85.9°	14°49.3'	+59.9'	86.2°	14°53.2'	+60.0'	86.5°	14°56.7'	+60.0'	86.7°	15°00.0'	+60.0'	90.0°	15
16	15°35.8'	+59.6'	85.3°	15°40.6'	+59.8'	85.6°	15°45.1'	+59.8'	85.9°	15°49.2'	+59.9'	86.1°	15°53.1'	+60.0'	86.4°	15°56.7'	+60.0'	86.7°	16°00.0'	+60.0'	90.0°	16
17	16°35.5'	+59.6'	85.2°	16°40.3'	+59.8'	85.5°	16°44.9'	+59.8'	85.8°	16°49.1'	+59.9'	86.1°	16°53.1'	+60.0'	86.4°	16°56.7'	+60.0'	86.7°	17°00.0'	+60.0'	90.0°	17
18	17°35.1'	+59.6'	85.1°	17°40.1'	+59.7'	85.4°	17°44.7'	+59.8'														

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

86° 274° LHA

Latitude CONTRARY to Declination

86° 274° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	0°25.0'	-59.7'	94.0°	0°20.9'	-59.8'	94.0°	0°16.7'	-59.9'	94.0°	0°12.6'	-59.9'	94.0°	0°08.4'	-60.0'	94.0°	0°04.2'	-60.0'	94.0°	0°00.0'	-60.0'	94.0°	0
1	0°34.6'	+59.7'	85.9°	0°38.9'	+59.8'	85.9°	0°43.1'	+59.9'	85.9°	0°47.4'	+59.9'	86.0°	0°51.6'	+60.0'	86.0°	0°55.8'	+60.0'	86.0°	1°00.0'	+60.0'	86.8°	1
2	1°34.3'	+59.7'	85.8°	1°38.6'	+59.8'	85.8°	1°43.0'	+59.9'	85.9°	1°47.3'	+59.9'	85.9°	1°51.6'	+60.0'	85.9°	1°55.8'	+60.0'	86.0°	2°00.0'	+60.0'	83.5°	2
3	2°34.0'	+59.7'	85.7°	2°38.4'	+59.8'	85.8°	2°42.8'	+59.9'	85.8°	2°47.2'	+59.9'	85.8°	2°51.5'	+60.0'	85.9°	2°55.8'	+60.0'	85.9°	3°00.0'	+60.0'	83.5°	3
4	3°33.6'	+59.7'	85.6°	3°38.2'	+59.8'	85.7°	3°42.7'	+59.9'	85.7°	3°47.1'	+59.9'	85.8°	3°51.5'	+60.0'	85.9°	3°55.8'	+60.0'	85.9°	4°00.0'	+60.0'	90.0°	4
5	4°33.3'	+59.7'	85.5°	4°38.0'	+59.8'	85.6°	4°42.5'	+59.9'	85.7°	4°47.0'	+59.9'	85.7°	4°51.4'	+60.0'	85.8°	4°55.8'	+60.0'	85.9°	5°00.0'	+60.0'	76.9°	5
6	5°33.0'	+59.7'	85.4°	5°37.7'	+59.8'	85.5°	5°42.4'	+59.9'	85.6°	5°47.0'	+59.9'	85.7°	5°51.4'	+60.0'	85.8°	5°55.8'	+60.0'	85.9°	6°00.0'	+60.0'	76.8°	6
7	6°32.6'	+59.7'	85.3°	6°37.5'	+59.8'	85.4°	6°42.2'	+59.9'	85.5°	6°46.9'	+59.9'	85.6°	6°51.4'	+60.0'	85.8°	6°55.8'	+60.0'	85.9°	7°00.0'	+60.0'	76.8°	7
8	7°32.3'	+59.7'	85.2°	7°37.3'	+59.8'	85.3°	7°42.1'	+59.9'	85.4°	7°46.8'	+59.9'	85.6°	7°51.3'	+60.0'	85.7°	7°55.7'	+60.0'	85.9°	8°00.0'	+60.0'	62.8°	8
9	8°32.0'	+59.7'	85.1°	8°37.0'	+59.8'	85.2°	8°42.0'	+59.9'	85.4°	8°46.7'	+59.9'	85.5°	8°51.3'	+60.0'	85.7°	8°55.7'	+60.0'	85.8°	9°00.0'	+60.0'	117.3°	9
10	9°31.6'	+59.7'	85.0°	9°36.8'	+59.8'	85.1°	9°41.8'	+59.8'	85.3°	9°46.6'	+59.9'	85.5°	9°51.3'	+60.0'	85.7°	9°55.7'	+60.0'	85.8°	10°00.0'	+60.0'	90.0°	10
11	10°31.3'	+59.7'	84.9°	10°36.6'	+59.8'	85.0°	10°41.7'	+59.8'	85.2°	10°46.5'	+59.9'	85.4°	10°51.2'	+60.0'	85.6°	10°55.7'	+60.0'	85.8°	11°00.0'	+60.0'	90.0°	11
12	11°31.0'	+59.7'	84.8°	11°36.3'	+59.8'	85.0°	11°41.5'	+59.8'	85.2°	11°46.5'	+59.9'	85.4°	11°51.2'	+60.0'	85.6°	11°55.7'	+60.0'	85.8°	12°00.0'	+60.0'	117.6°	12
13	12°30.6'	+59.7'	84.6°	12°36.1'	+59.8'	84.9°	12°41.4'	+59.8'	85.1°	12°46.4'	+59.9'	85.3°	12°51.2'	+60.0'	85.5°	12°55.7'	+60.0'	85.8°	13°00.0'	+60.0'	117.7°	13
14	13°30.3'	+59.7'	84.5°	13°35.9'	+59.8'	84.8°	13°41.2'	+59.8'	85.0°	13°46.3'	+59.9'	85.3°	13°51.1'	+60.0'	85.5°	13°55.7'	+60.0'	85.8°	14°00.0'	+60.0'	62.2°	14
15	14°29.9'	+59.6'	84.4°	14°35.6'	+59.8'	84.7°	14°41.0'	+59.8'	84.9°	14°46.2'	+59.9'	85.2°	14°51.1'	+60.0'	85.5°	14°55.7'	+60.0'	85.7°	15°00.0'	+60.0'	90.0°	15
16	15°29.6'	+59.6'	84.3°	15°35.4'	+59.8'	84.6°	15°40.9'	+59.8'	84.9°	15°46.1'	+59.9'	85.1°	15°51.0'	+60.0'	85.4°	15°55.7'	+60.0'	85.7°	16°00.0'	+60.0'	90.0°	16
17	16°29.2'	+59.6'	84.2°	16°35.1'	+59.8'	84.5°	16°40.7'	+59.8'	84.8°	16°46.0'	+59.9'	85.1°	16°51.0'	+60.0'	85.4°	16°55.7'	+60.0'	85.7°	17°00.0'	+60.0'	90.0°	17
18	17°28.9'	+59.6'	84.1°	17°34.9'	+59.7'	84.4°	17°40.6'	+59.8'	84.7°	17°45.9'	+59.9'	85.0°	17°51.0'	+60.0'	85.4°	17°55.6'	+60.0'	85.7°	18°00.0'	+60.0'	90.0°	18
19	18°28.5'	+59.6'	84.0°	18°34.6'	+59.7'	84.3°	18°40.4'	+59.8'	84.6°	18°45.8'	+59.9'	85.0°	18°50.9'	+60.0'	85.3°	18°55.6'	+60.0'	85.7°	19°00.0'	+60.0'	90.0°	19
20	19°28.1'	+59.6'	83.9°	19°34.4'	+59.7'	84.2°	19°40.2'	+59.8'	84.6°	19°45.7'	+59.9'	84.9°	19°50.9'	+60.0'	85.3°	19°55.6'	+60.0'	85.6°	20°00.0'	+60.0'	90.0°	20
21	20°27.8'	+59.6'	83.7°	20°34.1'	+59.7'	84.1°	20°40.1'	+59.8'	84.5°	20°45.7'	+59.9'	84.9°	20°50.8'	+60.0'	85.2°	20°55.6'	+60.0'	85.6°	21°00.0'	+60.0'	90.0°	21
22	21°27.4'	+59.6'	83.6°	21°33.9'	+59.7'	84.0°	21°39.9'	+59.8'	84.4°	21°45.6'	+59.9'	84.8°	21°50.8'	+60.0'	85.2°	21°55.6'	+60.0'	85.6°	22°00.0'	+60.0'	90.0°	22
23	22°27.0'	+59.6'	83.5°	22°33.6'	+59.7'	83.9°	22°39.7'	+59.8'	84.3°	22°45.5'	+59.9'	84.7°	22°50.7'	+60.0'	85.2°	22°55.6'	+60.0'	85.6°	23°00.0'	+60.0'	169.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	0°31.3'	-59.7'	95.0°	0°26.1'	-59.8'	95.0°	0°20.9'	-59.9'	95.0°	0°15.7'	-59.9'	95.0°	0°10.5'	-60.0'	95.0°	0°05.2'	-60.0'	95.0°	0°00.0'	-60.0'	95.0°	0
1	0°28.4'	+59.7'	84.9°	0°33.7'	+59.8'	84.9°	0°39.0'	+59.9'	84.9°	0°44.2'	+59.9'	85.0°	0°49.5'	+60.0'	85.0°	0°54.8'	+60.0'	85.0°	1°00.0'	+60.0'	83.5°	1
2	1°28.0'	+59.7'	84.8°	1°33.4'	+59.8'	84.8°	1°38.8'	+59.9'	84.9°	1°44.2'	+59.9'	84.9°	1°49.5'	+60.0'	84.9°	1°54.8'	+60.0'	85.0°	2°00.0'	+60.0'	83.5°	2
3	2°27.7'	+59.7'	84.7°	2°33.2'	+59.8'	84.8°	2°38.7'	+59.9'	84.8°	2°44.1'	+59.9'	84.9°	2°49.4'	+60.0'	84.9°	2°54.7'	+60.0'	84.9°	3°00.0'	+60.0'	83.5°	3
4	3°27.4'	+59.7'	84.6°	3°33.0'	+59.8'	84.7°	3°38.5'	+59.9'	84.7°	3°44.0'	+59.9'	84.8°	3°49.4'	+60.0'	84.9°	3°54.7'	+60.0'	84.9°	4°00.0'	+60.0'	90.0°	4
5	4°27.0'	+59.7'	84.5°	4°32.8'	+59.8'	84.6°	4°38.4'	+59.9'	84.7°	4°43.9'	+59.9'	84.7°	4°49.4'	+60.0'	84.8°	4°54.7'	+60.0'	84.9°	5°00.0'	+60.0'	76.9°	5
6	5°26.7'	+59.7'	84.4°	5°32.5'	+59.8'	84.5°	5°38.2'	+59.9'	84.6°	5°43.8'	+59.9'	84.7°	5°49.3'	+60.0'	84.8°	5°54.7'	+60.0'	84.9°	6°00.0'	+60.0'	76.8°	6
7	6°26.4'	+59.7'	84.3°	6°32.3'	+59.8'	84.4°	6°38.1'	+59.9'	84.5°	6°43.7'	+59.9'	84.6°	6°49.3'	+60.0'	84.8°	6°54.7'	+60.0'	84.9°	7°00.0'	+60.0'	76.8°	7
8	7°26.1'	+59.7'	84.2°	7°32.1'	+59.8'	84.3°	7°37.9'	+59.9'	84.5°	7°43.7'	+59.9'	84.6°	7°49.3'	+60.0'	84.7°	7°54.7'	+60.0'	84.9°	8°00.0'	+60.0'	62.8°	8
9	8°25.7'	+59.7'	84.1°	8°31.8'	+59.8'	84.2°	8°37.8'	+59.9'	84.4°	8°43.6'	+59.9'	84.5°	8°49.2'	+60.0'	84.7°	8°54.7'	+60.0'	84.8°	9°00.0'	+60.0'	117.3°	9
10	9°25.4'	+59.7'	84.0°	9°31.6'	+59.8'	84.1°	9°37.6'	+59.9'	84.3°	9°43.5'	+59.9'	84.5°	9°49.2'	+60.0'	84.7°	9°54.7'	+60.0'	84.8°	10°00.0'	+60.0'	90.0°	10
11	10°25.1'	+59.7'	83.9°	10°31.4'	+59.8'	84.1°	10°37.5'	+59.8'	84.2°	10°43.4'	+59.9'	84.4°	10°49.1'	+60.0'	84.6°	10°54.7'	+60.0'	84.8°	11°00.0'	+60.0'	90.0°	11
12	11°24.7'	+59.7'	83.8°	11°31.1'	+59.8'	84.0°	11°37.3'	+59.8'	84.2°	11°43.3'	+59.9'	84.4°	11°49.1'	+60.0'	84.6°	11°54.7'	+60.0'	84.8°	12°00.0'	+60.0'	117.6°	12
13	12°24.4'	+59.7'	83.7°	12°30.9'	+59.8'	83.9°	12°37.2'	+59.8'	84.1°	12°43.2'	+59.9'	84.3°	12°49.1'	+60.0'	84.5°	12°54.7'	+60.0'	84.8°	13°00.0'	+60.0'	117.7°	13
14	13°24.0'	+59.7'	83.5°	13°30.7'	+59.8'	83.8°	13°37.0'	+59.8'	84.0°	13°43.2'	+59.9'	84.3°	13°49.0'	+60.0'	84.5°	13°54.6'	+60.0'	84.8°	14°00.0'	+60.0'	62.2°	14
15	14°23.7'	+59.7'	83.4°	14°30.4'	+59.8'	83.7°	14°36.9'	+59.8'	83.9°	14°43.1'	+59.9'	84.2°	14°49.0'	+60.0'	84.5°	14°54.6'	+60.0'	84.7°	15°00.0'	+60.0'	90.0°	15
16	15°23.3'	+59.6'	83.3°	15°30.2'	+59.8'	83.6°	15°36.7'	+59.8'	83.9°	15°43.0'	+59.9'	84.2°	15°48.9'	+60.0'	84.4°	15°54.6'	+60.0'	84.7°	16°00.0'	+60.0'	90.0°	16
17	16°23.0'	+59.6'	83.2°	16°29.9'	+59.8'	83.5°	16°36.6'	+59.8'	83.8°	16°42.9'	+59.9'	84.1°	16°48.9'	+60.0'	84.4°	16°54.6'	+60.0'	84.7°	17°00.0'	+60.0'	90.0°	17
18	17°22.6'	+59.6'	83.1°	17°29.7'	+59.7'	83.4°	17°36.4'	+59.8'	83.7°	17°42.8'	+59.9'	84.0°	17°48.9'	+60.0'	84.4°	17°54.6'	+60.0'	84.7°	18°00.0'	+60.0'	90.0°	18
19	18°22.3'	+59.6'	83.0°	18°29.4'	+59.7'	83.3°	18°36.2'	+59.8'	83.6°	18°42.7'	+59.9'	84.0°	18°48.8'	+60.0'	84.3°	18°54.6'	+60.0'	84.7°	19°00.0'	+60.0'	90.0°	19
20	19°21.9'	+59.6'	82.9°	19°29.2'	+59.7'	83.2°	19°36.1'	+59.8'	83.6°	19°42.6'	+59.9'	83.9°	19°48.8'	+60.0'	84.3°	19°54.6'	+60.0'	84.6°	20°00.0'	+60.0'	90.0°	20
21	20°21.5'	+59.6'	82.7°	20°28.9'	+59.7'	83.1°	20°35.9'	+59.8'	83.5°	20°42.5'	+59.9'	83.9°	20°48.7'	+60.0'	84.2°	20°54.6'	+60.0'	84.6°	21°00.0'	+60.0'	90.0°	21
22	21°21.2'	+59.6'	82.6°	21°28.7'	+59.7'	83.0°	21°35.8'	+59.8'	83.4°	21°42.4'	+59.9'	83.8°	21°48.7'	+60.0'	84.2°	21°54.6'	+60.0'	84.6°	22°00.0'	+6		

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

84° 276° LHA

Latitude CONTRARY to Declination

84° 276° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	0°37.5'	-59.7'	96.0°	0°31.3'	-59.8'	96.0°	0°25.1'	-59.9'	96.0°	0°18.8'	-59.9'	96.0°	0°12.5'	-60.0'	96.0°	0°06.3'	-60.0'	96.0°	0°00.0'	-60.0'	96.0°	0
1	0°22.1'	+59.7'	83.9°	0°28.5'	+59.8'	83.9°	0°34.8'	+59.9'	83.9°	0°41.1'	+59.9'	84.0°	0°47.4'	+60.0'	84.0°	0°53.7'	+60.0'	84.0°	1°00.0'	+60.0'	83.5°	1
2	1°21.8'	+59.7'	83.8°	1°28.2'	+59.8'	83.8°	1°34.6'	+59.9'	83.9°	1°41.0'	+59.9'	83.9°	1°47.4'	+60.0'	83.9°	1°53.7'	+60.0'	84.0°	2°00.0'	+60.0'	83.5°	2
3	2°21.5'	+59.7'	83.7°	2°28.0'	+59.8'	83.8°	2°34.5'	+59.9'	83.8°	2°40.9'	+59.9'	83.9°	2°47.4'	+60.0'	83.9°	2°53.7'	+60.0'	83.9°	3°00.0'	+60.0'	83.5°	3
4	3°21.1'	+59.7'	83.6°	3°27.8'	+59.8'	83.7°	3°34.4'	+59.9'	83.7°	3°40.9'	+59.9'	83.8°	3°47.3'	+60.0'	83.9°	3°53.7'	+60.0'	83.9°	4°00.0'	+60.0'	90.0°	4
5	4°20.8'	+59.7'	83.5°	4°27.5'	+59.8'	83.6°	4°34.2'	+59.9'	83.7°	4°40.8'	+59.9'	83.7°	4°47.3'	+60.0'	83.8°	4°53.7'	+60.0'	83.9°	5°00.0'	+60.0'	76.9°	5
6	5°20.5'	+59.7'	83.4°	5°27.3'	+59.8'	83.5°	5°34.1'	+59.9'	83.6°	5°40.7'	+59.9'	83.7°	5°47.2'	+60.0'	83.8°	5°53.7'	+60.0'	83.9°	6°00.0'	+60.0'	76.8°	6
7	6°20.2'	+59.7'	83.3°	6°27.1'	+59.8'	83.4°	6°33.9'	+59.9'	83.5°	6°40.6'	+59.9'	83.6°	6°47.2'	+60.0'	83.8°	6°53.7'	+60.0'	83.9°	7°00.0'	+60.0'	76.8°	7
8	7°19.8'	+59.7'	83.2°	7°26.9'	+59.8'	83.3°	7°33.8'	+59.9'	83.5°	7°40.5'	+59.9'	83.6°	7°47.2'	+60.0'	83.7°	7°53.7'	+60.0'	83.9°	8°00.0'	+60.0'	62.8°	8
9	8°19.5'	+59.7'	83.1°	8°26.6'	+59.8'	83.2°	8°33.6'	+59.9'	83.4°	8°40.5'	+59.9'	83.5°	8°47.1'	+60.0'	83.7°	8°53.6'	+60.0'	83.8°	9°00.0'	+60.0'	117.3°	9
10	9°19.2'	+59.7'	83.0°	9°26.4'	+59.8'	83.1°	9°33.5'	+59.9'	83.3°	9°40.4'	+59.9'	83.5°	9°47.1'	+60.0'	83.7°	9°53.6'	+60.0'	83.8°	10°00.0'	+60.0'	90.0°	10
11	10°18.8'	+59.7'	82.9°	10°26.2'	+59.8'	83.1°	10°33.3'	+59.8'	83.2°	10°40.3'	+59.9'	83.4°	10°47.1'	+60.0'	83.6°	10°53.6'	+60.0'	83.8°	11°00.0'	+60.0'	90.0°	11
12	11°18.5'	+59.7'	82.8°	11°25.9'	+59.8'	83.0°	11°33.2'	+59.8'	83.2°	11°40.2'	+59.9'	83.4°	11°47.0'	+60.0'	83.6°	11°53.6'	+60.0'	83.8°	12°00.0'	+60.0'	117.6°	12
13	12°18.1'	+59.7'	82.7°	12°25.7'	+59.8'	82.9°	12°33.0'	+59.8'	83.1°	12°40.1'	+59.9'	83.3°	12°47.0'	+60.0'	83.5°	12°53.6'	+60.0'	83.8°	13°00.0'	+60.0'	117.7°	13
14	13°17.8'	+59.7'	82.6°	13°25.5'	+59.8'	82.8°	13°32.9'	+59.8'	83.0°	13°40.0'	+59.9'	83.3°	13°46.9'	+60.0'	83.5°	13°53.6'	+60.0'	83.8°	14°00.0'	+60.0'	62.2°	14
15	14°17.5'	+59.7'	82.4°	14°25.2'	+59.8'	82.7°	14°32.7'	+59.8'	83.0°	14°39.9'	+59.9'	83.2°	14°46.9'	+60.0'	83.5°	14°53.6'	+60.0'	83.7°	15°00.0'	+60.0'	90.0°	15
16	15°17.1'	+59.6'	82.3°	15°25.0'	+59.8'	82.6°	15°32.6'	+59.8'	82.9°	15°39.9'	+59.9'	83.2°	15°46.9'	+60.0'	83.4°	15°53.6'	+60.0'	83.7°	16°00.0'	+60.0'	90.0°	16
17	16°16.8'	+59.6'	82.2°	16°24.7'	+59.8'	82.5°	16°32.4'	+59.8'	82.8°	16°39.8'	+59.9'	83.1°	16°46.8'	+60.0'	83.4°	16°53.6'	+60.0'	83.7°	17°00.0'	+60.0'	90.0°	17
18	17°16.4'	+59.6'	82.1°	17°24.5'	+59.8'	82.4°	17°32.2'	+59.8'	82.7°	17°39.7'	+59.9'	83.0°	17°46.8'	+60.0'	83.4°	17°53.6'	+60.0'	83.7°	18°00.0'	+60.0'	90.0°	18
19	18°16.0'	+59.6'	82.0°	18°24.2'	+59.7'	82.3°	18°32.1'	+59.8'	82.6°	18°39.6'	+59.9'	83.0°	18°46.7'	+60.0'	83.3°	18°53.6'	+60.0'	83.7°	19°00.0'	+60.0'	90.0°	19
20	19°15.7'	+59.6'	81.9°	19°24.0'	+59.7'	82.2°	19°31.9'	+59.8'	82.6°	19°39.5'	+59.9'	82.9°	19°46.7'	+60.0'	83.3°	19°53.5'	+60.0'	83.6°	20°00.0'	+60.0'	90.0°	20
21	20°15.3'	+59.6'	81.8°	20°23.7'	+59.7'	82.1°	20°31.8'	+59.8'	82.5°	20°39.4'	+59.9'	82.9°	20°46.7'	+60.0'	83.2°	20°53.5'	+60.0'	83.6°	21°00.0'	+60.0'	90.0°	21
22	21°14.9'	+59.6'	81.6°	21°23.5'	+59.7'	82.0°	21°31.6'	+59.8'	82.4°	21°39.3'	+59.9'	82.8°	21°46.6'	+60.0'	83.2°	21°53.5'	+60.0'	83.6°	22°00.0'	+60.0'	90.0°	22
23	22°14.6'	+59.6'	81.5°	22°23.2'	+59.7'	81.9°	22°31.4'	+59.8'	82.3°	22°39.2'	+59.9'	82.7°	22°46.6'	+60.0'	83.2°	22°53.5'	+60.0'	83.6°	23°00.0'	+60.0'	169.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	0°43.7'	-59.7'	97.0°	0°36.5'	-59.8'	97.0°	0°29.2'	-59.9'	97.0°	0°21.9'	-59.9'	97.0°	0°14.6'	-60.0'	97.0°	0°07.3'	-60.0'	97.0°	0°00.0'	-60.0'	97.0°	0
1	0°15.9'	+59.7'	82.9°	0°23.3'	+59.8'	82.9°	0°30.6'	+59.9'	82.9°	0°38.0'	+59.9'	83.0°	0°45.3'	+60.0'	83.0°	0°52.7'	+60.0'	83.0°	1°00.0'	+60.0'	83.5°	1
2	1°15.6'	+59.7'	82.8°	1°23.0'	+59.8'	82.9°	1°30.5'	+59.9'	82.9°	1°37.9'	+59.9'	82.9°	1°45.3'	+60.0'	82.9°	1°52.7'	+60.0'	83.0°	2°00.0'	+60.0'	83.5°	2
3	2°15.2'	+59.7'	82.7°	2°22.8'	+59.8'	82.8°	2°30.3'	+59.9'	82.8°	2°37.8'	+59.9'	82.9°	2°45.3'	+60.0'	82.9°	2°52.7'	+60.0'	82.9°	3°00.0'	+60.0'	83.5°	3
4	3°14.9'	+59.7'	82.6°	3°22.6'	+59.8'	82.7°	3°30.2'	+59.9'	82.7°	3°37.7'	+59.9'	82.8°	3°45.2'	+60.0'	82.9°	3°52.7'	+60.0'	82.9°	4°00.0'	+60.0'	76.9°	4
5	4°14.6'	+59.7'	82.5°	4°22.4'	+59.8'	82.6°	4°30.1'	+59.9'	82.7°	4°37.7'	+59.9'	82.7°	4°45.2'	+60.0'	82.8°	4°52.7'	+60.0'	82.9°	5°00.0'	+60.0'	62.9°	5
6	5°14.3'	+59.7'	82.4°	5°22.1'	+59.8'	82.5°	5°29.9'	+59.9'	82.6°	5°37.6'	+59.9'	82.7°	5°45.2'	+60.0'	82.8°	5°52.6'	+60.0'	82.9°	6°00.0'	+60.0'	76.8°	6
7	6°13.9'	+59.7'	82.3°	6°21.9'	+59.8'	82.4°	6°29.8'	+59.9'	82.5°	6°37.5'	+59.9'	82.6°	6°45.1'	+60.0'	82.8°	6°52.6'	+60.0'	82.9°	7°00.0'	+60.0'	76.8°	7
8	7°13.6'	+59.7'	82.2°	7°21.7'	+59.8'	82.3°	7°29.6'	+59.9'	82.5°	7°37.4'	+59.9'	82.6°	7°45.1'	+60.0'	82.7°	7°52.6'	+60.0'	82.9°	8°00.0'	+60.0'	62.8°	8
9	8°13.3'	+59.7'	82.1°	8°21.4'	+59.8'	82.2°	8°29.5'	+59.9'	82.4°	8°37.3'	+59.9'	82.5°	8°45.1'	+60.0'	82.7°	8°52.6'	+60.0'	82.8°	9°00.0'	+60.0'	117.3°	9
10	9°12.9'	+59.7'	82.0°	9°21.2'	+59.8'	82.2°	9°29.3'	+59.9'	82.3°	9°37.3'	+59.9'	82.5°	9°45.0'	+60.0'	82.7°	9°52.6'	+60.0'	82.8°	10°00.0'	+60.0'	90.0°	10
11	10°12.6'	+59.7'	81.9°	10°21.0'	+59.8'	82.1°	10°29.2'	+59.9'	82.2°	10°37.2'	+59.9'	82.4°	10°45.0'	+60.0'	82.6°	10°52.6'	+60.0'	82.8°	11°00.0'	+60.0'	90.0°	11
12	11°12.3'	+59.7'	81.8°	11°20.8'	+59.8'	82.0°	11°29.0'	+59.8'	82.2°	11°37.1'	+59.9'	82.4°	11°44.9'	+60.0'	82.6°	11°52.6'	+60.0'	82.8°	12°00.0'	+60.0'	117.6°	12
13	12°11.9'	+59.7'	81.7°	12°20.5'	+59.8'	81.9°	12°28.9'	+59.8'	82.1°	12°37.0'	+59.9'	82.3°	12°44.9'	+60.0'	82.5°	12°52.6'	+60.0'	82.8°	13°00.0'	+60.0'	117.7°	13
14	13°11.6'	+59.7'	81.6°	13°20.3'	+59.8'	81.8°	13°28.7'	+59.8'	82.0°	13°36.9'	+59.9'	82.3°	13°44.9'	+60.0'	82.5°	13°52.6'	+60.0'	82.8°	14°00.0'	+60.0'	62.2°	14
15	14°11.3'	+59.7'	81.5°	14°20.0'	+59.8'	81.7°	14°28.6'	+59.8'	82.0°	14°36.8'	+59.9'	82.2°	14°44.8'	+60.0'	82.5°	14°52.6'	+60.0'	82.7°	15°00.0'	+60.0'	90.0°	15
16	15°10.9'	+59.7'	81.3°	15°19.8'	+59.8'	81.6°	15°28.4'	+59.8'	81.9°	15°36.7'	+59.9'	82.2°	15°44.8'	+60.0'	82.4°	15°52.5'	+60.0'	82.7°	16°00.0'	+60.0'	90.0°	16
17	16°10.6'	+59.6'	81.2°	16°19.6'	+59.8'	81.5°	16°28.3'	+59.8'	81.8°	16°36.7'	+59.9'	82.1°	16°44.7'	+60.0'	82.4°	16°52.5'	+60.0'	82.7°	17°00.0'	+60.0'	90.0°	17
18	17°10.2'	+59.6'	81.1°	17°19.3'	+59.8'	81.4°	17°28.1'	+59.8'	81.7°	17°36.6'	+59.9'	82.0°	17°44.7'	+60.0'	82.4°	17°52.5'	+60.0'	82.7°	18°00.0'	+60.0'	90.0°	18
19	18°09.8'	+59.6'	81.0°	18°19.1'	+59.7'	81.3°	18°27.9'	+59.8'	81.7°	18°36.5'	+59.9'	82.0°	18°44.7'	+60.0'	82.3°	18°52.5'	+60.0'	82.7°	19°00.0'	+60.0'	90.0°	19
20	19°09.5'	+59.6'	80.9°	19°18.8'	+59.7'	81.2°	19°27.8'	+59.8'	81.6°	19°36.4'	+59.9'	81.9°	19°44.6'	+60.0'	82.3°	19°52.5'	+60.0'	82.6°	20°00.0'	+60.0'	90.0°	20
21	20°09.1'	+59.6'	80.8°	20°18.6'	+59.7'	81.1°	20°27.6'	+59.8'	81.5°	20°36.3'	+59.9'	81.9°	20°44.6'	+60.0'	82.2°	20°52.5'	+60.0'	82.6°	21°00.0'	+60.0'	90.0°	21
22	21°08.8'	+59.6'	80.6°	21°18.3'	+59.7'	81.0°	21°27.5'	+59.8'	81.4°	21°36.2'	+59.9'	81.8°	21°44.5'	+60.0'	82.2°	21°52.5'	+60.0'	82.6°	22°00.0'	+6		

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

82° 278° LHA

Latitude CONTRARY to Declination

82° 278° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	0°50.0'	-59.7'	98.0°	0°41.7'	-59.8'	98.0°	0°33.4'	-59.9'	98.0°	0°25.0'	-59.9'	98.0°	0°16.7'	-60.0'	98.0°	0°08.3'	-60.0'	98.0°	0°00.0'	-60.0'	98.0°	0
1	0°09.7'	+59.7'	81.9°	0°18.1'	+59.8'	81.9°	0°26.5'	+59.9'	82.0°	0°34.9'	+59.9'	82.0°	0°43.3'	+60.0'	82.0°	0°51.6'	+60.0'	82.0°	1°00.0'	+60.0'	83.5°	1
2	1°09.3'	+59.7'	81.8°	1°17.9'	+59.8'	81.9°	1°26.3'	+59.9'	81.9°	1°34.8'	+59.9'	81.9°	1°43.2'	+60.0'	81.9°	1°51.6'	+60.0'	82.0°	2°00.0'	+60.0'	83.5°	2
3	2°09.0'	+59.7'	81.7°	2°17.6'	+59.8'	81.8°	2°26.2'	+59.9'	81.8°	2°34.7'	+59.9'	81.9°	2°43.2'	+60.0'	81.9°	2°51.6'	+60.0'	81.9°	3°00.0'	+60.0'	83.5°	3
4	3°08.7'	+59.7'	81.6°	3°17.4'	+59.8'	81.7°	3°26.1'	+59.9'	81.7°	3°34.6'	+59.9'	81.8°	3°43.2'	+60.0'	81.9°	3°51.6'	+60.0'	81.9°	4°00.0'	+60.0'	76.9°	4
5	4°08.4'	+59.7'	81.5°	4°17.2'	+59.8'	81.6°	4°25.9'	+59.9'	81.7°	4°34.6'	+59.9'	81.8°	4°43.1'	+60.0'	81.8°	4°51.6'	+60.0'	81.9°	5°00.0'	+60.0'	62.9°	5
6	5°08.0'	+59.7'	81.4°	5°17.0'	+59.8'	81.5°	5°25.8'	+59.9'	81.6°	5°34.5'	+59.9'	81.7°	5°43.1'	+60.0'	81.8°	5°51.6'	+60.0'	81.9°	6°00.0'	+60.0'	76.8°	6
7	6°07.7'	+59.7'	81.3°	6°16.7'	+59.8'	81.4°	6°25.6'	+59.9'	81.5°	6°34.4'	+59.9'	81.6°	6°43.1'	+60.0'	81.8°	6°51.6'	+60.0'	81.9°	7°00.0'	+60.0'	76.8°	7
8	7°07.4'	+59.7'	81.2°	7°16.5'	+59.8'	81.3°	7°25.5'	+59.9'	81.5°	7°34.3'	+59.9'	81.6°	7°43.0'	+60.0'	81.7°	7°51.6'	+60.0'	81.9°	8°00.0'	+60.0'	62.8°	8
9	8°07.1'	+59.7'	81.1°	8°16.3'	+59.8'	81.2°	8°25.3'	+59.9'	81.4°	8°34.2'	+59.9'	81.5°	8°43.0'	+60.0'	81.7°	8°51.6'	+60.0'	81.8°	9°00.0'	+60.0'	117.3°	9
10	9°06.7'	+59.7'	81.0°	9°16.0'	+59.8'	81.2°	9°25.2'	+59.9'	81.3°	9°34.1'	+59.9'	81.5°	9°42.9'	+60.0'	81.7°	9°51.6'	+60.0'	81.8°	10°00.0'	+60.0'	90.0°	10
11	10°06.4'	+59.7'	80.9°	10°15.8'	+59.8'	81.1°	10°25.0'	+59.9'	81.3°	10°34.1'	+59.9'	81.4°	10°42.9'	+60.0'	81.6°	10°51.6'	+60.0'	81.8°	11°00.0'	+60.0'	90.0°	11
12	11°06.1'	+59.7'	80.8°	11°15.6'	+59.8'	81.0°	11°24.9'	+59.9'	81.2°	11°34.0'	+59.9'	81.4°	11°42.9'	+60.0'	81.6°	11°51.5'	+60.0'	81.8°	12°00.0'	+60.0'	117.6°	12
13	12°05.7'	+59.7'	80.7°	12°15.3'	+59.8'	80.9°	12°24.7'	+59.8'	81.1°	12°33.9'	+59.9'	81.3°	12°42.8'	+60.0'	81.5°	12°51.5'	+60.0'	81.8°	13°00.0'	+60.0'	117.7°	13
14	13°05.4'	+59.7'	80.6°	13°15.1'	+59.8'	80.8°	13°24.6'	+59.8'	81.0°	13°33.8'	+59.9'	81.3°	13°42.8'	+60.0'	81.5°	13°51.5'	+60.0'	81.8°	14°00.0'	+60.0'	62.2°	14
15	14°05.1'	+59.7'	80.5°	14°14.9'	+59.8'	80.7°	14°24.4'	+59.8'	81.0°	14°33.7'	+59.9'	81.2°	14°42.8'	+60.0'	81.5°	14°51.5'	+60.0'	81.7°	15°00.0'	+60.0'	90.0°	15
16	15°04.7'	+59.7'	80.3°	15°14.6'	+59.8'	80.6°	15°24.3'	+59.8'	80.9°	15°33.6'	+59.9'	81.2°	15°42.7'	+60.0'	81.4°	15°51.5'	+60.0'	81.7°	16°00.0'	+60.0'	90.0°	16
17	16°04.4'	+59.6'	80.2°	16°14.4'	+59.8'	80.5°	16°24.1'	+59.8'	80.8°	16°33.6'	+59.9'	81.1°	16°42.7'	+60.0'	81.4°	16°51.5'	+60.0'	81.7°	17°00.0'	+60.0'	90.0°	17
18	17°04.0'	+59.6'	80.1°	17°14.1'	+59.8'	80.4°	17°24.0'	+59.8'	80.7°	17°33.5'	+59.9'	81.0°	17°42.6'	+60.0'	81.4°	17°51.5'	+60.0'	81.7°	18°00.0'	+60.0'	90.0°	18
19	18°03.7'	+59.6'	80.0°	18°13.9'	+59.8'	80.3°	18°23.8'	+59.8'	80.7°	18°33.4'	+59.9'	81.0°	18°42.6'	+60.0'	81.3°	18°51.5'	+60.0'	81.7°	19°00.0'	+60.0'	90.0°	19
20	19°03.3'	+59.6'	79.9°	19°13.7'	+59.7'	80.2°	19°23.6'	+59.8'	80.6°	19°33.3'	+59.9'	80.9°	19°42.6'	+60.0'	81.3°	19°51.5'	+60.0'	81.6°	20°00.0'	+60.0'	90.0°	20
21	20°02.9'	+59.6'	79.8°	20°13.4'	+59.7'	80.1°	20°23.5'	+59.8'	80.5°	20°33.2'	+59.9'	80.9°	20°42.5'	+60.0'	81.2°	20°51.5'	+60.0'	81.6°	21°00.0'	+60.0'	90.0°	21
22	21°02.6'	+59.6'	79.7°	21°13.1'	+59.7'	80.0°	21°23.3'	+59.8'	80.4°	21°33.1'	+59.9'	80.8°	21°42.5'	+60.0'	81.2°	21°51.4'	+60.0'	81.6°	22°00.0'	+60.0'	90.0°	22
23	22°02.2'	+59.6'	79.5°	22°12.9'	+59.7'	79.9°	22°23.2'	+59.8'	80.3°	22°33.0'	+59.9'	80.8°	22°42.4'	+60.0'	81.2°	22°51.4'	+60.0'	81.6°	23°00.0'	+60.0'	169.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	0°56.2'	-59.7'	99.0°	0°46.9'	-59.8'	99.0°	0°37.5'	-59.9'	99.0°	0°28.1'	-59.9'	99.0°	0°18.8'	-60.0'	99.0°	0°09.4'	-60.0'	99.0°	0°00.0'	-60.0'	99.0°	0
1	0°03.5'	+59.7'	80.9°	0°12.9'	+59.8'	80.9°	0°22.3'	+59.9'	81.0°	0°31.8'	+59.9'	81.0°	0°41.2'	+60.0'	81.0°	0°50.6'	+60.0'	81.0°	0°60.0'	+60.0'	80.2°	1
2	1°03.1'	+59.7'	80.8°	1°12.7'	+59.8'	80.9°	1°22.2'	+59.9'	80.9°	1°31.7'	+59.9'	80.9°	1°41.2'	+60.0'	80.9°	1°50.6'	+60.0'	81.0°	2°00.0'	+60.0'	83.5°	2
3	2°02.8'	+59.7'	80.7°	2°12.5'	+59.8'	80.8°	2°22.1'	+59.9'	80.8°	2°31.6'	+59.9'	80.9°	2°41.1'	+60.0'	80.9°	2°50.6'	+60.0'	80.9°	3°00.0'	+60.0'	83.5°	3
4	3°02.5'	+59.7'	80.6°	3°12.2'	+59.8'	80.7°	3°21.9'	+59.9'	80.7°	3°31.5'	+59.9'	80.8°	3°41.1'	+60.0'	80.9°	3°50.6'	+60.0'	80.9°	4°00.0'	+60.0'	76.9°	4
5	4°02.2'	+59.7'	80.5°	4°12.0'	+59.8'	80.6°	4°21.8'	+59.9'	80.6°	4°31.5'	+59.9'	80.8°	4°41.1'	+60.0'	80.8°	4°50.6'	+60.0'	80.9°	5°00.0'	+60.0'	62.9°	5
6	5°01.9'	+59.7'	80.4°	5°11.8'	+59.8'	80.5°	5°21.6'	+59.9'	80.6°	5°31.4'	+59.9'	80.7°	5°41.0'	+60.0'	80.8°	5°50.6'	+60.0'	80.9°	6°00.0'	+60.0'	76.8°	6
7	6°01.5'	+59.7'	80.3°	6°11.6'	+59.8'	80.4°	6°21.5'	+59.9'	80.5°	6°31.3'	+59.9'	80.6°	6°41.0'	+60.0'	80.8°	6°50.6'	+60.0'	80.9°	7°00.0'	+60.0'	76.8°	7
8	7°01.2'	+59.7'	80.2°	7°11.3'	+59.8'	80.3°	7°21.3'	+59.9'	80.5°	7°31.2'	+59.9'	80.6°	7°40.9'	+60.0'	80.7°	7°50.5'	+60.0'	80.9°	8°00.0'	+60.0'	62.8°	8
9	8°00.9'	+59.7'	80.1°	8°11.1'	+59.8'	80.3°	8°21.2'	+59.9'	80.4°	8°31.1'	+59.9'	80.5°	8°40.9'	+60.0'	80.7°	8°50.5'	+60.0'	80.8°	9°00.0'	+60.0'	117.3°	9
10	9°00.6'	+59.7'	80.0°	9°10.9'	+59.8'	80.2°	9°21.0'	+59.9'	80.3°	9°31.0'	+59.9'	80.5°	9°40.9'	+60.0'	80.7°	9°50.5'	+60.0'	80.8°	10°00.0'	+60.0'	90.0°	10
11	10°00.2'	+59.7'	79.9°	10°10.7'	+59.8'	80.1°	10°20.9'	+59.9'	80.3°	10°31.0'	+59.9'	80.4°	10°40.8'	+60.0'	80.6°	10°50.5'	+60.0'	80.8°	11°00.0'	+60.0'	90.0°	11
12	10°59.9'	+59.7'	79.8°	11°10.4'	+59.8'	80.0°	11°20.8'	+59.9'	80.2°	11°30.9'	+59.9'	80.4°	11°40.8'	+60.0'	80.6°	11°50.5'	+60.0'	80.8°	12°00.0'	+60.0'	117.6°	12
13	11°59.6'	+59.7'	79.7°	12°10.2'	+59.8'	79.9°	12°20.6'	+59.9'	80.1°	12°30.8'	+59.9'	80.3°	12°40.8'	+60.0'	80.6°	12°50.5'	+60.0'	80.8°	13°00.0'	+60.0'	117.7°	13
14	12°59.2'	+59.7'	79.6°	13°10.0'	+59.8'	79.8°	13°20.5'	+59.8'	80.0°	13°30.7'	+59.9'	80.3°	13°40.7'	+60.0'	80.5°	13°50.5'	+60.0'	80.8°	14°00.0'	+60.0'	62.2°	14
15	13°58.9'	+59.7'	79.5°	14°09.7'	+59.8'	79.7°	14°20.3'	+59.8'	80.0°	14°30.6'	+59.9'	80.2°	14°40.7'	+60.0'	80.5°	14°50.5'	+60.0'	80.7°	15°00.0'	+60.0'	90.0°	15
16	14°58.5'	+59.7'	79.4°	15°09.5'	+59.8'	79.6°	15°20.2'	+59.8'	79.9°	15°30.5'	+59.9'	80.2°	15°40.6'	+60.0'	80.4°	15°50.5'	+60.0'	80.7°	16°00.0'	+60.0'	90.0°	16
17	15°58.2'	+59.7'	79.2°	16°09.2'	+59.8'	79.5°	16°20.0'	+59.8'	79.8°	16°30.5'	+59.9'	80.1°	16°40.6'	+60.0'	80.4°	16°50.5'	+60.0'	80.7°	17°00.0'	+60.0'	90.0°	17
18	16°57.8'	+59.6'	79.1°	17°09.0'	+59.8'	79.4°	17°19.8'	+59.8'	79.7°	17°30.4'	+59.9'	80.1°	17°40.6'	+60.0'	80.4°	17°50.4'	+60.0'	80.7°	18°00.0'	+60.0'	90.0°	18
19	17°57.5'	+59.6'	79.0°	18°08.8'	+59.8'	79.3°	18°19.7'	+59.8'	79.7°	18°30.3'	+59.9'	80.0°	18°40.5'	+60.0'	80.3°	18°50.4'	+60.0'	80.7°	19°00.0'	+60.0'	90.0°	19
20	18°57.1'	+59.6'	78.9°	19°08.5'	+59.7'	79.2°	19°19.5'	+59.8'	79.6°	19°30.2'	+59.9'	79.9°	19°40.5'	+60.0'	80.3°	19°50.4'	+60.0'	80.6°	20°00.0'	+60.0'	90.0°	20
21	19°56.8'	+59.6'	78.8°	20°08.3'	+59.7'	79.2°	20°19.4'	+59.8'	79.5°	20°30.1'	+59.9'	79.9°	20°40.4'	+60.0'	80.2°	20°50.4'	+60.0'	80.6°	21°00.0'	+60.0'	90.0°	21
22	20°56.4'	+59.6'	78.7°	21°08.0'	+59.7'	79.1°	21°19.2'	+59.8'	79.4°	21°30.0'	+59.9'	79.8°	21°40.4'	+60.0'	80.2°	21°50.4'	+60.0'	80.6°	22°00.0'	+6		

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

80° 280° LHA

Latitude CONTRARY to Declination

80° 280° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	1°02.4' -59.7'	99.9°	0°52.0' -59.8'	100.0°	0°41.6' -59.9'	100.0°	0°31.2' -59.9'	100.0°	0°20.8' -60.0'	100.0°	0°10.4' -60.0'	100.0°	0°00.0' -60.0'	100.0°	0°00.0' -60.0'	100.0°	0					
1	0°02.7' -59.7'	100.0°	0°07.7' +59.8'	80.0°	0°18.2' +59.9'	80.0°	0°28.7' +59.9'	80.0°	0°39.1' +60.0'	80.0°	0°49.6' +60.0'	80.0°	0°60.0' +60.0'	80.2°	0°60.0' +60.0'	80.2°	1					
2	0°57.0' +59.7'	79.8°	1°07.5' +59.8'	79.9°	1°18.1' +59.9'	79.9°	1°28.6' +59.9'	79.9°	1°39.1' +60.0'	79.9°	1°49.6' +60.0'	80.0°	2°00.0' +60.0'	76.9°	2°00.0' +60.0'	76.9°	2					
3	1°56.6' +59.7'	79.7°	2°07.3' +59.8'	79.8°	2°17.9' +59.9'	79.8°	2°28.5' +59.9'	79.9°	2°39.1' +60.0'	79.9°	2°49.6' +60.0'	79.9°	3°00.0' +60.0'	83.5°	3°00.0' +60.0'	83.5°	3					
4	2°56.3' +59.7'	79.6°	3°07.1' +59.8'	79.7°	3°17.8' +59.9'	79.7°	3°28.4' +59.9'	79.8°	3°39.0' +60.0'	79.9°	3°49.5' +60.0'	79.9°	4°00.0' +60.0'	76.9°	4°00.0' +60.0'	76.9°	4					
5	3°56.0' +59.7'	79.5°	4°06.9' +59.8'	79.6°	4°17.6' +59.9'	79.7°	4°28.4' +59.9'	79.8°	4°39.0' +60.0'	79.8°	4°49.5' +60.0'	79.9°	5°00.0' +60.0'	62.9°	5°00.0' +60.0'	62.9°	5					
6	4°55.7' +59.7'	79.4°	5°06.6' +59.8'	79.5°	5°17.5' +59.9'	79.6°	5°28.3' +59.9'	79.7°	5°39.0' +60.0'	79.8°	5°49.5' +60.0'	79.9°	6°00.0' +60.0'	76.8°	6°00.0' +60.0'	76.8°	6					
7	5°55.4' +59.7'	79.3°	6°06.4' +59.8'	79.4°	6°17.4' +59.9'	79.5°	6°28.2' +59.9'	79.7°	6°38.9' +60.0'	79.8°	6°49.5' +60.0'	79.9°	7°00.0' +60.0'	76.8°	7°00.0' +60.0'	76.8°	7					
8	6°55.0' +59.7'	79.2°	7°06.2' +59.8'	79.3°	7°17.2' +59.9'	79.5°	7°28.1' +59.9'	79.6°	7°38.9' +60.0'	79.7°	7°49.5' +60.0'	79.9°	8°00.0' +60.0'	62.8°	8°00.0' +60.0'	62.8°	8					
9	7°54.7' +59.7'	79.1°	8°06.0' +59.8'	79.3°	8°17.1' +59.9'	79.4°	8°28.0' +59.9'	79.5°	8°38.8' +60.0'	79.7°	8°49.5' +60.0'	79.8°	9°00.0' +60.0'	117.3°	9°00.0' +60.0'	117.3°	9					
10	8°54.4' +59.7'	79.0°	9°05.7' +59.8'	79.2°	9°16.9' +59.9'	79.3°	9°28.0' +59.9'	79.5°	9°38.8' +60.0'	79.7°	9°49.5' +60.0'	79.8°	10°00.0' +60.0'	90.0°	10°00.0' +60.0'	90.0°	10					
11	9°54.1' +59.7'	78.9°	10°05.5' +59.8'	79.1°	10°16.8' +59.9'	79.3°	10°27.9' +59.9'	79.4°	10°38.8' +60.0'	79.6°	10°49.5' +60.0'	79.8°	11°00.0' +60.0'	90.0°	11°00.0' +60.0'	90.0°	11					
12	10°53.7' +59.7'	78.8°	11°05.3' +59.8'	79.0°	11°16.6' +59.9'	79.2°	11°27.8' +59.9'	79.4°	11°38.7' +60.0'	79.6°	11°49.5' +60.0'	79.8°	12°00.0' +60.0'	117.6°	12°00.0' +60.0'	117.6°	12					
13	11°53.4' +59.7'	78.7°	12°05.1' +59.8'	78.9°	12°16.5' +59.9'	79.1°	12°27.7' +59.9'	79.3°	12°38.7' +60.0'	79.6°	12°49.5' +60.0'	79.8°	13°00.0' +60.0'	117.7°	13°00.0' +60.0'	117.7°	13					
14	12°53.1' +59.7'	78.6°	13°04.8' +59.8'	78.8°	13°16.3' +59.8'	79.0°	13°27.6' +59.9'	79.3°	13°38.7' +60.0'	79.5°	13°49.5' +60.0'	79.8°	14°00.0' +60.0'	62.2°	14°00.0' +60.0'	62.2°	14					
15	13°52.7' +59.7'	78.5°	14°04.6' +59.8'	78.7°	14°16.2' +59.8'	79.0°	14°27.5' +59.9'	79.2°	14°38.6' +60.0'	79.5°	14°49.4' +60.0'	79.7°	15°00.0' +60.0'	90.0°	15°00.0' +60.0'	90.0°	15					
16	14°52.4' +59.7'	78.4°	15°04.3' +59.8'	78.6°	15°16.0' +59.8'	78.9°	15°27.5' +59.9'	79.2°	15°38.6' +60.0'	79.4°	15°49.4' +60.0'	79.7°	16°00.0' +60.0'	90.0°	16°00.0' +60.0'	90.0°	16					
17	15°52.0' +59.7'	78.3°	16°04.1' +59.8'	78.5°	16°15.9' +59.8'	78.8°	16°27.4' +59.9'	79.1°	16°38.5' +60.0'	79.4°	16°49.4' +60.0'	79.7°	17°00.0' +60.0'	90.0°	17°00.0' +60.0'	90.0°	17					
18	16°51.7' +59.7'	78.1°	17°03.9' +59.8'	78.4°	17°15.7' +59.8'	78.8°	17°27.3' +59.9'	79.1°	17°38.5' +60.0'	79.4°	17°49.4' +60.0'	79.7°	18°00.0' +60.0'	90.0°	18°00.0' +60.0'	90.0°	18					
19	17°51.3' +59.6'	78.0°	18°03.6' +59.8'	78.4°	18°15.6' +59.8'	78.7°	18°27.2' +59.9'	79.0°	18°38.5' +60.0'	79.3°	18°49.4' +60.0'	79.7°	19°00.0' +60.0'	90.0°	19°00.0' +60.0'	90.0°	19					
20	18°51.0' +59.6'	77.9°	19°03.4' +59.8'	78.3°	19°15.4' +59.8'	78.6°	19°27.1' +59.9'	78.9°	19°38.4' +60.0'	79.3°	19°49.4' +60.0'	79.6°	20°00.0' +60.0'	90.0°	20°00.0' +60.0'	90.0°	20					
21	19°50.6' +59.6'	77.8°	20°03.1' +59.7'	78.2°	20°15.3' +59.8'	78.5°	20°27.0' +59.9'	78.9°	20°38.4' +60.0'	79.3°	20°49.4' +60.0'	79.6°	21°00.0' +60.0'	90.0°	21°00.0' +60.0'	90.0°	21					
22	20°50.3' +59.6'	77.7°	21°02.9' +59.7'	78.1°	21°15.1' +59.8'	78.4°	21°26.9' +59.9'	78.8°	21°38.3' +60.0'	79.2°	21°49.4' +60.0'	79.6°	22°00.0' +60.0'	90.0°	22°00.0' +60.0'	90.0°	22					
23	21°49.9' +59.6'	77.6°	22°02.6' +59.7'	78.0°	22°14.9' +59.8'	78.4°	22°26.8' +59.9'	78.8°	22°38.3' +60.0'	79.2°	22°49.4' +60.0'	79.6°	23°00.0' +60.0'	169.9°	23°00.0' +60.0'	169.9°	23					
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	1°08.5' -59.7'	100.9°	0°57.2' -59.8'	101.0°	0°45.8' -59.9'	101.0°	0°34.3' -59.9'	101.0°	0°22.9' -60.0'	101.0°	0°11.4' -60.0'	101.0°	0°00.0' -60.0'	101.0°	0°00.0' -60.0'	101.0°	0					
1	0°08.8' -59.7'	101.0°	0°02.6' +59.8'	79.0°	0°14.1' +59.9'	79.0°	0°25.6' +59.9'	79.0°	0°37.1' +60.0'	79.0°	0°48.5' +60.0'	79.0°	0°60.0' +60.0'	80.2°	0°60.0' +60.0'	80.2°	1					
2	0°50.8' +59.7'	78.9°	1°02.4' +59.8'	78.9°	1°14.0' +59.9'	78.9°	1°25.5' +59.9'	78.9°	1°37.0' +60.0'	78.9°	1°48.5' +60.0'	79.0°	2°00.0' +60.0'	76.9°	2°00.0' +60.0'	76.9°	2					
3	1°50.5' +59.7'	78.8°	2°02.2' +59.8'	78.8°	2°13.8' +59.9'	78.8°	2°25.4' +59.9'	78.9°	2°37.0' +60.0'	78.9°	2°48.5' +60.0'	79.0°	3°00.0' +60.0'	83.5°	3°00.0' +60.0'	83.5°	3					
4	2°50.2' +59.7'	78.6°	3°01.9' +59.8'	78.7°	3°13.7' +59.9'	78.8°	3°25.4' +59.9'	78.8°	3°37.0' +60.0'	78.9°	3°48.5' +60.0'	78.9°	4°00.0' +60.0'	76.9°	4°00.0' +60.0'	76.9°	4					
5	3°49.8' +59.7'	78.5°	4°01.7' +59.8'	78.6°	4°13.5' +59.9'	78.7°	4°25.3' +59.9'	78.8°	4°36.9' +60.0'	78.8°	4°48.5' +60.0'	78.9°	5°00.0' +60.0'	62.9°	5°00.0' +60.0'	62.9°	5					
6	4°49.5' +59.7'	78.4°	5°01.5' +59.8'	78.5°	5°13.4' +59.9'	78.6°	5°25.2' +59.9'	78.7°	5°36.9' +60.0'	78.8°	5°48.5' +60.0'	78.9°	6°00.0' +60.0'	76.8°	6°00.0' +60.0'	76.8°	6					
7	5°49.2' +59.7'	78.3°	6°01.3' +59.8'	78.4°	6°13.3' +59.9'	78.5°	6°25.1' +59.9'	78.7°	6°36.9' +60.0'	78.8°	6°48.5' +60.0'	78.9°	7°00.0' +60.0'	76.8°	7°00.0' +60.0'	76.8°	7					
8	6°48.9' +59.7'	78.2°	7°01.1' +59.8'	78.4°	7°13.1' +59.9'	78.5°	7°25.0' +59.9'	78.6°	7°36.8' +60.0'	78.7°	7°48.5' +60.0'	78.9°	8°00.0' +60.0'	62.8°	8°00.0' +60.0'	62.8°	8					
9	7°48.6' +59.7'	78.1°	8°00.8' +59.8'	78.3°	8°13.0' +59.9'	78.4°	8°25.0' +59.9'	78.5°	8°36.8' +60.0'	78.7°	8°48.5' +60.0'	78.8°	9°00.0' +60.0'	117.3°	9°00.0' +60.0'	117.3°	9					
10	8°48.2' +59.7'	78.0°	9°00.6' +59.8'	78.2°	9°12.8' +59.9'	78.3°	9°24.9' +59.9'	78.5°	9°36.8' +60.0'	78.7°	9°48.5' +60.0'	78.8°	10°00.0' +60.0'	90.0°	10°00.0' +60.0'	90.0°	10					
11	9°47.9' +59.7'	77.9°	10°00.4' +59.8'	78.1°	10°12.7' +59.9'	78.3°	10°24.8' +59.9'	78.4°	10°36.7' +60.0'	78.6°	10°48.5' +60.0'	78.8°	11°00.0' +60.0'	90.0°	11°00.0' +60.0'	90.0°	11					
12	10°47.6' +59.7'	77.8°	11°00.2' +59.8'	78.0°	11°12.5' +59.9'	78.2°	11°24.7' +59.9'	78.4°	11°36.7' +60.0'	78.6°	11°48.4' +60.0'	78.8°	12°00.0' +60.0'	117.6°	12°00.0' +60.0'	117.6°	12					
13	11°47.3' +59.7'	77.7°	11°59.9' +59.8'	77.9°	12°12.4' +59.9'	78.1°	12°24.6' +59.9'	78.3°	12°36.6' +60.0'	78.6°	12°48.4' +60.0'	78.8°	13°00.0' +60.0'	117.7°	13°00.0' +60.0'	117.7°	13					
14	12°46.9' +59.7'	77.6°	12°59.7' +59.8'	77.8°	13°12.2' +59.9'	78.1°	13°24.5' +59.9'	78.3°	13°36.6' +60.0'	78.5°	13°48.4' +60.0'	78.8°	14°00.0' +60.0'	62.2°	14°00.0' +60.0'	62.2°	14					
15	13°46.6' +59.7'	77.5°	13°59.5' +59.8'	77.7°	14°12.1' +59.8'	78.0°	14°24.5' +59.9'	78.2°	14°36.6' +60.0'	78.5°	14°48.4' +60.0'	78.7°	15°00.0' +60.0'	90.0°	15°00.0' +60.0'	90.0°	15					
16	14°46.3' +59.7'	77.4°	14°59.2' +59.8'	77.6°	15°11.9' +59.8'	77.9°	15°24.4' +59.9'	78.2°	15°36.5' +60.0'	78.4°	15°48.4' +60.0'	78.7°	16°00.0' +60.0'	90.0°	16°00.0' +60.0'	90.0°	16					
17	15°45.9' +59.7'	77.3°	15°59.0' +59.8'	77.5°	16°11.8' +59.8'	77.8°	16°24.3' +59.9'	78.1°	16°36.5' +60.0'	78.4°	16°48.4' +60.0'	78.7°	17°00.0' +60.0'	90.0°	17°00.0' +60.0'	90.0°	17					
18	16°45.6' +59.7'	77.2°	16°58.8' +59.8'	77.5°	17°11.6' +59.8'	77.8°	17°24.2' +59.9'	78.1°	17°36.5' +60.0'	78.4°	17°48.4' +60.0'	78.7°	18°00.0' +60.0'	90.0°	18°00.0' +60.0'	90.0°	18					
19	17°45.2' +59.7'	77.0°	17°58.5' +59.8'	77.4°	18°11.5' +59.8'	77.7°	18°24.1' +59.9'	78.0°	18°36.4' +60.0'	78.3°	18°48.4' +60.0'	78.7°	19°00.0' +60.0'	90.0°	19°00.0' +60.0'	90.0°	19					
20	18°44.9' +59.6'	76.9°	18°58.3' +59.8'	77.3°	19°11.3' +59.8'	77.6°	19°24.0' +59.9'	77.9°	19°36.4' +60.0'	78.3°	19°48.4' +60.0'	78.6°	20°00.0' +60.0'	90.0°	20°00.0' +60.0'	90.0°	20					
21	19°44.5' +59.6'	76.8°	19°58.0' +59.7'	77.2°	20°11.2' +59.8'	77.5°	20°23.9' +59.9'	77.9°</														

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

78° 282° LHA

Latitude CONTRARY to Declination

78° 282° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	1°14.7'	-59.7'	101.9°	1°02.3'	-59.8'	102.0°	0°49.9'	-59.9'	102.0°	0°37.4'	-59.9'	102.0°	0°24.9'	-60.0'	102.0°	0°12.5'	-60.0'	102.0°	0°00.0'	-60.0'	102.0°	0
1	0°15.0'	-59.7'	102.0°	0°02.5'	-59.8'	102.0°	0°10.0'	+59.9'	78.0°	0°22.5'	+59.9'	78.0°	0°35.0'	+60.0'	78.0°	0°47.5'	+60.0'	78.0°	0°60.0'	+60.0'	76.9°	1
2	0°44.7'	+59.7'	77.9°	0°57.3'	+59.8'	77.9°	1°09.9'	+59.9'	77.9°	1°22.4'	+59.9'	77.9°	1°35.0'	+60.0'	77.9°	1°47.5'	+60.0'	78.0°	2°00.0'	+60.0'	76.9°	2
3	1°44.3'	+59.7'	77.8°	1°57.0'	+59.8'	77.8°	2°09.7'	+59.9'	77.8°	2°22.4'	+59.9'	77.9°	2°35.0'	+60.0'	77.9°	2°47.5'	+60.0'	78.0°	3°00.0'	+60.0'	83.5°	3
4	2°44.0'	+59.7'	77.7°	2°56.8'	+59.8'	77.7°	3°09.6'	+59.9'	77.8°	3°22.3'	+59.9'	77.8°	3°34.9'	+60.0'	77.9°	3°47.5'	+60.0'	77.9°	4°00.0'	+60.0'	76.9°	4
5	3°43.7'	+59.7'	77.6°	3°56.6'	+59.8'	77.6°	4°09.4'	+59.9'	77.7°	4°22.2'	+59.9'	77.8°	4°34.9'	+60.0'	77.8°	4°47.5'	+60.0'	77.9°	5°00.0'	+60.0'	62.9°	5
6	4°43.4'	+59.7'	77.4°	4°56.4'	+59.8'	77.5°	5°09.3'	+59.9'	77.6°	5°22.1'	+59.9'	77.7°	5°34.8'	+60.0'	77.8°	5°47.5'	+60.0'	77.9°	6°00.0'	+60.0'	76.8°	6
7	5°43.1'	+59.7'	77.3°	5°56.2'	+59.8'	77.4°	6°09.2'	+59.9'	77.5°	6°22.0'	+59.9'	77.7°	6°34.8'	+60.0'	77.8°	6°47.5'	+60.0'	77.9°	7°00.0'	+60.0'	76.8°	7
8	6°42.8'	+59.7'	77.2°	6°55.9'	+59.8'	77.4°	7°09.0'	+59.9'	77.5°	7°22.0'	+59.9'	77.6°	7°34.8'	+60.0'	77.7°	7°47.5'	+60.0'	77.9°	8°00.0'	+60.0'	62.8°	8
9	7°42.4'	+59.7'	77.1°	7°55.7'	+59.8'	77.3°	8°08.9'	+59.9'	77.4°	8°21.9'	+59.9'	77.6°	8°34.7'	+60.0'	77.7°	8°47.4'	+60.0'	77.8°	9°00.0'	+60.0'	117.3°	9
10	8°42.1'	+59.7'	77.0°	8°55.5'	+59.8'	77.2°	9°08.7'	+59.9'	77.3°	9°21.8'	+59.9'	77.5°	9°34.7'	+60.0'	77.7°	9°47.4'	+60.0'	77.8°	10°00.0'	+60.0'	90.0°	10
11	9°41.8'	+59.7'	76.9°	9°55.3'	+59.8'	77.1°	10°08.6'	+59.9'	77.3°	10°21.7'	+59.9'	77.4°	10°34.7'	+60.0'	77.6°	10°47.4'	+60.0'	77.8°	11°00.0'	+60.0'	90.0°	11
12	10°41.5'	+59.7'	76.8°	10°55.1'	+59.8'	77.0°	11°08.4'	+59.9'	77.2°	11°21.6'	+59.9'	77.4°	11°34.6'	+60.0'	77.6°	11°47.4'	+60.0'	77.8°	12°00.0'	+60.0'	117.6°	12
13	11°41.1'	+59.7'	76.7°	11°54.8'	+59.8'	76.9°	12°08.3'	+59.9'	77.1°	12°21.6'	+59.9'	77.3°	12°34.6'	+60.0'	77.6°	12°47.4'	+60.0'	77.8°	13°00.0'	+60.0'	117.7°	13
14	12°40.8'	+59.7'	76.6°	12°54.6'	+59.8'	76.8°	13°08.1'	+59.9'	77.1°	13°21.5'	+59.9'	77.3°	13°34.6'	+60.0'	77.5°	13°47.4'	+60.0'	77.8°	14°00.0'	+60.0'	62.2°	14
15	13°40.5'	+59.7'	76.5°	13°54.4'	+59.8'	76.7°	14°08.0'	+59.9'	77.0°	14°21.4'	+59.9'	77.2°	14°34.5'	+60.0'	77.5°	14°47.4'	+60.0'	77.7°	15°00.0'	+60.0'	90.0°	15
16	14°40.1'	+59.7'	76.4°	14°54.1'	+59.8'	76.7°	15°07.9'	+59.8'	76.9°	15°21.3'	+59.9'	77.2°	15°34.5'	+60.0'	77.4°	15°47.4'	+60.0'	77.7°	16°00.0'	+60.0'	90.0°	16
17	15°39.8'	+59.7'	76.3°	15°53.9'	+59.8'	76.6°	16°07.7'	+59.8'	76.8°	16°21.2'	+59.9'	77.1°	16°34.4'	+60.0'	77.4°	16°47.4'	+60.0'	77.7°	17°00.0'	+60.0'	90.0°	17
18	16°39.5'	+59.7'	76.2°	16°53.7'	+59.8'	76.5°	17°07.5'	+59.8'	76.8°	17°21.1'	+59.9'	77.1°	17°34.4'	+60.0'	77.4°	17°47.4'	+60.0'	77.7°	18°00.0'	+60.0'	90.0°	18
19	17°39.1'	+59.7'	76.1°	17°53.4'	+59.8'	76.4°	18°07.4'	+59.8'	76.7°	18°21.0'	+59.9'	77.0°	18°34.4'	+60.0'	77.3°	18°47.4'	+60.0'	77.7°	19°00.0'	+60.0'	90.0°	19
20	18°38.8'	+59.6'	75.9°	18°53.2'	+59.8'	76.3°	19°07.2'	+59.8'	76.6°	19°21.0'	+59.9'	77.0°	19°34.3'	+60.0'	77.3°	19°47.3'	+60.0'	77.6°	20°00.0'	+60.0'	90.0°	20
21	19°38.4'	+59.6'	75.8°	19°52.9'	+59.8'	76.2°	20°07.1'	+59.8'	76.5°	20°20.9'	+59.9'	76.9°	20°34.3'	+60.0'	77.3°	20°47.3'	+60.0'	77.6°	21°00.0'	+60.0'	90.0°	21
22	20°38.1'	+59.6'	75.7°	20°52.7'	+59.7'	76.1°	21°06.9'	+59.8'	76.5°	21°20.8'	+59.9'	76.8°	21°34.2'	+60.0'	77.2°	21°47.3'	+60.0'	77.6°	22°00.0'	+60.0'	90.0°	22
23	21°37.7'	+59.6'	75.6°	21°52.4'	+59.7'	76.0°	22°06.8'	+59.8'	76.4°	22°20.7'	+59.9'	76.8°	22°34.2'	+60.0'	77.2°	22°47.3'	+60.0'	77.6°	23°00.0'	+60.0'	169.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	1°20.8'	-59.7'	102.9°	1°07.4'	-59.8'	103.0°	0°53.9'	-59.9'	103.0°	0°40.5'	-59.9'	103.0°	0°27.0'	-60.0'	103.0°	0°13.5'	-60.0'	103.0°	0°00.0'	-60.0'	103.0°	0
1	0°21.1'	-59.7'	103.0°	0°07.6'	-59.8'	103.0°	0°05.9'	+59.9'	77.0°	0°19.4'	+59.9'	77.0°	0°33.0'	+60.0'	77.0°	0°46.5'	+60.0'	77.0°	0°60.0'	+60.0'	76.9°	1
2	0°38.5'	+59.7'	76.9°	0°52.2'	+59.8'	76.9°	1°05.8'	+59.9'	76.9°	1°19.4'	+59.9'	76.9°	1°32.9'	+60.0'	76.9°	1°46.5'	+60.0'	77.0°	2°00.0'	+60.0'	76.9°	2
3	1°38.2'	+59.7'	76.8°	1°51.9'	+59.8'	76.8°	2°05.6'	+59.9'	76.8°	2°19.3'	+59.9'	76.9°	2°32.9'	+60.0'	76.9°	2°46.5'	+60.0'	77.0°	3°00.0'	+60.0'	83.5°	3
4	2°37.9'	+59.7'	76.7°	2°51.7'	+59.8'	76.7°	3°05.5'	+59.9'	76.8°	3°19.2'	+59.9'	76.8°	3°32.9'	+60.0'	76.9°	3°46.5'	+60.0'	76.9°	4°00.0'	+60.0'	76.9°	4
5	3°37.6'	+59.7'	76.6°	3°51.5'	+59.8'	76.6°	4°05.4'	+59.9'	76.8°	4°19.1'	+59.9'	76.8°	4°32.8'	+60.0'	76.8°	4°46.5'	+60.0'	76.9°	5°00.0'	+60.0'	62.9°	5
6	4°37.3'	+59.7'	76.5°	4°51.3'	+59.8'	76.5°	5°05.2'	+59.9'	76.6°	5°19.1'	+59.9'	76.7°	5°32.8'	+60.0'	76.8°	5°46.5'	+60.0'	76.9°	6°00.0'	+60.0'	76.8°	6
7	5°37.0'	+59.7'	76.4°	5°51.1'	+59.8'	76.5°	6°05.1'	+59.9'	76.6°	6°19.0'	+59.9'	76.7°	6°32.8'	+60.0'	76.8°	6°46.4'	+60.0'	76.9°	7°00.0'	+60.0'	76.8°	7
8	6°36.7'	+59.7'	76.3°	6°50.9'	+59.8'	76.4°	7°04.9'	+59.9'	76.5°	7°18.9'	+59.9'	76.6°	7°32.7'	+60.0'	76.7°	7°46.4'	+60.0'	76.9°	8°00.0'	+60.0'	62.8°	8
9	7°36.3'	+59.7'	76.1°	7°50.6'	+59.8'	76.3°	8°04.8'	+59.9'	76.4°	8°18.8'	+59.9'	76.6°	8°32.7'	+60.0'	76.7°	8°46.4'	+60.0'	76.8°	9°00.0'	+60.0'	117.3°	9
10	8°36.0'	+59.7'	76.0°	8°50.4'	+59.8'	76.2°	9°04.7'	+59.9'	76.3°	9°18.7'	+59.9'	76.5°	9°32.7'	+60.0'	76.7°	9°46.4'	+60.0'	76.8°	10°00.0'	+60.0'	90.0°	10
11	9°35.7'	+59.7'	75.9°	9°50.2'	+59.8'	76.1°	10°04.5'	+59.9'	76.3°	10°18.7'	+59.9'	76.5°	10°32.6'	+60.0'	76.6°	10°46.4'	+60.0'	76.8°	11°00.0'	+60.0'	90.0°	11
12	10°35.4'	+59.7'	75.8°	10°50.0'	+59.8'	76.0°	11°04.4'	+59.9'	76.2°	11°18.6'	+59.9'	76.4°	11°32.6'	+60.0'	76.6°	11°46.4'	+60.0'	76.8°	12°00.0'	+60.0'	117.6°	12
13	11°35.1'	+59.7'	75.7°	11°49.7'	+59.8'	75.9°	12°04.2'	+59.9'	76.1°	12°18.5'	+59.9'	76.3°	12°32.6'	+60.0'	76.6°	12°46.4'	+60.0'	76.8°	13°00.0'	+60.0'	117.7°	13
14	12°34.7'	+59.7'	75.6°	12°49.5'	+59.8'	75.8°	13°04.1'	+59.9'	76.1°	13°18.4'	+59.9'	76.3°	13°32.5'	+60.0'	76.5°	13°46.4'	+60.0'	76.8°	14°00.0'	+60.0'	62.2°	14
15	13°34.4'	+59.7'	75.5°	13°49.3'	+59.8'	75.8°	14°03.9'	+59.9'	76.0°	14°18.3'	+59.9'	76.2°	14°32.5'	+60.0'	76.5°	14°46.4'	+60.0'	76.7°	15°00.0'	+60.0'	90.0°	15
16	14°34.1'	+59.7'	75.4°	14°49.1'	+59.8'	75.7°	15°03.8'	+59.9'	75.9°	15°18.2'	+59.9'	76.2°	15°32.4'	+60.0'	76.5°	15°46.4'	+60.0'	76.7°	16°00.0'	+60.0'	90.0°	16
17	15°33.7'	+59.7'	75.3°	15°48.8'	+59.8'	75.6°	16°03.6'	+59.8'	75.8°	16°18.2'	+59.9'	76.1°	16°32.4'	+60.0'	76.4°	16°46.4'	+60.0'	76.7°	17°00.0'	+60.0'	90.0°	17
18	16°33.4'	+59.7'	75.2°	16°48.6'	+59.8'	75.5°	17°03.5'	+59.8'	75.8°	17°18.1'	+59.9'	76.1°	17°32.4'	+60.0'	76.4°	17°46.3'	+60.0'	76.7°	18°00.0'	+60.0'	90.0°	18
19	17°33.1'	+59.7'	75.1°	17°48.3'	+59.8'	75.4°	18°03.3'	+59.8'	75.7°	18°18.0'	+59.9'	76.0°	18°32.3'	+60.0'	76.3°	18°46.3'	+60.0'	76.7°	19°00.0'	+60.0'	90.0°	19
20	18°32.7'	+59.7'	75.0°	18°48.1'	+59.8'	75.3°	19°03.2'	+59.8'	75.6°	19°17.9'	+59.9'	76.0°	19°32.3'	+60.0'	76.3°	19°46.3'	+60.0'	76.6°	20°00.0'	+60.0'	90.0°	20
21	19°32.4'	+59.6'	74.8°	19°47.9'	+59.8'	75.2°	20°03.0'	+59.8'	75.5°	20°17.8'	+59.9'	75.9°	20°32.3'	+60.0'	76.3°	20°46.3'	+60.0'	76.6°	21°00.0'	+60.0'	90.0°	21
22	20°32.0'	+59.6'	74.7°	20°47.6'	+59.8'	75.1°	21°02.9'	+59.8'	75.5°	21°17.7'	+59.9'	75.8°	21°32.2'	+60.0'	76.2°	21°46.3'	+60.0'					

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

76° 284° LHA

Latitude CONTRARY to Declination

76° 284° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	1°26.9'	-59.7'	103.9°	1°12.5'	-59.8'	103.9°	<u>0°58.0'</u>	<u>-59.9'</u>	<u>104.0°</u>	<u>0°43.5'</u>	<u>-59.9'</u>	<u>104.0°</u>	<u>0°29.0'</u>	<u>-60.0'</u>	<u>104.0°</u>	<u>0°14.5'</u>	<u>-60.0'</u>	<u>104.0°</u>	<u>0°00.0'</u>	<u>-60.0'</u>	<u>104.0°</u>	0
1	<u>0°27.2'</u>	<u>-59.7'</u>	<u>104.0°</u>	<u>0°12.7'</u>	<u>-59.8'</u>	<u>104.0°</u>	0°01.8'	+59.9'	76.0°	0°16.4'	+59.9'	76.0°	0°30.9'	+60.0'	76.0°	0°45.5'	+60.0'	76.0°	0°60.0'	+60.0'	76.9°	1
2	0°32.4'	+59.7'	75.9°	0°47.1'	+59.8'	75.9°	1°01.7'	+59.9'	75.9°	1°16.3'	+59.9'	75.9°	1°30.9'	+60.0'	75.9°	1°45.5'	+60.0'	76.0°	2°00.0'	+60.0'	76.9°	2
3	1°32.1'	+59.7'	75.8°	1°46.9'	+59.8'	75.8°	2°01.6'	+59.9'	75.8°	2°16.2'	+59.9'	75.9°	2°30.9'	+60.0'	75.9°	2°45.5'	+60.0'	76.0°	3°00.0'	+60.0'	83.5°	3
4	2°31.8'	+59.7'	75.7°	2°46.6'	+59.8'	75.7°	3°01.4'	+59.9'	75.8°	3°16.2'	+59.9'	75.8°	3°30.8'	+60.0'	75.9°	3°45.5'	+60.0'	75.9°	4°00.0'	+60.0'	76.9°	4
5	3°31.5'	+59.7'	75.6°	3°46.4'	+59.8'	75.6°	4°01.3'	+59.9'	75.7°	4°16.1'	+59.9'	75.8°	4°30.8'	+60.0'	75.8°	4°45.4'	+60.0'	75.9°	5°00.0'	+60.0'	62.9°	5
6	4°31.2'	+59.7'	75.5°	4°46.2'	+59.8'	75.5°	5°01.2'	+59.9'	75.6°	5°16.0'	+59.9'	75.7°	5°30.8'	+60.0'	75.8°	5°45.4'	+60.0'	75.9°	6°00.0'	+60.0'	76.8°	6
7	5°30.9'	+59.7'	75.4°	5°46.0'	+59.8'	75.5°	6°01.0'	+59.9'	75.6°	6°15.9'	+59.9'	75.7°	6°30.7'	+60.0'	75.8°	6°45.4'	+60.0'	75.9°	7°00.0'	+60.0'	76.8°	7
8	6°30.6'	+59.7'	75.3°	6°45.8'	+59.8'	75.4°	7°00.9'	+59.9'	75.5°	7°15.9'	+59.9'	75.6°	7°30.7'	+60.0'	75.7°	7°45.4'	+60.0'	75.9°	8°00.0'	+60.0'	23.8°	8
9	7°30.3'	+59.7'	75.2°	7°45.6'	+59.8'	75.3°	8°00.7'	+59.9'	75.4°	8°15.8'	+59.9'	75.6°	8°30.7'	+60.0'	75.7°	8°45.4'	+60.0'	75.8°	9°00.0'	+60.0'	90.0°	9
10	8°29.9'	+59.7'	75.1°	8°45.3'	+59.8'	75.2°	9°00.6'	+59.9'	75.4°	9°15.7'	+59.9'	75.5°	9°30.6'	+60.0'	75.7°	9°45.4'	+60.0'	75.8°	10°00.0'	+60.0'	62.6°	10
11	9°29.6'	+59.7'	74.9°	9°45.1'	+59.8'	75.1°	10°00.5'	+59.9'	75.3°	10°15.6'	+59.9'	75.5°	10°30.6'	+60.0'	75.6°	10°45.4'	+60.0'	75.8°	11°00.0'	+60.0'	62.5°	11
12	10°29.3'	+59.7'	74.8°	10°44.9'	+59.8'	75.0°	11°00.3'	+59.9'	75.2°	11°15.5'	+59.9'	75.4°	11°30.6'	+60.0'	75.6°	11°45.4'	+60.0'	75.8°	12°00.0'	+60.0'	90.0°	12
13	11°29.0'	+59.7'	74.7°	11°44.7'	+59.8'	74.9°	12°00.2'	+59.9'	75.1°	12°15.5'	+59.9'	75.3°	12°30.5'	+60.0'	75.6°	12°45.4'	+60.0'	75.8°	13°00.0'	+60.0'	90.0°	13
14	12°28.7'	+59.7'	74.6°	12°44.5'	+59.8'	74.8°	13°00.0'	+59.9'	75.1°	13°15.4'	+59.9'	75.3°	13°30.5'	+60.0'	75.5°	13°45.4'	+60.0'	75.8°	14°00.0'	+60.0'	20.9°	14
15	13°28.3'	+59.7'	74.5°	13°44.2'	+59.8'	74.8°	13°59.9'	+59.9'	75.0°	14°15.3'	+59.9'	75.2°	14°30.4'	+60.0'	75.5°	14°45.4'	+60.0'	75.7°	15°00.0'	+60.0'	90.0°	15
16	14°28.0'	+59.7'	74.4°	14°44.0'	+59.8'	74.7°	14°59.7'	+59.9'	74.9°	15°15.2'	+59.9'	75.2°	15°30.4'	+60.0'	75.5°	15°45.3'	+60.0'	75.7°	16°00.0'	+60.0'	90.0°	16
17	15°27.7'	+59.7'	74.3°	15°43.8'	+59.8'	74.6°	15°59.6'	+59.9'	74.9°	16°15.1'	+59.9'	75.1°	16°30.4'	+60.0'	75.4°	16°45.3'	+60.0'	75.7°	17°00.0'	+60.0'	90.0°	17
18	16°27.3'	+59.7'	74.2°	16°43.5'	+59.8'	74.5°	16°59.4'	+59.8'	74.8°	17°15.0'	+59.9'	75.1°	17°30.3'	+60.0'	75.4°	17°45.3'	+60.0'	75.7°	18°00.0'	+60.0'	90.0°	18
19	17°27.0'	+59.7'	74.1°	17°43.3'	+59.8'	74.4°	17°59.3'	+59.8'	74.7°	18°15.0'	+59.9'	75.0°	18°30.3'	+60.0'	75.3°	18°45.3'	+60.0'	75.7°	19°00.0'	+60.0'	90.0°	19
20	18°26.7'	+59.7'	74.0°	18°43.1'	+59.8'	74.3°	18°59.1'	+59.8'	74.6°	19°14.9'	+59.9'	75.0°	19°30.3'	+60.0'	75.3°	19°45.3'	+60.0'	75.6°	20°00.0'	+60.0'	90.0°	20
21	19°26.3'	+59.6'	73.9°	19°42.8'	+59.8'	74.2°	19°59.0'	+59.8'	74.6°	20°14.8'	+59.9'	74.9°	20°30.2'	+60.0'	75.3°	20°45.3'	+60.0'	75.6°	21°00.0'	+60.0'	90.0°	21
22	20°26.0'	+59.6'	73.7°	20°42.6'	+59.8'	74.1°	20°58.8'	+59.8'	74.5°	21°14.7'	+59.9'	74.8°	21°30.2'	+60.0'	75.2°	21°45.3'	+60.0'	75.6°	22°00.0'	+60.0'	90.0°	22
23	21°25.6'	+59.6'	73.6°	21°42.3'	+59.7'	74.0°	21°58.7'	+59.8'	74.4°	22°14.6'	+59.9'	74.8°	22°30.1'	+60.0'	75.2°	22°45.3'	+60.0'	75.6°	23°00.0'	+60.0'	169.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	1°33.0'	-59.7'	104.9°	1°17.6'	-59.8'	104.9°	<u>1°02.1'</u>	<u>-59.9'</u>	<u>105.0°</u>	<u>0°46.6'</u>	<u>-59.9'</u>	<u>105.0°</u>	<u>0°31.1'</u>	<u>-60.0'</u>	<u>105.0°</u>	<u>0°15.5'</u>	<u>-60.0'</u>	<u>105.0°</u>	<u>0°00.0'</u>	<u>-60.0'</u>	<u>105.0°</u>	0
1	<u>0°33.3'</u>	<u>-59.7'</u>	<u>105.0°</u>	<u>0°17.8'</u>	<u>-59.8'</u>	<u>105.0°</u>	<u>0°02.2'</u>	<u>-59.9'</u>	<u>105.0°</u>	0°13.4'	+59.9'	75.0°	0°28.9'	+60.0'	75.0°	0°44.5'	+60.0'	75.0°	0°60.0'	+60.0'	73.5°	1
2	0°26.4'	+59.7'	74.9°	0°42.0'	+59.8'	74.9°	0°57.7'	+59.9'	74.9°	1°13.3'	+59.9'	74.9°	1°28.9'	+60.0'	74.9°	1°44.5'	+60.0'	75.0°	2°00.0'	+60.0'	76.9°	2
3	1°26.1'	+59.7'	74.8°	1°41.8'	+59.8'	74.8°	1°57.5'	+59.9'	74.8°	2°13.2'	+59.9'	74.9°	2°28.8'	+60.0'	74.9°	2°44.4'	+60.0'	75.0°	3°00.0'	+60.0'	83.5°	3
4	2°25.8'	+59.7'	74.7°	2°41.6'	+59.8'	74.7°	2°57.4'	+59.9'	74.8°	3°13.1'	+59.9'	74.8°	3°28.8'	+60.0'	74.9°	3°44.4'	+60.0'	74.9°	4°00.0'	+60.0'	76.9°	4
5	3°25.4'	+59.7'	74.6°	3°41.4'	+59.8'	74.6°	3°57.2'	+59.9'	74.7°	4°13.0'	+59.9'	74.8°	4°28.8'	+60.0'	74.8°	4°44.4'	+60.0'	74.9°	5°00.0'	+60.0'	62.9°	5
6	4°25.1'	+59.7'	74.5°	4°41.2'	+59.8'	74.5°	4°57.1'	+59.9'	74.6°	5°13.0'	+59.9'	74.7°	5°28.7'	+60.0'	74.8°	5°44.4'	+60.0'	74.9°	6°00.0'	+60.0'	76.8°	6
7	5°24.8'	+59.7'	74.4°	5°41.0'	+59.8'	74.5°	5°57.0'	+59.9'	74.6°	6°12.9'	+59.9'	74.7°	6°28.7'	+60.0'	74.8°	6°44.4'	+60.0'	74.9°	7°00.0'	+60.0'	76.8°	7
8	6°24.5'	+59.7'	74.3°	6°40.7'	+59.8'	74.4°	6°56.8'	+59.9'	74.5°	7°12.8'	+59.9'	74.6°	7°28.7'	+60.0'	74.7°	7°44.4'	+60.0'	74.9°	8°00.0'	+60.0'	23.8°	8
9	7°24.2'	+59.7'	74.2°	7°40.5'	+59.8'	74.3°	7°56.7'	+59.9'	74.4°	8°12.7'	+59.9'	74.6°	8°28.6'	+60.0'	74.7°	8°44.4'	+60.0'	74.8°	9°00.0'	+60.0'	90.0°	9
10	8°23.9'	+59.7'	74.1°	8°40.3'	+59.8'	74.2°	8°56.6'	+59.9'	74.4°	9°12.7'	+59.9'	74.5°	9°28.6'	+60.0'	74.7°	9°44.4'	+60.0'	74.8°	10°00.0'	+60.0'	62.6°	10
11	9°23.6'	+59.7'	74.0°	9°40.1'	+59.8'	74.1°	9°56.4'	+59.9'	74.3°	10°12.6'	+59.9'	74.5°	10°28.6'	+60.0'	74.6°	10°44.4'	+60.0'	74.8°	11°00.0'	+60.0'	62.5°	11
12	10°23.3'	+59.7'	73.9°	10°39.9'	+59.8'	74.0°	10°56.3'	+59.9'	74.2°	11°12.5'	+59.9'	74.4°	11°28.5'	+60.0'	74.6°	11°44.4'	+60.0'	74.8°	12°00.0'	+60.0'	90.0°	12
13	11°23.0'	+59.7'	73.8°	11°39.6'	+59.8'	73.9°	11°56.1'	+59.9'	74.1°	12°12.4'	+59.9'	74.4°	12°28.5'	+60.0'	74.6°	12°44.4'	+60.0'	74.8°	13°00.0'	+60.0'	90.0°	13
14	12°22.6'	+59.7'	73.6°	12°39.4'	+59.8'	73.9°	12°56.0'	+59.9'	74.1°	13°12.3'	+59.9'	74.3°	13°28.5'	+60.0'	74.5°	13°44.3'	+60.0'	74.8°	14°00.0'	+60.0'	20.9°	14
15	13°22.3'	+59.7'	73.5°	13°39.2'	+59.8'	73.8°	13°55.8'	+59.9'	74.0°	14°12.3'	+59.9'	74.2°	14°28.4'	+60.0'	74.5°	14°44.3'	+60.0'	74.7°	15°00.0'	+60.0'	90.0°	15
16	14°22.0'	+59.7'	73.4°	14°39.0'	+59.8'	73.7°	14°55.7'	+59.9'	73.9°	15°12.2'	+59.9'	74.2°	15°28.4'	+60.0'	74.5°	15°44.3'	+60.0'	74.7°	16°00.0'	+60.0'	90.0°	16
17	15°21.7'	+59.7'	73.3°	15°38.7'	+59.8'	73.6°	15°55.6'	+59.9'	73.9°	16°12.1'	+59.9'	74.1°	16°28.4'	+60.0'	74.4°	16°44.3'	+60.0'	74.7°	17°00.0'	+60.0'	90.0°	17
18	16°21.3'	+59.7'	73.2°	16°38.5'	+59.8'	73.5°	16°55.4'	+59.9'	73.8°	17°12.0'	+59.9'	74.1°	17°28.3'	+60.0'	74.4°	17°44.3'	+60.0'	74.7°	18°00.0'	+60.0'	90.0°	18
19	17°21.0'	+59.7'	73.1°	17°38.3'	+59.8'	73.4°	17°55.3'	+59.8'	73.7°	18°11.9'	+59.9'	74.0°	18°28.3'	+60.0'	74.3°	18°44.3'	+60.0'	74.7°	19°00.0'	+60.0'	90.0°	19
20	18°20.6'	+59.7'	73.0°	18°38.0'	+59.8'	73.3°	18°55.1'	+59.8'	73.6°	19°11.8'	+59.9'	74.0°	19°28.2'	+60.0'	74.3°	19°44.3'	+60.0'	74.7°	20°00.0'	+60.0'	90.0°	20
21	19°20.3'	+59.7'	72.9°	19°37.8'	+59.8'	73.2°	19°55.0'	+59.8'	73.6°	20°11.8'	+59.9'	73.9°	20°28.2'	+60.0'	74.3°	20°44.3'	+60.0'	74.6°	21°00.0'	+60.0'	90.0°	21
22	20°20.0'																					

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

74° 286° LHA

Latitude CONTRARY to Declination

74° 286° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	1°39.0'	-59.7'	105.9°	1°22.6'	-59.8'	105.9°	1°06.1'	-59.9'	106.0°	<u>0°49.6'</u>	<u>-59.9'</u>	<u>106.0°</u>	<u>0°33.1'</u>	<u>-60.0'</u>	<u>106.0°</u>	<u>0°16.5'</u>	<u>-60.0'</u>	<u>106.0°</u>	<u>0°00.0'</u>	<u>-60.0'</u>	<u>106.0°</u>	0
1	<u>0°39.3'</u>	<u>-59.7'</u>	<u>106.0°</u>	<u>0°22.8'</u>	<u>-59.8'</u>	<u>106.0°</u>	<u>0°06.2'</u>	<u>-59.9'</u>	<u>106.0°</u>	0°10.3'	+59.9'	74.0°	0°26.9'	+60.0'	74.0°	0°43.5'	+60.0'	74.0°	0°60.0'	+60.0'	73.5°	1
2	0°20.3'	+59.7'	73.9°	0°37.0'	+59.8'	73.9°	0°53.6'	+59.9'	73.9°	1°10.3'	+59.9'	73.9°	1°26.9'	+60.0'	73.9°	1°43.4'	+60.0'	74.0°	2°00.0'	+60.0'	76.9°	2
3	1°20.0'	+59.7'	73.8°	1°36.8'	+59.8'	73.8°	1°53.5'	+59.9'	73.8°	2°10.2'	+59.9'	73.9°	2°26.8'	+60.0'	73.9°	2°43.4'	+60.0'	74.0°	3°00.0'	+60.0'	83.5°	3
4	2°19.7'	+59.7'	73.7°	2°36.6'	+59.8'	73.7°	2°53.4'	+59.9'	73.8°	3°10.1'	+59.9'	73.8°	3°26.8'	+60.0'	73.9°	3°43.4'	+60.0'	73.9°	4°00.0'	+60.0'	76.9°	4
5	3°19.4'	+59.7'	73.6°	3°36.3'	+59.8'	73.6°	3°53.2'	+59.9'	73.7°	4°10.0'	+59.9'	73.8°	4°26.8'	+60.0'	73.8°	4°43.4'	+60.0'	73.9°	5°00.0'	+60.0'	62.9°	5
6	4°19.1'	+59.7'	73.5°	4°36.1'	+59.8'	73.6°	4°53.1'	+59.9'	73.6°	5°09.9'	+59.9'	73.7°	5°26.7'	+60.0'	73.8°	5°43.4'	+60.0'	73.9°	6°00.0'	+60.0'	76.8°	6
7	5°18.8'	+59.7'	73.4°	5°35.9'	+59.8'	73.5°	5°52.9'	+59.9'	73.6°	6°09.9'	+59.9'	73.7°	6°26.7'	+60.0'	73.8°	6°43.4'	+60.0'	73.9°	7°00.0'	+60.0'	76.8°	7
8	6°18.5'	+59.7'	73.3°	6°35.7'	+59.8'	73.4°	6°52.8'	+59.9'	73.5°	7°09.8'	+59.9'	73.6°	7°26.7'	+60.0'	73.7°	7°43.4'	+60.0'	73.9°	8°00.0'	+60.0'	23.8°	8
9	7°18.2'	+59.7'	73.2°	7°35.5'	+59.8'	73.3°	7°52.7'	+59.9'	73.4°	8°09.7'	+59.9'	73.6°	8°26.6'	+60.0'	73.7°	8°43.4'	+60.0'	73.9°	9°00.0'	+60.0'	90.0°	9
10	8°17.9'	+59.7'	73.1°	8°35.3'	+59.8'	73.2°	8°52.5'	+59.9'	73.4°	9°09.6'	+59.9'	73.5°	9°26.6'	+60.0'	73.7°	9°43.4'	+60.0'	73.8°	10°00.0'	+60.0'	62.6°	10
11	9°17.6'	+59.7'	73.0°	9°35.1'	+59.8'	73.1°	9°52.4'	+59.9'	73.3°	10°09.6'	+59.9'	73.5°	10°26.6'	+60.0'	73.6°	10°43.4'	+60.0'	73.8°	11°00.0'	+60.0'	62.5°	11
12	10°17.3'	+59.7'	72.9°	10°34.8'	+59.8'	73.0°	10°52.3'	+59.9'	73.2°	11°09.5'	+59.9'	73.4°	11°26.5'	+60.0'	73.6°	11°43.4'	+60.0'	73.8°	12°00.0'	+60.0'	90.0°	12
13	11°16.9'	+59.7'	72.8°	11°34.6'	+59.8'	73.0°	11°52.1'	+59.9'	73.2°	12°09.4'	+59.9'	73.4°	12°26.5'	+60.0'	73.6°	12°43.4'	+60.0'	73.8°	13°00.0'	+60.0'	90.0°	13
14	12°16.6'	+59.7'	72.7°	12°34.4'	+59.8'	72.9°	12°52.0'	+59.9'	73.1°	13°09.3'	+59.9'	73.3°	13°26.4'	+60.0'	73.5°	13°43.3'	+60.0'	73.8°	14°00.0'	+60.0'	20.9°	14
15	13°16.3'	+59.7'	72.6°	13°34.2'	+59.8'	72.8°	13°51.8'	+59.9'	73.0°	14°09.2'	+59.9'	73.3°	14°26.4'	+60.0'	73.5°	14°43.3'	+60.0'	73.7°	15°00.0'	+60.0'	90.0°	15
16	14°16.0'	+59.7'	72.4°	14°34.0'	+59.8'	72.7°	14°51.7'	+59.9'	72.9°	15°09.2'	+59.9'	73.2°	15°26.4'	+60.0'	73.5°	15°43.3'	+60.0'	73.7°	16°00.0'	+60.0'	90.0°	16
17	15°15.7'	+59.7'	72.3°	15°33.7'	+59.8'	72.6°	15°51.5'	+59.9'	72.9°	16°09.1'	+59.9'	73.1°	16°26.3'	+60.0'	73.4°	16°43.3'	+60.0'	73.7°	17°00.0'	+60.0'	90.0°	17
18	16°15.3'	+59.7'	72.2°	16°33.5'	+59.8'	72.5°	16°51.4'	+59.9'	72.8°	17°09.0'	+59.9'	73.1°	17°26.3'	+60.0'	73.4°	17°43.3'	+60.0'	73.7°	18°00.0'	+60.0'	90.0°	18
19	17°15.0'	+59.7'	72.1°	17°33.3'	+59.8'	72.4°	17°51.2'	+59.9'	72.7°	18°08.9'	+59.9'	73.0°	18°26.3'	+60.0'	73.3°	18°43.3'	+60.0'	73.7°	19°00.0'	+60.0'	90.0°	19
20	18°14.7'	+59.7'	72.0°	18°33.0'	+59.8'	72.3°	18°51.1'	+59.8'	72.6°	19°08.8'	+59.9'	73.0°	19°26.2'	+60.0'	73.3°	19°43.3'	+60.0'	73.7°	20°00.0'	+60.0'	90.0°	20
21	19°14.3'	+59.7'	71.9°	19°32.8'	+59.8'	72.2°	19°50.9'	+59.8'	72.5°	20°08.7'	+59.9'	72.9°	20°26.2'	+60.0'	73.3°	20°43.3'	+60.0'	73.6°	21°00.0'	+60.0'	90.0°	21
22	20°14.0'	+59.7'	71.8°	20°32.6'	+59.8'	72.1°	20°50.8'	+59.8'	72.5°	21°08.7'	+59.9'	72.9°	21°26.2'	+60.0'	73.2°	21°43.3'	+60.0'	73.6°	22°00.0'	+60.0'	90.0°	22
23	21°13.6'	+59.6'	71.7°	21°32.3'	+59.8'	72.0°	21°50.6'	+59.8'	72.4°	22°08.6'	+59.9'	72.8°	22°26.1'	+60.0'	73.2°	22°43.3'	+60.0'	73.6°	23°00.0'	+60.0'	169.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

106° 254° LHA

Latitude SAME as DECLINATION

106° 254° LHA

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

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

73° 287° LHA

Latitude CONTRARY to Declination

73° 287° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	1°45.0'	-59.7'	106.9°	1°27.6'	-59.8'	106.9°	1°10.1'	-59.9'	107.0°	<u>0°52.6'</u>	<u>-59.9'</u>	<u>107.0°</u>	<u>0°35.1'</u>	<u>-60.0'</u>	<u>107.0°</u>	<u>0°17.5'</u>	<u>-60.0'</u>	<u>107.0°</u>	<u>0°00.0'</u>	<u>-60.0'</u>	<u>107.0°</u>	0
1	<u>0°45.3'</u>	<u>-59.7'</u>	<u>107.0°</u>	<u>0°27.8'</u>	<u>-59.8'</u>	<u>107.0°</u>	<u>0°10.3'</u>	<u>-59.9'</u>	<u>107.0°</u>	0°07.3'	+59.9'	73.0°	0°24.9'	+60.0'	73.0°	0°42.5'	+60.0'	73.0°	0°60.0'	+60.0'	73.5°	1
2	0°14.3'	+59.7'	72.9°	0°32.0'	+59.8'	72.9°	0°49.6'	+59.9'	72.9°	1°07.2'	+59.9'	72.9°	1°24.9'	+60.0'	72.9°	1°42.4'	+60.0'	73.0°	2°00.0'	+60.0'	70.1°	2
3	1°14.0'	+59.7'	72.8°	1°31.8'	+59.8'	72.8°	1°49.5'	+59.9'	72.8°	2°07.2'	+59.9'	72.9°	2°24.8'	+60.0'	72.9°	2°42.4'	+60.0'	73.0°	3°00.0'	+60.0'	76.9°	3
4	2°13.7'	+59.7'	72.7°	2°31.6'	+59.8'	72.7°	2°49.3'	+59.9'	72.8°	3°07.1'	+59.9'	72.8°	3°24.8'	+60.0'	72.9°	3°42.4'	+60.0'	72.9°	4°00.0'	+60.0'	76.9°	4
5	3°13.4'	+59.7'	72.6°	3°31.3'	+59.8'	72.6°	3°49.2'	+59.9'	72.7°	4°07.0'	+59.9'	72.8°	4°24.8'	+60.0'	72.8°	4°42.4'	+60.0'	72.9°	5°00.0'	+60.0'	62.9°	5
6	4°13.1'	+59.7'	72.5°	4°31.1'	+59.8'	72.6°	4°49.1'	+59.9'	72.6°	5°06.9'	+59.9'	72.7°	5°24.7'	+60.0'	72.8°	5°42.4'	+60.0'	72.9°	6°00.0'	+60.0'	76.8°	6
7	5°12.8'	+59.7'	72.4°	5°30.9'	+59.8'	72.5°	5°48.9'	+59.9'	72.6°	6°06.9'	+59.9'	72.7°	6°24.7'	+60.0'	72.8°	6°42.4'	+60.0'	72.9°	7°00.0'	+60.0'	76.8°	7
8	6°12.5'	+59.7'	72.3°	6°30.7'	+59.8'	72.4°	6°48.8'	+59.9'	72.5°	7°06.8'	+59.9'	72.6°	7°24.7'	+60.0'	72.7°	7°42.4'	+60.0'	72.9°	8°00.0'	+60.0'	23.8°	8
9	7°12.2'	+59.7'	72.2°	7°30.5'	+59.8'	72.3°	7°48.7'	+59.9'	72.4°	8°06.7'	+59.9'	72.6°	8°24.6'	+60.0'	72.7°	8°42.4'	+60.0'	72.9°	9°00.0'	+60.0'	90.0°	9
10	8°11.9'	+59.7'	72.1°	8°30.3'	+59.8'	72.2°	8°48.5'	+59.9'	72.4°	9°06.6'	+59.9'	72.5°	9°24.6'	+60.0'	72.7°	9°42.4'	+60.0'	72.8°	10°00.0'	+60.0'	62.6°	10
11	9°11.6'	+59.7'	72.0°	9°30.1'	+59.8'	72.1°	9°48.4'	+59.9'	72.3°	10°06.6'	+59.9'	72.5°	10°24.6'	+60.0'	72.6°	10°42.4'	+60.0'	72.8°	11°00.0'	+60.0'	62.5°	11
12	10°11.3'	+59.7'	71.9°	10°29.9'	+59.8'	72.1°	10°48.3'	+59.9'	72.2°	11°06.5'	+59.9'	72.4°	11°24.5'	+60.0'	72.6°	11°42.4'	+60.0'	72.8°	12°00.0'	+60.0'	90.0°	12
13	11°11.0'	+59.7'	71.8°	11°29.6'	+59.8'	72.0°	11°48.1'	+59.9'	72.2°	12°06.4'	+59.9'	72.4°	12°24.5'	+60.0'	72.6°	12°42.3'	+60.0'	72.8°	13°00.0'	+60.0'	90.0°	13
14	12°10.7'	+59.7'	71.7°	12°29.4'	+59.8'	71.9°	12°48.0'	+59.9'	72.1°	13°06.3'	+59.9'	72.3°	13°24.4'	+60.0'	72.5°	13°42.3'	+60.0'	72.8°	14°00.0'	+60.0'	20.9°	14
15	13°10.3'	+59.7'	71.6°	13°29.2'	+59.8'	71.8°	13°47.8'	+59.9'	72.0°	14°06.2'	+59.9'	72.3°	14°24.4'	+60.0'	72.5°	14°42.3'	+60.0'	72.7°	15°00.0'	+60.0'	90.0°	15
16	14°10.0'	+59.7'	71.5°	14°29.0'	+59.8'	71.7°	14°47.7'	+59.9'	71.9°	15°06.2'	+59.9'	72.2°	15°24.4'	+60.0'	72.5°	15°42.3'	+60.0'	72.7°	16°00.0'	+60.0'	90.0°	16
17	15°09.7'	+59.7'	71.4°	15°28.8'	+59.8'	71.6°	15°47.6'	+59.9'	71.9°	16°06.1'	+59.9'	72.1°	16°24.3'	+60.0'	72.4°	16°4						

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

72° 288° LHA

Latitude CONTRARY to Declination

72° 288° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	1°51.0'	-59.7'	107.9°	1°32.6'	-59.8'	107.9°	1°14.1'	-59.9'	108.0°	<u>0°55.6'</u>	<u>-59.9'</u>	<u>108.0°</u>	<u>0°37.1'</u>	<u>-60.0'</u>	<u>108.0°</u>	<u>0°18.5'</u>	<u>-60.0'</u>	<u>108.0°</u>	<u>0°00.0'</u>	<u>-60.0'</u>	<u>108.0°</u>	0
1	<u>0°51.3'</u>	<u>-59.7'</u>	<u>108.0°</u>	<u>0°32.8'</u>	<u>-59.8'</u>	<u>108.0°</u>	<u>0°14.2'</u>	<u>-59.9'</u>	<u>108.0°</u>	0°04.3'	+59.9'	72.0°	0°22.9'	+60.0'	72.0°	0°41.5'	+60.0'	72.0°	0°60.0'	+60.0'	73.5°	1
2	0°08.3'	+59.7'	71.9°	0°27.0'	+59.8'	71.9°	0°45.6'	+59.9'	71.9°	1°04.3'	+59.9'	71.9°	1°22.9'	+60.0'	71.9°	1°41.4'	+60.0'	72.0°	2°00.0'	+60.0'	70.1°	2
3	1°08.0'	+59.7'	71.8°	1°26.8'	+59.8'	71.8°	1°45.5'	+59.9'	71.8°	2°04.2'	+59.9'	71.9°	2°22.8'	+60.0'	71.9°	2°41.4'	+60.0'	72.0°	3°00.0'	+60.0'	76.9°	3
4	2°07.7'	+59.7'	71.7°	2°26.6'	+59.8'	71.7°	2°45.4'	+59.9'	71.8°	3°04.1'	+59.9'	71.8°	3°22.8'	+60.0'	71.9°	3°41.4'	+60.0'	71.9°	4°00.0'	+60.0'	76.9°	4
5	3°07.5'	+59.7'	71.6°	3°26.4'	+59.8'	71.6°	3°45.2'	+59.9'	71.7°	4°04.0'	+59.9'	71.8°	4°22.8'	+60.0'	71.8°	4°41.4'	+60.0'	71.9°	5°00.0'	+60.0'	62.9°	5
6	4°07.2'	+59.7'	71.5°	4°26.2'	+59.8'	71.6°	4°45.1'	+59.9'	71.6°	5°04.0'	+59.9'	71.7°	5°22.7'	+60.0'	71.8°	5°41.4'	+60.0'	71.9°	6°00.0'	+60.0'	76.8°	6
7	5°06.9'	+59.7'	71.4°	5°26.0'	+59.8'	71.5°	5°45.0'	+59.9'	71.6°	6°03.9'	+59.9'	71.7°	6°22.7'	+60.0'	71.8°	6°41.4'	+60.0'	71.9°	7°00.0'	+60.0'	76.8°	7
8	6°06.6'	+59.7'	71.3°	6°25.7'	+59.8'	71.4°	6°44.8'	+59.9'	71.5°	7°03.8'	+59.9'	71.6°	7°22.7'	+60.0'	71.7°	7°41.4'	+60.0'	71.9°	8°00.0'	+60.0'	23.8°	8
9	7°06.3'	+59.7'	71.2°	7°25.5'	+59.8'	71.3°	7°44.7'	+59.9'	71.4°	8°03.7'	+59.9'	71.6°	8°22.6'	+60.0'	71.7°	8°41.4'	+60.0'	71.9°	9°00.0'	+60.0'	90.0°	9
10	8°05.9'	+59.7'	71.1°	8°25.3'	+59.8'	71.2°	8°44.6'	+59.9'	71.4°	9°03.7'	+59.9'	71.5°	9°22.6'	+60.0'	71.7°	9°41.4'	+60.0'	71.8°	10°00.0'	+60.0'	62.6°	10
11	9°05.6'	+59.7'	71.0°	9°25.1'	+59.8'	71.1°	9°44.4'	+59.9'	71.3°	10°03.6'	+59.9'	71.5°	10°22.6'	+60.0'	71.6°	10°41.4'	+60.0'	71.8°	11°00.0'	+60.0'	62.5°	11
12	10°05.3'	+59.7'	70.9°	10°24.9'	+59.8'	71.1°	10°44.3'	+59.9'	71.2°	11°03.5'	+59.9'	71.4°	11°22.5'	+60.0'	71.6°	11°41.4'	+60.0'	71.8°	12°00.0'	+60.0'	90.0°	12
13	11°05.0'	+59.7'	70.8°	11°24.7'	+59.8'	71.0°	11°44.1'	+59.9'	71.2°	12°03.4'	+59.9'	71.4°	12°22.5'	+60.0'	71.6°	12°41.4'	+60.0'	71.8°	13°00.0'	+60.0'	90.0°	13
14	12°04.7'	+59.7'	70.7°	12°24.5'	+59.8'	70.9°	12°44.0'	+59.9'	71.1°	13°03.3'	+59.9'	71.3°	13°22.5'	+60.0'	71.5°	13°41.3'	+60.0'	71.8°	14°00.0'	+60.0'	20.9°	14
15	13°04.4'	+59.7'	70.6°	13°24.3'	+59.8'	70.8°	13°43.9'	+59.9'	71.0°	14°03.3'	+59.9'	71.3°	14°22.4'	+60.0'	71.5°	14°41.3'	+60.0'	71.7°	15°00.0'	+60.0'	90.0°	15
16	14°04.1'	+59.7'	70.5°	14°24.0'	+59.8'	70.7°	14°43.7'	+59.9'	71.0°	15°03.2'	+59.9'	71.2°	15°22.4'	+60.0'	71.5°	15°41.3'	+60.0'	71.7°	16°00.0'	+60.0'	90.0°	16
17	15°03.8'	+59.7'	70.4°	15°23.8'	+59.8'	70.6°	15°43.6'	+59.9'	70.9°	16°03.1'	+59.9'	71.2°	16°22.3'	+60.0'	71.4°	16°41.3'	+60.0'	71.7°	17°00.0'	+60.0'	90.0°	17
18	16°03.5'	+59.7'	70.3°	16°23.6'	+59.8'	70.5°	16°43.4'	+59.9'	70.8°	17°03.0'	+59.9'	71.1°	17°22.3'	+60.0'	71.4°	17°41.3'	+60.0'	71.7°	18°00.0'	+60.0'	90.0°	18
19	17°03.1'	+59.7'	70.2°	17°23.4'	+59.8'	70.4°	17°43.3'	+59.9'	70.7°	18°02.9'	+59.9'	71.0°	18°22.3'	+60.0'	71.4°	18°41.3'	+60.0'	71.7°	19°00.0'	+60.0'	90.0°	19
20	18°02.8'	+59.7'	70.0°	18°23.1'	+59.8'	70.4°	18°43.2'	+59.9'	70.7°	19°02.9'	+59.9'	71.0°	19°22.2'	+60.0'	71.3°	19°41.3'	+60.0'	71.7°	20°00.0'	+60.0'	90.0°	20
21	19°02.5'	+59.7'	69.9°	19°22.9'	+59.8'	70.3°	19°43.0'	+59.8'	70.6°	20°02.8'	+59.9'	70.9°	20°22.2'	+60.0'	71.3°	20°41.3'	+60.0'	71.6°	21°00.0'	+60.0'	90.0°	21
22	20°02.1'	+59.7'	69.8°	20°22.7'	+59.8'	70.2°	20°42.9'	+59.8'	70.5°	21°02.7'	+59.9'	70.9°	21°22.2'	+60.0'	71.2°	21°41.3'	+60.0'	71.6°	22°00.0'	+60.0'	90.0°	22
23	21°01.8'	+59.7'	69.7°	21°22.4'	+59.8'	70.1°	21°42.7'	+59.8'	70.4°	22°02.6'	+59.9'	70.8°	22°22.1'	+60.0'	71.2°	22°41.3'	+60.0'	71.6°	23°00.0'	+60.0'	169.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

108° 252° LHA

Latitude SAME as DECLINATION

108° 252° LHA

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

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

71° 289° LHA

Latitude CONTRARY to Declination

71° 289° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	1°57.0'	-59.7'	108.9°	1°37.6'	-59.8'	108.9°	1°18.1'	-59.9'	109.0°	<u>0°58.6'</u>	<u>-59.9'</u>	<u>109.0°</u>	<u>0°39.1'</u>	<u>-60.0'</u>	<u>109.0°</u>	<u>0°19.5'</u>	<u>-60.0'</u>	<u>109.0°</u>	<u>0°00.0'</u>	<u>-60.0'</u>	<u>109.0°</u>	0
1	<u>0°57.3'</u>	<u>-59.7'</u>	<u>109.0°</u>	<u>0°37.8'</u>	<u>-59.8'</u>	<u>109.0°</u>	<u>0°18.2'</u>	<u>-59.9'</u>	<u>109.0°</u>	0°01.3'	+59.9'	71.0°	0°20.9'	+60.0'	71.0°	0°40.5'	+60.0'	71.0°	0°60.0'	+60.0'	70.1°	1
2	0°02.4'	+59.7'	70.9°	0°22.0'	+59.8'	70.9°	0°41.7'	+59.9'	70.9°	1°01.3'	+59.9'	70.9°	1°20.9'	+60.0'	70.9°	1°40.5'	+60.0'	71.0°	2°00.0'	+60.0'	70.1°	2
3	1°02.1'	+59.7'	70.8°	1°21.8'	+59.8'	70.8°	1°41.5'	+59.9'	70.8°	2°01.2'	+59.9'	70.9°	2°20.8'	+60.0'	70.9°	2°40.4'	+60.0'	71.0°	3°00.0'	+60.0'	76.9°	3
4	2°01.8'	+59.7'	70.7°	2°21.6'	+59.8'	70.7°	2°41.4'	+59.9'	70.8°	3°01.1'	+59.9'	70.8°	3°20.8'	+60.0'	70.9°	3°40.4'	+60.0'	70.9°	4°00.0'	+60.0'	76.9°	4
5	3°01.5'	+59.7'	70.6°	3°21.4'	+59.8'	70.7°	3°41.3'	+59.9'	70.7°	4°01.1'	+59.9'	70.8°	4°20.8'	+60.0'	70.8°	4°40.4'	+60.0'	70.9°	5°00.0'	+60.0'	62.9°	5
6	4°01.2'	+59.7'	70.5°	4°21.2'	+59.8'	70.6°	4°41.1'	+59.9'	70.6°	5°01.0'	+59.9'	70.7°	5°20.7'	+60.0'	70.8°	5°40.4'	+60.0'	70.9°	6°00.0'	+60.0'	76.8°	6
7	5°00.9'	+59.7'	70.4°	5°21.0'	+59.8'	70.5°	5°41.0'	+59.9'	70.6°	6°00.9'	+59.9'	70.7°	6°20.7'	+60.0'	70.8°	6°40.4'	+60.0'	70.9°	7°00.0'	+60.0'	76.8°	7
8	6°00.6'	+59.7'	70.3°	6°20.8'	+59.8'	70.4°	6°40.9'	+59.9'	70.5°	7°00.8'	+59.9'	70.6°	7°20.7'	+60.0'	70.7°	7°40.4'	+60.0'	70.9°	8°00.0'	+60.0'	23.8°	8
9	7°00.3'	+59.7'	70.2°	7°20.6'	+59.8'	70.3°	7°40.7'	+59.9'	70.4°	8°00.8'	+59.9'	70.6°	8°20.6'	+60.0'	70.7°	8°40.4'	+60.0'	70.9°	9°00.0'	+60.0'	90.0°	9
10	8°00.0'	+59.7'	70.1°	8°20.4'	+59.8'	70.2°	8°40.6'	+59.9'	70.4°	9°00.7'	+59.9'	70.5°	9°20.6'	+60.0'	70.7°	9°40.4'	+60.0'	70.8°	10°00.0'	+60.0'	62.6°	10
11	8°59.7'	+59.7'	70.0°	9°20.2'	+59.8'	70.2°	9°40.5'	+59.9'	70.3°	10°00.6'	+59.9'	70.5°	10°20.6'	+60.0'	70.6°	10°40.4'	+60.0'	70.8°	11°00.0'	+60.0'	62.5°	11
12	9°59.4'	+59.7'	69.9°	10°20.0'	+59.8'	70.1°	10°40.3'	+59.9'	70.2°	11°00.5'	+59.9'	70.4°	11°20.5'	+60.0'	70.6°	11°40.4'	+60.0'	70.8°	12°00.0'	+60.0'	90.0°	12
13	10°59.1'	+59.7'	69.8°	11°19.8'	+59.8'	70.0°	11°40.2'	+59.9'	70.2°	12°00.5'	+59.9'	70.4°	12°20.5'	+60.0'	70.6°	12°40.4'	+60.0'	70.8°	13°00.0'	+60.0'	90.0°	13
14	11°58.8'	+59.7'	69.7°	12°19.5'	+59.8'	69.9°	12°40.1'	+59.9'	70.1°	13°00.4'	+59.9'	70.3°	13°20.5'	+60.0'	70.5°	13°40.4'	+60.0'	70.8°	14°00.0'	+60.0'	20.9°	14
15	12°58.5'	+59.7'	69.6°	13°19.3'	+59.8'	69.8°	13°39.9'	+59.9'	70.0°	14°00.3'	+59.9'	70.3°	14°20.4'	+60.0'	70.5°	14°40.3'	+60.0'	70.7°	15°00.0'	+60.0'	90.0°	15
16	13°58.2'	+59.7'	69.5°	14°19.1'	+59.8'	69.7°	14°39.8'	+59.9'	70.0°	15°00.2'	+59.9'	70.2°	15°20.4'	+60.0'	70.5°	15°40.3'	+60.0'	70.7°	16°00.0'	+60.0'	90.0°	16
17	14°57.9'	+59.7'	69.4°	15°18.9'	+59.8'	69.6°	15°39.6'	+59.9'	69.9°	16°00.1'	+59.9'	70.2°	16°20.4'	+60.0'								

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

70° 290° LHA

Latitude CONTRARY to Declination

70° 290° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	2°02.9'	-59.7'	109.9°	1°42.5'	-59.8'	109.9°	1°22.0'	-59.9'	110.0°	1°01.5'	-59.9'	110.0°	0°41.0'	-60.0'	110.0°	0°20.5'	-60.0'	110.0°	0°00.0'	-60.0'	110.0°	0
1	1°03.2'	-59.7'	110.0°	0°42.7'	-59.8'	110.0°	0°22.2'	-59.9'	110.0°	0°01.6'	-59.9'	110.0°	0°18.9'	+60.0'	70.0°	0°39.5'	+60.0'	70.0°	0°60.0'	+60.0'	70.1°	1
2	0°03.5'	-59.7'	110.1°	0°17.1'	+59.8'	69.9°	0°37.7'	+59.9'	69.9°	0°58.3'	+59.9'	69.9°	1°18.9'	+60.0'	69.9°	1°39.5'	+60.0'	70.0°	2°00.0'	+60.0'	70.1°	2
3	0°56.2'	+59.7'	69.8°	1°16.9'	+59.8'	69.8°	1°37.6'	+59.9'	69.8°	1°58.2'	+59.9'	69.9°	2°18.9'	+60.0'	69.9°	2°39.5'	+60.0'	70.0°	3°00.0'	+60.0'	76.9°	3
4	1°55.9'	+59.7'	69.7°	2°16.7'	+59.8'	69.7°	2°37.5'	+59.9'	69.8°	2°58.2'	+59.9'	69.8°	3°18.8'	+60.0'	69.9°	3°39.4'	+60.0'	69.9°	4°00.0'	+60.0'	63.0°	4
5	2°55.6'	+59.7'	69.6°	3°16.5'	+59.8'	69.7°	3°37.3'	+59.9'	69.7°	3°58.1'	+59.9'	69.8°	4°18.8'	+60.0'	69.8°	4°39.4'	+60.0'	69.9°	5°00.0'	+60.0'	62.9°	5
6	3°55.3'	+59.7'	69.5°	4°16.3'	+59.8'	69.6°	4°37.2'	+59.9'	69.7°	4°58.0'	+59.9'	69.7°	5°18.8'	+60.0'	69.8°	5°39.4'	+60.0'	69.9°	6°00.0'	+60.0'	62.9°	6
7	4°55.0'	+59.7'	69.4°	5°16.1'	+59.8'	69.5°	5°37.1'	+59.9'	69.6°	5°58.0'	+59.9'	69.7°	6°18.7'	+60.0'	69.8°	6°39.4'	+60.0'	69.9°	7°00.0'	+60.0'	76.8°	7
8	5°54.7'	+59.7'	69.3°	6°15.9'	+59.8'	69.4°	6°36.9'	+59.9'	69.5°	6°57.9'	+59.9'	69.6°	7°18.7'	+60.0'	69.7°	7°39.4'	+60.0'	69.9°	8°00.0'	+60.0'	23.8°	8
9	6°54.5'	+59.7'	69.2°	7°15.7'	+59.8'	69.3°	7°36.8'	+59.9'	69.5°	7°57.8'	+59.9'	69.6°	8°18.7'	+60.0'	69.7°	8°39.4'	+60.0'	69.9°	9°00.0'	+60.0'	90.0°	9
10	7°54.2'	+59.7'	69.1°	8°15.5'	+59.8'	69.2°	8°36.7'	+59.9'	69.4°	8°57.7'	+59.9'	69.5°	9°18.6'	+60.0'	69.7°	9°39.4'	+60.0'	69.8°	10°00.0'	+60.0'	62.6°	10
11	8°53.9'	+59.7'	69.0°	9°15.3'	+59.8'	69.2°	9°36.5'	+59.9'	69.3°	9°57.7'	+59.9'	69.5°	10°18.6'	+60.0'	69.6°	10°39.4'	+60.0'	69.8°	11°00.0'	+60.0'	62.5°	11
12	9°53.6'	+59.7'	68.9°	10°15.1'	+59.8'	69.1°	10°36.4'	+59.9'	69.3°	10°57.6'	+59.9'	69.4°	11°18.6'	+60.0'	69.6°	11°39.4'	+60.0'	69.8°	12°00.0'	+60.0'	90.0°	12
13	10°53.3'	+59.7'	68.8°	11°14.9'	+59.8'	69.0°	11°36.3'	+59.9'	69.2°	11°57.5'	+59.9'	69.4°	12°18.5'	+60.0'	69.6°	12°39.4'	+60.0'	69.8°	13°00.0'	+60.0'	90.0°	13
14	11°53.0'	+59.7'	68.7°	12°14.6'	+59.8'	68.9°	12°36.1'	+59.9'	69.1°	12°57.4'	+59.9'	69.3°	13°18.5'	+60.0'	69.5°	13°39.4'	+60.0'	69.8°	14°00.0'	+60.0'	20.9°	14
15	12°52.7'	+59.7'	68.6°	13°14.4'	+59.8'	68.8°	13°36.0'	+59.9'	69.0°	13°57.4'	+59.9'	69.3°	14°18.5'	+60.0'	69.5°	14°39.4'	+60.0'	69.8°	15°00.0'	+60.0'	90.0°	15
16	13°52.3'	+59.7'	68.5°	14°14.2'	+59.8'	68.7°	14°35.9'	+59.9'	69.0°	14°57.3'	+59.9'	69.2°	15°18.4'	+60.0'	69.5°	15°39.3'	+60.0'	69.7°	16°00.0'	+60.0'	90.0°	16
17	14°52.0'	+59.7'	68.4°	15°14.0'	+59.8'	68.6°	15°35.7'	+59.9'	68.9°	15°57.2'	+59.9'	69.2°	16°18.4'	+60.0'	69.4°	16°39.3'	+60.0'	69.7°	17°00.0'	+60.0'	90.0°	17
18	15°51.7'	+59.7'	68.3°	16°13.8'	+59.8'	68.6°	16°35.6'	+59.9'	68.8°	16°57.1'	+59.9'	69.1°	17°18.4'	+60.0'	69.4°	17°39.3'	+60.0'	69.7°	18°00.0'	+60.0'	90.0°	18
19	16°51.4'	+59.7'	68.2°	17°13.6'	+59.8'	68.5°	17°35.4'	+59.9'	68.8°	17°57.0'	+59.9'	69.1°	18°18.3'	+60.0'	69.4°	18°39.3'	+60.0'	69.7°	19°00.0'	+60.0'	90.0°	19
20	17°51.1'	+59.7'	68.1°	18°13.3'	+59.8'	68.4°	18°35.3'	+59.9'	68.7°	18°57.0'	+59.9'	69.0°	19°18.3'	+60.0'	69.3°	19°39.3'	+60.0'	69.7°	20°00.0'	+60.0'	90.0°	20
21	18°50.8'	+59.7'	68.0°	19°13.1'	+59.8'	68.3°	19°35.2'	+59.9'	68.6°	19°56.9'	+59.9'	69.0°	20°18.3'	+60.0'	69.3°	20°39.3'	+60.0'	69.6°	21°00.0'	+60.0'	90.0°	21
22	19°50.4'	+59.7'	67.9°	20°12.9'	+59.8'	68.2°	20°35.0'	+59.9'	68.5°	20°56.8'	+59.9'	68.9°	21°18.2'	+60.0'	69.3°	21°39.3'	+60.0'	69.6°	22°00.0'	+60.0'	90.0°	22
23	20°50.1'	+59.7'	67.7°	21°12.7'	+59.8'	68.1°	21°34.9'	+59.8'	68.5°	21°56.7'	+59.9'	68.8°	22°18.2'	+60.0'	69.2°	22°39.3'	+60.0'	69.6°	23°00.0'	+60.0'	169.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

110° 250° LHA

Latitude SAME as DECLINATION

110° 250° LHA

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

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

69° 291° LHA

Latitude CONTRARY to Declination

69° 291° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	2°08.8'	-59.7'	110.9°	1°47.4'	-59.8'	110.9°	1°25.9'	-59.9'	111.0°	1°04.5'	-59.9'	111.0°	0°43.0'	-60.0'	111.0°	0°21.5'	-60.0'	111.0°	0°00.0'	-60.0'	111.0°	0
1	1°09.0'	-59.7'	111.0°	0°47.6'	-59.8'	111.0°	0°26.1'	-59.9'	111.0°	0°04.6'	-59.9'	111.0°	0°17.0'	+60.0'	69.0°	0°38.5'	+60.0'	69.0°	0°60.0'	+60.0'	70.1°	1
2	0°09.3'	-59.7'	111.1°	0°12.2'	+59.8'	68.9°	0°33.8'	+59.9'	68.9°	0°55.4'	+59.9'	68.9°	1°16.9'	+60.0'	68.9°	1°38.5'	+60.0'	69.0°	2°00.0'	+60.0'	70.1°	2
3	0°50.3'	+59.7'	68.8°	1°12.0'	+59.8'	68.8°	1°33.7'	+59.9'	68.9°	1°55.3'	+59.9'	68.9°	2°16.9'	+60.0'	68.9°	2°38.5'	+60.0'	69.0°	3°00.0'	+60.0'	76.9°	3
4	1°50.0'	+59.7'	68.7°	2°11.8'	+59.8'	68.7°	2°33.5'	+59.9'	68.8°	2°55.2'	+59.9'	68.8°	3°16.9'	+60.0'	68.9°	3°38.5'	+60.0'	68.9°	4°00.0'	+60.0'	63.0°	4
5	2°49.8'	+59.7'	68.6°	3°11.6'	+59.8'	68.7°	3°33.4'	+59.9'	68.7°	3°55.2'	+59.9'	68.8°	4°16.8'	+60.0'	68.8°	4°38.5'	+60.0'	68.9°	5°00.0'	+60.0'	62.9°	5
6	3°49.5'	+59.7'	68.5°	4°11.4'	+59.8'	68.6°	4°33.3'	+59.9'	68.7°	4°55.1'	+59.9'	68.7°	5°16.8'	+60.0'	68.8°	5°38.5'	+60.0'	68.9°	6°00.0'	+60.0'	62.9°	6
7	4°49.2'	+59.7'	68.4°	5°11.2'	+59.8'	68.5°	5°33.2'	+59.9'	68.6°	5°55.0'	+59.9'	68.7°	6°16.8'	+60.0'	68.8°	6°38.4'	+60.0'	68.9°	7°00.0'	+60.0'	62.8°	7
8	5°48.9'	+59.7'	68.3°	6°11.0'	+59.8'	68.4°	6°33.0'	+59.9'	68.5°	6°54.9'	+59.9'	68.6°	7°16.7'	+60.0'	68.7°	7°38.4'	+60.0'	68.9°	8°00.0'	+60.0'	23.8°	8
9	6°48.6'	+59.7'	68.2°	7°10.8'	+59.8'	68.3°	7°32.9'	+59.9'	68.5°	7°54.9'	+59.9'	68.6°	8°16.7'	+60.0'	68.7°	8°38.4'	+60.0'	68.9°	9°00.0'	+60.0'	90.0°	9
10	7°48.3'	+59.7'	68.1°	8°10.6'	+59.8'	68.3°	8°32.8'	+59.9'	68.4°	8°54.8'	+59.9'	68.5°	9°16.7'	+60.0'	68.7°	9°38.4'	+60.0'	68.8°	10°00.0'	+60.0'	62.6°	10
11	8°48.0'	+59.7'	68.0°	9°10.4'	+59.8'	68.2°	9°32.6'	+59.9'	68.3°	9°54.7'	+59.9'	68.5°	10°16.6'	+60.0'	68.6°	10°38.4'	+60.0'	68.8°	11°00.0'	+60.0'	62.5°	11
12	9°47.7'	+59.7'	67.9°	10°10.2'	+59.8'	68.1°	10°32.5'	+59.9'	68.3°	10°54.6'	+59.9'	68.4°	11°16.6'	+60.0'	68.6°	11°38.4'	+60.0'	68.8°	12°00.0'	+60.0'	90.0°	12
13	10°47.4'	+59.7'	67.8°	11°10.0'	+59.8'	68.0°	11°32.4'	+59.9'	68.2°	11°54.6'	+59.9'	68.4°	12°16.6'	+60.0'	68.6°	12°38.4'	+60.0'	68.8°	13°00.0'	+60.0'	90.0°	13
14	11°47.1'	+59.7'	67.7°	12°09.8'	+59.8'	67.9°	12°32.2'	+59.9'	68.1°	12°54.5'	+59.9'	68.3°	13°16.5'	+60.0'	68.5°	13°38.4'	+60.0'	68.8°	14°00.0'	+60.0'	20.9°	14
15	12°46.8'	+59.7'	67.6°	13°09.6'	+59.8'	67.8°	13°32.1'	+59.9'	68.1°	13°54.4'	+59.9'	68.3°	14°16.5'	+60.0'	68.5°	14°38.4'	+60.0'	68.8°	15°00.0'	+60.0'	90.0°	15
16	13°46.5'	+59.7'	67.5°	14°09.4'	+59.8'	67.7°	14°32.0'	+59.9'	68.0°	14°54.3'	+59.9'	68.2°	15°16.5'	+60.0'	68.5°	15°38.4'	+60.0'	68.7°	16°00.0'	+60.0'	90.0°	16
17	14°46.2'	+59.7'	67.4°	15°09.2'	+59.8'	67.7°	15°31.8'	+59.9'	67.9°	15°54.3'	+59.9'	68.2°	16°16.4'	+60.0'	68.4°	16°38.4'	+60.0'	68.7°	17°00.0'	+60.0'	90.0°	17
18	15°45.9'	+59.7'	67.3°	16°08.9'	+59.8'	67.6°	16°31.7'	+59.9'	67.8°	16°54.2'	+59.9'	68.1°	17°16.4'	+60.0'	68.4°	17°38.4'	+60.0'	68.7°	18°00.0'	+60.0'	90.0°	18
19	16°45.6'	+59.7'	67.2°	17°08.7'	+59.8'	67.5°	17°31.6'	+59.9'	67.8°	17°54.1'	+59.9'	68.1°	18°16.4'	+60.0'	68.4°	18°38.3'	+60.0'	68.7°	19°00.0'	+60.0'	90.0°	19
20	17°45.3'	+59.7'	67.1°	18°08.5'	+59.8'	67.4°	18°31.4'	+59.9'	67.7°	18°54.0'	+59.9'	68.0°	19°16.3'	+60.0'	68.3°	19°38.3'	+60.0'	68.7°	20°00.0'	+60.0'	90.0°	20
21	18°45.0'	+59.7'	67.0°	19°08.3'	+59.8'	67.3°	19°31.3'	+59.9'	67.6°	19°54.0'	+59.9'	68.0°	20°16.3'	+60.0'	68.3°	20°38.3'	+60.0'	68.6°	21°00.0'	+60.0'	90.0°	21
22	19°44.7'	+59.7'	66.9°	20°08.1'	+59.8'	67.2°	20°31.1'	+59.9'	67.6°	20°53.9'	+59.9'	67.9°	21°16.3'	+60.0'	68.3°	21°38.3'	+60.0'	68.6°	22°			

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

68° 292° LHA

Latitude CONTRARY to Declination

68° 292° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	2°14.6'	-59.7'	111.9°	1°52.3'	-59.8'	111.9°	1°29.8'	-59.9'	112.0°	1°07.4'	-59.9'	112.0°	0°44.9'	-60.0'	112.0°	0°22.5'	-60.0'	112.0°	0°00.0'	-60.0'	112.0°	0
1	1°14.9'	-59.7'	112.0°	0°52.5'	-59.8'	112.0°	0°30.0'	-59.9'	112.0°	0°07.5'	-59.9'	112.0°	0°15.0'	+60.0'	68.0°	0°37.5'	+60.0'	68.0°	0°60.0'	+60.0'	66.6°	1
2	0°15.2'	-59.7'	112.1°	0°07.3'	+59.8'	67.9°	0°29.9'	+59.9'	67.9°	0°52.5'	+59.9'	67.9°	1°15.0'	+60.0'	67.9°	1°37.5'	+60.0'	68.0°	2°00.0'	+60.0'	70.1°	2
3	0°44.5'	+59.7'	67.8°	1°07.2'	+59.8'	67.8°	1°29.8'	+59.9'	67.9°	1°52.4'	+59.9'	67.9°	2°15.0'	+60.0'	67.9°	2°37.5'	+60.0'	68.0°	3°00.0'	+60.0'	76.9°	3
4	1°44.2'	+59.7'	67.7°	2°07.0'	+59.8'	67.8°	2°29.7'	+59.9'	67.8°	2°52.3'	+59.9'	67.8°	3°14.9'	+60.0'	67.9°	3°37.5'	+60.0'	67.9°	4°00.0'	+60.0'	63.0°	4
5	2°43.9'	+59.7'	67.6°	3°06.8'	+59.8'	67.7°	3°29.5'	+59.9'	67.7°	3°52.2'	+59.9'	67.8°	4°14.9'	+60.0'	67.9°	4°37.5'	+60.0'	67.9°	5°00.0'	+60.0'	62.9°	5
6	3°43.7'	+59.7'	67.5°	4°06.6'	+59.8'	67.6°	4°29.4'	+59.9'	67.7°	4°52.2'	+59.9'	67.7°	5°14.9'	+60.0'	67.8°	5°37.5'	+60.0'	67.9°	6°00.0'	+60.0'	62.9°	6
7	4°43.4'	+59.7'	67.4°	5°06.4'	+59.8'	67.5°	5°29.3'	+59.9'	67.6°	5°52.1'	+59.9'	67.7°	6°14.8'	+60.0'	67.8°	6°37.5'	+60.0'	67.9°	7°00.0'	+60.0'	62.8°	7
8	5°43.1'	+59.7'	67.3°	6°06.2'	+59.8'	67.4°	6°29.1'	+59.9'	67.5°	6°52.0'	+59.9'	67.6°	7°14.8'	+60.0'	67.8°	7°37.5'	+60.0'	67.9°	8°00.0'	+60.0'	23.8°	8
9	6°42.8'	+59.7'	67.2°	7°06.0'	+59.8'	67.3°	7°29.0'	+59.9'	67.5°	7°52.0'	+59.9'	67.6°	8°14.8'	+60.0'	67.7°	8°37.5'	+60.0'	67.9°	9°00.0'	+60.0'	90.0°	9
10	7°42.5'	+59.7'	67.1°	8°05.8'	+59.8'	67.3°	8°28.9'	+59.9'	67.4°	8°51.9'	+59.9'	67.5°	9°14.7'	+60.0'	67.7°	9°37.4'	+60.0'	67.8°	10°00.0'	+60.0'	62.6°	10
11	8°42.2'	+59.7'	67.0°	9°05.6'	+59.8'	67.2°	9°28.8'	+59.9'	67.3°	9°51.8'	+59.9'	67.5°	10°14.7'	+60.0'	67.7°	10°37.4'	+60.0'	67.8°	11°00.0'	+60.0'	62.5°	11
12	9°41.9'	+59.7'	66.9°	10°05.4'	+59.8'	67.1°	10°28.6'	+59.9'	67.3°	10°51.7'	+59.9'	67.4°	11°14.7'	+60.0'	67.6°	11°37.4'	+60.0'	67.8°	12°00.0'	+60.0'	90.0°	12
13	10°41.6'	+59.7'	66.8°	11°05.2'	+59.8'	67.0°	11°28.5'	+59.9'	67.2°	11°51.7'	+59.9'	67.4°	12°14.6'	+60.0'	67.6°	12°37.4'	+60.0'	67.8°	13°00.0'	+60.0'	90.0°	13
14	11°41.4'	+59.7'	66.7°	12°05.0'	+59.8'	66.9°	12°28.4'	+59.9'	67.1°	12°51.6'	+59.9'	67.3°	13°14.6'	+60.0'	67.6°	13°37.4'	+60.0'	67.8°	14°00.0'	+60.0'	20.9°	14
15	12°41.1'	+59.7'	66.6°	13°04.8'	+59.8'	66.8°	13°28.2'	+59.9'	67.1°	13°51.5'	+59.9'	67.3°	14°14.6'	+60.0'	67.5°	14°37.4'	+60.0'	67.8°	15°00.0'	+60.0'	90.0°	15
16	13°40.8'	+59.7'	66.5°	14°04.5'	+59.8'	66.8°	14°28.1'	+59.9'	67.0°	14°51.4'	+59.9'	67.2°	15°14.5'	+60.0'	67.5°	15°37.4'	+60.0'	67.7°	16°00.0'	+60.0'	90.0°	16
17	14°40.5'	+59.7'	66.4°	15°04.3'	+59.8'	66.7°	15°28.0'	+59.9'	66.9°	15°51.4'	+59.9'	67.2°	16°14.5'	+60.0'	67.4°	16°37.4'	+60.0'	67.7°	17°00.0'	+60.0'	90.0°	17
18	15°40.2'	+59.7'	66.3°	16°04.1'	+59.8'	66.6°	16°27.8'	+59.9'	66.9°	16°51.3'	+59.9'	67.1°	17°14.5'	+60.0'	67.4°	17°37.4'	+60.0'	67.7°	18°00.0'	+60.0'	90.0°	18
19	16°39.8'	+59.7'	66.2°	17°03.9'	+59.8'	66.5°	17°27.7'	+59.9'	66.8°	17°51.2'	+59.9'	67.1°	18°14.4'	+60.0'	67.4°	18°37.4'	+60.0'	67.7°	19°00.0'	+60.0'	90.0°	19
20	17°39.5'	+59.7'	66.1°	18°03.7'	+59.8'	66.4°	18°27.6'	+59.9'	66.7°	18°51.1'	+59.9'	67.0°	19°14.4'	+60.0'	67.3°	19°37.4'	+60.0'	67.7°	20°00.0'	+60.0'	90.0°	20
21	18°39.2'	+59.7'	66.0°	19°03.5'	+59.8'	66.3°	19°27.4'	+59.9'	66.6°	19°51.1'	+59.9'	67.0°	20°14.4'	+60.0'	67.3°	20°37.4'	+60.0'	67.6°	21°00.0'	+60.0'	90.0°	21
22	19°38.9'	+59.7'	65.9°	20°03.3'	+59.8'	66.2°	20°27.3'	+59.9'	66.6°	20°51.0'	+59.9'	66.9°	21°14.3'	+60.0'	67.3°	21°37.3'	+60.0'	67.6°	22°00.0'	+60.0'	90.0°	22
23	20°38.6'	+59.7'	65.8°	21°03.0'	+59.8'	66.1°	21°27.1'	+59.9'	66.5°	21°50.9'	+59.9'	66.9°	22°14.3'	+60.0'	67.2°	22°37.3'	+60.0'	67.6°	23°00.0'	+60.0'	169.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

112° 248° LHA

Latitude SAME as DECLINATION

112° 248° LHA

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

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

67° 293° LHA

Latitude CONTRARY to Declination

67° 293° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	2°20.4'	-59.7'	112.9°	1°57.1'	-59.8'	112.9°	1°33.7'	-59.9'	112.9°	1°10.3'	-59.9'	113.0°	0°46.9'	-60.0'	113.0°	0°23.4'	-60.0'	113.0°	0°00.0'	-60.0'	113.0°	0
1	1°20.7'	-59.7'	113.0°	0°57.3'	-59.8'	113.0°	0°33.8'	-59.9'	113.0°	0°10.4'	-59.9'	113.0°	0°13.1'	+60.0'	67.0°	0°36.5'	+60.0'	67.0°	0°60.0'	+60.0'	66.6°	1
2	0°21.0'	-59.7'	113.1°	0°02.5'	+59.8'	66.9°	0°26.0'	+59.9'	66.9°	0°49.6'	+59.9'	66.9°	1°13.1'	+60.0'	66.9°	1°36.5'	+60.0'	67.0°	2°00.0'	+60.0'	70.1°	2
3	0°38.7'	+59.7'	66.8°	1°02.3'	+59.8'	66.8°	1°25.9'	+59.9'	66.9°	1°49.5'	+59.9'	66.9°	2°13.0'	+60.0'	66.9°	2°36.5'	+60.0'	67.0°	3°00.0'	+60.0'	76.9°	3
4	1°38.4'	+59.7'	66.7°	2°02.1'	+59.8'	66.8°	2°25.8'	+59.9'	66.8°	2°49.4'	+59.9'	66.8°	3°13.0'	+60.0'	66.9°	3°36.5'	+60.0'	66.9°	4°00.0'	+60.0'	63.0°	4
5	2°38.2'	+59.7'	66.6°	3°01.9'	+59.8'	66.7°	3°25.7'	+59.9'	66.7°	3°49.3'	+59.9'	66.8°	4°13.0'	+60.0'	66.9°	4°36.5'	+60.0'	66.9°	5°00.0'	+60.0'	62.9°	5
6	3°37.9'	+59.7'	66.5°	4°01.7'	+59.8'	66.6°	4°25.5'	+59.9'	66.7°	4°49.3'	+59.9'	66.7°	5°12.9'	+60.0'	66.8°	5°36.5'	+60.0'	66.9°	6°00.0'	+60.0'	62.9°	6
7	4°37.6'	+59.7'	66.4°	5°01.6'	+59.8'	66.5°	5°25.4'	+59.9'	66.6°	5°49.2'	+59.9'	66.7°	6°12.9'	+60.0'	66.8°	6°36.5'	+60.0'	66.9°	7°00.0'	+60.0'	62.8°	7
8	5°37.3'	+59.7'	66.3°	6°01.4'	+59.8'	66.4°	6°25.3'	+59.9'	66.5°	6°49.1'	+59.9'	66.6°	7°12.9'	+60.0'	66.8°	7°36.5'	+60.0'	66.9°	8°00.0'	+60.0'	23.8°	8
9	6°37.0'	+59.7'	66.2°	7°01.2'	+59.8'	66.4°	7°25.2'	+59.9'	66.5°	7°49.1'	+59.9'	66.6°	8°12.8'	+60.0'	66.7°	8°36.5'	+60.0'	66.9°	9°00.0'	+60.0'	90.0°	9
10	7°36.8'	+59.7'	66.1°	8°01.0'	+59.8'	66.3°	8°25.0'	+59.9'	66.4°	8°49.0'	+59.9'	66.5°	9°12.8'	+60.0'	66.7°	9°36.5'	+60.0'	66.8°	10°00.0'	+60.0'	62.6°	10
11	8°36.5'	+59.7'	66.0°	9°00.8'	+59.8'	66.2°	9°24.9'	+59.9'	66.3°	9°48.9'	+59.9'	66.5°	10°12.8'	+60.0'	66.7°	10°36.5'	+60.0'	66.8°	11°00.0'	+60.0'	62.5°	11
12	9°36.2'	+59.7'	65.9°	10°00.6'	+59.8'	66.1°	10°24.8'	+59.9'	66.3°	10°48.9'	+59.9'	66.4°	11°12.7'	+60.0'	66.6°	11°36.5'	+60.0'	66.8°	12°00.0'	+60.0'	90.0°	12
13	10°35.9'	+59.7'	65.9°	11°00.4'	+59.8'	66.0°	11°24.7'	+59.9'	66.2°	11°48.8'	+59.9'	66.4°	12°12.7'	+60.0'	66.6°	12°36.5'	+60.0'	66.8°	13°00.0'	+60.0'	90.0°	13
14	11°35.6'	+59.7'	65.8°	12°00.2'	+59.8'	65.9°	12°24.5'	+59.9'	66.1°	12°48.7'	+59.9'	66.3°	13°12.7'	+60.0'	66.6°	13°36.4'	+60.0'	66.8°	14°00.0'	+60.0'	20.9°	14
15	12°35.3'	+59.7'	65.6°	12°60.0'	+59.8'	65.9°	13°24.4'	+59.9'	66.1°	13°48.6'	+59.9'	66.3°	14°12.6'	+60.0'	66.5°	14°36.4'	+60.0'	66.8°	15°00.0'	+60.0'	90.0°	15
16	13°35.0'	+59.7'	65.5°	13°59.8'	+59.8'	65.8°	14°24.3'	+59.9'	66.0°	14°48.6'	+59.9'	66.2°	15°12.6'	+60.0'	66.5°	15°36.4'	+60.0'	66.7°	16°00.0'	+60.0'	90.0°	16
17	14°34.7'	+59.7'	65.4°	14°59.6'	+59.8'	65.7°	15°24.1'	+59.9'	65.9°	15°48.5'	+59.9'	66.2°	16°12.6'	+60.0'	66.5°	16°36.4'	+60.0'	66.7°	17°00.0'	+60.0'	90.0°	17
18	15°34.4'	+59.7'	65.3°	15°59.3'	+59.8'	65.6°	16°24.0'	+59.9'	65.9°	16°48.4'	+59.9'	66.1°	17°12.5'	+60.0'	66.4°	17°36.4'	+60.0'	66.7°	18°00.0'	+60.0'	90.0°	18
19	16°34.1'	+59.7'	65.2°	16°59.1'	+59.8'	65.5°	17°23.9'	+59.9'	65.8°	17°48.3'	+59.9'	66.1°	18°12.5'	+60.0'	66.4°	18°36.4'	+60.0'	66.7°	19°00.0'	+60.0'	90.0°	19
20	17°33.8'	+59.7'	65.1°	17°58.9'	+59.8'	65.4°	18°23.7'	+59.9'	65.7°	18°48.3'	+59.9'	66.0°	19°12.5'	+60.0'	66.3°	19°36.4'	+60.0'	66.7°	20°00.0'	+60.0'	90.0°	20
21	18°33.5'	+59.7'	65.0°	18°58.7'	+59.8'	65.3°	19°23.6'	+59.9'	65.7°	19°48.2'	+59.9'	66.0°	20°12.4'	+60.0'	66.3°	20°36.4'	+60.0'	66.7°	21°00.0'	+60.0'	90.0°	21
22	19°33.2'	+59.7'	64.9°	19°58.5'	+59.8'	65.2°	20°23.5'	+59.9'	65.6°	20°48.1'	+59.9'	65.9°	21°12.4'	+60.0'	66.3°	21°36.4'	+60.0'	66.6°	22°			

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

66° 294° LHA

Latitude CONTRARY to Declination

66° 294° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	2°26.2'	-59.7'	113.9°	2°01.9'	-59.8'	113.9°	1°37.6'	-59.9'	113.9°	1°13.2'	-59.9'	114.0°	<u>0°48.8'</u>	<u>-60.0'</u>	<u>114.0°</u>	<u>0°24.4'</u>	<u>-60.0'</u>	<u>114.0°</u>	<u>0°00.0'</u>	<u>-60.0'</u>	<u>114.0°</u>	0
1	1°26.4'	-59.7'	114.0°	1°02.1'	-59.8'	114.0°	<u>0°37.7'</u>	<u>-59.9'</u>	<u>114.0°</u>	<u>0°13.3'</u>	<u>-59.9'</u>	<u>114.0°</u>	0°11.2'	+60.0'	66.0°	0°35.6'	+60.0'	66.0°	0°60.0'	+60.0'	66.6°	1
2	<u>0°26.7'</u>	<u>-59.7'</u>	<u>114.1°</u>	<u>0°02.3'</u>	<u>-59.8'</u>	<u>114.1°</u>	0°22.2'	+59.9'	65.9°	0°46.7'	+59.9'	65.9°	1°11.1'	+60.0'	65.9°	1°35.6'	+60.0'	66.0°	2°00.0'	+60.0'	63.0°	2
3	0°33.0'	+59.7'	65.8°	0°57.5'	+59.8'	65.8°	1°22.1'	+59.9'	65.9°	1°46.6'	+59.9'	65.9°	2°11.1'	+60.0'	65.9°	2°35.6'	+60.0'	66.0°	3°00.0'	+60.0'	70.1°	3
4	1°32.7'	+59.7'	65.7°	1°57.3'	+59.8'	65.8°	2°22.0'	+59.9'	65.8°	2°46.5'	+59.9'	65.8°	3°11.1'	+60.0'	65.9°	3°35.6'	+60.0'	65.9°	4°00.0'	+60.0'	63.0°	4
5	2°32.4'	+59.7'	65.6°	2°57.2'	+59.8'	65.7°	3°21.8'	+59.9'	65.7°	3°46.5'	+59.9'	65.8°	4°11.0'	+60.0'	65.9°	4°35.6'	+60.0'	65.9°	5°00.0'	+60.0'	62.9°	5
6	3°32.2'	+59.7'	65.5°	3°57.0'	+59.8'	65.6°	4°21.7'	+59.9'	65.7°	4°46.4'	+59.9'	65.7°	5°11.0'	+60.0'	65.8°	5°35.6'	+60.0'	65.9°	6°00.0'	+60.0'	62.9°	6
7	4°31.9'	+59.7'	65.4°	4°56.8'	+59.8'	65.5°	5°21.6'	+59.9'	65.6°	5°46.3'	+59.9'	65.7°	6°11.0'	+60.0'	65.8°	6°35.5'	+60.0'	65.9°	7°00.0'	+60.0'	62.8°	7
8	5°31.6'	+59.7'	65.4°	5°56.6'	+59.8'	65.4°	6°21.5'	+59.9'	65.5°	6°46.3'	+59.9'	65.6°	7°11.0'	+60.0'	65.8°	7°35.5'	+60.0'	65.9°	8°00.0'	+60.0'	23.8°	8
9	6°31.3'	+59.7'	65.3°	6°56.4'	+59.8'	65.4°	7°21.3'	+59.9'	65.5°	7°46.2'	+59.9'	65.6°	8°10.9'	+60.0'	65.7°	8°35.5'	+60.0'	65.9°	9°00.0'	+60.0'	90.0°	9
10	7°31.0'	+59.7'	65.2°	7°56.2'	+59.8'	65.3°	8°21.2'	+59.9'	65.4°	8°46.1'	+59.9'	65.5°	9°10.9'	+60.0'	65.7°	9°35.5'	+60.0'	65.8°	10°00.0'	+60.0'	62.6°	10
11	8°30.8'	+59.7'	65.1°	8°56.0'	+59.8'	65.2°	9°21.1'	+59.9'	65.3°	9°46.1'	+59.9'	65.5°	10°10.9'	+60.0'	65.7°	10°35.5'	+60.0'	65.8°	11°00.0'	+60.0'	62.5°	11
12	9°30.5'	+59.7'	65.0°	9°55.8'	+59.8'	65.1°	10°21.0'	+59.9'	65.3°	10°46.0'	+59.9'	65.4°	11°10.8'	+60.0'	65.6°	11°35.5'	+60.0'	65.8°	12°00.0'	+60.0'	90.0°	12
13	10°30.2'	+59.7'	64.9°	10°55.6'	+59.8'	65.0°	11°20.8'	+59.9'	65.2°	11°45.9'	+59.9'	65.4°	12°10.8'	+60.0'	65.6°	12°35.5'	+60.0'	65.8°	13°00.0'	+60.0'	90.0°	13
14	11°29.9'	+59.7'	64.8°	11°55.4'	+59.8'	65.0°	12°20.7'	+59.9'	65.1°	12°45.8'	+59.9'	65.3°	13°10.8'	+60.0'	65.6°	13°35.5'	+60.0'	65.8°	14°00.0'	+60.0'	20.9°	14
15	12°29.6'	+59.7'	64.7°	12°55.2'	+59.8'	64.9°	13°20.6'	+59.9'	65.1°	13°45.8'	+59.9'	65.3°	14°10.7'	+60.0'	65.5°	14°35.5'	+60.0'	65.8°	15°00.0'	+60.0'	90.0°	15
16	13°29.3'	+59.7'	64.6°	13°55.0'	+59.8'	64.8°	14°20.5'	+59.9'	65.0°	14°45.7'	+59.9'	65.2°	15°10.7'	+60.0'	65.5°	15°35.5'	+60.0'	65.7°	16°00.0'	+60.0'	90.0°	16
17	14°29.0'	+59.7'	64.5°	14°54.8'	+59.8'	64.7°	15°20.3'	+59.9'	64.9°	15°45.6'	+59.9'	65.2°	16°10.7'	+60.0'	65.5°	16°35.5'	+60.0'	65.7°	17°00.0'	+60.0'	90.0°	17
18	15°28.8'	+59.7'	64.4°	15°54.6'	+59.8'	64.6°	16°20.2'	+59.9'	64.9°	16°45.5'	+59.9'	65.1°	17°10.6'	+60.0'	65.4°	17°35.5'	+60.0'	65.7°	18°00.0'	+60.0'	90.0°	18
19	16°28.5'	+59.7'	64.3°	16°54.4'	+59.8'	64.5°	17°20.1'	+59.9'	64.8°	17°45.5'	+59.9'	65.1°	18°10.6'	+60.0'	65.4°	18°35.4'	+60.0'	65.7°	19°00.0'	+60.0'	90.0°	19
20	17°28.2'	+59.7'	64.2°	17°54.2'	+59.8'	64.4°	18°19.9'	+59.9'	64.7°	18°45.4'	+59.9'	65.0°	19°10.6'	+60.0'	65.4°	19°35.4'	+60.0'	65.7°	20°00.0'	+60.0'	90.0°	20
21	18°27.9'	+59.7'	64.0°	18°54.0'	+59.8'	64.4°	19°19.8'	+59.9'	64.7°	19°45.3'	+59.9'	65.0°	20°10.5'	+60.0'	65.3°	20°35.4'	+60.0'	65.7°	21°00.0'	+60.0'	90.0°	21
22	19°27.5'	+59.7'	63.9°	19°53.8'	+59.8'	64.3°	20°19.7'	+59.9'	64.6°	20°45.2'	+59.9'	64.9°	21°10.5'	+60.0'	65.3°	21°35.4'	+60.0'	65.6°	22°00.0'	+60.0'	90.0°	22
23	20°27.2'	+59.7'	63.8°	20°53.5'	+59.8'	64.2°	21°19.5'	+59.9'	64.5°	21°45.2'	+59.9'	64.9°	22°10.5'	+60.0'	65.2°	22°35.4'	+60.0'	65.6°	23°00.0'	+60.0'	169.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

114° 246° LHA

Latitude SAME as DECLINATION

114° 246° LHA

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

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

65° 295° LHA

Latitude CONTRARY to Declination

65° 295° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	2°31.9'	-59.7'	114.9°	2°06.7'	-59.8'	114.9°	1°41.4'	-59.9'	114.9°	1°16.0'	-59.9'	115.0°	<u>0°50.7'</u>	<u>-60.0'</u>	<u>115.0°</u>	<u>0°25.4'</u>	<u>-60.0'</u>	<u>115.0°</u>	<u>0°00.0'</u>	<u>-60.0'</u>	<u>115.0°</u>	0
1	1°32.1'	-59.7'	115.0°	1°06.8'	-59.8'	115.0°	<u>0°41.5'</u>	<u>-59.9'</u>	<u>115.0°</u>	<u>0°16.1'</u>	<u>-59.9'</u>	<u>115.0°</u>	0°09.3'	+60.0'	65.0°	0°34.6'	+60.0'	65.0°	0°60.0'	+60.0'	66.6°	1
2	<u>0°32.4'</u>	<u>-59.7'</u>	<u>115.1°</u>	<u>0°07.0'</u>	<u>-59.8'</u>	<u>115.1°</u>	0°18.4'	+59.9'	64.9°	0°43.8'	+59.9'	64.9°	1°09.2'	+60.0'	65.0°	1°34.6'	+60.0'	65.0°	2°00.0'	+60.0'	63.0°	2
3	0°27.3'	+59.7'	64.8°	0°52.8'	+59.8'	64.8°	1°18.3'	+59.9'	64.9°	1°43.8'	+59.9'	64.9°	2°09.2'	+60.0'	64.9°	2°34.6'	+60.0'	65.0°	3°00.0'	+60.0'	70.1°	3
4	1°27.0'	+59.7'	64.7°	1°52.6'	+59.8'	64.8°	2°18.2'	+59.9'	64.8°	2°43.7'	+59.9'	64.8°	3°09.2'	+60.0'	64.9°	3°34.6'	+60.0'	64.9°	4°00.0'	+60.0'	63.0°	4
5	2°26.7'	+59.7'	64.6°	2°52.4'	+59.8'	64.7°	3°18.0'	+59.9'	64.7°	3°43.6'	+59.9'	64.8°	4°09.1'	+60.0'	64.9°	4°34.6'	+60.0'	64.9°	5°00.0'	+60.0'	62.9°	5
6	3°26.5'	+59.7'	64.6°	3°52.2'	+59.8'	64.6°	4°17.9'	+59.9'	64.7°	4°43.6'	+59.9'	64.7°	5°09.1'	+60.0'	64.8°	5°34.6'	+60.0'	64.9°	6°00.0'	+60.0'	62.9°	6
7	4°26.2'	+59.7'	64.5°	4°52.0'	+59.8'	64.5°	5°17.8'	+59.9'	64.6°	5°43.5'	+59.9'	64.7°	6°09.1'	+60.0'	64.8°	6°34.6'	+60.0'	64.9°	7°00.0'	+60.0'	62.8°	7
8	5°25.9'	+59.7'	64.4°	5°51.8'	+59.8'	64.4°	6°17.7'	+59.9'	64.5°	6°43.4'	+59.9'	64.6°	7°09.1'	+60.0'	64.8°	7°34.6'	+60.0'	64.9°	8°00.0'	+60.0'	23.8°	8
9	6°25.6'	+59.7'	64.3°	6°51.7'	+59.8'	64.4°	7°17.6'	+59.9'	64.5°	7°43.3'	+59.9'	64.6°	8°09.0'	+60.0'	64.7°	8°34.6'	+60.0'	64.9°	9°00.0'	+60.0'	90.0°	9
10	7°25.4'	+59.7'	64.2°	7°51.5'	+59.8'	64.3°	8°17.4'	+59.9'	64.4°	8°43.3'	+59.9'	64.6°	9°09.0'	+60.0'	64.7°	9°34.6'	+60.0'	64.8°	10°00.0'	+60.0'	62.6°	10
11	8°25.1'	+59.7'	64.1°	8°51.3'	+59.8'	64.2°	9°17.3'	+59.9'	64.4°	9°43.2'	+59.9'	64.5°	10°09.0'	+60.0'	64.7°	10°34.6'	+60.0'	64.8°	11°00.0'	+60.0'	62.5°	11
12	9°24.8'	+59.7'	64.0°	9°51.1'	+59.8'	64.1°	10°17.2'	+59.9'	64.3°	10°43.1'	+59.9'	64.5°	11°08.9'	+60.0'	64.6°	11°34.6'	+60.0'	64.8°	12°00.0'	+60.0'	90.0°	12
13	10°24.5'	+59.7'	63.9°	10°50.9'	+59.8'	64.0°	11°17.1'	+59.9'	64.2°	11°43.1'	+59.9'	64.4°	12°08.9'	+60.0'	64.6°	12°34.5'	+60.0'	64.8°	13°00.0'	+60.0'	90.0°	13
14	11°24.3'	+59.7'	63.8°	11°50.7'	+59.8'	64.0°	12°16.9'	+59.9'	64.2°	12°43.0'	+59.9'	64.4°	13°08.9'	+60.0'	64.6°	13°34.5'	+60.0'	64.8°	14°00.0'	+60.0'	20.9°	14
15	12°24.0'	+59.7'	63.7°	12°50.5'	+59.8'	63.9°	13°16.8'	+59.9'	64.1°	13°42.9'	+59.9'	64.3°	14°08.8'	+60.0'	64.5°	14°34.5'	+60.0'	64.8°	15°00.0'	+60.0'	90.0°	15
16	13°23.7'	+59.7'	63.6°	13°50.3'	+59.8'	63.8°	14°16.7'	+59.9'	64.0°	14°42.9'	+59.9'	64.3°	15°08.8'	+60.0'	64.5°	15°34.5'	+60.0'	64.7°	16°00.0'	+60.0'	90.0°	16
17	14°23.4'	+59.7'	63.5°	14°50.1'	+59.8'	63.7°	15°16.6'	+59.9'	64.0°	15°42.8'	+59.9'	64.2°	16°08.8'	+60.0'	64.5°	16°34.5'	+60.0'	64.7°	17°00.0'	+60.0'	90.0°	17
18	15°23.1'	+59.7'	63.4°	15°49.9'	+59.8'	63.6°	16°16.4'	+59.9'	63.9°	16°42.7'	+59.9'	64.2°	17°08.7'	+60.0'	64.4°	17°34.5'	+60.0'	64.7°	18°00.0'	+60.0'	90.0°	18
19	16°22.8'	+59.7'	63.3°	16°49.7'	+59.8'	63.5°	17°16.3'	+59.9'	63.8°	17°42.6'	+59.9'	64.1°	18°08.7'	+60.0'	64.4°	18°34.5'	+60.0'	64.7°	19°00.0'	+60.0'	90.0°	19
20	17°22.5'	+59.7'	63.2°	17°49.5'	+59.8'	63.5°	18°16.2'	+59.9'	63.7°	18°42.6'	+59.9'	64.0°	19°08.7'	+60.0'	64.4°	19°34.5'	+60.0'	64.7°	20°00.0'	+60.0'	90.0°	20
21	18°22.2'	+59.7'	63.1°	18°49.3'	+59.8'	63.4°	19°16.0'	+59.9'	63.7°	19°42.5'	+59.9'	64.0°	20°08.6'	+60.0'	64.3°	20°34.5'	+60.0'	64.7°	21°00.0'	+60.0'	90.0°	21
22	19°21.9'	+5																				

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

64° 296° LHA

Latitude CONTRARY to Declination

64° 296° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	2°37.5'	-59.7'	115.9°	2°11.4'	-59.8'	115.9°	1°45.1'	-59.9'	115.9°	1°18.9'	-59.9'	116.0°	<u>0°52.6'</u>	<u>-60.0'</u>	<u>116.0°</u>	<u>0°26.3'</u>	<u>-60.0'</u>	<u>116.0°</u>	<u>0°00.0'</u>	<u>-60.0'</u>	<u>116.0°</u>	0
1	1°37.8'	-59.7'	116.0°	1°11.6'	-59.8'	116.0°	<u>0°45.3'</u>	<u>-59.9'</u>	<u>116.0°</u>	<u>0°18.9'</u>	<u>-59.9'</u>	<u>116.0°</u>	0°07.4'	+60.0'	64.0°	0°33.7'	+60.0'	64.0°	0°60.0'	+60.0'	63.1°	1
2	<u>0°38.1'</u>	<u>-59.7'</u>	<u>116.1°</u>	<u>0°11.7'</u>	<u>-59.8'</u>	<u>116.1°</u>	0°14.6'	+59.9'	63.9°	0°41.0'	+59.9'	63.9°	1°07.3'	+60.0'	64.0°	1°33.7'	+60.0'	64.0°	2°00.0'	+60.0'	63.0°	2
3	0°21.6'	+59.7'	63.8°	0°48.1'	+59.8'	63.9°	1°14.5'	+59.9'	63.9°	1°40.9'	+59.9'	63.9°	2°07.3'	+60.0'	63.9°	2°33.7'	+60.0'	64.0°	3°00.0'	+60.0'	70.1°	3
4	1°21.4'	+59.7'	63.7°	1°47.9'	+59.8'	63.8°	2°14.4'	+59.9'	63.8°	2°40.9'	+59.9'	63.8°	3°07.3'	+60.0'	63.9°	3°33.7'	+60.0'	63.9°	4°00.0'	+60.0'	63.0°	4
5	2°21.1'	+59.7'	63.7°	2°47.7'	+59.8'	63.7°	3°14.3'	+59.9'	63.7°	3°40.8'	+59.9'	63.8°	4°07.3'	+60.0'	63.9°	4°33.7'	+60.0'	63.9°	5°00.0'	+60.0'	62.9°	5
6	3°20.8'	+59.7'	63.6°	3°47.5'	+59.8'	63.6°	4°14.2'	+59.9'	63.7°	4°40.7'	+59.9'	63.7°	5°07.2'	+60.0'	63.8°	5°33.7'	+60.0'	63.9°	6°00.0'	+60.0'	62.9°	6
7	4°20.6'	+59.7'	63.5°	4°47.3'	+59.8'	63.5°	5°14.0'	+59.9'	63.6°	5°40.4'	+59.9'	63.7°	6°07.2'	+60.0'	63.8°	6°33.6'	+60.0'	63.9°	7°00.0'	+60.0'	62.8°	7
8	5°20.3'	+59.7'	63.4°	5°47.1'	+59.8'	63.5°	6°13.9'	+59.9'	63.6°	6°40.6'	+59.9'	63.7°	7°07.2'	+60.0'	63.8°	7°33.6'	+60.0'	63.9°	8°00.0'	+60.0'	23.8°	8
9	6°20.0'	+59.7'	63.3°	6°47.0'	+59.8'	63.4°	7°13.8'	+59.9'	63.5°	7°40.5'	+59.9'	63.6°	8°07.1'	+60.0'	63.7°	8°33.6'	+60.0'	63.9°	9°00.0'	+60.0'	90.0°	9
10	7°19.8'	+59.7'	63.2°	7°46.8'	+59.8'	63.3°	8°13.7'	+59.9'	63.4°	8°40.5'	+59.9'	63.6°	9°07.1'	+60.0'	63.7°	9°33.6'	+60.0'	63.8°	10°00.0'	+60.0'	62.6°	10
11	8°19.5'	+59.7'	63.1°	8°46.6'	+59.8'	63.2°	9°13.6'	+59.9'	63.4°	9°40.4'	+59.9'	63.5°	10°07.1'	+60.0'	63.7°	10°33.6'	+60.0'	63.8°	11°00.0'	+60.0'	62.5°	11
12	9°19.2'	+59.7'	63.0°	9°46.4'	+59.8'	63.1°	10°13.4'	+59.9'	63.3°	10°40.3'	+59.9'	63.5°	11°07.0'	+60.0'	63.6°	11°33.6'	+60.0'	63.8°	12°00.0'	+60.0'	90.0°	12
13	10°18.9'	+59.7'	62.9°	10°46.2'	+59.8'	63.1°	11°13.3'	+59.9'	63.2°	11°40.2'	+59.9'	63.4°	12°07.0'	+60.0'	63.6°	12°33.6'	+60.0'	63.8°	13°00.0'	+60.0'	90.0°	13
14	11°18.7'	+59.7'	62.8°	11°46.0'	+59.8'	63.0°	12°13.2'	+59.9'	63.2°	12°40.2'	+59.9'	63.4°	13°07.0'	+60.0'	63.6°	13°33.6'	+60.0'	63.8°	14°00.0'	+60.0'	20.9°	14
15	12°18.4'	+59.7'	62.7°	12°45.8'	+59.8'	62.9°	13°13.1'	+59.9'	63.1°	13°40.1'	+59.9'	63.3°	14°07.0'	+60.0'	63.5°	14°33.6'	+60.0'	63.8°	15°00.0'	+60.0'	90.0°	15
16	13°18.1'	+59.7'	62.6°	13°45.6'	+59.8'	62.8°	14°12.9'	+59.9'	63.0°	14°40.0'	+59.9'	63.3°	15°06.9'	+60.0'	63.5°	15°33.6'	+60.0'	63.7°	16°00.0'	+60.0'	90.0°	16
17	14°17.8'	+59.7'	62.5°	14°45.4'	+59.8'	62.7°	15°12.8'	+59.9'	63.0°	15°40.0'	+59.9'	63.2°	16°06.9'	+60.0'	63.5°	16°33.6'	+60.0'	63.7°	17°00.0'	+60.0'	90.0°	17
18	15°17.5'	+59.7'	62.4°	15°45.2'	+59.8'	62.6°	16°12.7'	+59.9'	62.9°	16°39.9'	+59.9'	63.2°	17°06.9'	+60.0'	63.4°	17°33.6'	+60.0'	63.7°	18°00.0'	+60.0'	90.0°	18
19	16°17.3'	+59.7'	62.3°	16°45.0'	+59.8'	62.6°	17°12.6'	+59.9'	62.8°	17°39.8'	+59.9'	63.1°	18°06.8'	+60.0'	63.4°	18°33.6'	+60.0'	63.7°	19°00.0'	+60.0'	90.0°	19
20	17°17.0'	+59.7'	62.2°	17°44.8'	+59.8'	62.5°	18°12.4'	+59.9'	62.8°	18°39.7'	+59.9'	63.1°	19°06.8'	+60.0'	63.4°	19°33.5'	+60.0'	63.7°	20°00.0'	+60.0'	90.0°	20
21	18°16.7'	+59.7'	62.1°	18°44.6'	+59.8'	62.4°	19°12.3'	+59.9'	62.7°	19°39.7'	+59.9'	63.0°	20°06.8'	+60.0'	63.3°	20°33.5'	+60.0'	63.7°	21°00.0'	+60.0'	90.0°	21
22	19°16.4'	+59.7'	62.0°	19°44.4'	+59.8'	62.3°	20°12.2'	+59.9'	62.6°	20°39.6'	+59.9'	63.0°	21°06.7'	+60.0'	63.3°	21°33.5'	+60.0'	63.6°	22°00.0'	+60.0'	90.0°	22
23	20°16.1'	+59.7'	61.9°	20°44.2'	+59.8'	62.2°	21°12.0'	+59.9'	62.5°	21°39.5'	+59.9'	62.9°	22°06.7'	+60.0'	63.3°	22°33.5'	+60.0'	63.6°	23°00.0'	+60.0'	169.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

116° 244° LHA

Latitude SAME as DECLINATION

116° 244° LHA

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

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

63° 297° LHA

Latitude CONTRARY to Declination

63° 297° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	2°43.1'	-59.7'	116.9°	2°16.1'	-59.8'	116.9°	1°48.9'	-59.9'	116.9°	1°21.7'	-59.9'	117.0°	<u>0°54.5'</u>	<u>-60.0'</u>	<u>117.0°</u>	<u>0°27.2'</u>	<u>-60.0'</u>	<u>117.0°</u>	<u>0°00.0'</u>	<u>-60.0'</u>	<u>117.0°</u>	0
1	1°43.4'	-59.7'	117.0°	1°16.2'	-59.8'	117.0°	<u>0°49.0'</u>	<u>-59.9'</u>	<u>117.0°</u>	<u>0°21.8'</u>	<u>-59.9'</u>	<u>117.0°</u>	0°05.5'	+60.0'	63.0°	0°32.8'	+60.0'	63.0°	0°60.0'	+60.0'	63.1°	1
2	<u>0°43.7'</u>	<u>-59.7'</u>	<u>117.1°</u>	<u>0°16.4'</u>	<u>-59.8'</u>	<u>117.1°</u>	0°10.9'	+59.9'	62.9°	0°38.2'	+59.9'	62.9°	1°05.5'	+60.0'	63.0°	1°32.7'	+60.0'	63.0°	2°00.0'	+60.0'	63.0°	2
3	0°16.0'	+59.7'	62.8°	0°43.4'	+59.8'	62.9°	1°10.8'	+59.9'	62.9°	1°38.1'	+59.9'	62.9°	2°05.4'	+60.0'	62.9°	2°32.7'	+60.0'	63.0°	3°00.0'	+60.0'	70.1°	3
4	1°15.8'	+59.7'	62.8°	1°43.2'	+59.8'	62.8°	2°10.6'	+59.9'	62.8°	2°38.1'	+59.9'	62.8°	3°05.4'	+60.0'	62.9°	3°32.7'	+60.0'	62.9°	4°00.0'	+60.0'	63.0°	4
5	2°15.5'	+59.7'	62.7°	2°43.0'	+59.8'	62.7°	3°10.5'	+59.9'	62.7°	3°38.0'	+59.9'	62.8°	4°05.4'	+60.0'	62.9°	4°32.7'	+60.0'	62.9°	5°00.0'	+60.0'	62.9°	5
6	3°15.2'	+59.7'	62.6°	3°42.9'	+59.8'	62.6°	4°10.4'	+59.9'	62.7°	4°37.9'	+59.9'	62.8°	5°05.4'	+60.0'	62.8°	5°32.7'	+60.0'	62.9°	6°00.0'	+60.0'	62.9°	6
7	4°15.0'	+59.7'	62.5°	4°42.7'	+59.8'	62.5°	5°10.3'	+59.9'	62.6°	5°37.9'	+59.9'	62.7°	6°05.3'	+60.0'	62.8°	6°32.7'	+60.0'	62.9°	7°00.0'	+60.0'	62.8°	7
8	5°14.7'	+59.7'	62.4°	5°42.5'	+59.8'	62.5°	6°10.2'	+59.9'	62.6°	6°37.8'	+59.9'	62.7°	7°05.3'	+60.0'	62.8°	7°32.7'	+60.0'	62.9°	8°00.0'	+60.0'	23.8°	8
9	6°14.4'	+59.7'	62.3°	6°42.3'	+59.8'	62.4°	7°10.1'	+59.9'	62.5°	7°37.7'	+59.9'	62.6°	8°05.3'	+60.0'	62.7°	8°32.7'	+60.0'	62.9°	9°00.0'	+60.0'	90.0°	9
10	7°14.2'	+59.7'	62.2°	7°42.1'	+59.8'	62.3°	8°09.9'	+59.9'	62.4°	8°37.7'	+59.9'	62.6°	9°05.2'	+60.0'	62.7°	9°32.7'	+60.0'	62.8°	10°00.0'	+60.0'	62.6°	10
11	8°13.9'	+59.7'	62.1°	8°41.9'	+59.8'	62.2°	9°09.8'	+59.9'	62.4°	9°37.6'	+59.9'	62.5°	10°05.2'	+60.0'	62.7°	10°32.7'	+60.0'	62.8°	11°00.0'	+60.0'	62.5°	11
12	9°13.6'	+59.7'	62.0°	9°41.7'	+59.8'	62.1°	10°09.7'	+59.9'	62.3°	10°37.5'	+59.9'	62.5°	11°05.2'	+60.0'	62.6°	11°32.7'	+60.0'	62.8°	12°00.0'	+60.0'	90.0°	12
13	10°13.4'	+59.7'	61.9°	10°41.6'	+59.8'	62.1°	11°09.6'	+59.9'	62.2°	11°37.5'	+59.9'	62.4°	12°05.1'	+60.0'	62.6°	12°32.7'	+60.0'	62.8°	13°00.0'	+60.0'	90.0°	13
14	11°13.1'	+59.7'	61.8°	11°41.4'	+59.8'	62.0°	12°09.5'	+59.9'	62.2°	12°37.4'	+59.9'	62.4°	13°05.1'	+60.0'	62.6°	13°32.7'	+60.0'	62.8°	14°00.0'	+60.0'	20.9°	14
15	12°12.8'	+59.7'	61.7°	12°41.2'	+59.8'	61.9°	13°09.3'	+59.9'	62.1°	13°37.3'	+59.9'	62.3°	14°05.1'	+60.0'	62.5°	14°32.7'	+60.0'	62.8°	15°00.0'	+60.0'	90.0°	15
16	13°12.6'	+59.7'	61.6°	13°41.0'	+59.8'	61.8°	14°09.2'	+59.9'	62.0°	14°37.2'	+59.9'	62.3°	15°05.1'	+60.0'	62.5°	15°32.6'	+60.0'	62.7°	16°00.0'	+60.0'	90.0°	16
17	14°12.3'	+59.7'	61.5°	14°40.8'	+59.8'	61.7°	15°09.1'	+59.9'	62.0°	15°37.2'	+59.9'	62.2°	16°05.0'	+60.0'	62.5°	16°32.6'	+60.0'	62.7°	17°00.0'	+60.0'	90.0°	17
18	15°12.0'	+59.7'	61.4°	15°40.6'	+59.8'	61.7°	16°09.0'	+59.9'	61.9°	16°37.1'	+59.9'	62.2°	17°05.0'	+60.0'	62.4°	17°32.6'	+60.0'	62.7°	18°00.0'	+60.0'	90.0°	18
19	16°11.7'	+59.7'	61.3°	16°40.4'	+59.8'	61.6°	17°08.8'	+59.9'	61.8°	17°37.0'	+59.9'	62.1°	18°05.0'	+60.0'	62.4°	18°32.6'	+60.0'	62.7°	19°00.0'	+60.0'	90.0°	19
20	17°11.4'	+59.7'	61.2°	17°40.2'	+59.8'	61.5°	18°08.7'	+59.9'	61.8°	18°37.0'	+59.9'	62.1°	19°04.9'	+60.0'	62.4°	19°32.6'	+60.0'	62.7°	20°00.0'	+60.0'	90.0°	20
21	18°11.2'	+59.7'	61.1°	18°40.0'	+59.8'	61.4°	19°08.6'	+59.9'	61.7°	19°36.9'	+59.9'	62.0°	20°04.9'	+60.0'	62.3°	20°32.6'	+60.0'	62.7°	21°00.0'	+60.0'	90.0°	21
22	19°10.9'	+59.7'																				

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

62° 298° LHA

Latitude CONTRARY to Declination

62° 298° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	2°48.7'	-59.7'	117.9°	2°20.7'	-59.8'	117.9°	1°52.6'	-59.9'	117.9°	1°24.5'	-59.9'	118.0°	<u>0°56.3'</u>	<u>-60.0'</u>	<u>118.0°</u>	<u>0°28.2'</u>	<u>-60.0'</u>	<u>118.0°</u>	<u>0°00.0'</u>	<u>-60.0'</u>	<u>118.0°</u>	0
1	1°49.0'	-59.7'	118.0°	1°20.9'	-59.8'	118.0°	<u>0°52.7'</u>	<u>-59.9'</u>	<u>118.0°</u>	<u>0°24.5'</u>	<u>-59.9'</u>	<u>118.0°</u>	0°03.6'	+60.0'	62.0°	0°31.8'	+60.0'	62.0°	0°60.0'	+60.0'	63.1°	1
2	<u>0°49.2'</u>	<u>-59.7'</u>	<u>118.1°</u>	<u>0°21.1'</u>	<u>-59.8'</u>	<u>118.1°</u>	0°07.2'	+59.9'	61.9°	0°35.4'	+59.9'	61.9°	1°03.6'	+60.0'	62.0°	1°31.8'	+60.0'	62.0°	2°00.0'	+60.0'	63.0°	2
3	0°10.5'	+59.7'	61.9°	0°38.8'	+59.8'	61.9°	1°07.1'	+59.9'	61.9°	1°35.3'	+59.9'	61.9°	2°03.6'	+60.0'	61.9°	2°31.8'	+60.0'	62.0°	3°00.0'	+60.0'	70.1°	3
4	1°10.2'	+59.7'	61.8°	1°38.6'	+59.8'	61.8°	2°06.9'	+59.9'	61.8°	2°35.3'	+59.9'	61.8°	3°03.6'	+60.0'	61.9°	3°31.8'	+60.0'	61.9°	4°00.0'	+60.0'	63.0°	4
5	2°09.9'	+59.7'	61.7°	2°38.4'	+59.8'	61.7°	3°06.8'	+59.9'	61.7°	3°35.2'	+59.9'	61.8°	4°03.5'	+60.0'	61.9°	4°31.8'	+60.0'	61.9°	5°00.0'	+60.0'	62.9°	5
6	3°09.7'	+59.7'	61.6°	3°38.2'	+59.8'	61.6°	4°06.7'	+59.9'	61.7°	4°35.1'	+59.9'	61.8°	5°03.5'	+60.0'	61.8°	5°31.8'	+60.0'	61.9°	6°00.0'	+60.0'	62.9°	6
7	4°09.4'	+59.7'	61.5°	4°38.1'	+59.8'	61.6°	5°06.6'	+59.9'	61.6°	5°35.1'	+59.9'	61.7°	6°03.5'	+60.0'	61.8°	6°31.8'	+60.0'	61.9°	7°00.0'	+60.0'	62.8°	7
8	5°09.2'	+59.7'	61.4°	5°37.9'	+59.8'	61.5°	6°06.5'	+59.9'	61.6°	6°35.0'	+59.9'	61.7°	7°03.4'	+60.0'	61.8°	7°31.8'	+60.0'	61.9°	8°00.0'	+60.0'	23.8°	8
9	6°08.9'	+59.7'	61.3°	6°37.7'	+59.8'	61.4°	7°06.4'	+59.9'	61.5°	7°34.9'	+59.9'	61.6°	8°03.4'	+60.0'	61.7°	8°31.8'	+60.0'	61.9°	9°00.0'	+60.0'	90.0°	9
10	7°08.7'	+59.7'	61.2°	7°37.5'	+59.8'	61.3°	8°06.3'	+59.9'	61.4°	8°34.9'	+59.9'	61.6°	9°03.4'	+60.0'	61.7°	9°31.8'	+60.0'	61.8°	10°00.0'	+60.0'	62.6°	10
11	8°08.4'	+59.7'	61.1°	8°37.3'	+59.8'	61.2°	9°06.1'	+59.9'	61.4°	9°34.8'	+59.9'	61.5°	10°03.4'	+60.0'	61.7°	10°31.8'	+60.0'	61.8°	11°00.0'	+60.0'	62.5°	11
12	9°08.1'	+59.7'	61.0°	9°37.1'	+59.8'	61.2°	10°06.0'	+59.9'	61.3°	10°34.7'	+59.9'	61.5°	11°03.3'	+60.0'	61.6°	11°31.7'	+60.0'	61.8°	12°00.0'	+60.0'	90.0°	12
13	10°07.9'	+59.7'	60.9°	10°37.0'	+59.8'	61.1°	11°05.9'	+59.9'	61.2°	11°34.7'	+59.9'	61.4°	12°03.3'	+60.0'	61.6°	12°31.7'	+60.0'	61.8°	13°00.0'	+60.0'	90.0°	13
14	11°07.6'	+59.7'	60.8°	11°36.8'	+59.8'	61.0°	12°05.8'	+59.9'	61.2°	12°34.6'	+59.9'	61.4°	13°03.3'	+60.0'	61.6°	13°31.7'	+60.0'	61.8°	14°00.0'	+60.0'	20.9°	14
15	12°07.3'	+59.7'	60.7°	12°36.6'	+59.8'	60.9°	13°05.7'	+59.9'	61.1°	13°34.5'	+59.9'	61.3°	14°03.2'	+60.0'	61.5°	14°31.7'	+60.0'	61.8°	15°00.0'	+60.0'	20.3°	15
16	13°07.1'	+59.7'	60.6°	13°36.4'	+59.8'	60.8°	14°05.5'	+59.9'	61.1°	14°34.5'	+59.9'	61.3°	15°03.2'	+60.0'	61.5°	15°31.7'	+60.0'	61.8°	16°00.0'	+60.0'	90.0°	16
17	14°06.8'	+59.7'	60.5°	14°36.2'	+59.8'	60.8°	15°05.4'	+59.9'	61.0°	15°34.4'	+59.9'	61.2°	16°03.2'	+60.0'	61.5°	16°31.7'	+60.0'	61.7°	17°00.0'	+60.0'	90.0°	17
18	15°06.5'	+59.7'	60.4°	15°36.0'	+59.8'	60.7°	16°05.3'	+59.9'	60.9°	16°34.3'	+59.9'	61.2°	17°03.1'	+60.0'	61.4°	17°31.7'	+60.0'	61.7°	18°00.0'	+60.0'	90.0°	18
19	16°06.3'	+59.7'	60.3°	16°35.8'	+59.8'	60.6°	17°05.2'	+59.9'	60.9°	17°34.3'	+59.9'	61.1°	18°03.1'	+60.0'	61.4°	18°31.7'	+60.0'	61.7°	19°00.0'	+60.0'	90.0°	19
20	17°06.0'	+59.7'	60.2°	17°35.6'	+59.8'	60.5°	18°05.0'	+59.9'	60.8°	18°34.2'	+59.9'	61.1°	19°03.1'	+60.0'	61.4°	19°31.7'	+60.0'	61.7°	20°00.0'	+60.0'	90.0°	20
21	18°05.7'	+59.7'	60.1°	18°35.4'	+59.8'	60.4°	19°04.9'	+59.9'	60.7°	19°34.1'	+59.9'	61.0°	20°03.0'	+60.0'	61.3°	20°31.7'	+60.0'	61.7°	21°00.0'	+60.0'	90.0°	21
22	19°05.4'	+59.7'	60.0°	19°35.2'	+59.8'	60.3°	20°04.8'	+59.9'	60.6°	20°34.1'	+59.9'	61.0°	21°03.0'	+60.0'	61.3°	21°31.7'	+60.0'	61.6°	22°00.0'	+60.0'	90.0°	22
23	20°05.1'	+59.7'	59.9°	20°35.0'	+59.8'	60.2°	21°04.7'	+59.9'	60.6°	21°34.0'	+59.9'	60.9°	22°03.0'	+60.0'	61.3°	22°31.7'	+60.0'	61.6°	23°00.0'	+60.0'	169.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

118° 242° LHA

Latitude SAME as DECLINATION

118° 242° LHA

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

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

61° 299° LHA

Latitude CONTRARY to Declination

61° 299° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	2°54.2'	-59.7'	118.9°	2°25.3'	-59.8'	118.9°	1°56.3'	-59.9'	118.9°	1°27.2'	-59.9'	119.0°	<u>0°58.2'</u>	<u>-60.0'</u>	<u>119.0°</u>	<u>0°29.1'</u>	<u>-60.0'</u>	<u>119.0°</u>	<u>0°00.0'</u>	<u>-60.0'</u>	<u>119.0°</u>	0
1	1°54.5'	-59.7'	119.0°	1°25.5'	-59.8'	119.0°	<u>0°56.4'</u>	<u>-59.9'</u>	<u>119.0°</u>	<u>0°27.3'</u>	<u>-59.9'</u>	<u>119.0°</u>	0°01.8'	+60.0'	61.0°	0°30.9'	+60.0'	61.0°	0°60.0'	+60.0'	59.3°	1
2	<u>0°54.7'</u>	<u>-59.7'</u>	<u>119.0°</u>	<u>0°25.7'</u>	<u>-59.8'</u>	<u>119.1°</u>	0°03.5'	+59.9'	60.9°	0°32.6'	+59.9'	60.9°	1°01.8'	+60.0'	61.0°	1°30.9'	+60.0'	61.0°	2°00.0'	+60.0'	63.0°	2
3	0°05.0'	+59.7'	60.9°	0°34.2'	+59.8'	60.9°	1°03.4'	+59.9'	60.9°	1°32.6'	+59.9'	60.9°	2°01.7'	+60.0'	60.9°	2°30.9'	+60.0'	61.0°	3°00.0'	+60.0'	70.1°	3
4	1°04.7'	+59.7'	60.8°	1°34.0'	+59.8'	60.8°	2°03.3'	+59.9'	60.8°	2°32.5'	+59.9'	60.9°	3°01.7'	+60.0'	60.9°	3°30.9'	+60.0'	60.9°	4°00.0'	+60.0'	63.0°	4
5	2°04.5'	+59.7'	60.7°	2°33.8'	+59.8'	60.7°	3°03.2'	+59.9'	60.7°	3°32.5'	+59.9'	60.8°	4°01.7'	+60.0'	60.9°	4°30.9'	+60.0'	60.9°	5°00.0'	+60.0'	62.9°	5
6	3°04.2'	+59.7'	60.6°	3°33.6'	+59.8'	60.6°	4°03.0'	+59.9'	60.8°	4°32.4'	+59.9'	60.8°	5°01.7'	+60.0'	60.8°	5°30.9'	+60.0'	60.9°	6°00.0'	+60.0'	62.9°	6
7	4°04.0'	+59.7'	60.5°	4°33.5'	+59.8'	60.6°	5°02.9'	+59.9'	60.6°	5°32.3'	+59.9'	60.7°	6°01.6'	+60.0'	60.8°	6°30.9'	+60.0'	60.9°	7°00.0'	+60.0'	62.8°	7
8	5°03.7'	+59.7'	60.4°	5°33.3'	+59.8'	60.5°	6°02.8'	+59.9'	60.6°	6°32.3'	+59.9'	60.7°	7°01.6'	+60.0'	60.8°	7°30.9'	+60.0'	60.9°	8°00.0'	+60.0'	23.8°	8
9	6°03.4'	+59.7'	60.3°	6°33.1'	+59.8'	60.4°	7°02.7'	+59.9'	60.5°	7°32.2'	+59.9'	60.6°	8°01.6'	+60.0'	60.7°	8°30.8'	+60.0'	60.9°	9°00.0'	+60.0'	90.0°	9
10	7°03.2'	+59.7'	60.2°	7°32.9'	+59.8'	60.3°	8°02.6'	+59.9'	60.4°	8°32.1'	+59.9'	60.6°	9°01.6'	+60.0'	60.7°	9°30.8'	+60.0'	60.8°	10°00.0'	+60.0'	62.6°	10
11	8°02.9'	+59.7'	60.1°	8°32.8'	+59.8'	60.2°	9°02.5'	+59.9'	60.4°	9°32.1'	+59.9'	60.5°	10°01.5'	+60.0'	60.7°	10°30.8'	+60.0'	60.8°	11°00.0'	+60.0'	62.5°	11
12	9°02.7'	+59.7'	60.0°	9°32.6'	+59.8'	60.2°	10°02.4'	+59.9'	60.3°	10°32.0'	+59.9'	60.5°	11°01.5'	+60.0'	60.6°	11°30.8'	+60.0'	60.8°	12°00.0'	+60.0'	90.0°	12
13	10°02.4'	+59.7'	59.9°	10°32.4'	+59.8'	60.1°	11°02.2'	+59.9'	60.3°	11°31.9'	+59.9'	60.4°	12°01.5'	+60.0'	60.6°	12°30.8'	+60.0'	60.8°	13°00.0'	+60.0'	90.0°	13
14	11°02.2'	+59.7'	59.8°	11°32.2'	+59.8'	60.0°	12°02.1'	+59.9'	60.2°	12°31.9'	+59.9'	60.4°	13°01.4'	+60.0'	60.6°	13°30.8'	+60.0'	60.8°	14°00.0'	+60.0'	20.9°	14
15	12°01.9'	+59.7'	59.7°	12°32.0'	+59.8'	59.9°	13°02.0'	+59.9'	60.1°	13°31.8'	+59.9'	60.3°	14°01.4'	+60.0'	60.5°	14°30.8'	+60.0'	60.8°	15°00.0'	+60.0'	20.3°	15
16	13°01.6'	+59.7'	59.6°	13°31.9'	+59.8'	59.9°	14°01.9'	+59.9'	60.1°	14°31.7'	+59.9'	60.3°	15°01.4'	+60.0'	60.5°	15°30.8'	+60.0'	60.8°	16°00.0'	+60.0'	19.5°	16
17	14°01.4'	+59.7'	59.6°	14°31.7'	+59.8'	59.8°	15°01.8'	+59.9'	60.0°	15°31.7'	+59.9'	60.2°	16°01.3'	+60.0'	60.5°	16°30.8'	+60.0'	60.7°	17°00.0'	+60.0'	18.6°	17
18	15°01.1'	+59.7'	59.5°	15°31.5'	+59.8'	59.7°	16°01.7'	+59.9'	59.9°	16°31.6'	+59.9'	60.2°	17°01.3'	+60.0'	60.4°	17°30.8'	+60.0'	60.7°	18°00.0'	+60.0'	17.7°	18
19	16°00.8'	+59.7'	59.4°	16°31.3'	+59.8'	59.6°	17°01.5'	+59.9'	59.9°	17°31.5'	+59.9'	60.1°	18°01.3'	+60.0'	60.4°	18°30.8'	+60.0'	60.7°	19°00.0'	+60.0'	16.6°	19
20	17°00.6'	+59.7'	59.3°	17°31.1'	+59.8'	59.5°	18°01.4'	+59.9'	59.8°	18°31.5'	+59.9'	60.1°	19°01.3'	+60.0'	60.4°	19°30.8'	+60.0'	60.7°	20°00.0'	+60.0'	15.3°	20
21	18°00.3'	+59.7'	59.2°	18°30.9'	+59.8'	59.4°	19°01.3'	+59.9'	59.7°	19°31.4'	+59.9'	60.0°	20°01.2'	+60.0'	60.3°	20°30.8'	+60.0'	60.7°	21°00.0'	+60.0'	90.0°	21
22	19°00.0'	+5																				

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

60° 300° LHA

Latitude CONTRARY to Declination

60° 300° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	2°59.7'	-59.8'	119.9°	2°29.9'	-59.8'	119.9°	1°59.9'	-59.9'	119.9°	1°30.0'	-59.9'	120.0°	0°60.0'	-60.0'	120.0°	0°30.0'	-60.0'	120.0°	0°00.0'	-60.0'	120.0°	0
1	1°59.9'	-59.8'	120.0°	1°30.0'	-59.8'	120.0°	1°00.0'	-59.9'	120.0°	0°30.0'	-59.9'	120.0°	0°00.0'	-60.0'	120.0°	0°30.0'	+60.0'	60.0°	0°60.0'	+60.0'	59.3°	1
2	1°00.2'	-59.8'	120.0°	0°30.2'	-59.8'	120.1°	0°00.1'	-59.9'	120.1°	0°29.9'	+59.9'	59.9°	0°60.0'	+60.0'	60.0°	1°30.0'	+60.0'	60.0°	2°00.0'	+60.0'	63.0°	2
3	0°00.5'	-59.8'	120.1°	0°29.6'	+59.8'	59.9°	0°59.7'	+59.9'	59.9°	1°29.8'	+59.9'	59.9°	1°59.9'	+60.0'	59.9°	2°30.0'	+60.0'	60.0°	3°00.0'	+60.0'	70.1°	3
4	0°59.3'	+59.8'	59.8°	1°29.5'	+59.8'	59.8°	1°59.6'	+59.9'	59.8°	2°29.8'	+59.9'	59.9°	2°59.9'	+60.0'	59.9°	3°30.0'	+60.0'	59.9°	4°00.0'	+60.0'	63.0°	4
5	1°59.0'	+59.8'	59.7°	2°29.3'	+59.8'	59.7°	2°59.5'	+59.9'	59.8°	3°29.7'	+59.9'	59.8°	3°59.9'	+60.0'	59.9°	4°30.0'	+60.0'	59.9°	5°00.0'	+60.0'	62.9°	5
6	2°58.8'	+59.8'	59.6°	3°29.1'	+59.8'	59.6°	3°59.4'	+59.9'	59.7°	4°29.7'	+59.9'	59.8°	4°59.8'	+60.0'	59.8°	5°30.0'	+60.0'	59.9°	6°00.0'	+60.0'	62.9°	6
7	3°58.5'	+59.8'	59.5°	4°28.9'	+59.8'	59.6°	4°59.3'	+59.9'	59.6°	5°29.6'	+59.9'	59.7°	5°59.8'	+60.0'	59.8°	6°30.0'	+60.0'	59.9°	7°00.0'	+60.0'	62.8°	7
8	4°58.3'	+59.8'	59.4°	5°28.8'	+59.8'	59.5°	5°59.2'	+59.9'	59.6°	6°29.5'	+59.9'	59.7°	6°59.8'	+60.0'	59.8°	7°29.9'	+60.0'	59.9°	8°00.0'	+60.0'	23.8°	8
9	5°58.0'	+59.8'	59.3°	6°28.6'	+59.8'	59.4°	6°59.1'	+59.9'	59.5°	7°29.5'	+59.9'	59.6°	7°59.8'	+60.0'	59.7°	8°29.9'	+60.0'	59.9°	9°00.0'	+60.0'	90.0°	9
10	6°57.8'	+59.7'	59.2°	7°28.4'	+59.8'	59.3°	7°59.0'	+59.9'	59.5°	8°29.4'	+59.9'	59.6°	8°59.7'	+60.0'	59.7°	9°29.9'	+60.0'	59.9°	10°00.0'	+60.0'	62.6°	10
11	7°57.5'	+59.7'	59.1°	8°28.2'	+59.8'	59.3°	8°58.9'	+59.9'	59.4°	9°29.3'	+59.9'	59.5°	9°59.7'	+60.0'	59.7°	10°29.9'	+60.0'	59.8°	11°00.0'	+60.0'	62.5°	11
12	8°57.3'	+59.7'	59.0°	9°28.1'	+59.8'	59.2°	9°58.7'	+59.9'	59.3°	10°29.3'	+59.9'	59.5°	10°59.7'	+60.0'	59.6°	11°29.9'	+60.0'	59.8°	12°00.0'	+60.0'	90.0°	12
13	9°57.0'	+59.7'	58.9°	10°27.9'	+59.8'	59.1°	10°58.6'	+59.9'	59.3°	11°29.2'	+59.9'	59.4°	11°59.6'	+60.0'	59.6°	12°29.9'	+60.0'	59.8°	13°00.0'	+60.0'	90.0°	13
14	10°56.8'	+59.7'	58.9°	11°27.7'	+59.8'	59.0°	11°58.5'	+59.9'	59.2°	12°29.2'	+59.9'	59.4°	12°59.6'	+60.0'	59.6°	13°29.9'	+60.0'	59.8°	14°00.0'	+60.0'	20.9°	14
15	11°56.5'	+59.7'	58.8°	12°27.5'	+59.8'	58.9°	12°58.4'	+59.9'	59.1°	13°29.1'	+59.9'	59.3°	13°59.6'	+60.0'	59.6°	14°29.9'	+60.0'	59.8°	15°00.0'	+60.0'	20.3°	15
16	12°56.2'	+59.7'	58.7°	13°27.4'	+59.8'	58.9°	13°58.3'	+59.9'	59.1°	14°29.0'	+59.9'	59.3°	14°59.6'	+60.0'	59.5°	15°29.9'	+60.0'	59.8°	16°00.0'	+60.0'	19.5°	16
17	13°56.0'	+59.7'	58.6°	14°27.2'	+59.8'	58.8°	14°58.2'	+59.9'	59.0°	15°29.0'	+59.9'	59.2°	15°59.5'	+60.0'	59.5°	16°29.9'	+60.0'	59.7°	17°00.0'	+60.0'	18.6°	17
18	14°55.7'	+59.7'	58.5°	15°27.0'	+59.8'	58.7°	15°58.1'	+59.9'	58.9°	16°28.9'	+59.9'	59.2°	16°59.5'	+60.0'	59.5°	17°29.9'	+60.0'	59.7°	18°00.0'	+60.0'	17.7°	18
19	15°55.5'	+59.7'	58.4°	16°26.8'	+59.8'	58.6°	16°57.9'	+59.9'	58.9°	17°28.8'	+59.9'	59.1°	17°59.5'	+60.0'	59.4°	18°29.9'	+60.0'	59.7°	19°00.0'	+60.0'	16.6°	19
20	16°55.2'	+59.7'	58.3°	17°26.6'	+59.8'	58.5°	17°57.8'	+59.9'	58.8°	18°28.8'	+59.9'	59.1°	18°59.4'	+60.0'	59.4°	19°29.9'	+60.0'	59.7°	20°00.0'	+60.0'	15.3°	20
21	17°54.9'	+59.7'	58.2°	18°26.4'	+59.8'	58.5°	18°57.7'	+59.9'	58.7°	19°28.7'	+59.9'	59.0°	19°59.4'	+60.0'	59.4°	20°29.9'	+60.0'	59.7°	21°00.0'	+60.0'	13.9°	21
22	18°54.6'	+59.7'	58.1°	19°26.2'	+59.8'	58.4°	19°57.6'	+59.9'	58.7°	20°28.6'	+59.9'	59.0°	20°59.4'	+60.0'	59.3°	21°29.8'	+60.0'	59.7°	22°00.0'	+60.0'	12.2°	22
23	19°54.4'	+59.7'	58.0°	20°26.0'	+59.8'	58.3°	20°57.4'	+59.9'	58.6°	21°28.5'	+59.9'	58.9°	21°59.3'	+60.0'	59.3°	22°29.8'	+60.0'	59.6°	23°00.0'	+60.0'	90.0°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

120° 240° LHA

Latitude SAME as DECLINATION

120° 240° 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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	3°05.1'	-59.8'	120.9°	2°34.4'	-59.8'	120.9°	2°03.5'	-59.9'	120.9°	1°32.7'	-59.9'	121.0°	1°01.8'	-60.0'	121.0°	0°30.9'	-60.0'	121.0°	0°00.0'	-60.0'	121.0°	0
1	2°05.4'	-59.8'	121.0°	1°34.5'	-59.8'	121.0°	1°03.6'	-59.9'	121.0°	0°32.7'	-59.9'	121.0°	0°01.8'	-60.0'	121.0°	0°29.1'	+60.0'	59.0°	0°60.0'	+60.0'	59.3°	1
2	1°05.6'	-59.8'	121.0°	0°34.7'	-59.8'	121.1°	0°03.8'	-59.9'	121.1°	0°27.2'	+59.9'	58.9°	0°58.2'	+60.0'	59.0°	1°29.1'	+60.0'	59.0°	2°00.0'	+60.0'	55.5°	2
3	0°05.9'	-59.8'	121.1°	0°25.1'	+59.8'	58.9°	0°56.1'	+59.9'	58.9°	1°27.1'	+59.9'	58.9°	1°58.1'	+60.0'	58.9°	2°29.1'	+60.0'	59.0°	3°00.0'	+60.0'	63.0°	3
4	0°53.9'	+59.8'	58.8°	1°25.0'	+59.8'	58.8°	1°56.0'	+59.9'	58.8°	2°27.1'	+59.9'	58.9°	2°58.1'	+60.0'	58.9°	3°29.1'	+60.0'	58.9°	4°00.0'	+60.0'	63.0°	4
5	1°53.6'	+59.8'	58.7°	2°24.8'	+59.8'	58.7°	2°55.9'	+59.9'	58.8°	3°27.0'	+59.9'	58.8°	3°58.1'	+60.0'	58.9°	4°29.1'	+60.0'	58.9°	5°00.0'	+60.0'	62.9°	5
6	2°53.4'	+59.8'	58.6°	3°24.6'	+59.8'	58.6°	3°55.8'	+59.9'	58.7°	4°27.0'	+59.9'	58.8°	4°58.0'	+60.0'	58.8°	5°29.1'	+60.0'	58.9°	6°00.0'	+60.0'	62.9°	6
7	3°53.1'	+59.8'	58.5°	4°24.5'	+59.8'	58.6°	4°55.7'	+59.9'	58.6°	5°26.9'	+59.9'	58.7°	5°58.0'	+60.0'	58.8°	6°29.1'	+60.0'	58.9°	7°00.0'	+60.0'	62.8°	7
8	4°52.9'	+59.8'	58.4°	5°24.3'	+59.8'	58.5°	5°55.6'	+59.9'	58.6°	6°26.8'	+59.9'	58.7°	6°58.0'	+60.0'	58.8°	7°29.0'	+60.0'	58.9°	8°00.0'	+60.0'	23.8°	8
9	5°52.7'	+59.8'	58.3°	6°24.1'	+59.8'	58.4°	6°55.5'	+59.9'	58.5°	7°26.8'	+59.9'	58.6°	7°58.0'	+60.0'	58.7°	8°29.0'	+60.0'	58.9°	9°00.0'	+60.0'	90.0°	9
10	6°52.4'	+59.8'	58.2°	7°23.9'	+59.8'	58.3°	7°55.4'	+59.9'	58.5°	8°26.7'	+59.9'	58.6°	8°57.9'	+60.0'	58.7°	9°29.0'	+60.0'	58.9°	10°00.0'	+60.0'	62.6°	10
11	7°52.2'	+59.8'	58.1°	8°23.8'	+59.8'	58.3°	8°55.3'	+59.9'	58.4°	9°26.7'	+59.9'	58.5°	9°57.9'	+60.0'	58.7°	10°29.0'	+60.0'	58.8°	11°00.0'	+60.0'	62.5°	11
12	8°51.9'	+59.8'	58.1°	9°23.6'	+59.8'	58.2°	9°55.2'	+59.9'	58.3°	10°26.6'	+59.9'	58.5°	10°57.9'	+60.0'	58.7°	11°29.0'	+60.0'	58.8°	12°00.0'	+60.0'	90.0°	12
13	9°51.7'	+59.8'	58.0°	10°23.4'	+59.8'	58.1°	10°55.1'	+59.9'	58.3°	11°26.5'	+59.9'	58.4°	11°57.9'	+60.0'	58.6°	12°29.0'	+60.0'	58.8°	13°00.0'	+60.0'	90.0°	13
14	10°51.4'	+59.7'	57.9°	11°23.3'	+59.8'	58.0°	11°54.9'	+59.9'	58.2°	12°26.5'	+59.9'	58.4°	12°57.8'	+60.0'	58.6°	13°29.0'	+60.0'	58.8°	14°00.0'	+60.0'	20.9°	14
15	11°51.2'	+59.7'	57.8°	12°23.1'	+59.8'	58.0°	12°54.8'	+59.9'	58.2°	13°26.4'	+59.9'	58.4°	13°57.8'	+60.0'	58.6°	14°29.0'	+60.0'	58.8°	15°00.0'	+60.0'	20.3°	15
16	12°50.9'	+59.7'	57.7°	13°22.9'	+59.8'	57.9°	13°54.7'	+59.9'	58.1°	14°26.3'	+59.9'	58.3°	14°57.8'	+60.0'	58.5°	15°29.0'	+60.0'	58.8°	16°00.0'	+60.0'	19.5°	16
17	13°50.7'	+59.7'	57.6°	14°22.7'	+59.8'	57.8°	14°54.6'	+59.9'	58.0°	15°26.3'	+59.9'	58.3°	15°57.7'	+60.0'	58.5°	16°29.0'	+60.0'	58.7°	17°00.0'	+60.0'	18.6°	17
18	14°50.4'	+59.7'	57.5°	15°22.6'	+59.8'	57.7°	15°54.5'	+59.9'	58.0°	16°26.2'	+59.9'	58.2°	16°57.7'	+60.0'	58.5°	17°29.0'	+60.0'	58.7°	18°00.0'	+60.0'	17.7°	18
19	15°50.1'	+59.7'	57.4°	16°22.4'	+59.8'	57.6°	16°54.4'	+59.9'	57.9°	17°26.1'	+59.9'	58.2°	17°57.7'	+60.0'	58.4°	18°29.0'	+60.0'	58.7°	19°00.0'	+60.0'	16.6°	19
20	16°49.9'	+59.7'	57.3°	17°22.2'	+59.8'	57.6°	17°54.3'	+59.9'	57.8°	18°26.1'	+59.9'	58.1°	18°57.6'	+60.0'	58.4°	19°29.0'	+60.0'	58.7°	20°00.0'	+60.0'	15.3°	20
21	17°49.6'	+59.7'	57.2°	18°22.0'	+59.8'	57.5°	18°54.1'	+59.9'	57.8°	19°26.0'	+59.9'	58.1°	19°57.6'	+60.0'	58.4°	20°29.0'	+60.0'	58.7°	21°00.0'	+60.0'	13.9°	21
22	18°49.4'	+59.7'	57.1°	19°21.8'	+59.8'	57.4°	19°54.0'	+59.9'	57.7°	20°25.9'	+59.9'	58.0°	20°57.6'	+60.0'	58.3°	21°28.9'	+60.0'	58.7°	22°0			

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

58° 302° LHA

Latitude CONTRARY to Declination

58° 302° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	3°10.5'	-59.8'	121.9°	2°38.8'	-59.8'	121.9°	2°07.1'	-59.9'	121.9°	1°35.4'	-59.9'	122.0°	1°03.6'	-60.0'	122.0°	0°31.8'	-60.0'	122.0°	0°00.0'	-60.0'	122.0°	0
1	2°10.7'	-59.8'	121.9°	1°39.0'	-59.8'	122.0°	1°07.2'	-59.9'	122.0°	0°35.4'	-59.9'	122.0°	0°03.6'	-60.0'	122.0°	0°28.2'	+60.0'	58.0°	0°60.0'	+60.0'	59.3°	1
2	1°10.9'	-59.8'	122.0°	0°39.2'	-59.8'	122.0°	0°07.3'	-59.9'	122.1°	0°24.5'	+59.9'	57.9°	0°56.4'	+60.0'	58.0°	1°28.2'	+60.0'	58.0°	2°00.0'	+60.0'	55.5°	2
3	0°11.2'	-59.8'	122.1°	0°20.7'	+59.8'	57.9°	0°52.6'	+59.9'	57.9°	1°24.5'	+59.9'	57.9°	1°56.3'	+60.0'	57.9°	2°28.2'	+60.0'	58.0°	3°00.0'	+60.0'	63.0°	3
4	0°48.5'	+59.8'	57.8°	1°20.5'	+59.8'	57.8°	1°52.5'	+59.9'	57.8°	2°24.4'	+59.9'	57.9°	2°56.3'	+60.0'	57.9°	3°28.2'	+60.0'	57.9°	4°00.0'	+60.0'	63.0°	4
5	1°48.3'	+59.8'	57.7°	2°20.3'	+59.8'	57.7°	2°52.4'	+59.9'	57.8°	3°24.3'	+59.9'	57.8°	3°56.3'	+60.0'	57.9°	4°28.2'	+60.0'	57.9°	5°00.0'	+60.0'	62.9°	5
6	2°48.1'	+59.8'	57.6°	3°20.2'	+59.8'	57.7°	3°52.3'	+59.9'	57.7°	4°24.3'	+59.9'	57.8°	4°56.3'	+60.0'	57.8°	5°28.2'	+60.0'	57.9°	6°00.0'	+60.0'	62.9°	6
7	3°47.8'	+59.8'	57.5°	4°20.0'	+59.8'	57.6°	4°52.2'	+59.9'	57.6°	5°24.2'	+59.9'	57.7°	5°56.2'	+60.0'	57.8°	6°28.2'	+60.0'	57.9°	7°00.0'	+60.0'	62.8°	7
8	4°47.6'	+59.8'	57.4°	5°19.9'	+59.8'	57.5°	5°52.1'	+59.9'	57.6°	6°24.2'	+59.9'	57.7°	6°56.2'	+60.0'	57.8°	7°28.2'	+60.0'	57.9°	8°00.0'	+60.0'	23.8°	8
9	5°47.3'	+59.8'	57.3°	6°19.7'	+59.8'	57.4°	6°51.9'	+59.9'	57.5°	7°24.1'	+59.9'	57.6°	7°56.2'	+60.0'	57.7°	8°28.1'	+60.0'	57.9°	9°00.0'	+60.0'	90.0°	9
10	6°47.1'	+59.8'	57.3°	7°19.5'	+59.8'	57.4°	7°51.8'	+59.9'	57.5°	8°24.1'	+59.9'	57.6°	8°56.2'	+60.0'	57.7°	9°28.1'	+60.0'	57.9°	10°00.0'	+60.0'	62.6°	10
11	7°46.9'	+59.8'	57.2°	8°19.4'	+59.8'	57.3°	8°51.7'	+59.9'	57.4°	9°24.0'	+59.9'	57.5°	9°56.1'	+60.0'	57.7°	10°28.1'	+60.0'	57.8°	11°00.0'	+60.0'	62.5°	11
12	8°46.6'	+59.8'	57.1°	9°19.2'	+59.8'	57.2°	9°51.6'	+59.9'	57.3°	10°23.9'	+59.9'	57.5°	10°56.1'	+60.0'	57.7°	11°28.1'	+60.0'	57.8°	12°00.0'	+60.0'	90.0°	12
13	9°46.4'	+59.8'	57.0°	10°19.0'	+59.8'	57.1°	10°51.5'	+59.9'	57.3°	11°23.9'	+59.9'	57.5°	11°56.1'	+60.0'	57.6°	12°28.1'	+60.0'	57.8°	13°00.0'	+60.0'	90.0°	13
14	10°46.1'	+59.8'	56.9°	11°18.8'	+59.8'	57.1°	11°51.4'	+59.9'	57.2°	12°23.8'	+59.9'	57.4°	12°56.0'	+60.0'	57.6°	13°28.1'	+60.0'	57.8°	14°00.0'	+60.0'	20.9°	14
15	11°45.9'	+59.8'	56.8°	12°18.7'	+59.8'	57.0°	12°51.3'	+59.9'	57.2°	13°23.7'	+59.9'	57.4°	13°56.0'	+60.0'	57.6°	14°28.1'	+60.0'	57.8°	15°00.0'	+60.0'	20.3°	15
16	12°45.6'	+59.8'	56.7°	13°18.5'	+59.8'	56.9°	13°51.2'	+59.9'	57.1°	14°23.7'	+59.9'	57.3°	14°56.0'	+60.0'	57.5°	15°28.1'	+60.0'	57.8°	16°00.0'	+60.0'	19.5°	16
17	13°45.4'	+59.7'	56.6°	14°18.3'	+59.8'	56.8°	14°51.1'	+59.9'	57.0°	15°23.6'	+59.9'	57.3°	15°56.0'	+60.0'	57.5°	16°28.1'	+60.0'	57.7°	17°00.0'	+60.0'	18.6°	17
18	14°45.1'	+59.7'	56.5°	15°18.2'	+59.8'	56.7°	15°51.0'	+59.9'	57.0°	16°23.6'	+59.9'	57.2°	16°55.9'	+60.0'	57.5°	17°28.1'	+60.0'	57.7°	18°00.0'	+60.0'	17.7°	18
19	15°44.9'	+59.7'	56.4°	16°18.0'	+59.8'	56.7°	16°50.8'	+59.9'	56.9°	17°23.5'	+59.9'	57.2°	17°55.9'	+60.0'	57.4°	18°28.1'	+60.0'	57.7°	19°00.0'	+60.0'	16.6°	19
20	16°44.6'	+59.7'	56.3°	17°17.8'	+59.8'	56.6°	17°50.7'	+59.9'	56.8°	18°23.4'	+59.9'	57.1°	18°55.9'	+60.0'	57.4°	19°28.1'	+60.0'	57.7°	20°00.0'	+60.0'	15.3°	20
21	17°44.4'	+59.7'	56.2°	18°17.6'	+59.8'	56.5°	18°50.6'	+59.9'	56.8°	19°23.4'	+59.9'	57.1°	19°55.8'	+60.0'	57.4°	20°28.1'	+60.0'	57.7°	21°00.0'	+60.0'	13.9°	21
22	18°44.1'	+59.7'	56.1°	19°17.4'	+59.8'	56.4°	19°50.5'	+59.9'	56.7°	20°23.3'	+59.9'	57.0°	20°55.8'	+60.0'	57.3°	21°28.1'	+60.0'	57.7°	22°00.0'	+60.0'	12.2°	22
23	19°43.9'	+59.7'	56.0°	20°17.2'	+59.8'	56.3°	20°50.4'	+59.9'	56.6°	21°23.2'	+59.9'	57.0°	21°55.8'	+60.0'	57.3°	22°28.0'	+60.0'	57.6°	23°00.0'	+60.0'	90.0°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

122° 238° LHA

Latitude SAME as DECLINATION

122° 238° 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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	3°15.8'	-59.8'	122.9°	2°43.2'	-59.8'	122.9°	2°10.6'	-59.9'	122.9°	1°38.0'	-59.9'	123.0°	1°05.3'	-60.0'	123.0°	0°32.7'	-60.0'	123.0°	0°00.0'	-60.0'	123.0°	0
1	2°16.0'	-59.8'	122.9°	1°43.4'	-59.8'	123.0°	1°10.7'	-59.9'	123.0°	0°38.1'	-59.9'	123.0°	0°05.4'	-60.0'	123.0°	0°27.3'	+60.0'	57.0°	0°60.0'	+60.0'	55.5°	1
2	1°16.2'	-59.8'	123.0°	0°43.6'	-59.8'	123.0°	0°10.8'	-59.9'	123.1°	0°21.9'	+59.9'	56.9°	0°54.6'	+60.0'	57.0°	1°27.3'	+60.0'	57.0°	2°00.0'	+60.0'	55.5°	2
3	0°16.5'	-59.8'	123.1°	0°16.3'	+59.8'	56.9°	0°49.1'	+59.9'	56.9°	1°21.8'	+59.9'	56.9°	1°54.6'	+60.0'	56.9°	2°27.3'	+60.0'	57.0°	3°00.0'	+60.0'	63.0°	3
4	0°43.3'	+59.8'	56.8°	1°16.1'	+59.8'	56.8°	1°49.0'	+59.9'	56.8°	2°21.8'	+59.9'	56.9°	2°54.5'	+60.0'	56.9°	3°27.3'	+60.0'	56.9°	4°00.0'	+60.0'	63.0°	4
5	1°43.0'	+59.8'	56.7°	2°16.0'	+59.8'	56.7°	2°48.8'	+59.9'	56.8°	3°21.7'	+59.9'	56.8°	3°54.5'	+60.0'	56.9°	4°27.3'	+60.0'	56.9°	5°00.0'	+60.0'	62.9°	5
6	2°42.8'	+59.8'	56.6°	3°15.8'	+59.8'	56.7°	3°48.7'	+59.9'	56.7°	4°21.6'	+59.9'	56.8°	4°54.5'	+60.0'	56.8°	5°27.3'	+60.0'	56.9°	6°00.0'	+60.0'	62.9°	6
7	3°42.6'	+59.8'	56.5°	4°15.6'	+59.8'	56.6°	4°48.6'	+59.9'	56.7°	5°21.6'	+59.9'	56.7°	5°54.5'	+60.0'	56.8°	6°27.3'	+60.0'	56.9°	7°00.0'	+60.0'	62.8°	7
8	4°42.3'	+59.8'	56.4°	5°15.5'	+59.8'	56.5°	5°48.5'	+59.9'	56.6°	6°21.5'	+59.9'	56.7°	6°54.4'	+60.0'	56.8°	7°27.3'	+60.0'	56.9°	8°00.0'	+60.0'	23.8°	8
9	5°42.1'	+59.8'	56.4°	6°15.3'	+59.8'	56.4°	6°48.4'	+59.9'	56.5°	7°21.5'	+59.9'	56.6°	7°54.4'	+60.0'	56.8°	8°27.3'	+60.0'	56.9°	9°00.0'	+60.0'	90.0°	9
10	6°41.9'	+59.8'	56.3°	7°15.1'	+59.8'	56.4°	7°48.3'	+59.9'	56.5°	8°21.4'	+59.9'	56.6°	8°54.4'	+60.0'	56.7°	9°27.3'	+60.0'	56.9°	10°00.0'	+60.0'	62.6°	10
11	7°41.6'	+59.8'	56.2°	8°15.0'	+59.8'	56.3°	8°48.2'	+59.9'	56.4°	9°21.4'	+59.9'	56.5°	9°54.4'	+60.0'	56.7°	10°27.3'	+60.0'	56.8°	11°00.0'	+60.0'	62.5°	11
12	8°41.4'	+59.8'	56.1°	9°14.8'	+59.8'	56.2°	9°48.1'	+59.9'	56.4°	10°21.3'	+59.9'	56.5°	10°54.3'	+60.0'	56.7°	11°27.2'	+60.0'	56.8°	12°00.0'	+60.0'	90.0°	12
13	9°41.2'	+59.8'	56.0°	10°14.6'	+59.8'	56.1°	10°48.0'	+59.9'	56.3°	11°21.2'	+59.9'	56.5°	11°54.3'	+60.0'	56.6°	12°27.2'	+60.0'	56.8°	13°00.0'	+60.0'	90.0°	13
14	10°40.9'	+59.8'	55.9°	11°14.5'	+59.8'	56.1°	11°47.9'	+59.9'	56.2°	12°21.2'	+59.9'	56.4°	12°54.3'	+60.0'	56.6°	13°27.2'	+60.0'	56.8°	14°00.0'	+60.0'	20.9°	14
15	11°40.7'	+59.8'	55.8°	12°14.3'	+59.8'	56.0°	12°47.8'	+59.9'	56.2°	13°21.1'	+59.9'	56.4°	13°54.3'	+60.0'	56.6°	14°27.2'	+60.0'	56.8°	15°00.0'	+60.0'	20.3°	15
16	12°40.4'	+59.8'	55.7°	13°14.1'	+59.8'	55.9°	13°47.7'	+59.9'	56.1°	14°21.1'	+59.9'	56.3°	14°54.2'	+60.0'	56.5°	15°27.2'	+60.0'	56.8°	16°00.0'	+60.0'	19.5°	16
17	13°40.2'	+59.8'	55.6°	14°14.0'	+59.8'	55.8°	14°47.6'	+59.9'	56.0°	15°21.0'	+59.9'	56.3°	15°54.2'	+60.0'	56.5°	16°27.2'	+60.0'	56.7°	17°00.0'	+60.0'	18.6°	17
18	14°39.9'	+59.8'	55.5°	15°13.8'	+59.8'	55.8°	15°47.5'	+59.9'	56.0°	16°20.9'	+59.9'	56.2°	16°54.2'	+60.0'	56.5°	17°27.2'	+60.0'	56.7°	18°00.0'	+60.0'	17.7°	18
19	15°39.7'	+59.7'	55.4°	16°13.6'	+59.8'	55.7°	16°47.4'	+59.9'	55.9°	17°20.9'	+59.9'	56.2°	17°54.1'	+60.0'	56.4°	18°27.2'	+60.0'	56.7°	19°00.0'	+60.0'	16.6°	19
20	16°39.4'	+59.7'	55.3°	17°13.5'	+59.8'	55.6°	17°47.2'	+59.9'	55.9°	18°20.8'	+59.9'	56.1°	18°54.1'	+60.0'	56.4°	19°27.2'	+60.0'	56.7°	20°00.0'	+60.0'	15.3°	20
21	17°39.2'	+59.7'	55.3°	18°13.3'	+59.8'	55.5°	18°47.1'	+59.9'	55.8°	19°20.7'	+59.9'	56.1°	19°54.1'	+60.0'	56.4°	20°27.2'	+60.0'	56.7°	21°00.0'	+60.0'	13.9°	21
22	18°38.9'	+59.7'	55.2°	19°13.1'	+59.8'	55.4°	19°47.0'	+59.9'	55.7°	20°20.7'	+59.9'	56.0°	20°54.1'	+60.0'	56.3°	21°27.2'	+60.0'	56.7°</				

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

56° 304° LHA

Latitude CONTRARY to Declination

56° 304° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	3°21.0'	-59.8'	123.9°	2°47.6'	-59.8'	123.9°	2°14.1'	-59.9'	123.9°	1°40.6'	-59.9'	124.0°	1°07.1'	-60.0'	124.0°	<u>0°33.6'</u>	<u>-60.0'</u>	<u>124.0°</u>	<u>0°00.0'</u>	<u>-60.0'</u>	<u>124.0°</u>	0
1	2°21.2'	-59.8'	123.9°	1°47.8'	-59.8'	124.0°	1°14.2'	-59.9'	124.0°	<u>0°40.7'</u>	<u>-59.9'</u>	<u>124.0°</u>	<u>0°07.1'</u>	<u>-60.0'</u>	<u>124.0°</u>	0°26.4'	+60.0'	56.0°	0°60.0'	+60.0'	55.5°	1
2	1°21.5'	-59.8'	124.0°	<u>0°47.9'</u>	<u>-59.8'</u>	<u>124.0°</u>	<u>0°14.3'</u>	<u>-59.9'</u>	<u>124.1°</u>	0°19.3'	+59.9'	55.9°	0°52.9'	+60.0'	56.0°	1°26.4'	+60.0'	56.0°	2°00.0'	+60.0'	55.5°	2
3	<u>0°21.7'</u>	<u>-59.8'</u>	<u>124.1°</u>	0°11.9'	+59.8'	55.9°	0°45.6'	+59.9'	55.9°	1°19.2'	+59.9'	55.9°	1°52.8'	+60.0'	55.9°	2°26.4'	+60.0'	56.0°	3°00.0'	+60.0'	63.0°	3
4	0°38.0'	+59.8'	55.8°	1°11.8'	+59.8'	55.8°	1°45.5'	+59.9'	55.8°	2°19.2'	+59.9'	55.9°	2°52.8'	+60.0'	55.9°	3°26.4'	+60.0'	55.9°	4°00.0'	+60.0'	63.0°	4
5	1°37.8'	+59.8'	55.7°	2°11.6'	+59.8'	55.7°	2°45.4'	+59.9'	55.8°	3°19.1'	+59.9'	55.8°	3°52.8'	+60.0'	55.9°	4°26.4'	+60.0'	55.9°	5°00.0'	+60.0'	62.9°	5
6	2°37.6'	+59.8'	55.6°	3°11.4'	+59.8'	55.7°	3°45.3'	+59.9'	55.7°	4°19.0'	+59.9'	55.8°	4°52.8'	+60.0'	55.8°	5°26.4'	+60.0'	55.9°	6°00.0'	+60.0'	62.9°	6
7	3°37.4'	+59.8'	55.5°	4°11.3'	+59.8'	55.6°	4°45.2'	+59.9'	55.7°	5°19.0'	+59.9'	55.7°	5°52.7'	+60.0'	55.8°	6°26.4'	+60.0'	55.9°	7°00.0'	+60.0'	62.8°	7
8	4°37.1'	+59.8'	55.5°	5°11.1'	+59.8'	55.5°	5°45.1'	+59.9'	55.6°	6°18.9'	+59.9'	55.7°	6°52.7'	+60.0'	55.8°	7°26.4'	+60.0'	55.9°	8°00.0'	+60.0'	23.8°	8
9	5°36.9'	+59.8'	55.4°	6°11.0'	+59.8'	55.4°	6°45.0'	+59.9'	55.5°	7°18.9'	+59.9'	55.6°	7°52.7'	+60.0'	55.8°	8°26.4'	+60.0'	55.9°	9°00.0'	+60.0'	90.0°	9
10	6°36.7'	+59.8'	55.3°	7°10.8'	+59.8'	55.4°	7°44.9'	+59.9'	55.5°	8°18.8'	+59.9'	55.6°	8°52.7'	+60.0'	55.7°	9°26.4'	+60.0'	55.9°	10°00.0'	+60.0'	62.6°	10
11	7°36.4'	+59.8'	55.2°	8°10.7'	+59.8'	55.3°	8°44.8'	+59.9'	55.4°	9°18.8'	+59.9'	55.6°	9°52.6'	+60.0'	55.7°	10°26.4'	+60.0'	55.8°	11°00.0'	+60.0'	62.5°	11
12	8°36.2'	+59.8'	55.1°	9°10.5'	+59.8'	55.2°	9°44.7'	+59.9'	55.4°	10°18.7'	+59.9'	55.5°	10°52.6'	+60.0'	55.7°	11°26.4'	+60.0'	55.8°	12°00.0'	+60.0'	90.0°	12
13	9°36.0'	+59.8'	55.0°	10°10.3'	+59.8'	55.2°	10°44.6'	+59.9'	55.3°	11°18.6'	+59.9'	55.5°	11°52.6'	+60.0'	55.6°	12°26.4'	+60.0'	55.8°	13°00.0'	+60.0'	90.0°	13
14	10°35.8'	+59.8'	54.9°	11°10.2'	+59.8'	55.1°	11°44.4'	+59.9'	55.2°	12°18.6'	+59.9'	55.4°	12°52.5'	+60.0'	55.6°	13°26.4'	+60.0'	55.8°	14°00.0'	+60.0'	20.9°	14
15	11°35.5'	+59.8'	54.8°	12°10.0'	+59.8'	55.0°	12°44.3'	+59.9'	55.2°	13°18.5'	+59.9'	55.4°	13°52.5'	+60.0'	55.6°	14°26.4'	+60.0'	55.8°	15°00.0'	+60.0'	20.3°	15
16	12°35.3'	+59.8'	54.7°	13°09.8'	+59.8'	54.9°	13°44.2'	+59.9'	55.1°	14°18.5'	+59.9'	55.3°	14°52.5'	+60.0'	55.5°	15°26.3'	+60.0'	55.8°	16°00.0'	+60.0'	19.5°	16
17	13°35.0'	+59.8'	54.6°	14°09.7'	+59.8'	54.9°	14°44.1'	+59.9'	55.1°	15°18.4'	+59.9'	55.3°	15°52.5'	+60.0'	55.5°	16°26.3'	+60.0'	55.8°	17°00.0'	+60.0'	18.6°	17
18	14°34.8'	+59.8'	54.6°	15°09.5'	+59.8'	54.8°	15°44.0'	+59.9'	55.0°	16°18.3'	+59.9'	55.2°	16°52.4'	+60.0'	55.5°	17°26.3'	+60.0'	55.7°	18°00.0'	+60.0'	17.7°	18
19	15°34.6'	+59.8'	54.5°	16°09.3'	+59.8'	54.7°	16°43.9'	+59.9'	54.9°	17°18.3'	+59.9'	55.2°	17°52.4'	+60.0'	55.4°	18°26.3'	+60.0'	55.7°	19°00.0'	+60.0'	16.6°	19
20	16°34.3'	+59.8'	54.4°	17°09.2'	+59.8'	54.6°	17°43.8'	+59.9'	54.9°	18°18.2'	+59.9'	55.1°	18°52.4'	+60.0'	55.4°	19°26.3'	+60.0'	55.7°	20°00.0'	+60.0'	15.3°	20
21	17°34.1'	+59.8'	54.3°	18°09.0'	+59.8'	54.5°	18°43.7'	+59.9'	54.8°	19°18.1'	+59.9'	55.1°	19°52.3'	+60.0'	55.4°	20°26.3'	+60.0'	55.7°	21°00.0'	+60.0'	13.9°	21
22	18°33.8'	+59.7'	54.2°	19°08.8'	+59.8'	54.5°	19°43.6'	+59.9'	54.7°	20°18.1'	+59.9'	55.0°	20°52.3'	+60.0'	55.4°	21°26.3'	+60.0'	55.7°	22°00.0'	+60.0'	12.2°	22
23	19°33.6'	+59.7'	54.1°	20°08.6'	+59.8'	54.4°	20°43.5'	+59.9'	54.7°	21°18.0'	+59.9'	55.0°	21°52.3'	+60.0'	55.3°	22°26.3'	+60.0'	55.7°	23°00.0'	+60.0'	90.0°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

124° 236° LHA

Latitude SAME as DECLINATION

124° 236° 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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	3°26.2'	-59.8'	124.9°	2°51.9'	-59.8'	124.9°	2°17.6'	-59.9'	124.9°	1°43.2'	-59.9'	125.0°	1°08.8'	-60.0'	125.0°	<u>0°34.4'</u>	<u>-60.0'</u>	<u>125.0°</u>	<u>0°00.0'</u>	<u>-60.0'</u>	<u>125.0°</u>	0
1	2°26.4'	-59.8'	124.9°	1°52.1'	-59.8'	125.0°	1°17.7'	-59.9'	125.0°	<u>0°43.3'</u>	<u>-59.9'</u>	<u>125.0°</u>	<u>0°08.8'</u>	<u>-60.0'</u>	<u>125.0°</u>	0°25.6'	+60.0'	55.0°	0°60.0'	+60.0'	55.5°	1
2	1°26.6'	-59.8'	125.0°	<u>0°52.2'</u>	<u>-59.8'</u>	<u>125.0°</u>	<u>0°17.8'</u>	<u>-59.9'</u>	<u>125.0°</u>	0°16.7'	+59.9'	55.0°	0°51.1'	+60.0'	55.0°	1°25.6'	+60.0'	55.0°	2°00.0'	+60.0'	55.5°	2
3	<u>0°26.9'</u>	<u>-59.8'</u>	<u>125.1°</u>	0°07.6'	+59.8'	54.9°	0°42.1'	+59.9'	54.9°	1°16.6'	+59.9'	54.9°	1°51.1'	+60.0'	54.9°	2°25.6'	+60.0'	55.0°	3°00.0'	+60.0'	63.0°	3
4	0°32.9'	+59.8'	54.8°	1°07.5'	+59.8'	54.8°	1°42.0'	+59.9'	54.8°	2°16.6'	+59.9'	54.9°	2°51.1'	+60.0'	54.9°	3°25.6'	+60.0'	54.9°	4°00.0'	+60.0'	47.1°	4
5	1°32.7'	+59.8'	54.7°	2°07.3'	+59.8'	54.7°	2°41.9'	+59.9'	54.8°	3°16.5'	+59.9'	54.8°	3°51.1'	+60.0'	54.9°	4°25.6'	+60.0'	54.9°	5°00.0'	+60.0'	47.0°	5
6	2°32.4'	+59.8'	54.6°	3°07.2'	+59.8'	54.7°	3°41.8'	+59.9'	54.8°	4°16.5'	+59.9'	54.8°	4°51.0'	+60.0'	54.8°	5°25.5'	+60.0'	54.9°	6°00.0'	+60.0'	46.9°	6
7	3°32.2'	+59.8'	54.5°	4°07.0'	+59.8'	54.6°	4°41.7'	+59.9'	54.7°	5°16.4'	+59.9'	54.7°	5°51.0'	+60.0'	54.8°	6°25.5'	+60.0'	54.9°	7°00.0'	+60.0'	46.8°	7
8	4°32.0'	+59.8'	54.5°	5°06.8'	+59.8'	54.5°	5°41.6'	+59.9'	54.6°	6°16.3'	+59.9'	54.7°	6°51.0'	+60.0'	54.8°	7°25.5'	+60.0'	54.9°	8°00.0'	+60.0'	23.8°	8
9	5°31.8'	+59.8'	54.4°	6°06.7'	+59.8'	54.5°	6°41.5'	+59.9'	54.5°	7°16.3'	+59.9'	54.6°	7°51.0'	+60.0'	54.8°	8°25.5'	+60.0'	54.9°	9°00.0'	+60.0'	90.0°	9
10	6°31.6'	+59.8'	54.3°	7°06.5'	+59.8'	54.4°	7°41.4'	+59.9'	54.5°	8°16.2'	+59.9'	54.6°	8°50.9'	+60.0'	54.7°	9°25.5'	+60.0'	54.9°	10°00.0'	+60.0'	62.6°	10
11	7°31.3'	+59.8'	54.2°	8°06.4'	+59.8'	54.3°	8°41.3'	+59.9'	54.4°	9°16.2'	+59.9'	54.6°	9°50.9'	+60.0'	54.7°	10°25.5'	+60.0'	54.8°	11°00.0'	+60.0'	62.5°	11
12	8°31.1'	+59.8'	54.1°	9°06.2'	+59.8'	54.2°	9°41.2'	+59.9'	54.4°	10°16.1'	+59.9'	54.5°	10°50.9'	+60.0'	54.7°	11°25.5'	+60.0'	54.8°	12°00.0'	+60.0'	90.0°	12
13	9°30.9'	+59.8'	54.0°	10°06.1'	+59.8'	54.2°	10°41.1'	+59.9'	54.3°	11°16.1'	+59.9'	54.5°	11°50.9'	+60.0'	54.6°	12°25.5'	+60.0'	54.8°	13°00.0'	+60.0'	90.0°	13
14	10°30.7'	+59.8'	53.9°	11°05.9'	+59.8'	54.1°	11°41.0'	+59.9'	54.3°	12°16.0'	+59.9'	54.4°	12°50.8'	+60.0'	54.6°	13°25.5'	+60.0'	54.8°	14°00.0'	+60.0'	20.9°	14
15	11°30.4'	+59.8'	53.8°	12°05.7'	+59.8'	54.0°	12°40.9'	+59.9'	54.2°	13°15.9'	+59.9'	54.4°	13°50.8'	+60.0'	54.6°	14°25.5'	+60.0'	54.8°	15°00.0'	+60.0'	20.3°	15
16	12°30.2'	+59.8'	53.8°	13°05.6'	+59.8'	53.9°	13°40.8'	+59.9'	54.1°	14°15.9'	+59.9'	54.3°	14°50.8'	+60.0'	54.5°	15°25.5'	+60.0'	54.8°	16°00.0'	+60.0'	19.5°	16
17	13°30.0'	+59.8'	53.7°	14°05.4'	+59.8'	53.9°	14°40.7'	+59.9'	54.1°	15°15.8'	+59.9'	54.3°	15°50.8'	+60.0'	54.5°	16°25.5'	+60.0'	54.8°	17°00.0'	+60.0'	18.6°	17
18	14°29.7'	+59.8'	53.6°	15°05.3'	+59.8'	53.8°	15°40.6'	+59.9'	54.0°	16°15.8'	+59.9'	54.2°	16°50.7'	+60.0'	54.5°	17°25.5'	+60.0'	54.7°	18°00.0'	+60.0'	17.7°	18
19	15°29.5'	+59.8'	53.5°	16°05.1'	+59.8'	53.7°	16°40.5'	+59.9'	54.0°	17°15.7'	+59.9'	54.2°	17°50.7'	+60.0'	54.5°	18°25.5'	+60.0'	54.7°	19°00.0'	+60.0'	16.6°	19
20	16°29.3'	+59.8'	53.4°	17°04.9'	+59.8'	53.6°	17°40.4'	+59.9'	53.9°	18°15.6'	+59.9'	54.2°	18°50.7'	+60.0'	54.4°	19°25.5'	+60.0'	54.7°	20°00.0'	+60.0'	15.3°	20
21	17°29.0'	+59.8'	53.3°	18°04.8'	+59.8'	53.6°	18°40.3'	+59.9'	53.8°	19°15.6'	+59.9'	54.1°	19°50.6'	+60.0'	54.4°	20°25.5'	+60.0'	54.7°	21°00.0'	+60.0'	13.9°	21
22	18°28.8'	+59																				

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

54° 306° LHA

Latitude CONTRARY to Declination

54° 306° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	3°31.3'	-59.8'	125.9°	2°56.2'	-59.9'	125.9°	2°21.0'	-59.9'	125.9°	1°45.8'	-59.9'	126.0°	1°10.5'	-60.0'	126.0°	<u>0°35.3'</u>	<u>-60.0'</u>	<u>126.0°</u>	<u>0°00.0'</u>	<u>-60.0'</u>	<u>126.0°</u>	0
1	2°31.5'	-59.8'	125.9°	1°56.3'	-59.9'	126.0°	1°21.1'	-59.9'	126.0°	<u>0°45.8'</u>	<u>-59.9'</u>	<u>126.0°</u>	<u>0°10.5'</u>	<u>-60.0'</u>	<u>126.0°</u>	0°24.7'	+60.0'	54.0°	0°60.0'	+60.0'	55.5°	1
2	1°31.7'	-59.8'	126.0°	<u>0°56.5'</u>	<u>-59.9'</u>	<u>126.0°</u>	<u>0°21.2'</u>	<u>-59.9'</u>	<u>126.0°</u>	0°14.1'	+59.9'	54.0°	0°49.4'	+60.0'	54.0°	1°24.7'	+60.0'	54.0°	2°00.0'	+60.0'	55.5°	2
3	<u>0°32.0'</u>	<u>-59.8'</u>	<u>126.1°</u>	0°03.4'	+59.9'	53.9°	0°38.7'	+59.9'	53.9°	1°14.1'	+59.9'	53.9°	1°49.4'	+60.0'	53.9°	2°24.7'	+60.0'	54.0°	3°00.0'	+60.0'	63.0°	3
4	0°27.8'	+59.8'	53.8°	1°03.2'	+59.9'	53.8°	1°38.6'	+59.9'	53.8°	2°14.0'	+59.9'	53.9°	2°49.4'	+60.0'	53.9°	3°24.7'	+60.0'	53.9°	4°00.0'	+60.0'	47.1°	4
5	1°27.6'	+59.8'	53.7°	2°03.1'	+59.9'	53.8°	2°38.5'	+59.9'	53.8°	3°14.0'	+59.9'	53.8°	3°49.4'	+60.0'	53.9°	4°24.7'	+60.0'	53.9°	5°00.0'	+60.0'	47.0°	5
6	2°27.4'	+59.8'	53.6°	3°02.9'	+59.9'	53.7°	3°38.4'	+59.9'	53.7°	4°13.9'	+59.9'	53.8°	4°49.3'	+60.0'	53.8°	5°24.7'	+60.0'	53.9°	6°00.0'	+60.0'	46.9°	6
7	3°27.1'	+59.8'	53.6°	4°02.8'	+59.8'	53.6°	4°38.3'	+59.9'	53.7°	5°13.9'	+59.9'	53.7°	5°49.3'	+60.0'	53.8°	6°24.7'	+60.0'	53.9°	7°00.0'	+60.0'	46.8°	7
8	4°26.9'	+59.8'	53.5°	5°02.6'	+59.8'	53.5°	5°38.2'	+59.9'	53.6°	6°13.8'	+59.9'	53.7°	6°49.3'	+60.0'	53.8°	7°24.7'	+60.0'	53.9°	8°00.0'	+60.0'	23.8°	8
9	5°26.7'	+59.8'	53.4°	6°02.5'	+59.8'	53.5°	6°38.1'	+59.9'	53.6°	7°13.7'	+59.9'	53.7°	7°49.3'	+60.0'	53.8°	8°24.7'	+60.0'	53.9°	9°00.0'	+60.0'	90.0°	9
10	6°26.5'	+59.8'	53.3°	7°02.3'	+59.8'	53.4°	7°38.0'	+59.9'	53.5°	8°13.7'	+59.9'	53.6°	8°49.2'	+60.0'	53.7°	9°24.7'	+60.0'	53.9°	10°00.0'	+60.0'	62.6°	10
11	7°26.3'	+59.8'	53.2°	8°02.2'	+59.8'	53.3°	8°37.9'	+59.9'	53.4°	9°13.6'	+59.9'	53.6°	9°49.2'	+60.0'	53.7°	10°24.7'	+60.0'	53.8°	11°00.0'	+60.0'	62.5°	11
12	8°26.1'	+59.8'	53.1°	9°02.0'	+59.8'	53.3°	9°37.9'	+59.9'	53.4°	10°13.6'	+59.9'	53.5°	10°49.2'	+60.0'	53.7°	11°24.7'	+60.0'	53.8°	12°00.0'	+60.0'	90.0°	12
13	9°25.8'	+59.8'	53.0°	10°01.9'	+59.8'	53.2°	10°37.8'	+59.9'	53.3°	11°13.5'	+59.9'	53.5°	11°49.2'	+60.0'	53.6°	12°24.7'	+60.0'	53.8°	13°00.0'	+60.0'	90.0°	13
14	10°25.6'	+59.8'	53.0°	11°01.7'	+59.8'	53.1°	11°37.7'	+59.9'	53.3°	12°13.5'	+59.9'	53.4°	12°49.1'	+60.0'	53.6°	13°24.6'	+60.0'	53.8°	14°00.0'	+60.0'	20.9°	14
15	11°25.4'	+59.8'	52.9°	12°01.5'	+59.8'	53.0°	12°37.6'	+59.9'	53.2°	13°13.4'	+59.9'	53.4°	13°49.1'	+60.0'	53.6°	14°24.6'	+60.0'	53.8°	15°00.0'	+60.0'	20.3°	15
16	12°25.2'	+59.8'	52.8°	13°01.4'	+59.8'	53.0°	13°37.5'	+59.9'	53.1°	14°13.4'	+59.9'	53.3°	14°49.1'	+60.0'	53.6°	15°24.6'	+60.0'	53.8°	16°00.0'	+60.0'	19.5°	16
17	13°24.9'	+59.8'	52.7°	14°01.2'	+59.8'	52.9°	14°37.3'	+59.9'	53.1°	15°13.3'	+59.9'	53.3°	15°49.1'	+60.0'	53.5°	16°24.6'	+60.0'	53.8°	17°00.0'	+60.0'	18.6°	17
18	14°24.7'	+59.8'	52.6°	15°01.1'	+59.8'	52.8°	15°37.2'	+59.9'	53.0°	16°13.2'	+59.9'	53.3°	16°49.0'	+60.0'	53.5°	17°24.6'	+60.0'	53.7°	18°00.0'	+60.0'	17.7°	18
19	15°24.5'	+59.8'	52.5°	16°00.9'	+59.8'	52.7°	16°37.1'	+59.9'	53.0°	17°13.2'	+59.9'	53.2°	17°49.0'	+60.0'	53.5°	18°24.6'	+60.0'	53.7°	19°00.0'	+60.0'	16.6°	19
20	16°24.3'	+59.8'	52.4°	17°00.7'	+59.8'	52.7°	17°37.0'	+59.9'	52.9°	18°13.1'	+59.9'	53.2°	18°49.0'	+60.0'	53.4°	19°24.6'	+60.0'	53.7°	20°00.0'	+60.0'	15.3°	20
21	17°24.0'	+59.8'	52.3°	18°00.6'	+59.8'	52.6°	18°36.9'	+59.9'	52.8°	19°13.1'	+59.9'	53.1°	19°49.0'	+60.0'	53.4°	20°24.6'	+60.0'	53.7°	21°00.0'	+60.0'	13.9°	21
22	18°23.8'	+59.8'	52.2°	19°00.4'	+59.8'	52.5°	19°36.8'	+59.9'	52.8°	20°13.0'	+59.9'	53.1°	20°48.9'	+60.0'	53.4°	21°24.6'	+60.0'	53.7°	22°00.0'	+60.0'	12.2°	22
23	19°23.5'	+59.8'	52.1°	20°00.2'	+59.8'	52.4°	20°36.7'	+59.9'	52.7°	21°12.9'	+59.9'	53.0°	21°48.9'	+60.0'	53.3°	22°24.6'	+60.0'	53.7°	23°00.0'	+60.0'	90.0°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

126° 234° LHA

Latitude SAME as DECLINATION

126° 234° 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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	3°36.4'	-59.8'	126.8°	3°00.4'	-59.9'	126.9°	2°24.4'	-59.9'	126.9°	1°48.3'	-59.9'	127.0°	1°12.2'	-60.0'	127.0°	<u>0°36.1'</u>	<u>-60.0'</u>	<u>127.0°</u>	<u>0°00.0'</u>	<u>-60.0'</u>	<u>127.0°</u>	0
1	2°36.6'	-59.8'	126.9°	2°00.5'	-59.9'	127.0°	1°24.5'	-59.9'	127.0°	<u>0°48.3'</u>	<u>-59.9'</u>	<u>127.0°</u>	<u>0°12.2'</u>	<u>-60.0'</u>	<u>127.0°</u>	0°23.9'	+60.0'	53.0°	0°60.0'	+60.0'	51.5°	1
2	1°36.8'	-59.8'	127.0°	1°00.7'	-59.9'	127.0°	<u>0°24.5'</u>	<u>-59.9'</u>	<u>127.0°</u>	0°11.6'	+59.9'	53.0°	0°47.7'	+60.0'	53.0°	1°23.9'	+60.0'	53.0°	2°00.0'	+60.0'	55.5°	2
3	<u>0°37.0'</u>	<u>-59.8'</u>	<u>127.1°</u>	<u>0°00.8'</u>	<u>-59.9'</u>	<u>127.1°</u>	0°35.4'	+59.9'	52.9°	1°11.5'	+59.9'	52.9°	1°47.7'	+60.0'	52.9°	2°23.9'	+60.0'	53.0°	3°00.0'	+60.0'	63.0°	3
4	0°22.8'	+59.8'	52.8°	0°59.0'	+59.9'	52.8°	1°35.3'	+59.9'	52.8°	2°11.5'	+59.9'	52.9°	2°47.7'	+60.0'	52.9°	3°23.9'	+60.0'	52.9°	4°00.0'	+60.0'	47.1°	4
5	1°22.6'	+59.8'	52.7°	1°58.9'	+59.9'	52.8°	2°35.2'	+59.9'	52.8°	3°11.4'	+59.9'	52.8°	3°47.7'	+60.0'	52.9°	4°23.9'	+60.0'	52.9°	5°00.0'	+60.0'	47.0°	5
6	2°22.3'	+59.8'	52.6°	2°58.7'	+59.9'	52.7°	3°35.1'	+59.9'	52.7°	4°11.4'	+59.9'	52.8°	4°47.7'	+60.0'	52.8°	5°23.9'	+60.0'	52.9°	6°00.0'	+60.0'	46.9°	6
7	3°22.1'	+59.8'	52.6°	3°58.6'	+59.9'	52.6°	4°35.0'	+59.9'	52.7°	5°11.3'	+59.9'	52.7°	5°47.6'	+60.0'	52.8°	6°23.9'	+60.0'	52.9°	7°00.0'	+60.0'	46.8°	7
8	4°21.9'	+59.8'	52.5°	4°58.4'	+59.9'	52.5°	5°34.9'	+59.9'	52.6°	6°11.3'	+59.9'	52.7°	6°47.6'	+60.0'	52.8°	7°23.8'	+60.0'	52.9°	8°00.0'	+60.0'	23.8°	8
9	5°21.7'	+59.8'	52.4°	5°58.3'	+59.9'	52.5°	6°34.8'	+59.9'	52.6°	7°11.2'	+59.9'	52.7°	7°47.6'	+60.0'	52.8°	8°23.8'	+60.0'	52.9°	9°00.0'	+60.0'	90.0°	9
10	6°21.5'	+59.8'	52.3°	6°58.1'	+59.9'	52.4°	7°34.7'	+59.9'	52.5°	8°11.2'	+59.9'	52.6°	8°47.6'	+60.0'	52.7°	9°23.8'	+60.0'	52.9°	10°00.0'	+60.0'	62.6°	10
11	7°21.3'	+59.8'	52.2°	7°58.0'	+59.9'	52.3°	8°34.6'	+59.9'	52.5°	9°11.1'	+59.9'	52.6°	9°47.5'	+60.0'	52.7°	10°23.8'	+60.0'	52.8°	11°00.0'	+60.0'	62.5°	11
12	8°21.1'	+59.8'	52.1°	8°57.8'	+59.9'	52.3°	9°34.5'	+59.9'	52.4°	10°11.1'	+59.9'	52.5°	10°47.5'	+60.0'	52.7°	11°23.8'	+60.0'	52.8°	12°00.0'	+60.0'	90.0°	12
13	9°20.9'	+59.8'	52.1°	9°57.7'	+59.8'	52.2°	10°34.4'	+59.9'	52.3°	11°11.0'	+59.9'	52.5°	11°47.5'	+60.0'	52.6°	12°23.8'	+60.0'	52.8°	13°00.0'	+60.0'	90.0°	13
14	10°20.6'	+59.8'	52.0°	10°57.5'	+59.8'	52.1°	11°34.3'	+59.9'	52.3°	12°11.0'	+59.9'	52.4°	12°47.5'	+60.0'	52.6°	13°23.8'	+60.0'	52.8°	14°00.0'	+60.0'	20.9°	14
15	11°20.4'	+59.8'	51.9°	11°57.4'	+59.8'	52.0°	12°34.2'	+59.9'	52.2°	13°10.9'	+59.9'	52.4°	13°47.4'	+60.0'	52.6°	14°23.8'	+60.0'	52.8°	15°00.0'	+60.0'	20.3°	15
16	12°20.2'	+59.8'	51.8°	12°57.2'	+59.8'	52.0°	13°34.1'	+59.9'	52.2°	14°10.9'	+59.9'	52.4°	14°47.4'	+60.0'	52.6°	15°23.8'	+60.0'	52.8°	16°00.0'	+60.0'	19.5°	16
17	13°20.0'	+59.8'	51.7°	13°57.1'	+59.8'	51.9°	14°34.0'	+59.9'	52.1°	15°10.8'	+59.9'	52.3°	15°47.4'	+60.0'	52.5°	16°23.8'	+60.0'	52.8°	17°00.0'	+60.0'	18.6°	17
18	14°19.8'	+59.8'	51.6°	14°56.9'	+59.8'	51.8°	15°33.9'	+59.9'	52.0°	16°10.7'	+59.9'	52.3°	16°47.4'	+60.0'	52.5°	17°23.8'	+60.0'	52.7°	18°00.0'	+60.0'	17.7°	18
19	15°19.5'	+59.8'	51.5°	15°56.8'	+59.8'	51.8°	16°33.8'	+59.9'	52.0°	17°10.7'	+59.9'	52.2°	17°47.3'	+60.0'	52.5°	18°23.8'	+60.0'	52.7°	19°00.0'	+60.0'	16.6°	19
20	16°19.3'	+59.8'	51.4°	16°56.6'	+59.8'	51.7°	17°33.7'	+59.9'	51.9°	18°10.6'	+59.9'	52.2°	18°47.3'	+60.0'	52.4°	19°23.8'	+60.0'	52.7°	20°00.0'	+60.0'	15.3°	20
21	17°19.1'	+59.8'	51.4°	17°56.5'	+59.8'	51.6°	18°33.6'	+59.9'	51.9°	19°10.6'	+59.9'	52.1°	19°47.3'	+60.0'	52.4°	20°23.8'	+60.0'	52.7°	21°00.0'	+60.0'	13.9°	21
22	18°18.9'	+59																				

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

52° 308° LHA

Latitude CONTRARY to Declination

52° 308° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	3°41.3'	-59.8'	127.8°	3°04.6'	-59.9'	127.9°	2°27.7'	-59.9'	127.9°	1°50.8'	-59.9'	128.0°	1°13.9'	-60.0'	128.0°	<u>0°36.9'</u>	<u>-60.0'</u>	<u>128.0°</u>	<u>0°00.0'</u>	<u>-60.0'</u>	<u>128.0°</u>	0
1	2°41.5'	-59.8'	127.9°	2°04.7'	-59.9'	128.0°	1°27.8'	-59.9'	128.0°	<u>0°50.8'</u>	<u>-59.9'</u>	<u>128.0°</u>	<u>0°13.9'</u>	<u>-60.0'</u>	<u>128.0°</u>	0°23.1'	+60.0'	52.0°	0°60.0'	+60.0'	51.5°	1
2	1°41.7'	-59.8'	128.0°	1°04.8'	-59.9'	128.0°	<u>0°27.9'</u>	<u>-59.9'</u>	<u>128.0°</u>	0°09.1'	+59.9'	52.0°	0°46.1'	+60.0'	52.0°	1°23.1'	+60.0'	52.0°	2°00.0'	+60.0'	55.5°	2
3	<u>0°42.0'</u>	<u>-59.8'</u>	<u>128.1°</u>	<u>0°05.0'</u>	<u>-59.9'</u>	<u>128.1°</u>	0°32.0'	+59.9'	51.9°	1°09.1'	+59.9'	51.9°	1°46.1'	+60.0'	51.9°	2°23.0'	+60.0'	52.0°	3°00.0'	+60.0'	63.0°	3
4	0°17.8'	+59.8'	51.8°	0°54.9'	+59.9'	51.8°	1°32.0'	+59.9'	51.8°	2°09.0'	+59.9'	51.9°	2°46.0'	+60.0'	51.9°	3°23.0'	+60.0'	51.9°	4°00.0'	+60.0'	47.1°	4
5	1°17.6'	+59.8'	51.7°	1°54.7'	+59.9'	51.8°	2°31.9'	+59.9'	51.8°	3°09.0'	+59.9'	51.8°	3°46.0'	+60.0'	51.9°	4°23.0'	+60.0'	51.9°	5°00.0'	+60.0'	47.0°	5
6	2°17.4'	+59.8'	51.7°	2°54.6'	+59.9'	51.7°	3°31.8'	+59.9'	51.7°	4°08.9'	+59.9'	51.8°	4°46.0'	+60.0'	51.9°	5°23.0'	+60.0'	51.9°	6°00.0'	+60.0'	46.9°	6
7	3°17.2'	+59.8'	51.6°	3°54.5'	+59.9'	51.6°	4°31.7'	+59.9'	51.7°	5°08.9'	+59.9'	51.7°	5°46.0'	+60.0'	51.8°	6°23.0'	+60.0'	51.9°	7°00.0'	+60.0'	46.8°	7
8	4°17.0'	+59.8'	51.5°	4°54.3'	+59.9'	51.6°	5°31.6'	+59.9'	51.6°	6°08.8'	+59.9'	51.7°	6°45.9'	+60.0'	51.8°	7°23.0'	+60.0'	51.9°	8°00.0'	+60.0'	23.8°	8
9	5°16.8'	+59.8'	51.4°	5°54.2'	+59.9'	51.5°	6°31.5'	+59.9'	51.6°	7°08.8'	+59.9'	51.7°	7°45.9'	+60.0'	51.8°	8°23.0'	+60.0'	51.9°	9°00.0'	+60.0'	90.0°	9
10	6°16.6'	+59.8'	51.3°	6°54.0'	+59.9'	51.4°	7°31.4'	+59.9'	51.5°	8°08.7'	+59.9'	51.6°	8°45.9'	+60.0'	51.7°	9°23.0'	+60.0'	51.9°	10°00.0'	+60.0'	62.6°	10
11	7°16.4'	+59.8'	51.2°	7°53.9'	+59.9'	51.3°	8°31.3'	+59.9'	51.5°	9°08.6'	+59.9'	51.6°	9°45.9'	+60.0'	51.7°	10°23.0'	+60.0'	51.9°	11°00.0'	+60.0'	62.5°	11
12	8°16.2'	+59.8'	51.2°	8°53.7'	+59.9'	51.3°	9°31.2'	+59.9'	51.4°	10°08.6'	+59.9'	51.5°	10°45.9'	+60.0'	51.7°	11°23.0'	+60.0'	51.8°	12°00.0'	+60.0'	90.0°	12
13	9°15.9'	+59.8'	51.1°	9°53.6'	+59.9'	51.2°	10°31.1'	+59.9'	51.3°	11°08.5'	+59.9'	51.5°	11°45.8'	+60.0'	51.7°	12°23.0'	+60.0'	51.8°	13°00.0'	+60.0'	90.0°	13
14	10°15.7'	+59.8'	51.0°	10°53.4'	+59.9'	51.1°	11°31.0'	+59.9'	51.3°	12°08.5'	+59.9'	51.5°	12°45.8'	+60.0'	51.6°	13°23.0'	+60.0'	51.8°	14°00.0'	+60.0'	20.9°	14
15	11°15.5'	+59.8'	50.9°	11°53.3'	+59.9'	51.1°	12°30.9'	+59.9'	51.2°	13°08.4'	+59.9'	51.4°	13°45.8'	+60.0'	51.6°	14°23.0'	+60.0'	51.8°	15°00.0'	+60.0'	20.3°	15
16	12°15.3'	+59.8'	50.8°	12°53.1'	+59.9'	51.0°	13°30.8'	+59.9'	51.2°	14°08.4'	+59.9'	51.4°	14°45.8'	+60.0'	51.6°	15°23.0'	+60.0'	51.8°	16°00.0'	+60.0'	19.5°	16
17	13°15.1'	+59.8'	50.7°	13°53.0'	+59.8'	50.9°	14°30.7'	+59.9'	51.1°	15°08.3'	+59.9'	51.3°	15°45.7'	+60.0'	51.5°	16°23.0'	+60.0'	51.8°	17°00.0'	+60.0'	18.6°	17
18	14°14.9'	+59.8'	50.6°	14°52.8'	+59.8'	50.8°	15°30.6'	+59.9'	51.1°	16°08.3'	+59.9'	51.3°	16°45.7'	+60.0'	51.5°	17°23.0'	+60.0'	51.7°	18°00.0'	+60.0'	17.7°	18
19	15°14.7'	+59.8'	50.6°	15°52.7'	+59.8'	50.8°	16°30.5'	+59.9'	51.0°	17°08.2'	+59.9'	51.2°	17°45.7'	+60.0'	51.5°	18°22.9'	+60.0'	51.7°	19°00.0'	+60.0'	16.6°	19
20	16°14.4'	+59.8'	50.5°	16°52.5'	+59.8'	50.7°	17°30.4'	+59.9'	50.9°	18°08.2'	+59.9'	51.2°	18°45.7'	+60.0'	51.4°	19°22.9'	+60.0'	51.7°	20°00.0'	+60.0'	15.3°	20
21	17°14.2'	+59.8'	50.4°	17°52.4'	+59.8'	50.6°	18°30.3'	+59.9'	50.8°	19°08.1'	+59.9'	51.1°	19°45.6'	+60.0'	51.4°	20°22.9'	+60.0'	51.7°	21°00.0'	+60.0'	13.9°	21
22	18°14.0'	+59.8'	50.3°	18°52.2'	+59.8'	50.5°	19°30.2'	+59.9'	50.8°	20°08.0'	+59.9'	51.1°	20°45.6'	+60.0'	51.4°	21°22.9'	+60.0'	51.7°	22°00.0'	+60.0'	12.2°	22
23	19°13.8'	+59.8'	50.2°	19°52.1'	+59.8'	50.5°	20°30.1'	+59.9'	50.8°	21°08.0'	+59.9'	51.0°	21°45.6'	+60.0'	51.4°	22°22.9'	+60.0'	51.7°	23°00.0'	+60.0'	90.0°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

128° 232° LHA

Latitude SAME as DECLINATION

128° 232° 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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	3°46.3'	-59.8'	128.8°	3°08.7'	-59.9'	128.9°	2°31.0'	-59.9'	128.9°	1°53.2'	-60.0'	129.0°	1°15.5'	-60.0'	129.0°	<u>0°37.8'</u>	<u>-60.0'</u>	<u>129.0°</u>	<u>0°00.0'</u>	<u>-60.0'</u>	<u>129.0°</u>	0
1	2°46.5'	-59.8'	128.9°	2°08.8'	-59.9'	129.0°	1°31.1'	-59.9'	129.0°	<u>0°53.3'</u>	<u>-60.0'</u>	<u>129.0°</u>	<u>0°15.5'</u>	<u>-60.0'</u>	<u>129.0°</u>	0°22.2'	+60.0'	51.0°	0°60.0'	+60.0'	51.5°	1
2	1°46.7'	-59.8'	129.0°	1°08.9'	-59.9'	129.0°	<u>0°31.1'</u>	<u>-59.9'</u>	<u>129.0°</u>	0°06.7'	+60.0'	51.0°	0°44.4'	+60.0'	51.0°	1°22.2'	+60.0'	51.0°	2°00.0'	+60.0'	47.2°	2
3	<u>0°46.9'</u>	<u>-59.8'</u>	<u>129.1°</u>	<u>0°09.1'</u>	<u>-59.9'</u>	<u>129.1°</u>	0°28.8'	+59.9'	50.9°	1°06.6'	+60.0'	50.9°	1°44.4'	+60.0'	50.9°	2°22.2'	+60.0'	51.0°	3°00.0'	+60.0'	55.4°	3
4	0°12.9'	+59.8'	50.8°	0°50.8'	+59.9'	50.8°	1°28.7'	+59.9'	50.9°	2°06.6'	+60.0'	50.9°	2°44.4'	+60.0'	50.9°	3°22.2'	+60.0'	50.9°	4°00.0'	+60.0'	47.1°	4
5	1°12.7'	+59.8'	50.7°	1°50.7'	+59.9'	50.8°	2°28.6'	+59.9'	50.8°	3°06.5'	+60.0'	50.8°	3°44.4'	+60.0'	50.9°	4°22.2'	+60.0'	50.9°	5°00.0'	+60.0'	47.0°	5
6	2°12.5'	+59.8'	50.7°	2°50.5'	+59.9'	50.7°	3°28.5'	+59.9'	50.7°	4°06.5'	+60.0'	50.8°	4°44.4'	+60.0'	50.9°	5°22.2'	+60.0'	50.9°	6°00.0'	+60.0'	46.9°	6
7	3°12.3'	+59.8'	50.6°	3°50.4'	+59.9'	50.6°	4°28.4'	+59.9'	50.7°	5°06.4'	+59.9'	50.8°	5°44.3'	+60.0'	50.8°	6°22.2'	+60.0'	50.9°	7°00.0'	+60.0'	46.8°	7
8	4°12.1'	+59.8'	50.5°	4°50.2'	+59.9'	50.6°	5°28.3'	+59.9'	50.6°	6°06.4'	+59.9'	50.7°	6°44.3'	+60.0'	50.8°	7°22.2'	+60.0'	50.9°	8°00.0'	+60.0'	23.8°	8
9	5°11.9'	+59.8'	50.4°	5°50.1'	+59.9'	50.5°	6°28.2'	+59.9'	50.6°	7°06.3'	+59.9'	50.7°	7°44.3'	+60.0'	50.8°	8°22.2'	+60.0'	50.9°	9°00.0'	+60.0'	90.0°	9
10	6°11.7'	+59.8'	50.3°	6°50.0'	+59.9'	50.4°	7°28.2'	+59.9'	50.5°	8°06.3'	+59.9'	50.6°	8°44.3'	+60.0'	50.7°	9°22.2'	+60.0'	50.9°	10°00.0'	+60.0'	62.6°	10
11	7°11.5'	+59.8'	50.3°	7°49.8'	+59.9'	50.4°	8°28.1'	+59.9'	50.5°	9°06.2'	+59.9'	50.6°	9°44.2'	+60.0'	50.7°	10°22.2'	+60.0'	50.9°	11°00.0'	+60.0'	62.5°	11
12	8°11.3'	+59.8'	50.2°	8°49.7'	+59.9'	50.3°	9°28.0'	+59.9'	50.4°	10°06.2'	+59.9'	50.5°	10°44.2'	+60.0'	50.7°	11°22.2'	+60.0'	50.8°	12°00.0'	+60.0'	90.0°	12
13	9°11.1'	+59.8'	50.1°	9°49.5'	+59.9'	50.2°	10°27.9'	+59.9'	50.4°	11°06.1'	+59.9'	50.5°	11°44.2'	+60.0'	50.7°	12°22.2'	+60.0'	50.8°	13°00.0'	+60.0'	90.0°	13
14	10°10.9'	+59.8'	50.0°	10°49.4'	+59.9'	50.1°	11°27.8'	+59.9'	50.3°	12°06.0'	+59.9'	50.5°	12°44.2'	+60.0'	50.6°	13°22.2'	+60.0'	50.8°	14°00.0'	+60.0'	20.9°	14
15	11°10.7'	+59.8'	49.9°	11°49.3'	+59.9'	50.1°	12°27.7'	+59.9'	50.2°	13°06.0'	+59.9'	50.4°	13°44.2'	+60.0'	50.6°	14°22.2'	+60.0'	50.8°	15°00.0'	+60.0'	20.3°	15
16	12°10.5'	+59.8'	49.8°	12°49.1'	+59.9'	50.0°	13°27.6'	+59.9'	50.2°	14°05.9'	+59.9'	50.4°	14°44.1'	+60.0'	50.6°	15°22.2'	+60.0'	50.8°	16°00.0'	+60.0'	19.5°	16
17	13°10.3'	+59.8'	49.8°	13°49.0'	+59.9'	49.9°	14°27.5'	+59.9'	50.1°	15°05.9'	+59.9'	50.3°	15°44.1'	+60.0'	50.5°	16°22.1'	+60.0'	50.8°	17°00.0'	+60.0'	18.6°	17
18	14°10.1'	+59.8'	49.7°	14°48.8'	+59.9'	49.9°	15°27.4'	+59.9'	50.1°	16°05.8'	+59.9'	50.3°	16°44.1'	+60.0'	50.5°	17°22.1'	+60.0'	50.8°	18°00.0'	+60.0'	17.7°	18
19	15°09.9'	+59.8'	49.6°	15°48.7'	+59.9'	49.8°	16°27.3'	+59.9'	50.0°	17°05.8'	+59.9'	50.2°	17°44.1'	+60.0'	50.5°	18°22.1'	+60.0'	50.7°	19°00.0'	+60.0'	16.6°	19
20	16°09.6'	+59.8'	49.5°	16°48.5'	+59.8'	49.7°	17°27.2'	+59.9'	50.0°	18°05.7'	+59.9'	50.2°	18°44.0'	+60.0'	50.5°	19°22.1'	+60.0'	50.7°	20°00.0'	+60.0'	15.3°	20
21	17°09.4'	+59.8'	49.4°	17°48.4'	+59.8'	49.6°	18°27.1'	+59.9'	49.9°	19°05.7'	+59.9'	50.2°	19°44.0'	+60.0'	50.4°	20°22.1'	+60.0'	50.7°	21°00.0'	+60.0'	13.9°	21
22	18°09.2'	+59																				

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

50° 310° LHA

Latitude CONTRARY to Declination

50° 310° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	3°51.1'	-59.8'	129.8°	3°42.7'	-59.9'	129.9°	2°34.2'	-59.9'	129.9°	1°55.7'	-60.0'	130.0°	1°17.1'	-60.0'	130.0°	<u>0°38.6'</u>	<u>-60.0'</u>	<u>130.0°</u>	<u>0°00.0'</u>	<u>-60.0'</u>	<u>130.0°</u>	0
1	2°51.3'	-59.8'	129.9°	2°42.8'	-59.9'	130.0°	1°34.3'	-59.9'	130.0°	<u>0°55.7'</u>	<u>-60.0'</u>	<u>130.0°</u>	<u>0°17.1'</u>	<u>-60.0'</u>	<u>130.0°</u>	0°21.4'	+60.0'	50.0°	0°60.0'	+60.0'	51.5°	1
2	1°51.5'	-59.8'	130.0°	1°43.0'	-59.9'	130.0°	<u>0°34.4'</u>	<u>-59.9'</u>	<u>130.0°</u>	0°04.2'	+60.0'	50.0°	0°42.8'	+60.0'	50.0°	1°21.4'	+60.0'	50.0°	2°00.0'	+60.0'	47.2°	2
3	<u>0°51.7'</u>	<u>-59.8'</u>	<u>130.1°</u>	<u>0°13.1'</u>	<u>-59.9'</u>	<u>130.1°</u>	0°25.5'	+59.9'	49.9°	1°04.2'	+60.0'	49.9°	1°42.8'	+60.0'	49.9°	2°21.4'	+60.0'	50.0°	3°00.0'	+60.0'	55.4°	3
4	0°08.1'	+59.8'	49.8°	0°46.8'	+59.9'	49.8°	1°25.5'	+59.9'	49.9°	2°04.1'	+60.0'	49.9°	2°42.8'	+60.0'	49.9°	3°21.4'	+60.0'	50.0°	4°00.0'	+60.0'	47.1°	4
5	1°07.9'	+59.8'	49.8°	1°46.6'	+59.9'	49.8°	2°25.4'	+59.9'	49.8°	3°04.1'	+60.0'	49.8°	3°42.8'	+60.0'	49.9°	4°21.4'	+60.0'	49.9°	5°00.0'	+60.0'	47.0°	5
6	2°07.7'	+59.8'	49.7°	2°46.5'	+59.9'	49.7°	3°25.3'	+59.9'	49.7°	4°04.0'	+60.0'	49.8°	4°42.7'	+60.0'	49.9°	5°21.4'	+60.0'	49.9°	6°00.0'	+60.0'	46.9°	6
7	3°07.5'	+59.8'	49.6°	3°46.4'	+59.9'	49.6°	4°25.2'	+59.9'	49.7°	5°04.0'	+60.0'	49.8°	5°42.7'	+60.0'	49.8°	6°21.4'	+60.0'	49.9°	7°00.0'	+60.0'	46.8°	7
8	4°07.3'	+59.8'	49.5°	4°46.2'	+59.9'	49.6°	5°25.1'	+59.9'	49.6°	6°03.9'	+60.0'	49.7°	6°42.7'	+60.0'	49.8°	7°21.4'	+60.0'	49.9°	8°00.0'	+60.0'	23.8°	8
9	5°07.1'	+59.8'	49.4°	5°46.1'	+59.9'	49.5°	6°25.0'	+59.9'	49.6°	7°03.9'	+60.0'	49.7°	7°42.7'	+60.0'	49.8°	8°21.4'	+60.0'	49.9°	9°00.0'	+60.0'	90.0°	9
10	6°06.9'	+59.8'	49.4°	6°46.0'	+59.9'	49.4°	7°24.9'	+59.9'	49.5°	8°03.8'	+60.0'	49.6°	8°42.7'	+60.0'	49.7°	9°21.4'	+60.0'	49.9°	10°00.0'	+60.0'	62.6°	10
11	7°06.7'	+59.8'	49.3°	7°45.8'	+59.9'	49.4°	8°24.9'	+59.9'	49.5°	9°03.8'	+60.0'	49.6°	9°42.6'	+60.0'	49.7°	10°21.4'	+60.0'	49.9°	11°00.0'	+60.0'	62.5°	11
12	8°06.5'	+59.8'	49.2°	8°45.7'	+59.9'	49.3°	9°24.8'	+59.9'	49.4°	10°03.7'	+60.0'	49.6°	10°42.6'	+60.0'	49.7°	11°21.4'	+60.0'	49.8°	12°00.0'	+60.0'	90.0°	12
13	9°06.3'	+59.8'	49.1°	9°45.6'	+59.9'	49.2°	10°24.7'	+59.9'	49.4°	11°03.7'	+59.9'	49.5°	11°42.6'	+60.0'	49.7°	12°21.4'	+60.0'	49.8°	13°00.0'	+60.0'	90.0°	13
14	10°06.1'	+59.8'	49.0°	10°45.4'	+59.9'	49.2°	11°24.6'	+59.9'	49.3°	12°03.6'	+59.9'	49.5°	12°42.6'	+60.0'	49.6°	13°21.4'	+60.0'	49.8°	14°00.0'	+60.0'	20.9°	14
15	11°05.9'	+59.8'	48.9°	11°45.3'	+59.9'	49.1°	12°24.5'	+59.9'	49.3°	13°03.6'	+59.9'	49.4°	13°42.5'	+60.0'	49.6°	14°21.4'	+60.0'	49.8°	15°00.0'	+60.0'	20.3°	15
16	12°05.7'	+59.8'	48.9°	12°45.1'	+59.9'	49.0°	13°24.4'	+59.9'	49.2°	14°03.5'	+59.9'	49.4°	14°42.5'	+60.0'	49.6°	15°21.3'	+60.0'	49.8°	16°00.0'	+60.0'	19.5°	16
17	13°05.5'	+59.8'	48.8°	13°45.0'	+59.9'	49.0°	14°24.3'	+59.9'	49.1°	15°03.5'	+59.9'	49.3°	15°42.5'	+60.0'	49.6°	16°21.3'	+60.0'	49.8°	17°00.0'	+60.0'	18.6°	17
18	14°05.3'	+59.8'	48.7°	14°44.9'	+59.9'	48.9°	15°24.2'	+59.9'	49.1°	16°03.4'	+59.9'	49.3°	16°42.5'	+60.0'	49.5°	17°21.3'	+60.0'	49.8°	18°00.0'	+60.0'	17.7°	18
19	15°05.1'	+59.8'	48.6°	15°44.7'	+59.9'	48.8°	16°24.1'	+59.9'	49.0°	17°03.4'	+59.9'	49.3°	17°42.5'	+60.0'	49.5°	18°21.3'	+60.0'	49.7°	19°00.0'	+60.0'	16.6°	19
20	16°04.9'	+59.8'	48.5°	16°44.6'	+59.9'	48.7°	17°24.0'	+59.9'	49.0°	18°03.3'	+59.9'	49.2°	18°42.4'	+60.0'	49.5°	19°21.3'	+60.0'	49.7°	20°00.0'	+60.0'	15.3°	20
21	17°04.7'	+59.8'	48.4°	17°44.4'	+59.9'	48.7°	18°23.9'	+59.9'	48.9°	19°03.3'	+59.9'	49.2°	19°42.4'	+60.0'	49.4°	20°21.3'	+60.0'	49.7°	21°00.0'	+60.0'	13.9°	21
22	18°04.5'	+59.8'	48.3°	18°44.3'	+59.8'	48.6°	19°23.9'	+59.9'	48.8°	20°03.2'	+59.9'	49.1°	20°42.4'	+60.0'	49.4°	21°21.3'	+60.0'	49.7°	22°00.0'	+60.0'	12.2°	22
23	19°04.3'	+59.8'	48.3°	19°44.1'	+59.8'	48.5°	20°23.8'	+59.9'	48.8°	21°03.2'	+59.9'	49.1°	21°42.4'	+60.0'	49.4°	22°21.3'	+60.0'	49.7°	23°00.0'	+60.0'	90.0°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

130° 230° LHA

Latitude SAME as DECLINATION

130° 230° 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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	3°55.9'	-59.8'	130.8°	3°46.7'	-59.9'	130.9°	2°37.4'	-59.9'	130.9°	1°58.1'	-60.0'	131.0°	1°18.7'	-60.0'	131.0°	<u>0°39.4'</u>	<u>-60.0'</u>	<u>131.0°</u>	<u>0°00.0'</u>	<u>-60.0'</u>	<u>131.0°</u>	0
1	2°56.1'	-59.8'	130.9°	2°46.8'	-59.9'	131.0°	1°37.5'	-59.9'	131.0°	<u>0°58.1'</u>	<u>-60.0'</u>	<u>131.0°</u>	<u>0°18.7'</u>	<u>-60.0'</u>	<u>131.0°</u>	0°20.6'	+60.0'	49.0°	0°60.0'	+60.0'	47.2°	1
2	1°56.3'	-59.8'	131.0°	1°46.9'	-59.9'	131.0°	<u>0°37.5'</u>	<u>-59.9'</u>	<u>131.0°</u>	0°01.8'	+60.0'	49.0°	0°41.2'	+60.0'	49.0°	1°20.6'	+60.0'	49.0°	2°00.0'	+60.0'	47.2°	2
3	<u>0°56.5'</u>	<u>-59.8'</u>	<u>131.1°</u>	<u>0°17.1'</u>	<u>-59.9'</u>	<u>131.1°</u>	0°22.4'	+59.9'	48.9°	1°01.8'	+60.0'	48.9°	1°41.2'	+60.0'	48.9°	2°20.6'	+60.0'	49.0°	3°00.0'	+60.0'	55.4°	3
4	0°03.3'	+59.8'	48.8°	0°42.8'	+59.9'	48.8°	1°22.3'	+59.9'	48.9°	2°01.8'	+60.0'	48.9°	2°41.2'	+60.0'	48.9°	3°20.6'	+60.0'	49.0°	4°00.0'	+60.0'	47.1°	4
5	1°03.1'	+59.8'	48.8°	1°42.7'	+59.9'	48.8°	2°22.2'	+59.9'	48.8°	3°01.7'	+60.0'	48.8°	3°41.2'	+60.0'	48.9°	4°20.6'	+60.0'	48.9°	5°00.0'	+60.0'	47.0°	5
6	2°02.9'	+59.8'	48.7°	2°42.5'	+59.9'	48.7°	3°22.1'	+59.9'	48.8°	4°01.7'	+60.0'	48.8°	4°41.2'	+60.0'	48.9°	5°20.6'	+60.0'	48.9°	6°00.0'	+60.0'	46.9°	6
7	3°02.8'	+59.8'	48.6°	3°42.4'	+59.9'	48.6°	4°22.0'	+59.9'	48.7°	5°01.6'	+60.0'	48.8°	5°41.1'	+60.0'	48.8°	6°20.6'	+60.0'	48.9°	7°00.0'	+60.0'	46.8°	7
8	4°02.6'	+59.8'	48.5°	4°42.3'	+59.9'	48.6°	5°22.0'	+59.9'	48.6°	6°01.6'	+60.0'	48.7°	6°41.1'	+60.0'	48.8°	7°20.6'	+60.0'	48.9°	8°00.0'	+60.0'	23.8°	8
9	5°02.4'	+59.8'	48.4°	5°42.2'	+59.9'	48.5°	6°21.9'	+59.9'	48.6°	7°01.5'	+60.0'	48.7°	7°41.1'	+60.0'	48.8°	8°20.6'	+60.0'	48.9°	9°00.0'	+60.0'	90.0°	9
10	6°02.2'	+59.8'	48.4°	6°42.0'	+59.9'	48.4°	7°21.8'	+59.9'	48.5°	8°01.5'	+60.0'	48.6°	8°41.1'	+60.0'	48.8°	9°20.6'	+60.0'	48.9°	10°00.0'	+60.0'	62.6°	10
11	7°02.0'	+59.8'	48.3°	7°41.9'	+59.9'	48.4°	8°21.7'	+59.9'	48.5°	9°01.4'	+60.0'	48.6°	9°41.1'	+60.0'	48.7°	10°20.6'	+60.0'	48.9°	11°00.0'	+60.0'	62.5°	11
12	8°01.8'	+59.8'	48.2°	8°41.8'	+59.9'	48.3°	9°21.6'	+59.9'	48.4°	10°01.4'	+60.0'	48.6°	10°41.0'	+60.0'	48.7°	11°20.6'	+60.0'	48.8°	12°00.0'	+60.0'	90.0°	12
13	9°01.6'	+59.8'	48.1°	9°41.6'	+59.9'	48.2°	10°21.5'	+59.9'	48.4°	11°01.3'	+60.0'	48.5°	11°41.0'	+60.0'	48.7°	12°20.6'	+60.0'	48.8°	13°00.0'	+60.0'	90.0°	13
14	10°01.4'	+59.8'	48.0°	10°41.5'	+59.9'	48.2°	11°21.4'	+59.9'	48.3°	12°01.3'	+60.0'	48.5°	12°41.0'	+60.0'	48.6°	13°20.6'	+60.0'	48.8°	14°00.0'	+60.0'	20.9°	14
15	11°01.2'	+59.8'	48.0°	11°41.4'	+59.9'	48.1°	12°21.4'	+59.9'	48.3°	13°01.2'	+60.0'	48.4°	13°41.0'	+60.0'	48.6°	14°20.6'	+60.0'	48.8°	15°00.0'	+60.0'	20.3°	15
16	12°01.0'	+59.8'	47.9°	12°41.2'	+59.9'	48.0°	13°21.3'	+59.9'	48.2°	14°01.2'	+60.0'	48.4°	14°40.9'	+60.0'	48.6°	15°20.6'	+60.0'	48.8°	16°00.0'	+60.0'	19.5°	16
17	13°00.8'	+59.8'	47.8°	13°41.1'	+59.9'	48.0°	14°21.2'	+59.9'	48.2°	15°01.1'	+59.9'	48.4°	15°40.9'	+60.0'	48.6°	16°20.5'	+60.0'	48.8°	17°00.0'	+60.0'	18.6°	17
18	14°00.6'	+59.8'	47.7°	14°40.9'	+59.9'	47.9°	15°21.1'	+59.9'	48.1°	16°01.1'	+59.9'	48.3°	16°40.9'	+60.0'	48.5°	17°20.5'	+60.0'	48.8°	18°00.0'	+60.0'	17.7°	18
19	15°00.4'	+59.8'	47.6°	15°40.8'	+59.9'	47.8°	16°21.0'	+59.9'	48.0°	17°01.0'	+59.9'	48.3°	17°40.9'	+60.0'	48.5°	18°20.5'	+60.0'	48.7°	19°00.0'	+60.0'	16.6°	19
20	16°00.2'	+59.8'	47.5°	16°40.7'	+59.9'	47.8°	17°20.9'	+59.9'	48.0°	18°01.0'	+59.9'	48.2°	18°40.9'	+60.0'	48.5°	19°20.5'	+60.0'	48.7°	20°00.0'	+60.0'	15.3°	20
21	17°00.0'	+59.8'	47.5°	17°40.5'	+59.9'	47.7°	18°20.8'	+59.9'	47.9°	19°00.9'	+59.9'	48.2°	19°40.8'	+60.0'	48.4°	20°20.5'	+60.0'	48.7°	21°00.0'	+60.0'	13.9°	21
22	17°59.8'	+59																				

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

48° 312° LHA

Latitude CONTRARY to Declination

48° 312° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	4°00.6'	-59.8'	131.8°	3°20.6'	-59.9'	131.9°	2°40.5'	-59.9'	131.9°	2°00.4'	-60.0'	132.0°	1°20.3'	-60.0'	132.0°	<u>0°40.1'</u>	<u>-60.0'</u>	<u>132.0°</u>	<u>0°00.0'</u>	<u>-60.0'</u>	<u>132.0°</u>	0
1	3°00.8'	-59.8'	131.9°	2°20.7'	-59.9'	132.0°	1°40.6'	-59.9'	132.0°	1°00.5'	-60.0'	132.0°	<u>0°20.3'</u>	<u>-60.0'</u>	<u>132.0°</u>	0°19.8'	+60.0'	48.0°	0°60.0'	+60.0'	47.2°	1
2	2°01.0'	-59.8'	132.0°	1°20.9'	-59.9'	132.0°	<u>0°40.7'</u>	<u>-59.9'</u>	<u>132.0°</u>	<u>0°00.5'</u>	<u>-60.0'</u>	<u>132.0°</u>	0°39.7'	+60.0'	48.0°	1°19.8'	+60.0'	48.0°	2°00.0'	+60.0'	47.2°	2
3	1°01.2'	-59.8'	132.1°	<u>0°21.0'</u>	<u>-59.9'</u>	<u>132.1°</u>	0°19.2'	+59.9'	47.9°	0°59.5'	+60.0'	47.9°	1°39.7'	+60.0'	47.9°	2°19.8'	+60.0'	48.0°	3°00.0'	+60.0'	55.4°	3
4	<u>0°01.4'</u>	<u>-59.8'</u>	<u>132.2°</u>	0°38.9'	+59.9'	47.8°	1°19.2'	+59.9'	47.9°	1°59.4'	+60.0'	47.9°	2°39.6'	+60.0'	47.9°	3°19.8'	+60.0'	48.0°	4°00.0'	+60.0'	47.1°	4
5	0°58.4'	+59.8'	47.8°	1°38.8'	+59.9'	47.8°	2°19.1'	+59.9'	47.8°	2°59.4'	+60.0'	47.8°	3°39.6'	+60.0'	47.9°	4°19.8'	+60.0'	47.9°	5°00.0'	+60.0'	47.0°	5
6	1°58.3'	+59.8'	47.7°	2°38.6'	+59.9'	47.7°	3°19.0'	+59.9'	47.8°	3°59.3'	+60.0'	47.8°	4°39.6'	+60.0'	47.9°	5°19.8'	+60.0'	47.9°	6°00.0'	+60.0'	46.9°	6
7	2°58.1'	+59.8'	47.6°	3°38.5'	+59.9'	47.7°	4°18.9'	+59.9'	47.7°	4°59.3'	+60.0'	47.8°	5°39.6'	+60.0'	47.8°	6°19.8'	+60.0'	47.9°	7°00.0'	+60.0'	46.8°	7
8	3°57.9'	+59.8'	47.5°	4°38.4'	+59.9'	47.6°	5°18.8'	+59.9'	47.7°	5°59.2'	+60.0'	47.7°	6°39.6'	+60.0'	47.8°	7°19.8'	+60.0'	47.9°	8°00.0'	+60.0'	23.8°	8
9	4°57.7'	+59.8'	47.5°	5°38.3'	+59.9'	47.5°	6°18.8'	+59.9'	47.6°	6°59.2'	+60.0'	47.7°	7°39.5'	+60.0'	47.8°	8°19.8'	+60.0'	47.9°	9°00.0'	+60.0'	90.0°	9
10	5°57.5'	+59.8'	47.4°	6°38.1'	+59.9'	47.5°	7°18.7'	+59.9'	47.5°	7°59.1'	+60.0'	47.6°	8°39.5'	+60.0'	47.8°	9°19.8'	+60.0'	47.9°	10°00.0'	+60.0'	62.6°	10
11	6°57.4'	+59.8'	47.3°	7°38.0'	+59.9'	47.4°	8°18.6'	+59.9'	47.5°	8°59.1'	+60.0'	47.6°	9°39.5'	+60.0'	47.7°	10°19.8'	+60.0'	47.9°	11°00.0'	+60.0'	62.5°	11
12	7°57.2'	+59.8'	47.2°	8°37.9'	+59.9'	47.3°	9°18.5'	+59.9'	47.4°	9°59.0'	+60.0'	47.6°	10°39.5'	+60.0'	47.7°	11°19.8'	+60.0'	47.8°	12°00.0'	+60.0'	90.0°	12
13	8°57.0'	+59.8'	47.1°	9°37.8'	+59.9'	47.3°	10°18.4'	+59.9'	47.4°	10°59.0'	+60.0'	47.5°	11°39.4'	+60.0'	47.7°	12°19.8'	+60.0'	47.8°	13°00.0'	+60.0'	90.0°	13
14	9°56.8'	+59.8'	47.1°	10°37.6'	+59.9'	47.2°	11°18.3'	+59.9'	47.3°	11°58.9'	+60.0'	47.5°	12°39.4'	+60.0'	47.6°	13°19.8'	+60.0'	47.8°	14°00.0'	+60.0'	20.9°	14
15	10°56.6'	+59.8'	47.0°	11°37.5'	+59.9'	47.1°	12°18.3'	+59.9'	47.3°	12°58.9'	+60.0'	47.4°	13°39.4'	+60.0'	47.6°	14°19.8'	+60.0'	47.8°	15°00.0'	+60.0'	20.3°	15
16	11°56.4'	+59.8'	46.9°	12°37.4'	+59.9'	47.1°	13°18.2'	+59.9'	47.2°	13°58.8'	+60.0'	47.4°	14°39.4'	+60.0'	47.6°	15°19.8'	+60.0'	47.8°	16°00.0'	+60.0'	19.5°	16
17	12°56.2'	+59.8'	46.8°	13°37.2'	+59.9'	47.0°	14°18.1'	+59.9'	47.2°	14°58.8'	+60.0'	47.4°	15°39.4'	+60.0'	47.6°	16°19.8'	+60.0'	47.8°	17°00.0'	+60.0'	18.6°	17
18	13°56.0'	+59.8'	46.7°	14°37.1'	+59.9'	46.9°	15°18.0'	+59.9'	47.1°	15°58.8'	+60.0'	47.3°	16°39.3'	+60.0'	47.5°	17°19.8'	+60.0'	47.8°	18°00.0'	+60.0'	17.7°	18
19	14°55.8'	+59.8'	46.7°	15°37.0'	+59.9'	46.9°	16°17.9'	+59.9'	47.1°	16°58.7'	+60.0'	47.3°	17°39.3'	+60.0'	47.5°	18°19.8'	+60.0'	47.7°	19°00.0'	+60.0'	16.6°	19
20	15°55.7'	+59.8'	46.6°	16°36.8'	+59.9'	46.8°	17°17.8'	+59.9'	47.0°	17°58.7'	+59.9'	47.2°	18°39.3'	+60.0'	47.5°	19°19.7'	+60.0'	47.7°	20°00.0'	+60.0'	15.3°	20
21	16°55.5'	+59.8'	46.5°	17°36.7'	+59.9'	46.7°	18°17.7'	+59.9'	46.9°	18°58.6'	+59.9'	47.2°	19°39.3'	+60.0'	47.5°	20°19.7'	+60.0'	47.7°	21°00.0'	+60.0'	13.9°	21
22	17°55.3'	+59.8'	46.4°	18°36.5'	+59.9'	46.6°	19°17.6'	+59.9'	46.9°	19°58.5'	+59.9'	47.2°	20°39.3'	+60.0'	47.4°	21°19.7'	+60.0'	47.7°	22°00.0'	+60.0'	12.2°	22
23	18°55.1'	+59.8'	46.3°	19°36.4'	+59.9'	46.6°	20°17.6'	+59.9'	46.8°	20°58.5'	+59.9'	47.1°	21°39.2'	+60.0'	47.4°	22°19.7'	+60.0'	47.7°	23°00.0'	+60.0'	90.0°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

132° 228° LHA

Latitude SAME as DECLINATION

132° 228° 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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	4°05.2'	-59.8'	132.8°	3°24.5'	-59.9'	132.9°	2°43.6'	-59.9'	132.9°	2°02.7'	-60.0'	133.0°	1°21.8'	-60.0'	133.0°	<u>0°40.9'</u>	<u>-60.0'</u>	<u>133.0°</u>	<u>0°00.0'</u>	<u>-60.0'</u>	<u>133.0°</u>	0
1	3°05.4'	-59.8'	132.9°	2°24.6'	-59.9'	133.0°	1°43.7'	-59.9'	133.0°	1°02.8'	-60.0'	133.0°	<u>0°21.9'</u>	<u>-60.0'</u>	<u>133.0°</u>	0°19.1'	+60.0'	47.0°	0°60.0'	+60.0'	47.2°	1
2	2°05.6'	-59.8'	133.0°	1°24.7'	-59.9'	133.0°	<u>0°43.8'</u>	<u>-59.9'</u>	<u>133.0°</u>	<u>0°02.8'</u>	<u>-60.0'</u>	<u>133.0°</u>	0°38.1'	+60.0'	47.0°	1°19.1'	+60.0'	47.0°	2°00.0'	+60.0'	47.2°	2
3	1°05.8'	-59.8'	133.1°	<u>0°24.8'</u>	<u>-59.9'</u>	<u>133.1°</u>	0°16.2'	+59.9'	46.9°	0°57.1'	+60.0'	46.9°	1°38.1'	+60.0'	46.9°	2°19.1'	+60.0'	47.0°	3°00.0'	+60.0'	55.4°	3
4	<u>0°06.0'</u>	<u>-59.8'</u>	<u>133.1°</u>	0°35.1'	+59.9'	46.9°	1°16.1'	+59.9'	46.9°	1°57.1'	+60.0'	46.9°	2°38.1'	+60.0'	46.9°	3°19.1'	+60.0'	47.0°	4°00.0'	+60.0'	47.1°	4
5	0°53.8'	+59.8'	46.8°	1°34.9'	+59.9'	46.8°	2°16.0'	+59.9'	46.8°	2°57.1'	+60.0'	46.8°	3°38.1'	+60.0'	46.9°	4°19.1'	+60.0'	46.9°	5°00.0'	+60.0'	47.0°	5
6	1°53.7'	+59.8'	46.7°	2°34.8'	+59.9'	46.7°	3°15.9'	+59.9'	46.8°	3°57.0'	+60.0'	46.8°	4°38.1'	+60.0'	46.9°	5°19.1'	+60.0'	46.9°	6°00.0'	+60.0'	46.9°	6
7	2°53.5'	+59.8'	46.6°	3°34.7'	+59.9'	46.7°	4°15.8'	+59.9'	46.7°	4°57.0'	+60.0'	46.8°	5°38.0'	+60.0'	46.8°	6°19.0'	+60.0'	46.9°	7°00.0'	+60.0'	46.8°	7
8	3°53.3'	+59.8'	46.5°	4°34.6'	+59.9'	46.6°	5°15.8'	+59.9'	46.7°	5°56.9'	+60.0'	46.7°	6°38.0'	+60.0'	46.8°	7°19.0'	+60.0'	46.9°	8°00.0'	+60.0'	23.8°	8
9	4°53.1'	+59.8'	46.5°	5°34.4'	+59.9'	46.5°	6°15.7'	+59.9'	46.6°	6°56.9'	+60.0'	46.7°	7°38.0'	+60.0'	46.8°	8°19.0'	+60.0'	46.9°	9°00.0'	+60.0'	90.0°	9
10	5°53.0'	+59.8'	46.4°	6°34.3'	+59.9'	46.5°	7°15.6'	+59.9'	46.6°	7°56.8'	+60.0'	46.7°	8°38.0'	+60.0'	46.8°	9°19.0'	+60.0'	46.9°	10°00.0'	+60.0'	62.6°	10
11	6°52.8'	+59.8'	46.3°	7°34.2'	+59.9'	46.4°	8°15.5'	+59.9'	46.5°	8°56.8'	+60.0'	46.6°	9°38.0'	+60.0'	46.7°	10°19.0'	+60.0'	46.9°	11°00.0'	+60.0'	62.5°	11
12	7°52.6'	+59.8'	46.2°	8°34.1'	+59.9'	46.3°	9°15.4'	+59.9'	46.5°	9°56.7'	+60.0'	46.6°	10°37.9'	+60.0'	46.7°	11°19.0'	+60.0'	46.8°	12°00.0'	+60.0'	90.0°	12
13	8°52.4'	+59.8'	46.2°	9°33.9'	+59.9'	46.3°	10°15.4'	+59.9'	46.4°	10°56.7'	+60.0'	46.5°	11°37.9'	+60.0'	46.7°	12°19.0'	+60.0'	46.8°	13°00.0'	+60.0'	90.0°	13
14	9°52.2'	+59.8'	46.1°	10°33.8'	+59.9'	46.2°	11°15.3'	+59.9'	46.3°	11°56.6'	+60.0'	46.5°	12°37.9'	+60.0'	46.7°	13°19.0'	+60.0'	46.8°	14°00.0'	+60.0'	20.9°	14
15	10°52.1'	+59.8'	46.0°	11°33.7'	+59.9'	46.1°	12°15.2'	+59.9'	46.3°	12°56.6'	+60.0'	46.5°	13°37.9'	+60.0'	46.6°	14°19.0'	+60.0'	46.8°	15°00.0'	+60.0'	20.3°	15
16	11°51.9'	+59.8'	45.9°	12°33.6'	+59.9'	46.1°	13°15.1'	+59.9'	46.2°	13°56.6'	+60.0'	46.4°	14°37.8'	+60.0'	46.6°	15°19.0'	+60.0'	46.8°	16°00.0'	+60.0'	19.5°	16
17	12°51.7'	+59.8'	45.8°	13°33.4'	+59.9'	46.0°	14°15.0'	+59.9'	46.2°	14°56.5'	+60.0'	46.4°	15°37.8'	+60.0'	46.6°	16°19.0'	+60.0'	46.8°	17°00.0'	+60.0'	18.6°	17
18	13°51.5'	+59.8'	45.8°	14°33.3'	+59.9'	45.9°	15°15.0'	+59.9'	46.1°	15°56.5'	+60.0'	46.3°	16°37.8'	+60.0'	46.5°	17°19.0'	+60.0'	46.8°	18°00.0'	+60.0'	17.7°	18
19	14°51.3'	+59.8'	45.7°	15°33.2'	+59.9'	45.9°	16°14.9'	+59.9'	46.1°	16°56.4'	+60.0'	46.3°	17°37.8'	+60.0'	46.5°	18°19.0'	+60.0'	46.8°	19°00.0'	+60.0'	16.6°	19
20	15°51.1'	+59.8'	45.6°	16°33.0'	+59.9'	45.8°	17°14.8'	+59.9'	46.0°	17°56.4'	+60.0'	46.3°	18°37.8'	+60.0'	46.5°	19°19.0'	+60.0'	46.7°	20°00.0'	+60.0'	15.3°	20
21	16°50.9'	+59.8'	45.5°	17°32.9'	+59.9'	45.7°	18°14.7'	+59.9'	46.0°	18°56.3'	+60.0'	46.2°	19°37.7'	+60.0'	46.5°	20°19.0'	+60.0'	46.7°	21°00.0'	+60.0'	13.9°	21
22	17°50.8'	+59.8'	4																			

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

46° 314° LHA

Latitude CONTRARY to Declination

46° 314° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	4°09.8'	-59.8'	133.8°	3°28.3'	-59.9'	133.9°	2°46.6'	-59.9'	133.9°	2°05.0'	-60.0'	134.0°	1°23.4'	-60.0'	134.0°	<u>0°41.7'</u>	<u>-60.0'</u>	<u>134.0°</u>	<u>0°00.0'</u>	<u>-60.0'</u>	<u>134.0°</u>	0
1	3°10.0'	-59.8'	133.9°	2°28.4'	-59.9'	134.0°	1°46.7'	-59.9'	134.0°	1°05.1'	-60.0'	134.0°	<u>0°23.4'</u>	<u>-60.0'</u>	<u>134.0°</u>	0°18.3'	+60.0'	46.0°	0°60.0'	+60.0'	47.2°	1
2	2°10.1'	-59.8'	134.0°	1°28.5'	-59.9'	134.0°	<u>0°46.8'</u>	<u>-59.9'</u>	<u>134.0°</u>	<u>0°05.1'</u>	<u>-60.0'</u>	<u>134.0°</u>	0°36.6'	+60.0'	46.0°	1°18.3'	+60.0'	46.0°	2°00.0'	+60.0'	47.2°	2
3	1°10.4'	-59.8'	134.1°	<u>0°28.6'</u>	<u>-59.9'</u>	<u>134.1°</u>	0°13.1'	+59.9'	45.9°	0°54.9'	+60.0'	45.9°	1°36.6'	+60.0'	45.9°	2°18.3'	+60.0'	46.0°	3°00.0'	+60.0'	55.4°	3
4	<u>0°10.5'</u>	<u>-59.8'</u>	<u>134.1°</u>	0°31.3'	+59.9'	45.9°	1°13.0'	+59.9'	45.9°	1°54.8'	+60.0'	45.9°	2°36.6'	+60.0'	45.9°	3°18.3'	+60.0'	46.0°	4°00.0'	+60.0'	47.1°	4
5	0°49.3'	+59.8'	45.8°	1°31.1'	+59.9'	45.8°	2°13.0'	+59.9'	45.8°	2°54.8'	+60.0'	45.9°	3°36.6'	+60.0'	45.9°	4°18.3'	+60.0'	45.9°	5°00.0'	+60.0'	47.0°	5
6	1°49.1'	+59.8'	45.7°	2°31.0'	+59.9'	45.7°	3°12.9'	+59.9'	45.8°	3°54.7'	+60.0'	45.8°	4°36.5'	+60.0'	45.9°	5°18.3'	+60.0'	45.9°	6°00.0'	+60.0'	46.9°	6
7	2°49.0'	+59.8'	45.6°	3°30.9'	+59.9'	45.7°	4°12.8'	+59.9'	45.7°	4°54.7'	+60.0'	45.8°	5°36.5'	+60.0'	45.8°	6°18.3'	+60.0'	45.9°	7°00.0'	+60.0'	46.8°	7
8	3°48.8'	+59.8'	45.6°	4°30.8'	+59.9'	45.6°	5°12.7'	+59.9'	45.7°	5°54.6'	+60.0'	45.7°	6°36.5'	+60.0'	45.8°	7°18.3'	+60.0'	45.9°	8°00.0'	+60.0'	0.0°	8
9	4°48.6'	+59.8'	45.5°	5°30.7'	+59.9'	45.5°	6°12.7'	+59.9'	45.6°	6°54.6'	+60.0'	45.7°	7°36.5'	+60.0'	45.8°	8°18.3'	+60.0'	45.9°	9°00.0'	+60.0'	62.7°	9
10	5°48.5'	+59.8'	45.4°	6°30.6'	+59.9'	45.5°	7°12.6'	+59.9'	45.6°	7°54.6'	+60.0'	45.7°	8°36.5'	+60.0'	45.8°	9°18.3'	+60.0'	45.9°	10°00.0'	+60.0'	23.0°	10
11	6°48.3'	+59.8'	45.3°	7°30.4'	+59.9'	45.4°	8°12.5'	+59.9'	45.5°	8°54.5'	+60.0'	45.6°	9°36.4'	+60.0'	45.7°	10°18.3'	+60.0'	45.9°	11°00.0'	+60.0'	22.6°	11
12	7°48.1'	+59.8'	45.3°	8°30.3'	+59.9'	45.4°	9°12.4'	+59.9'	45.5°	9°54.5'	+60.0'	45.6°	10°36.4'	+60.0'	45.7°	11°18.3'	+60.0'	45.9°	12°00.0'	+60.0'	90.0°	12
13	8°47.9'	+59.8'	45.2°	9°30.2'	+59.9'	45.3°	10°12.4'	+59.9'	45.4°	10°54.4'	+60.0'	45.5°	11°36.4'	+60.0'	45.7°	12°18.3'	+60.0'	45.8°	13°00.0'	+60.0'	90.0°	13
14	9°47.8'	+59.8'	45.1°	10°30.1'	+59.9'	45.2°	11°12.3'	+59.9'	45.4°	11°54.4'	+60.0'	45.5°	12°36.4'	+60.0'	45.7°	13°18.3'	+60.0'	45.8°	14°00.0'	+60.0'	20.9°	14
15	10°47.6'	+59.8'	45.0°	11°29.9'	+59.9'	45.2°	12°12.2'	+59.9'	45.3°	12°54.3'	+60.0'	45.5°	13°36.4'	+60.0'	45.6°	14°18.2'	+60.0'	45.8°	15°00.0'	+60.0'	20.3°	15
16	11°47.4'	+59.8'	44.9°	12°29.8'	+59.9'	45.1°	13°12.1'	+59.9'	45.3°	13°54.3'	+60.0'	45.4°	14°36.3'	+60.0'	45.6°	15°18.2'	+60.0'	45.8°	16°00.0'	+60.0'	19.5°	16
17	12°47.2'	+59.8'	44.9°	13°29.7'	+59.9'	45.0°	14°12.0'	+59.9'	45.2°	14°54.3'	+60.0'	45.4°	15°36.3'	+60.0'	45.6°	16°18.2'	+60.0'	45.8°	17°00.0'	+60.0'	18.6°	17
18	13°47.1'	+59.8'	44.8°	14°29.6'	+59.9'	45.0°	15°12.0'	+59.9'	45.1°	15°54.2'	+60.0'	45.3°	16°36.3'	+60.0'	45.6°	17°18.2'	+60.0'	45.8°	18°00.0'	+60.0'	17.7°	18
19	14°46.9'	+59.8'	44.7°	15°29.5'	+59.9'	44.9°	16°11.9'	+59.9'	45.1°	16°54.2'	+60.0'	45.3°	17°36.3'	+60.0'	45.5°	18°18.2'	+60.0'	45.8°	19°00.0'	+60.0'	16.6°	19
20	15°46.7'	+59.8'	44.6°	16°29.3'	+59.9'	44.8°	17°11.8'	+59.9'	45.0°	17°54.1'	+60.0'	45.3°	18°36.3'	+60.0'	45.5°	19°18.2'	+60.0'	45.7°	20°00.0'	+60.0'	15.3°	20
21	16°46.5'	+59.8'	44.5°	17°29.2'	+59.9'	44.8°	18°11.7'	+59.9'	45.0°	18°54.1'	+60.0'	45.2°	19°36.2'	+60.0'	45.5°	20°18.2'	+60.0'	45.7°	21°00.0'	+60.0'	13.9°	21
22	17°46.3'	+618.3'	44.5°	18°29.1'	+535.5'	44.7°	19°11.6'	+452.6'	44.9°	19°54.0'	+369.5'	45.2°	20°36.2'	+286.4'	45.4°	21°18.2'	+203.2'	45.7°	22°00.0'	+120.0'	12.2°	22
23	18°46.1'	-1380.5'	44.4°	19°28.9'	-1380.9'	44.6°	20°11.5'	-1381.2'	44.9°	20°54.0'	-1381.2'	45.1°	21°36.2'	-1381.0'	45.4°	22°18.2'	-1380.6'	45.7°	23°00.0'	-1380.0'	90.0°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	4°14.3'	-59.8'	134.8°	3°32.0'	-59.9'	134.9°	2°49.6'	-59.9'	134.9°	2°07.3'	-60.0'	135.0°	1°24.8'	-60.0'	135.0°	<u>0°42.4'</u>	<u>-60.0'</u>	<u>135.0°</u>	<u>0°00.0'</u>	<u>-60.0'</u>	<u>135.0°</u>	0
1	3°14.4'	-59.8'	134.9°	2°32.1'	-59.9'	135.0°	1°49.7'	-59.9'	135.0°	1°07.3'	-60.0'	135.0°	<u>0°24.9'</u>	<u>-60.0'</u>	<u>135.0°</u>	0°17.6'	+60.0'	45.0°	0°60.0'	+60.0'	47.2°	1
2	2°14.6'	-59.8'	135.0°	1°32.2'	-59.9'	135.0°	<u>0°49.8'</u>	<u>-59.9'</u>	<u>135.0°</u>	<u>0°07.3'</u>	<u>-60.0'</u>	<u>135.0°</u>	0°35.1'	+60.0'	45.0°	1°17.6'	+60.0'	45.0°	2°00.0'	+60.0'	47.2°	2
3	1°14.8'	-59.8'	135.1°	<u>0°32.3'</u>	<u>-59.9'</u>	<u>135.1°</u>	0°10.1'	+59.9'	44.9°	0°52.6'	+60.0'	44.9°	1°35.1'	+60.0'	44.9°	2°17.6'	+60.0'	45.0°	3°00.0'	+60.0'	55.4°	3
4	<u>0°15.0'</u>	<u>-59.8'</u>	<u>135.1°</u>	0°27.5'	+59.9'	44.9°	1°10.1'	+59.9'	44.9°	1°52.6'	+60.0'	44.9°	2°35.1'	+60.0'	44.9°	3°17.6'	+60.0'	45.0°	4°00.0'	+60.0'	47.1°	4
5	0°44.9'	+59.8'	44.8°	1°27.4'	+59.9'	44.8°	2°10.0'	+59.9'	44.8°	2°52.5'	+60.0'	44.9°	3°35.1'	+60.0'	44.9°	4°17.6'	+60.0'	44.9°	5°00.0'	+60.0'	47.0°	5
6	1°44.7'	+59.8'	44.7°	2°27.3'	+59.9'	44.7°	3°09.9'	+59.9'	44.8°	3°52.5'	+60.0'	44.8°	4°35.0'	+60.0'	44.9°	5°17.5'	+60.0'	44.9°	6°00.0'	+60.0'	46.9°	6
7	2°44.5'	+59.8'	44.6°	3°27.2'	+59.9'	44.7°	4°09.9'	+59.9'	44.7°	4°52.5'	+60.0'	44.8°	5°35.0'	+60.0'	44.8°	6°17.5'	+60.0'	44.9°	7°00.0'	+60.0'	46.8°	7
8	3°44.4'	+59.8'	44.6°	4°27.1'	+59.9'	44.6°	5°09.8'	+59.9'	44.7°	5°52.4'	+60.0'	44.7°	6°35.0'	+60.0'	44.8°	7°17.5'	+60.0'	44.9°	8°00.0'	+60.0'	0.0°	8
9	4°44.2'	+59.8'	44.5°	5°27.0'	+59.9'	44.6°	6°09.7'	+59.9'	44.6°	6°52.4'	+60.0'	44.7°	7°35.0'	+60.0'	44.8°	8°17.5'	+60.0'	44.9°	9°00.0'	+60.0'	62.7°	9
10	5°44.0'	+59.8'	44.4°	6°26.9'	+59.9'	44.5°	7°09.6'	+59.9'	44.6°	7°52.3'	+60.0'	44.7°	8°35.0'	+60.0'	44.8°	9°17.5'	+60.0'	44.9°	10°00.0'	+60.0'	23.0°	10
11	6°43.9'	+59.8'	44.3°	7°26.7'	+59.9'	44.4°	8°09.6'	+59.9'	44.5°	8°52.3'	+60.0'	44.6°	9°35.0'	+60.0'	44.7°	10°17.5'	+60.0'	44.9°	11°00.0'	+60.0'	22.6°	11
12	7°43.7'	+59.8'	44.3°	8°26.6'	+59.9'	44.4°	9°09.5'	+59.9'	44.5°	9°52.3'	+60.0'	44.6°	10°34.9'	+60.0'	44.7°	11°17.5'	+60.0'	44.9°	12°00.0'	+60.0'	62.4°	12
13	8°43.5'	+59.8'	44.2°	9°26.5'	+59.9'	44.3°	10°09.4'	+59.9'	44.4°	10°52.2'	+60.0'	44.6°	11°34.9'	+60.0'	44.7°	12°17.5'	+60.0'	44.8°	13°00.0'	+60.0'	62.3°	13
14	9°43.4'	+59.8'	44.1°	10°26.4'	+59.9'	44.2°	11°09.3'	+59.9'	44.4°	11°52.2'	+60.0'	44.5°	12°34.9'	+60.0'	44.7°	13°17.5'	+60.0'	44.8°	14°00.0'	+60.0'	0.0°	14
15	10°43.2'	+59.8'	44.0°	11°26.3'	+59.9'	44.2°	12°09.3'	+59.9'	44.3°	12°52.1'	+60.0'	44.5°	13°34.9'	+60.0'	44.6°	14°17.5'	+60.0'	44.8°	15°00.0'	+60.0'	20.3°	15
16	11°43.0'	+59.8'	44.0°	12°26.2'	+59.9'	44.1°	13°09.2'	+59.9'	44.3°	13°52.1'	+60.0'	44.4°	14°34.9'	+60.0'	44.6°	15°17.5'	+60.0'	44.8°	16°00.0'	+60.0'	19.5°	16
17	12°42.8'	+59.8'	43.9°	13°26.0'	+59.9'	44.0°	14°09.1'	+59.9'	44.2°	14°52.0'	+60.0'	44.4°	15°34.8'	+60.0'	44.6°	16°17.5'	+60.0'	44.8°	17°00.0'	+60.0'	18.6°	17
18	13°42.7'	+59.8'	43.8°	14°25.9'	+59.9'	44.0°	15°09.0'	+59.9'	44.2°	15°52.0'	+60.0'	44.4°	16°34.8'	+60.0'	44.6°	17°17.5'	+60.0'	44.8°	18°00.0'	+60.0'	17.7°	18
19	14°42.5'	+59.8'	43.7°	15°25.8'	+59.9'	43.9°	16°08.9'	+59.9'	44.1°	16°51.9'	+60.0'	44.3°	17°34.8'	+60.0'	44.5°	18°17.5'	+60.0'	44.8°	19°00.0'	+60.0'	16.6°	19
20	15°42.3'	+59.8'	43.6°	16°25.7'	+59.9'	43.8°	17°08.9'	+59.9'	44.1°	17°51.9'	+60.0'	44.3°	18°34.8'	+60.0'	44.5°	19°17.5'	+60.0'	44.7°	20°00.0'	+60.0'	15.3°	20
21	16°42.1'	+59.8'	43.6°	17°25.5'	+59.9'	43.8°	18°08.8'	+59.9'	44.0°	18°51.9'	+60.0'	44.2°	19°34.8'	+60.0'	44.5°	20°17.5'	+60.0'	44.7°	21°00.0'	+60.0'	13.9°	21
22	17°4																					

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

44° 316° LHA

Latitude CONTRARY to Declination

44° 316° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	4°18.7'	-59.8'	135.8°	3°35.7'	-59.9'	135.9°	2°52.6'	-59.9'	135.9°	2°09.5'	-60.0'	136.0°	1°26.3'	-60.0'	136.0°	<u>0°43.2' -60.0' 136.0°</u>	<u>0°00.0' -60.0' 136.0°</u>				0	
1	3°18.8'	-59.8'	135.9°	2°35.8'	-59.9'	136.0°	1°52.6'	-59.9'	136.0°	1°09.5'	-60.0'	136.0°	<u>0°26.3' -60.0' 136.0°</u>	0°16.8'	+60.0'	44.0°	0°60.0'	+60.0'	42.6°			1
2	2°19.0'	-59.8'	136.0°	1°35.9'	-59.9'	136.0°	<u>0°52.7' -59.9' 136.0°</u>	<u>0°09.5' -60.0' 136.0°</u>	0°33.7'	+60.0'	44.0°	1°16.8'	+60.0'	44.0°	2°00.0'	+60.0'	47.2°				2	
3	1°19.2'	-59.8'	136.1°	<u>0°36.0' -59.9' 136.1°</u>	0°07.2'	+59.9'	43.9°	0°50.4'	+60.0'	43.9°	1°33.6'	+60.0'	43.9°	2°16.8'	+60.0'	44.0°	3°00.0'	+60.0'	55.4°			3
4	<u>0°19.4' -59.8' 136.1°</u>	0°23.9'	+59.9'	43.9°	1°07.1'	+59.9'	43.9°	1°50.4'	+60.0'	43.9°	2°33.6'	+60.0'	43.9°	3°16.8'	+60.0'	44.0°	4°00.0'	+60.0'	47.1°			4
5	0°40.5'	+59.8'	43.8°	1°23.8'	+59.9'	43.8°	2°07.1'	+59.9'	43.8°	2°50.3'	+60.0'	43.9°	3°33.6'	+60.0'	43.9°	4°16.8'	+60.0'	43.9°	5°00.0'	+60.0'	47.0°	5
6	1°40.3'	+59.8'	43.7°	2°23.7'	+59.9'	43.7°	3°07.0'	+59.9'	43.8°	3°50.3'	+60.0'	43.8°	4°33.6'	+60.0'	43.9°	5°16.8'	+60.0'	43.9°	6°00.0'	+60.0'	46.9°	6
7	2°40.2'	+59.8'	43.6°	3°23.6'	+59.9'	43.7°	4°06.9'	+59.9'	43.7°	4°50.3'	+60.0'	43.8°	5°33.6'	+60.0'	43.8°	6°16.8'	+60.0'	43.9°	7°00.0'	+60.0'	46.8°	7
8	3°40.0'	+59.8'	43.6°	4°23.4'	+59.9'	43.6°	5°06.9'	+59.9'	43.7°	5°50.2'	+60.0'	43.7°	6°33.5'	+60.0'	43.8°	7°16.8'	+60.0'	43.9°	8°00.0'	+60.0'	0.0°	8
9	4°39.8'	+59.8'	43.5°	5°23.3'	+59.9'	43.6°	6°06.8'	+59.9'	43.6°	6°50.2'	+60.0'	43.7°	7°33.5'	+60.0'	43.8°	8°16.8'	+60.0'	43.9°	9°00.0'	+60.0'	62.7°	9
10	5°39.7'	+59.8'	43.4°	6°23.2'	+59.9'	43.5°	7°06.7'	+59.9'	43.6°	7°50.1'	+60.0'	43.7°	8°33.5'	+60.0'	43.8°	9°16.8'	+60.0'	43.9°	10°00.0'	+60.0'	23.0°	10
11	6°39.5'	+59.8'	43.4°	7°23.1'	+59.9'	43.4°	8°06.6'	+59.9'	43.5°	8°50.1'	+60.0'	43.6°	9°33.5'	+60.0'	43.7°	10°16.8'	+60.0'	43.9°	11°00.0'	+60.0'	22.6°	11
12	7°39.4'	+59.8'	43.3°	8°23.0'	+59.9'	43.4°	9°06.6'	+59.9'	43.5°	9°50.1'	+60.0'	43.6°	10°33.5'	+60.0'	43.7°	11°16.8'	+60.0'	43.9°	12°00.0'	+60.0'	62.4°	12
13	8°39.2'	+59.8'	43.2°	9°22.9'	+59.9'	43.3°	10°06.5'	+59.9'	43.4°	10°50.0'	+60.0'	43.6°	11°33.5'	+60.0'	43.7°	12°16.8'	+60.0'	43.8°	13°00.0'	+60.0'	62.3°	13
14	9°39.0'	+59.8'	43.1°	10°22.8'	+59.9'	43.3°	11°06.4'	+59.9'	43.4°	11°50.0'	+60.0'	43.5°	12°33.4'	+60.0'	43.7°	13°16.8'	+60.0'	43.8°	14°00.0'	+60.0'	0.0°	14
15	10°38.9'	+59.8'	43.1°	11°22.7'	+59.9'	43.2°	12°06.4'	+59.9'	43.3°	12°49.9'	+60.0'	43.5°	13°33.4'	+60.0'	43.6°	14°16.8'	+60.0'	43.8°	15°00.0'	+60.0'	20.3°	15
16	11°38.7'	+59.8'	43.0°	12°22.5'	+59.9'	43.1°	13°06.3'	+59.9'	43.3°	13°49.9'	+60.0'	43.4°	14°33.4'	+60.0'	43.6°	15°16.8'	+60.0'	43.8°	16°00.0'	+60.0'	19.5°	16
17	12°38.5'	+59.8'	42.9°	13°22.4'	+59.9'	43.1°	14°06.2'	+59.9'	43.2°	14°49.9'	+60.0'	43.4°	15°33.4'	+60.0'	43.6°	16°16.8'	+60.0'	43.8°	17°00.0'	+60.0'	18.6°	17
18	13°38.4'	+59.8'	42.8°	14°22.3'	+59.9'	43.0°	15°06.1'	+59.9'	43.2°	15°49.8'	+60.0'	43.4°	16°33.4'	+60.0'	43.6°	17°16.8'	+60.0'	43.8°	18°00.0'	+60.0'	17.7°	18
19	14°38.2'	+59.8'	42.8°	15°22.2'	+59.9'	42.9°	16°06.1'	+59.9'	43.1°	16°49.8'	+60.0'	43.3°	17°33.3'	+60.0'	43.5°	18°16.8'	+60.0'	43.8°	19°00.0'	+60.0'	16.6°	19
20	15°38.0'	+59.8'	42.7°	16°22.1'	+59.9'	42.9°	17°06.0'	+59.9'	43.1°	17°49.7'	+60.0'	43.3°	18°33.3'	+60.0'	43.5°	19°16.7'	+60.0'	43.8°	20°00.0'	+60.0'	15.3°	20
21	16°37.9'	+59.8'	42.6°	17°22.0'	+59.9'	42.8°	18°05.9'	+59.9'	43.0°	18°49.7'	+60.0'	43.2°	19°33.3'	+60.0'	43.5°	20°16.7'	+60.0'	43.7°	21°00.0'	+60.0'	13.9°	21
22	17°37.7'	+59.8'	42.5°	18°21.8'	+59.9'	42.7°	19°05.8'	+59.9'	43.0°	19°49.6'	+60.0'	43.2°	20°33.3'	+60.0'	43.5°	21°16.7'	+60.0'	43.7°	22°00.0'	+60.0'	12.2°	22
23	18°37.5'	+59.8'	42.4°	19°21.7'	+59.9'	42.7°	20°05.7'	+59.9'	42.9°	20°49.6'	+60.0'	43.2°	21°33.3'	+60.0'	43.4°	22°16.7'	+60.0'	43.7°	23°00.0'	+60.0'	90.0°	23
Dec°	84			85			86			87			88			89			90			Dec°

136° 224° LHA

Latitude SAME as DECLINATION

136° 224° 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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	4°23.0'	-59.8'	136.8°	3°39.3'	-59.9'	136.9°	2°55.5'	-59.9'	136.9°	2°11.6'	-60.0'	137.0°	1°27.8'	-60.0'	137.0°	<u>0°43.9' -60.0' 137.0°</u>	<u>0°00.0' -60.0' 137.0°</u>				0	
1	3°23.2'	-59.8'	136.9°	2°39.4'	-59.9'	137.0°	1°55.5'	-59.9'	137.0°	1°11.7'	-60.0'	137.0°	<u>0°27.8' -60.0' 137.0°</u>	0°16.1'	+60.0'	43.0°	0°60.0'	+60.0'	42.6°			1
2	2°23.3'	-59.8'	137.0°	1°39.5'	-59.9'	137.0°	<u>0°55.6' -59.9' 137.0°</u>	<u>0°11.7' -60.0' 137.0°</u>	0°32.2'	+60.0'	43.0°	1°16.1'	+60.0'	43.0°	2°00.0'	+60.0'	47.2°				2	
3	1°23.5'	-59.8'	137.1°	<u>0°39.6' -59.9' 137.1°</u>	0°04.3'	+59.9'	42.9°	0°48.3'	+60.0'	42.9°	1°32.2'	+60.0'	42.9°	2°16.1'	+60.0'	43.0°	3°00.0'	+60.0'	55.4°			3
4	<u>0°23.7' -59.8' 137.1°</u>	0°20.3'	+59.9'	42.9°	1°04.3'	+59.9'	42.9°	1°48.2'	+60.0'	42.9°	2°32.2'	+60.0'	42.9°	3°16.1'	+60.0'	43.0°	4°00.0'	+60.0'	47.1°			4
5	0°36.2'	+59.8'	42.8°	1°20.2'	+59.9'	42.8°	2°04.2'	+59.9'	42.8°	2°48.2'	+60.0'	42.9°	3°32.2'	+60.0'	42.9°	4°16.1'	+60.0'	42.9°	5°00.0'	+60.0'	47.0°	5
6	1°36.0'	+59.8'	42.7°	2°20.1'	+59.9'	42.8°	3°04.1'	+59.9'	42.8°	3°48.2'	+60.0'	42.8°	4°32.1'	+60.0'	42.9°	5°16.1'	+60.0'	42.9°	6°00.0'	+60.0'	46.9°	6
7	2°35.9'	+59.8'	42.7°	3°20.0'	+59.9'	42.7°	4°04.1'	+59.9'	42.7°	4°48.1'	+60.0'	42.8°	5°32.1'	+60.0'	42.9°	6°16.1'	+60.0'	42.9°	7°00.0'	+60.0'	46.8°	7
8	3°35.7'	+59.8'	42.6°	4°19.9'	+59.9'	42.6°	5°04.0'	+59.9'	42.7°	5°48.1'	+60.0'	42.8°	6°32.1'	+60.0'	42.8°	7°16.1'	+60.0'	42.9°	8°00.0'	+60.0'	0.0°	8
9	4°35.6'	+59.8'	42.5°	5°19.8'	+59.9'	42.6°	6°03.9'	+59.9'	42.6°	6°48.0'	+60.0'	42.7°	7°32.1'	+60.0'	42.8°	8°16.1'	+60.0'	42.9°	9°00.0'	+60.0'	62.7°	9
10	5°35.4'	+59.8'	42.4°	6°19.7'	+59.9'	42.5°	7°03.9'	+59.9'	42.6°	7°48.0'	+60.0'	42.7°	8°32.1'	+60.0'	42.8°	9°16.1'	+60.0'	42.9°	10°00.0'	+60.0'	23.0°	10
11	6°35.3'	+59.8'	42.4°	7°19.6'	+59.9'	42.5°	8°03.8'	+59.9'	42.5°	8°48.0'	+60.0'	42.6°	9°32.1'	+60.0'	42.8°	10°16.1'	+60.0'	42.9°	11°00.0'	+60.0'	22.6°	11
12	7°35.1'	+59.8'	42.3°	8°19.4'	+59.9'	42.4°	9°03.7'	+59.9'	42.5°	9°47.9'	+60.0'	42.6°	10°32.0'	+60.0'	42.7°	11°16.1'	+60.0'	42.9°	12°00.0'	+60.0'	62.4°	12
13	8°34.9'	+59.8'	42.2°	9°19.3'	+59.9'	42.3°	10°03.7'	+59.9'	42.4°	10°47.9'	+60.0'	42.6°	11°32.0'	+60.0'	42.7°	12°16.1'	+60.0'	42.8°	13°00.0'	+60.0'	62.3°	13
14	9°34.8'	+59.8'	42.2°	10°19.2'	+59.9'	42.3°	11°03.6'	+59.9'	42.4°	11°47.8'	+60.0'	42.5°	12°32.0'	+60.0'	42.7°	13°16.1'	+60.0'	42.8°	14°00.0'	+60.0'	0.0°	14
15	10°34.6'	+59.8'	42.1°	11°19.1'	+59.9'	42.2°	12°03.5'	+59.9'	42.3°	12°47.8'	+60.0'	42.5°	13°32.0'	+60.0'	42.7°	14°16.1'	+60.0'	42.8°	15°00.0'	+60.0'	20.3°	15
16	11°34.5'	+59.8'	42.0°	12°19.0'	+59.9'	42.1°	13°03.4'	+59.9'	42.3°	13°47.8'	+60.0'	42.5°	14°32.0'	+60.0'	42.6°	15°16.1'	+60.0'	42.8°	16°00.0'	+60.0'	19.5°	16
17	12°34.3'	+59.8'	41.9°	13°18.9'	+59.9'	42.1°	14°03.4'	+59.9'	42.2°	14°47.7'	+60.0'	42.4°	15°32.0'	+60.0'	42.6°	16°16.0'	+60.0'	42.8°	17°00.0'	+60.0'	18.6°	17
18	13°34.1'	+59.8'	41.9°	14°18.8'	+59.9'	42.0°	15°03.3'	+59.9'	42.2°	15°47.7'	+60.0'	42.4°	16°31.9'	+60.0'	42.6°	17°16.0'	+60.0'	42.8°	18°00.0'	+60.0'	17.7°	18
19	14°34.0'	+59.8'	41.8°	15°18.7'	+59.9'	42.0°	16°03.2'	+59.9'	42.1°	16°47.6'	+60.0'	42.3°	17°31.9'	+60.0'	42.6°	18°16.0'	+60.0'	42.8°	19°00.0'	+60.0'	16.6°	19
20	15°33.8'	+59.8'	41.7°	16°18.6'	+59.9'	41.9°	17°03.1'	+59.9'	42.1°	17°47.6'	+60.0'	42.3°	18°31.9'	+60.0'	42.5°	19°16.0'	+60.0'	42.8°	20°00.0'	+60.0'	15.3°	20
21	16°33.7'	+59.8'	41.6°	17°18.4'	+59.9'	41.8°	18°03.1'	+59.9'	42.0°	18°47.6'	+60.0'	42.3°	19°31.9'	+60.0'	42.5°	20°16.0'	+60.0'	42.7°	21°00.0'	+60.0'	13.9°	21
22	17°33.5'	+59.8'	41.5°	18°18.3'	+59.9'	41.8°	19°03.0'	+59.9'	42.0°	19°47.5'	+60.0'	42.2°	20°31.9'	+60.0'	42.5°	21°16.0'	+60.0'	42.7°	22°00.0'	+60.0'	12.2°	22
23	18°33.3'	+59.8'	41.5°	19°18.2'	+59.																	

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

42° 318° LHA

Latitude CONTRARY to Declination

42° 318° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	4°27.3'	-59.9'	137.8°	3°42.8'	-59.9'	137.9°	2°58.3'	-59.9'	137.9°	2°13.7'	-60.0'	138.0°	1°29.2'	-60.0'	138.0°	<u>0°44.6'</u>	<u>-60.0'</u>	<u>138.0°</u>	<u>0°00.0'</u>	<u>-60.0'</u>	<u>138.0°</u>	0
1	3°27.4'	-59.9'	137.9°	2°42.9'	-59.9'	137.9°	1°58.4'	-59.9'	138.0°	1°13.8'	-60.0'	138.0°	<u>0°29.2'</u>	<u>-60.0'</u>	<u>138.0°</u>	0°15.4'	+60.0'	42.0°	0°60.0'	+60.0'	42.6°	1
2	2°27.6'	-59.9'	138.0°	1°43.0'	-59.9'	138.0°	<u>0°58.4'</u>	<u>-59.9'</u>	<u>138.0°</u>	<u>0°13.8'</u>	<u>-60.0'</u>	<u>138.0°</u>	0°30.8'	+60.0'	42.0°	1°15.4'	+60.0'	42.0°	2°00.0'	+60.0'	37.5°	2
3	1°27.8'	-59.9'	138.1°	<u>0°43.1'</u>	<u>-59.9'</u>	<u>138.1°</u>	0°01.5'	+59.9'	41.9°	0°46.2'	+60.0'	41.9°	1°30.8'	+60.0'	41.9°	2°15.4'	+60.0'	42.0°	3°00.0'	+60.0'	47.1°	3
4	<u>0°27.9'</u>	<u>-59.9'</u>	<u>138.1°</u>	0°16.8'	+59.9'	41.9°	1°01.4'	+59.9'	41.9°	1°46.1'	+60.0'	41.9°	2°30.8'	+60.0'	41.9°	3°15.4'	+60.0'	42.0°	4°00.0'	+60.0'	47.1°	4
5	0°32.0'	+59.9'	41.8°	1°16.7'	+59.9'	41.8°	2°01.4'	+59.9'	41.8°	2°46.1'	+60.0'	41.9°	3°30.7'	+60.0'	41.9°	4°15.4'	+60.0'	41.9°	5°00.0'	+60.0'	47.0°	5
6	1°31.8'	+59.9'	41.7°	2°16.6'	+59.9'	41.8°	3°01.3'	+59.9'	41.8°	3°46.0'	+60.0'	41.8°	4°30.7'	+60.0'	41.9°	5°15.4'	+60.0'	41.9°	6°00.0'	+60.0'	46.9°	6
7	2°31.7'	+59.9'	41.7°	3°16.5'	+59.9'	41.7°	4°01.3'	+59.9'	41.7°	4°46.0'	+60.0'	41.8°	5°30.7'	+60.0'	41.9°	6°15.4'	+60.0'	41.9°	7°00.0'	+60.0'	46.8°	7
8	3°31.5'	+59.9'	41.6°	4°16.4'	+59.9'	41.6°	5°01.2'	+59.9'	41.7°	5°46.0'	+60.0'	41.8°	6°30.7'	+60.0'	41.8°	7°15.4'	+60.0'	41.9°	8°00.0'	+60.0'	0.0°	8
9	4°31.4'	+59.9'	41.5°	5°16.3'	+59.9'	41.6°	6°01.1'	+59.9'	41.6°	6°45.9'	+60.0'	41.7°	7°30.7'	+60.0'	41.8°	8°15.4'	+60.0'	41.9°	9°00.0'	+60.0'	62.7°	9
10	5°31.2'	+59.9'	41.5°	6°16.2'	+59.9'	41.5°	7°01.1'	+59.9'	41.6°	7°45.9'	+60.0'	41.7°	8°30.7'	+60.0'	41.8°	9°15.4'	+60.0'	41.9°	10°00.0'	+60.0'	23.0°	10
11	6°31.1'	+59.9'	41.4°	7°16.1'	+59.9'	41.5°	8°01.0'	+59.9'	41.6°	8°45.9'	+60.0'	41.7°	9°30.6'	+60.0'	41.8°	10°15.4'	+60.0'	41.9°	11°00.0'	+60.0'	22.6°	11
12	7°30.9'	+59.9'	41.3°	8°16.0'	+59.9'	41.4°	9°00.9'	+59.9'	41.5°	9°45.8'	+60.0'	41.6°	10°30.6'	+60.0'	41.7°	11°15.4'	+60.0'	41.9°	12°00.0'	+60.0'	62.4°	12
13	8°30.8'	+59.8'	41.2°	9°15.8'	+59.9'	41.3°	10°00.9'	+59.9'	41.5°	10°45.8'	+60.0'	41.6°	11°30.6'	+60.0'	41.7°	12°15.4'	+60.0'	41.9°	13°00.0'	+60.0'	62.3°	13
14	9°30.6'	+59.8'	41.2°	10°15.7'	+59.9'	41.3°	11°00.8'	+59.9'	41.4°	11°45.7'	+60.0'	41.5°	12°30.6'	+60.0'	41.7°	13°15.4'	+60.0'	41.8°	14°00.0'	+60.0'	0.0°	14
15	10°30.5'	+59.8'	41.1°	11°15.6'	+59.9'	41.2°	12°00.7'	+59.9'	41.4°	12°45.7'	+60.0'	41.5°	13°30.6'	+60.0'	41.7°	14°15.3'	+60.0'	41.8°	15°00.0'	+60.0'	20.3°	15
16	11°30.3'	+59.8'	41.0°	12°15.5'	+59.9'	41.2°	13°00.6'	+59.9'	41.3°	13°45.7'	+60.0'	41.5°	14°30.6'	+60.0'	41.6°	15°15.3'	+60.0'	41.8°	16°00.0'	+60.0'	19.5°	16
17	12°30.2'	+59.8'	41.0°	13°15.4'	+59.9'	41.1°	14°00.6'	+59.9'	41.3°	14°45.6'	+60.0'	41.4°	15°30.5'	+60.0'	41.6°	16°15.3'	+60.0'	41.8°	17°00.0'	+60.0'	18.6°	17
18	13°30.0'	+59.8'	40.9°	14°15.3'	+59.9'	41.0°	15°00.5'	+59.9'	41.2°	15°45.6'	+60.0'	41.4°	16°30.5'	+60.0'	41.6°	17°15.3'	+60.0'	41.8°	18°00.0'	+60.0'	17.7°	18
19	14°29.8'	+59.8'	40.8°	15°15.2'	+59.9'	41.0°	16°00.4'	+59.9'	41.2°	16°45.5'	+60.0'	41.4°	17°30.5'	+60.0'	41.6°	18°15.3'	+60.0'	41.8°	19°00.0'	+60.0'	16.6°	19
20	15°29.7'	+59.8'	40.7°	16°15.1'	+59.9'	40.9°	17°00.4'	+59.9'	41.1°	17°45.5'	+60.0'	41.3°	18°30.5'	+60.0'	41.5°	19°15.3'	+60.0'	41.8°	20°00.0'	+60.0'	15.3°	20
21	16°29.5'	+59.8'	40.7°	17°15.0'	+59.9'	40.9°	18°00.3'	+59.9'	41.1°	18°45.5'	+60.0'	41.3°	19°30.5'	+60.0'	41.5°	20°15.3'	+60.0'	41.7°	21°00.0'	+60.0'	13.9°	21
22	17°29.4'	+59.8'	40.6°	18°14.9'	+59.9'	40.8°	19°00.2'	+59.9'	41.0°	19°45.4'	+60.0'	41.2°	20°30.5'	+60.0'	41.5°	21°15.3'	+60.0'	41.7°	22°00.0'	+60.0'	12.2°	22
23	18°29.2'	+59.8'	40.5°	19°14.8'	+59.9'	40.7°	20°00.1'	+59.9'	41.0°	20°45.4'	+60.0'	41.2°	21°30.4'	+60.0'	41.5°	22°15.3'	+60.0'	41.7°	23°00.0'	+60.0'	90.0°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

138° 222° LHA

Latitude SAME as DECLINATION

138° 222° 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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	4°31.4'	-59.9'	138.8°	3°46.3'	-59.9'	138.9°	3°01.1'	-59.9'	138.9°	2°15.8'	-60.0'	139.0°	1°30.6'	-60.0'	139.0°	<u>0°45.3'</u>	<u>-60.0'</u>	<u>139.0°</u>	<u>0°00.0'</u>	<u>-60.0'</u>	<u>139.0°</u>	0
1	3°31.6'	-59.9'	138.9°	2°46.4'	-59.9'	138.9°	2°01.1'	-59.9'	139.0°	1°15.9'	-60.0'	139.0°	<u>0°30.6'</u>	<u>-60.0'</u>	<u>139.0°</u>	0°14.7'	+60.0'	41.0°	0°60.0'	+60.0'	42.6°	1
2	2°31.7'	-59.9'	139.0°	1°46.5'	-59.9'	139.0°	1°01.2'	-59.9'	139.0°	<u>0°15.9'</u>	<u>-60.0'</u>	<u>139.0°</u>	0°29.4'	+60.0'	41.0°	1°14.7'	+60.0'	41.0°	2°00.0'	+60.0'	37.5°	2
3	1°31.9'	-59.9'	139.1°	<u>0°46.6'</u>	<u>-59.9'</u>	<u>139.1°</u>	<u>0°01.3'</u>	<u>-59.9'</u>	<u>139.1°</u>	0°44.1'	+60.0'	40.9°	1°29.4'	+60.0'	40.9°	2°14.7'	+60.0'	41.0°	3°00.0'	+60.0'	47.1°	3
4	<u>0°32.0'</u>	<u>-59.9'</u>	<u>139.1°</u>	0°13.3'	+59.9'	40.9°	0°58.7'	+59.9'	40.9°	1°44.0'	+60.0'	40.9°	2°29.4'	+60.0'	40.9°	3°14.7'	+60.0'	41.0°	4°00.0'	+60.0'	47.1°	4
5	0°27.8'	+59.9'	40.8°	1°13.2'	+59.9'	40.8°	1°58.6'	+59.9'	40.8°	2°44.0'	+60.0'	40.9°	3°29.4'	+60.0'	40.9°	4°14.7'	+60.0'	40.9°	5°00.0'	+60.0'	47.0°	5
6	1°27.7'	+59.9'	40.7°	2°13.1'	+59.9'	40.8°	2°58.6'	+59.9'	40.8°	3°44.0'	+60.0'	40.8°	4°29.3'	+60.0'	40.9°	5°14.7'	+60.0'	40.9°	6°00.0'	+60.0'	46.9°	6
7	2°27.5'	+59.9'	40.7°	3°13.0'	+59.9'	40.7°	3°58.5'	+59.9'	40.7°	4°43.9'	+60.0'	40.8°	5°29.3'	+60.0'	40.9°	6°14.7'	+60.0'	40.9°	7°00.0'	+60.0'	46.8°	7
8	3°27.4'	+59.9'	40.6°	4°12.9'	+59.9'	40.7°	4°58.4'	+59.9'	40.7°	5°43.9'	+60.0'	40.8°	6°29.3'	+60.0'	40.8°	7°14.7'	+60.0'	40.9°	8°00.0'	+60.0'	0.0°	8
9	4°27.2'	+59.9'	40.5°	5°12.8'	+59.9'	40.6°	5°58.4'	+59.9'	40.7°	6°43.9'	+60.0'	40.7°	7°29.3'	+60.0'	40.8°	8°14.7'	+60.0'	40.9°	9°00.0'	+60.0'	62.7°	9
10	5°27.1'	+59.9'	40.5°	6°12.7'	+59.9'	40.5°	6°58.3'	+59.9'	40.6°	7°43.8'	+60.0'	40.7°	8°29.3'	+60.0'	40.8°	9°14.7'	+60.0'	40.9°	10°00.0'	+60.0'	23.0°	10
11	6°27.0'	+59.9'	40.4°	7°12.6'	+59.9'	40.5°	7°58.2'	+59.9'	40.6°	8°43.8'	+60.0'	40.7°	9°29.3'	+60.0'	40.8°	10°14.7'	+60.0'	40.9°	11°00.0'	+60.0'	22.6°	11
12	7°26.8'	+59.9'	40.3°	8°12.5'	+59.9'	40.4°	8°58.2'	+59.9'	40.5°	9°43.8'	+60.0'	40.6°	10°29.3'	+60.0'	40.7°	11°14.7'	+60.0'	40.9°	12°00.0'	+60.0'	62.4°	12
13	8°26.7'	+59.9'	40.3°	9°12.4'	+59.9'	40.4°	9°58.1'	+59.9'	40.5°	10°43.7'	+60.0'	40.6°	11°29.2'	+60.0'	40.7°	12°14.7'	+60.0'	40.9°	13°00.0'	+60.0'	62.3°	13
14	9°26.5'	+59.9'	40.2°	10°12.3'	+59.9'	40.3°	10°58.0'	+59.9'	40.4°	11°43.7'	+60.0'	40.6°	12°29.2'	+60.0'	40.7°	13°14.7'	+60.0'	40.8°	14°00.0'	+60.0'	0.0°	14
15	10°26.4'	+59.9'	40.1°	11°12.2'	+59.9'	40.2°	11°58.0'	+59.9'	40.4°	12°43.6'	+60.0'	40.5°	13°29.2'	+60.0'	40.7°	14°14.7'	+60.0'	40.8°	15°00.0'	+60.0'	20.3°	15
16	11°26.2'	+59.9'	40.0°	12°12.1'	+59.9'	40.2°	12°57.9'	+59.9'	40.3°	13°43.6'	+60.0'	40.5°	14°29.2'	+60.0'	40.6°	15°14.7'	+60.0'	40.8°	16°00.0'	+60.0'	19.5°	16
17	12°26.1'	+59.9'	40.0°	13°12.0'	+59.9'	40.1°	13°57.8'	+59.9'	40.3°	14°43.6'	+60.0'	40.4°	15°29.2'	+60.0'	40.6°	16°14.6'	+60.0'	40.8°	17°00.0'	+60.0'	18.6°	17
18	13°25.9'	+59.9'	39.9°	14°11.9'	+59.9'	40.1°	14°57.8'	+59.9'	40.2°	15°43.5'	+60.0'	40.4°	16°29.2'	+60.0'	40.6°	17°14.6'	+60.0'	40.8°	18°00.0'	+60.0'	17.7°	18
19	14°25.8'	+59.8'	39.8°	15°11.8'	+59.9'	40.0°	15°57.7'	+59.9'	40.2°	16°43.5'	+60.0'	40.4°	17°29.1'	+60.0'	40.6°	18°14.6'	+60.0'	40.8°	19°00.0'	+60.0'	16.6°	19
20	15°25.6'	+59.8'	39.8°	16°11.7'	+59.9'	39.9°	16°57.6'	+59.9'	40.1°	17°43.5'	+60.0'	40.3°	18°29.1'	+60.0'	40.5°	19°14.6'	+60.0'	40.8°	20°00.0'	+60.0'	15.3°	20
21	16°25.5'	+59.8'	39.7°	17°11.6'	+59.9'	39.9°	17°57.6'	+59.9'	40.1°	18°43.4'	+60.0'	40.3°	19°29.1'	+60.0'	40.5°	20°14.6'	+60.0'	40.8°	21°00.0'	+60.0'	13.9°	21
22	17°25.3'	+59.8'	39.6°																			

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

40° 320° LHA

Latitude CONTRARY to Declination

40° 320° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	4°35.5'	-59.9'	139.8°	3°49.7'	-59.9'	139.9°	3°03.8'	-59.9'	139.9°	2°17.9'	-60.0'	140.0°	1°31.9'	-60.0'	140.0°	<u>0°46.0'</u>	<u>-60.0'</u>	<u>140.0°</u>	<u>0°00.0'</u>	<u>-60.0'</u>	<u>140.0°</u>	0
1	3°35.7'	-59.9'	139.9°	2°49.8'	-59.9'	139.9°	2°03.8'	-59.9'	140.0°	1°17.9'	-60.0'	140.0°	<u>0°31.9'</u>	<u>-60.0'</u>	<u>140.0°</u>	0°14.0'	+60.0'	40.0°	0°60.0'	+60.0'	37.5°	1
2	2°35.8'	-59.9'	140.0°	1°49.9'	-59.9'	140.0°	1°03.9'	-59.9'	140.0°	<u>0°17.9'</u>	<u>-60.0'</u>	<u>140.0°</u>	0°28.1'	+60.0'	40.0°	1°14.0'	+60.0'	40.0°	2°00.0'	+60.0'	37.5°	2
3	1°36.0'	-59.9'	140.0°	<u>0°50.0'</u>	<u>-59.9'</u>	<u>140.1°</u>	<u>0°04.0'</u>	<u>-59.9'</u>	<u>140.1°</u>	0°42.0'	+60.0'	39.9°	1°28.0'	+60.0'	39.9°	2°14.0'	+60.0'	40.0°	3°00.0'	+60.0'	47.1°	3
4	<u>0°36.1'</u>	<u>-59.9'</u>	<u>140.1°</u>	0°09.9'	+59.9'	39.9°	0°56.0'	+59.9'	39.9°	1°42.0'	+60.0'	39.9°	2°28.0'	+60.0'	39.9°	3°14.0'	+60.0'	40.0°	4°00.0'	+60.0'	47.1°	4
5	0°23.8'	+59.9'	39.8°	1°09.8'	+59.9'	39.8°	1°55.9'	+59.9'	39.8°	2°42.0'	+60.0'	39.9°	3°28.0'	+60.0'	39.9°	4°14.0'	+60.0'	39.9°	5°00.0'	+60.0'	47.0°	5
6	1°23.6'	+59.9'	39.8°	2°09.7'	+59.9'	39.8°	2°55.8'	+59.9'	39.8°	3°41.9'	+60.0'	39.8°	4°28.0'	+60.0'	39.9°	5°14.0'	+60.0'	39.9°	6°00.0'	+60.0'	46.9°	6
7	2°23.5'	+59.9'	39.7°	3°09.6'	+59.9'	39.7°	3°55.8'	+59.9'	39.8°	4°41.9'	+60.0'	39.8°	5°28.0'	+60.0'	39.9°	6°14.0'	+60.0'	39.9°	7°00.0'	+60.0'	46.8°	7
8	3°23.3'	+59.9'	39.6°	4°09.6'	+59.9'	39.7°	4°55.7'	+59.9'	39.7°	5°41.9'	+60.0'	39.8°	6°28.0'	+60.0'	39.8°	7°14.0'	+60.0'	39.9°	8°00.0'	+60.0'	0.0°	8
9	4°23.2'	+59.9'	39.5°	5°09.5'	+59.9'	39.6°	5°55.7'	+59.9'	39.7°	6°41.8'	+60.0'	39.7°	7°27.9'	+60.0'	39.8°	8°14.0'	+60.0'	39.9°	9°00.0'	+60.0'	62.7°	9
10	5°23.1'	+59.9'	39.5°	6°09.4'	+59.9'	39.5°	6°55.6'	+59.9'	39.6°	7°41.8'	+60.0'	39.7°	8°27.9'	+60.0'	39.8°	9°14.0'	+60.0'	39.9°	10°00.0'	+60.0'	23.0°	10
11	6°22.9'	+59.9'	39.4°	7°09.3'	+59.9'	39.5°	7°55.5'	+59.9'	39.6°	8°41.8'	+60.0'	39.7°	9°27.9'	+60.0'	39.8°	10°14.0'	+60.0'	39.9°	11°00.0'	+60.0'	22.6°	11
12	7°22.8'	+59.9'	39.3°	8°09.2'	+59.9'	39.4°	8°55.5'	+59.9'	39.5°	9°41.7'	+60.0'	39.6°	10°27.9'	+60.0'	39.7°	11°14.0'	+60.0'	39.9°	12°00.0'	+60.0'	62.4°	12
13	8°22.7'	+59.9'	39.3°	9°09.1'	+59.9'	39.4°	9°55.4'	+59.9'	39.5°	10°41.7'	+60.0'	39.6°	11°27.9'	+60.0'	39.7°	12°14.0'	+60.0'	39.9°	13°00.0'	+60.0'	62.3°	13
14	9°22.5'	+59.9'	39.2°	10°09.0'	+59.9'	39.3°	10°55.4'	+59.9'	39.4°	11°41.7'	+60.0'	39.6°	12°27.9'	+60.0'	39.7°	13°14.0'	+60.0'	39.8°	14°00.0'	+60.0'	0.0°	14
15	10°22.4'	+59.9'	39.1°	11°08.9'	+59.9'	39.3°	11°55.3'	+59.9'	39.4°	12°41.6'	+60.0'	39.5°	13°27.9'	+60.0'	39.7°	14°14.0'	+60.0'	39.8°	15°00.0'	+60.0'	20.3°	15
16	11°22.2'	+59.9'	39.1°	12°08.8'	+59.9'	39.2°	12°55.2'	+59.9'	39.3°	13°41.6'	+60.0'	39.5°	14°27.8'	+60.0'	39.7°	15°14.0'	+60.0'	39.8°	16°00.0'	+60.0'	19.5°	16
17	12°22.1'	+59.9'	39.0°	13°08.7'	+59.9'	39.1°	13°55.2'	+59.9'	39.3°	14°41.5'	+60.0'	39.5°	15°27.8'	+60.0'	39.6°	16°14.0'	+60.0'	39.8°	17°00.0'	+60.0'	18.6°	17
18	13°22.0'	+59.9'	38.9°	14°08.6'	+59.9'	39.1°	14°55.1'	+59.9'	39.2°	15°41.5'	+60.0'	39.4°	16°27.8'	+60.0'	39.6°	17°14.0'	+60.0'	39.8°	18°00.0'	+60.0'	17.7°	18
19	14°21.8'	+59.9'	38.9°	15°08.5'	+59.9'	39.0°	15°55.0'	+59.9'	39.2°	16°41.5'	+60.0'	39.4°	17°27.8'	+60.0'	39.6°	18°14.0'	+60.0'	39.8°	19°00.0'	+60.0'	16.6°	19
20	15°21.7'	+59.9'	38.8°	16°08.4'	+59.9'	39.0°	16°55.0'	+59.9'	39.1°	17°41.4'	+60.0'	39.3°	18°27.8'	+60.0'	39.6°	19°14.0'	+60.0'	39.8°	20°00.0'	+60.0'	15.3°	20
21	16°21.5'	+59.9'	38.7°	17°08.3'	+59.9'	38.9°	17°54.9'	+59.9'	39.1°	18°41.4'	+60.0'	39.3°	19°27.7'	+60.0'	39.5°	20°14.0'	+60.0'	39.8°	21°00.0'	+60.0'	13.9°	21
22	17°21.4'	+59.9'	38.6°	18°08.2'	+59.9'	38.8°	18°54.8'	+59.9'	39.0°	19°41.4'	+60.0'	39.3°	20°27.7'	+60.0'	39.5°	21°14.0'	+60.0'	39.7°	22°00.0'	+60.0'	12.2°	22
23	18°21.2'	+59.8'	38.6°	19°08.1'	+59.9'	38.8°	19°54.8'	+59.9'	39.0°	20°41.3'	+60.0'	39.2°	21°27.7'	+60.0'	39.5°	22°13.9'	+60.0'	39.7°	23°00.0'	+60.0'	90.0°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

140° 220° LHA

Latitude SAME as DECLINATION

140° 220° 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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	4°39.5'	-59.9'	140.8°	3°53.0'	-59.9'	140.9°	3°06.5'	-59.9'	140.9°	2°19.9'	-60.0'	141.0°	1°33.3'	-60.0'	141.0°	<u>0°46.6'</u>	<u>-60.0'</u>	<u>141.0°</u>	<u>0°00.0'</u>	<u>-60.0'</u>	<u>141.0°</u>	0
1	3°39.7'	-59.9'	140.9°	2°53.1'	-59.9'	140.9°	2°06.5'	-59.9'	141.0°	1°19.9'	-60.0'	141.0°	<u>0°33.3'</u>	<u>-60.0'</u>	<u>141.0°</u>	0°13.4'	+60.0'	39.0°	0°60.0'	+60.0'	37.5°	1
2	2°39.8'	-59.9'	141.0°	1°53.2'	-59.9'	141.0°	1°06.6'	-59.9'	141.0°	<u>0°19.9'</u>	<u>-60.0'</u>	<u>141.0°</u>	0°26.7'	+60.0'	39.0°	1°13.4'	+60.0'	39.0°	2°00.0'	+60.0'	37.5°	2
3	1°40.0'	-59.9'	141.0°	<u>0°53.3'</u>	<u>-59.9'</u>	<u>141.1°</u>	<u>0°06.6'</u>	<u>-59.9'</u>	<u>141.1°</u>	0°40.0'	+60.0'	38.9°	1°26.7'	+60.0'	39.0°	2°13.4'	+60.0'	39.0°	3°00.0'	+60.0'	47.1°	3
4	<u>0°40.1'</u>	<u>-59.9'</u>	<u>141.1°</u>	0°06.6'	+59.9'	38.9°	0°53.3'	+59.9'	38.9°	1°40.0'	+60.0'	38.9°	2°26.7'	+60.0'	38.9°	3°13.4'	+60.0'	39.0°	4°00.0'	+60.0'	47.1°	4
5	0°19.8'	+59.9'	38.8°	1°06.5'	+59.9'	38.8°	1°53.3'	+59.9'	38.8°	2°40.0'	+60.0'	38.9°	3°26.7'	+60.0'	38.9°	4°13.4'	+60.0'	38.9°	5°00.0'	+60.0'	47.0°	5
6	1°19.6'	+59.9'	38.8°	2°06.4'	+59.9'	38.8°	2°53.2'	+59.9'	38.8°	3°39.9'	+60.0'	38.8°	4°26.7'	+60.0'	38.9°	5°13.4'	+60.0'	38.9°	6°00.0'	+60.0'	46.9°	6
7	2°19.5'	+59.9'	38.7°	3°06.3'	+59.9'	38.7°	3°53.1'	+59.9'	38.8°	4°39.9'	+60.0'	38.8°	5°26.6'	+60.0'	38.9°	6°13.3'	+60.0'	38.9°	7°00.0'	+60.0'	46.8°	7
8	3°19.4'	+59.9'	38.6°	4°06.2'	+59.9'	38.7°	4°53.1'	+59.9'	38.7°	5°39.9'	+60.0'	38.8°	6°26.6'	+60.0'	38.8°	7°13.3'	+60.0'	38.9°	8°00.0'	+60.0'	0.0°	8
9	4°19.3'	+59.9'	38.6°	5°06.2'	+59.9'	38.6°	5°53.0'	+59.9'	38.7°	6°39.8'	+60.0'	38.7°	7°26.6'	+60.0'	38.8°	8°13.3'	+60.0'	38.9°	9°00.0'	+60.0'	62.7°	9
10	5°19.1'	+59.9'	38.5°	6°06.1'	+59.9'	38.6°	6°53.0'	+59.9'	38.6°	7°39.8'	+60.0'	38.7°	8°26.6'	+60.0'	38.8°	9°13.3'	+60.0'	38.9°	10°00.0'	+60.0'	23.0°	10
11	6°19.0'	+59.9'	38.4°	7°06.0'	+59.9'	38.5°	7°52.9'	+59.9'	38.6°	8°39.8'	+60.0'	38.7°	9°26.6'	+60.0'	38.8°	10°13.3'	+60.0'	38.9°	11°00.0'	+60.0'	22.6°	11
12	7°18.9'	+59.9'	38.4°	8°05.9'	+59.9'	38.4°	8°52.8'	+59.9'	38.5°	9°39.7'	+60.0'	38.6°	10°26.6'	+60.0'	38.8°	11°13.3'	+60.0'	38.9°	12°00.0'	+60.0'	62.4°	12
13	8°18.7'	+59.9'	38.3°	9°05.8'	+59.9'	38.4°	9°52.8'	+59.9'	38.5°	10°39.7'	+60.0'	38.6°	11°26.6'	+60.0'	38.7°	12°13.3'	+60.0'	38.9°	13°00.0'	+60.0'	62.3°	13
14	9°18.6'	+59.9'	38.2°	10°05.7'	+59.9'	38.3°	10°52.7'	+59.9'	38.4°	11°39.7'	+60.0'	38.6°	12°26.5'	+60.0'	38.7°	13°13.3'	+60.0'	38.8°	14°00.0'	+60.0'	0.0°	14
15	10°18.5'	+59.9'	38.2°	11°05.6'	+59.9'	38.3°	11°52.7'	+59.9'	38.4°	12°39.6'	+60.0'	38.5°	13°26.5'	+60.0'	38.7°	14°13.3'	+60.0'	38.8°	15°00.0'	+60.0'	20.3°	15
16	11°18.3'	+59.9'	38.1°	12°05.5'	+59.9'	38.2°	12°52.6'	+59.9'	38.4°	13°39.6'	+60.0'	38.5°	14°26.5'	+60.0'	38.7°	15°13.3'	+60.0'	38.8°	16°00.0'	+60.0'	19.5°	16
17	12°18.2'	+59.9'	38.0°	13°05.4'	+59.9'	38.2°	13°52.5'	+59.9'	38.3°	14°39.6'	+60.0'	38.5°	15°26.5'	+60.0'	38.6°	16°13.3'	+60.0'	38.8°	17°00.0'	+60.0'	18.6°	17
18	13°18.1'	+59.9'	38.0°	14°05.3'	+59.9'	38.1°	14°52.5'	+59.9'	38.3°	15°39.5'	+60.0'	38.4°	16°26.5'	+60.0'	38.6°	17°13.3'	+60.0'	38.8°	18°00.0'	+60.0'	17.7°	18
19	14°17.9'	+59.9'	37.9°	15°05.2'	+59.9'	38.0°	15°52.4'	+59.9'	38.2°	16°39.5'	+60.0'	38.4°	17°26.5'	+60.0'	38.6°	18°13.3'	+60.0'	38.8°	19°00.0'	+60.0'	16.6°	19
20	15°17.8'	+59.9'	37.8°	16°05.1'	+59.9'	38.0°	16°52.4'	+59.9'	38.2°	17°39.5'	+60.0'	38.4°	18°26.5'	+60.0'	38.6°	19°13.3'	+60.0'	38.8°	20°00.0'	+60.0'	15.3°	20
21	16°17.6'	+59.9'	37.7°	17°05.0'	+59.9'	37.9°	17°52.3'	+59.9'	38.1°	18°39.4'	+60.0'	38.3°	19°26.4'	+60.0'	38.5°	20°13.3'	+60.0'	38.8°	21°00.0'	+60.0'	13.9°	21
22	17°17.5'	+59.9'	37.7°																			

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

38° 322° LHA

Latitude CONTRARY to Declination

38° 322° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	4°43.4'	-59.9'	141.8°	3°56.3'	-59.9'	141.9°	3°09.1'	-59.9'	141.9°	2°21.8'	-60.0'	142.0°	1°34.6'	-60.0'	142.0°	<u>0°47.3' -60.0' 142.0°</u>	<u>0°00.0' -60.0' 142.0°</u>				0	
1	3°43.6'	-59.9'	141.9°	2°56.4'	-59.9'	141.9°	2°09.1'	-59.9'	142.0°	1°21.8'	-60.0'	142.0°	<u>0°34.6' -60.0' 142.0°</u>	0°12.7'	+60.0'	38.0°	0°60.0'	+60.0'	37.5°			1
2	2°43.7'	-59.9'	142.0°	1°56.5'	-59.9'	142.0°	1°09.2'	-59.9'	142.0°	<u>0°21.9' -60.0' 142.0°</u>	0°25.4'	+60.0'	38.0°	1°12.7'	+60.0'	38.0°	2°00.0'	+60.0'	37.5°			2
3	1°43.9'	-59.9'	142.0°	<u>0°56.5' -59.9' 142.1°</u>	<u>0°09.2' -59.9' 142.1°</u>	0°38.1'	+60.0'	37.9°	1°25.4'	+60.0'	38.0°	2°12.7'	+60.0'	38.0°	3°00.0'	+60.0'	47.1°					3
4	<u>0°44.0' -59.9' 142.1°</u>	0°03.4'	+59.9'	37.9°	0°50.7'	+59.9'	37.9°	1°38.1'	+60.0'	37.9°	2°25.4'	+60.0'	37.9°	3°12.7'	+60.0'	38.0°	4°00.0'	+60.0'	47.1°			4
5	0°15.9'	+59.9'	37.8°	1°03.3'	+59.9'	37.8°	1°50.7'	+59.9'	37.9°	2°38.0'	+60.0'	37.9°	3°25.4'	+60.0'	37.9°	4°12.7'	+60.0'	38.0°	5°00.0'	+60.0'	47.0°	5
6	1°15.8'	+59.9'	37.8°	2°03.2'	+59.9'	37.8°	2°50.6'	+59.9'	37.8°	3°38.0'	+60.0'	37.8°	4°25.4'	+60.0'	37.9°	5°12.7'	+60.0'	37.9°	6°00.0'	+60.0'	46.9°	6
7	2°15.6'	+59.9'	37.7°	3°03.1'	+59.9'	37.7°	3°50.5'	+59.9'	37.8°	4°38.0'	+60.0'	37.8°	5°25.3'	+60.0'	37.9°	6°12.7'	+60.0'	37.9°	7°00.0'	+60.0'	46.8°	7
8	3°15.5'	+59.9'	37.6°	4°03.0'	+59.9'	37.7°	4°50.5'	+59.9'	37.7°	5°37.9'	+60.0'	37.8°	6°25.3'	+60.0'	37.8°	7°12.7'	+60.0'	37.9°	8°00.0'	+60.0'	0.0°	8
9	4°15.4'	+59.9'	37.6°	5°02.9'	+59.9'	37.6°	5°50.4'	+59.9'	37.7°	6°37.9'	+60.0'	37.7°	7°25.3'	+60.0'	37.8°	8°12.7'	+60.0'	37.9°	9°00.0'	+60.0'	62.7°	9
10	5°15.3'	+59.9'	37.5°	6°02.8'	+59.9'	37.6°	6°50.4'	+59.9'	37.6°	7°37.9'	+60.0'	37.7°	8°25.3'	+60.0'	37.8°	9°12.7'	+60.0'	37.9°	10°00.0'	+60.0'	23.0°	10
11	6°15.1'	+59.9'	37.4°	7°02.8'	+59.9'	37.5°	7°50.3'	+59.9'	37.6°	8°37.8'	+60.0'	37.7°	9°25.3'	+60.0'	37.8°	10°12.7'	+60.0'	37.9°	11°00.0'	+60.0'	22.6°	11
12	7°15.0'	+59.9'	37.4°	8°02.7'	+59.9'	37.5°	8°50.3'	+59.9'	37.5°	9°37.8'	+60.0'	37.6°	10°25.3'	+60.0'	37.8°	11°12.7'	+60.0'	37.9°	12°00.0'	+60.0'	62.4°	12
13	8°14.9'	+59.9'	37.3°	9°02.6'	+59.9'	37.4°	9°50.2'	+59.9'	37.5°	10°37.8'	+60.0'	37.6°	11°25.3'	+60.0'	37.7°	12°12.7'	+60.0'	37.9°	13°00.0'	+60.0'	62.3°	13
14	9°14.8'	+59.9'	37.2°	10°02.5'	+59.9'	37.3°	10°50.2'	+59.9'	37.5°	11°37.7'	+60.0'	37.6°	12°25.2'	+60.0'	37.7°	13°12.7'	+60.0'	37.9°	14°00.0'	+60.0'	0.0°	14
15	10°14.6'	+59.9'	37.2°	11°02.4'	+59.9'	37.3°	11°50.1'	+59.9'	37.4°	12°37.7'	+60.0'	37.5°	13°25.2'	+60.0'	37.7°	14°12.7'	+60.0'	37.8°	15°00.0'	+60.0'	20.3°	15
16	11°14.5'	+59.9'	37.1°	12°02.3'	+59.9'	37.2°	12°50.0'	+59.9'	37.4°	13°37.7'	+60.0'	37.5°	14°25.2'	+60.0'	37.7°	15°12.7'	+60.0'	37.8°	16°00.0'	+60.0'	19.5°	16
17	12°14.4'	+59.9'	37.0°	13°02.2'	+59.9'	37.2°	13°50.0'	+59.9'	37.3°	14°37.6'	+60.0'	37.5°	15°25.2'	+60.0'	37.6°	16°12.7'	+60.0'	37.8°	17°00.0'	+60.0'	18.6°	17
18	13°14.2'	+59.9'	37.0°	14°02.1'	+59.9'	37.1°	14°49.9'	+59.9'	37.3°	15°37.6'	+60.0'	37.4°	16°25.2'	+60.0'	37.6°	17°12.7'	+60.0'	37.8°	18°00.0'	+60.0'	17.7°	18
19	14°14.1'	+59.9'	36.9°	15°02.0'	+59.9'	37.1°	15°49.9'	+59.9'	37.2°	16°37.6'	+60.0'	37.4°	17°25.2'	+60.0'	37.6°	18°12.7'	+60.0'	37.8°	19°00.0'	+60.0'	16.6°	19
20	15°14.0'	+59.9'	36.8°	16°01.9'	+59.9'	37.0°	16°49.8'	+59.9'	37.2°	17°37.5'	+60.0'	37.4°	18°25.2'	+60.0'	37.6°	19°12.6'	+60.0'	37.8°	20°00.0'	+60.0'	15.3°	20
21	16°13.8'	+59.9'	36.8°	17°01.8'	+59.9'	37.0°	17°49.7'	+59.9'	37.1°	18°37.5'	+60.0'	37.3°	19°25.1'	+60.0'	37.5°	20°12.6'	+60.0'	37.8°	21°00.0'	+60.0'	13.9°	21
22	17°13.7'	+59.9'	36.7°	18°01.8'	+59.9'	36.9°	18°49.7'	+59.9'	37.1°	19°37.5'	+60.0'	37.3°	20°25.1'	+60.0'	37.5°	21°12.6'	+60.0'	37.8°	22°00.0'	+60.0'	12.2°	22
23	18°13.6'	+59.9'	36.6°	19°01.7'	+59.9'	36.8°	19°49.6'	+59.9'	37.0°	20°37.4'	+60.0'	37.3°	21°25.1'	+60.0'	37.5°	22°12.6'	+60.0'	37.7°	23°00.0'	+60.0'	90.0°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

142° 218° LHA

Latitude SAME as DECLINATION

142° 218° 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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	4°47.3'	-59.9'	142.8°	3°59.5'	-59.9'	142.9°	3°11.6'	-59.9'	142.9°	2°23.7'	-60.0'	143.0°	1°35.8'	-60.0'	143.0°	<u>0°47.9' -60.0' 143.0°</u>	<u>0°00.0' -60.0' 143.0°</u>				0	
1	3°47.4'	-59.9'	142.9°	2°59.6'	-59.9'	142.9°	2°11.7'	-59.9'	143.0°	1°23.8'	-60.0'	143.0°	<u>0°35.8' -60.0' 143.0°</u>	0°12.1'	+60.0'	37.0°	0°60.0'	+60.0'	37.5°			1
2	2°47.5'	-59.9'	143.0°	1°59.6'	-59.9'	143.0°	1°11.7'	-59.9'	143.0°	<u>0°23.8' -60.0' 143.0°</u>	0°24.1'	+60.0'	37.0°	1°12.1'	+60.0'	37.0°	2°00.0'	+60.0'	37.5°			2
3	1°47.7'	-59.9'	143.0°	<u>0°59.7' -59.9' 143.1°</u>	<u>0°11.8' -59.9' 143.1°</u>	0°36.2'	+60.0'	36.9°	1°24.1'	+60.0'	37.0°	2°12.1'	+60.0'	37.0°	3°00.0'	+60.0'	47.1°					3
4	<u>0°47.8' -59.9' 143.1°</u>	0°00.2'	+59.9'	36.9°	0°48.2'	+59.9'	36.9°	1°36.2'	+60.0'	36.9°	2°24.1'	+60.0'	36.9°	3°12.1'	+60.0'	37.0°	4°00.0'	+60.0'	24.7°			4
5	0°12.1'	+59.9'	36.8°	1°00.1'	+59.9'	36.8°	1°48.1'	+59.9'	36.9°	2°36.1'	+60.0'	36.9°	3°24.1'	+60.0'	36.9°	4°12.1'	+60.0'	37.0°	5°00.0'	+60.0'	24.5°	5
6	1°12.0'	+59.9'	36.8°	2°00.0'	+59.9'	36.8°	2°48.1'	+59.9'	36.8°	3°36.1'	+60.0'	36.8°	4°24.1'	+60.0'	36.9°	5°12.1'	+60.0'	36.9°	6°00.0'	+60.0'	24.3°	6
7	2°11.8'	+59.9'	36.7°	2°59.9'	+59.9'	36.7°	3°48.0'	+59.9'	36.8°	4°36.1'	+60.0'	36.8°	5°24.1'	+60.0'	36.9°	6°12.1'	+60.0'	36.9°	7°00.0'	+60.0'	46.8°	7
8	3°11.7'	+59.9'	36.6°	3°59.9'	+59.9'	36.7°	4°48.0'	+59.9'	36.7°	5°36.0'	+60.0'	36.8°	6°24.1'	+60.0'	36.8°	7°12.1'	+60.0'	36.9°	8°00.0'	+60.0'	0.0°	8
9	4°11.6'	+59.9'	36.6°	4°59.8'	+59.9'	36.6°	5°47.9'	+59.9'	36.7°	6°36.0'	+60.0'	36.8°	7°24.1'	+60.0'	36.8°	8°12.1'	+60.0'	36.9°	9°00.0'	+60.0'	62.7°	9
10	5°11.5'	+59.9'	36.5°	5°59.7'	+59.9'	36.6°	6°47.9'	+59.9'	36.6°	7°36.0'	+60.0'	36.7°	8°24.0'	+60.0'	36.8°	9°12.0'	+60.0'	36.9°	10°00.0'	+60.0'	23.0°	10
11	6°11.4'	+59.9'	36.5°	6°59.6'	+59.9'	36.5°	7°47.8'	+59.9'	36.6°	8°35.9'	+60.0'	36.7°	9°24.0'	+60.0'	36.8°	10°12.0'	+60.0'	36.9°	11°00.0'	+60.0'	22.6°	11
12	7°11.3'	+59.9'	36.4°	7°59.5'	+59.9'	36.5°	8°47.7'	+59.9'	36.6°	9°35.9'	+60.0'	36.7°	10°24.0'	+60.0'	36.8°	11°12.0'	+60.0'	36.9°	12°00.0'	+60.0'	62.4°	12
13	8°11.1'	+59.9'	36.3°	8°59.4'	+59.9'	36.4°	9°47.7'	+59.9'	36.5°	10°35.9'	+60.0'	36.6°	11°24.0'	+60.0'	36.7°	12°12.0'	+60.0'	36.9°	13°00.0'	+60.0'	62.3°	13
14	9°11.0'	+59.9'	36.3°	9°59.4'	+59.9'	36.4°	10°47.6'	+59.9'	36.5°	11°35.8'	+60.0'	36.6°	12°24.0'	+60.0'	36.7°	13°12.0'	+60.0'	36.9°	14°00.0'	+60.0'	0.0°	14
15	10°10.9'	+59.9'	36.2°	10°59.3'	+59.9'	36.3°	11°47.6'	+59.9'	36.4°	12°35.8'	+60.0'	36.6°	13°24.0'	+60.0'	36.7°	14°12.0'	+60.0'	36.8°	15°00.0'	+60.0'	20.3°	15
16	11°10.8'	+59.9'	36.1°	11°59.2'	+59.9'	36.3°	12°47.5'	+59.9'	36.4°	13°35.8'	+60.0'	36.5°	14°24.0'	+60.0'	36.7°	15°12.0'	+60.0'	36.8°	16°00.0'	+60.0'	19.5°	16
17	12°10.6'	+59.9'	36.1°	12°59.1'	+59.9'	36.2°	13°47.5'	+59.9'	36.3°	14°35.8'	+60.0'	36.5°	15°23.9'	+60.0'	36.7°	16°12.0'	+60.0'	36.8°	17°00.0'	+60.0'	18.6°	17
18	13°10.5'	+59.9'	36.0°	13°59.0'	+59.9'	36.1°	14°47.4'	+59.9'	36.3°	15°35.7'	+60.0'	36.5°	16°23.9'	+60.0'	36.6°	17°12.0'	+60.0'	36.8°	18°00.0'	+60.0'	17.7°	18
19	14°10.4'	+59.9'	35.9°	14°58.9'	+59.9'	36.1°	15°47.4'	+59.9'	36.3°	16°35.7'	+60.0'	36.4°	17°23.9'	+60.0'	36.6°	18°12.0'	+60.0'	36.8°	19°00.0'	+60.0'	16.6°	19
20	15°10.3'	+59.9'	35.9°	15°58.8'	+59.9'	36.0°	16°47.3'	+59.9'	36.2°	17°35.7'	+60.0'	36.4°	18°23.9'	+60.0'	36.6°	19°12.0'	+60.0'	36.8°	20°00.0'	+60.0'	15.3°	20
21	16°10.1'	+59.9'	35.8°	16°58.7'	+59.9'	36.0°	17°47.2'	+59.9'	36.2°	18°35.6'	+60.0'	36.4°	19°23.9'	+60.0'	36.6°	20°12.0'	+60.0'	36.8°	21°00.0'	+60.0'	13.9°	21
22	17°10.0'	+59.9'	35.7°	17°58.7'	+59.9'	35.9°	18°47.2'	+59.9'	36.1°	19°35.6'	+60.0'											

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

36° 324° LHA

Latitude CONTRARY to Declination

36° 324° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	4°51.0'	-59.9'	143.9°	4°02.6'	-59.9'	143.9°	3°14.1'	-59.9'	143.9°	2°25.6'	-60.0'	144.0°	1°37.1'	-60.0'	144.0°	<u>0°48.5'</u>	<u>-60.0'</u>	<u>144.0°</u>	<u>0°00.0'</u>	<u>-60.0'</u>	<u>144.0°</u>	0
1	3°51.1'	-59.9'	143.9°	3°02.7'	-59.9'	143.9°	2°14.2'	-59.9'	144.0°	1°25.6'	-60.0'	144.0°	<u>0°37.1'</u>	<u>-60.0'</u>	<u>144.0°</u>	0°11.5'	+60.0'	36.0°	0°60.0'	+60.0'	37.5°	1
2	2°51.2'	-59.9'	144.0°	2°02.8'	-59.9'	144.0°	1°14.2'	-59.9'	144.0°	<u>0°25.7'</u>	<u>-60.0'</u>	<u>144.0°</u>	0°22.9'	+60.0'	36.0°	1°11.5'	+60.0'	36.0°	2°00.0'	+60.0'	37.5°	2
3	1°51.4'	-59.9'	144.0°	1°02.8'	-59.9'	144.1°	<u>0°14.3'</u>	<u>-59.9'</u>	<u>144.1°</u>	0°34.3'	+60.0'	35.9°	1°22.9'	+60.0'	36.0°	2°11.5'	+60.0'	36.0°	3°00.0'	+60.0'	47.1°	3
4	<u>0°51.5'</u>	<u>-59.9'</u>	<u>144.1°</u>	<u>0°02.9'</u>	<u>-59.9'</u>	<u>144.1°</u>	0°45.7'	+59.9'	35.9°	1°34.3'	+60.0'	35.9°	2°22.9'	+60.0'	35.9°	3°11.4'	+60.0'	36.0°	4°00.0'	+60.0'	24.7°	4
5	0°08.4'	+59.9'	35.8°	0°57.0'	+59.9'	35.8°	1°45.6'	+59.9'	35.9°	2°34.3'	+60.0'	35.9°	3°22.9'	+60.0'	35.9°	4°11.4'	+60.0'	36.0°	5°00.0'	+60.0'	24.5°	5
6	1°08.3'	+59.9'	35.8°	1°56.9'	+59.9'	35.8°	2°45.6'	+59.9'	35.8°	3°34.2'	+60.0'	35.9°	4°22.8'	+60.0'	35.9°	5°11.4'	+60.0'	35.9°	6°00.0'	+60.0'	24.3°	6
7	2°08.1'	+59.9'	35.7°	2°56.8'	+59.9'	35.7°	3°45.5'	+59.9'	35.8°	4°34.2'	+60.0'	35.8°	5°22.8'	+60.0'	35.9°	6°11.4'	+60.0'	35.9°	7°00.0'	+60.0'	0.0°	7
8	3°08.0'	+59.9'	35.7°	3°56.8'	+59.9'	35.7°	4°45.5'	+59.9'	35.7°	5°34.2'	+60.0'	35.8°	6°22.8'	+60.0'	35.9°	7°11.4'	+60.0'	35.9°	8°00.0'	+60.0'	0.0°	8
9	4°07.9'	+59.9'	35.6°	4°56.7'	+59.9'	35.6°	5°45.4'	+59.9'	35.7°	6°34.1'	+60.0'	35.8°	7°22.8'	+60.0'	35.8°	8°11.4'	+60.0'	35.9°	9°00.0'	+60.0'	62.7°	9
10	5°07.8'	+59.9'	35.5°	5°56.6'	+59.9'	35.6°	6°45.4'	+59.9'	35.7°	7°34.1'	+60.0'	35.7°	8°22.8'	+60.0'	35.8°	9°11.4'	+60.0'	35.9°	10°00.0'	+60.0'	23.0°	10
11	6°07.7'	+59.9'	35.5°	6°56.5'	+59.9'	35.5°	7°45.3'	+59.9'	35.6°	8°34.1'	+60.0'	35.7°	9°22.8'	+60.0'	35.8°	10°11.4'	+60.0'	35.9°	11°00.0'	+60.0'	22.6°	11
12	7°07.6'	+59.9'	35.4°	7°56.5'	+59.9'	35.5°	8°45.3'	+59.9'	35.6°	9°34.1'	+60.0'	35.7°	10°22.8'	+60.0'	35.8°	11°11.4'	+60.0'	35.9°	12°00.0'	+60.0'	62.4°	12
13	8°07.5'	+59.9'	35.3°	8°56.4'	+59.9'	35.4°	9°45.2'	+59.9'	35.5°	10°34.0'	+60.0'	35.6°	11°22.8'	+60.0'	35.7°	12°11.4'	+60.0'	35.9°	13°00.0'	+60.0'	62.3°	13
14	9°07.3'	+59.9'	35.3°	9°56.3'	+59.9'	35.4°	10°45.2'	+59.9'	35.5°	11°34.0'	+60.0'	35.6°	12°22.7'	+60.0'	35.7°	13°11.4'	+60.0'	35.9°	14°00.0'	+60.0'	0.0°	14
15	10°07.2'	+59.9'	35.2°	10°56.2'	+59.9'	35.3°	11°45.1'	+59.9'	35.4°	12°34.0'	+60.0'	35.6°	13°22.7'	+60.0'	35.7°	14°11.4'	+60.0'	35.8°	15°00.0'	+60.0'	20.3°	15
16	11°07.1'	+59.9'	35.2°	11°56.1'	+59.9'	35.3°	12°45.1'	+59.9'	35.4°	13°33.9'	+60.0'	35.5°	14°22.7'	+60.0'	35.7°	15°11.4'	+60.0'	35.8°	16°00.0'	+60.0'	19.5°	16
17	12°07.0'	+59.9'	35.1°	12°56.0'	+59.9'	35.2°	13°45.0'	+59.9'	35.4°	14°33.9'	+60.0'	35.5°	15°22.7'	+60.0'	35.7°	16°11.4'	+60.0'	35.8°	17°00.0'	+60.0'	18.6°	17
18	13°06.9'	+59.9'	35.0°	13°56.0'	+59.9'	35.2°	14°45.0'	+59.9'	35.3°	15°33.9'	+60.0'	35.5°	16°22.7'	+60.0'	35.6°	17°11.4'	+60.0'	35.8°	18°00.0'	+60.0'	17.7°	18
19	14°06.7'	+59.9'	35.0°	14°55.9'	+59.9'	35.1°	15°44.9'	+59.9'	35.3°	16°33.8'	+60.0'	35.4°	17°22.7'	+60.0'	35.6°	18°11.4'	+60.0'	35.8°	19°00.0'	+60.0'	16.6°	19
20	15°06.6'	+59.9'	34.9°	15°55.8'	+59.9'	35.1°	16°44.9'	+59.9'	35.2°	17°33.8'	+60.0'	35.4°	18°22.7'	+60.0'	35.6°	19°11.4'	+60.0'	35.8°	20°00.0'	+60.0'	15.3°	20
21	16°06.5'	+59.9'	34.8°	16°55.7'	+59.9'	35.0°	17°44.8'	+59.9'	35.2°	18°33.8'	+60.0'	35.4°	19°22.6'	+60.0'	35.6°	20°11.4'	+60.0'	35.8°	21°00.0'	+60.0'	13.9°	21
22	17°06.4'	+59.9'	34.8°	17°55.6'	+59.9'	34.9°	18°44.7'	+59.9'	35.1°	19°33.8'	+60.0'	35.3°	20°22.6'	+60.0'	35.5°	21°11.4'	+60.0'	35.8°	22°00.0'	+60.0'	12.2°	22
23	18°06.3'	+59.9'	34.7°	18°55.5'	+59.9'	34.9°	19°44.7'	+59.9'	35.1°	20°33.7'	+60.0'	35.3°	21°22.6'	+60.0'	35.5°	22°11.4'	+60.0'	35.8°	23°00.0'	+60.0'	90.0°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

144° 216° LHA

Latitude SAME as DECLINATION

144° 216° 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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	4°54.7'	-59.9'	144.9°	4°05.6'	-59.9'	144.9°	3°16.5'	-60.0'	144.9°	2°27.4'	-60.0'	145.0°	1°38.3'	-60.0'	145.0°	<u>0°49.1'</u>	<u>-60.0'</u>	<u>145.0°</u>	<u>0°00.0'</u>	<u>-60.0'</u>	<u>145.0°</u>	0
1	3°54.8'	-59.9'	144.9°	3°05.7'	-59.9'	144.9°	2°16.6'	-60.0'	145.0°	1°27.5'	-60.0'	145.0°	<u>0°38.3'</u>	<u>-60.0'</u>	<u>145.0°</u>	0°10.8'	+60.0'	35.0°	0°60.0'	+60.0'	37.5°	1
2	2°54.9'	-59.9'	145.0°	2°05.8'	-59.9'	145.0°	1°16.6'	-60.0'	145.0°	<u>0°27.5'</u>	<u>-60.0'</u>	<u>145.0°</u>	0°21.7'	+60.0'	35.0°	1°10.8'	+60.0'	35.0°	2°00.0'	+60.0'	37.5°	2
3	1°55.0'	-59.9'	145.0°	1°05.9'	-59.9'	145.0°	<u>0°16.7'</u>	<u>-60.0'</u>	<u>145.1°</u>	0°32.5'	+60.0'	34.9°	1°21.7'	+60.0'	35.0°	2°10.8'	+60.0'	35.0°	3°00.0'	+60.0'	47.1°	3
4	<u>0°55.1'</u>	<u>-59.9'</u>	<u>145.1°</u>	<u>0°05.9'</u>	<u>-59.9'</u>	<u>145.1°</u>	0°43.3'	+60.0'	34.9°	1°32.5'	+60.0'	34.9°	2°21.7'	+60.0'	34.9°	3°10.8'	+60.0'	35.0°	4°00.0'	+60.0'	24.7°	4
5	0°04.7'	+59.9'	34.8°	0°54.0'	+59.9'	34.9°	1°43.2'	+60.0'	34.9°	2°32.4'	+60.0'	34.9°	3°21.6'	+60.0'	34.9°	4°10.8'	+60.0'	35.0°	5°00.0'	+60.0'	24.5°	5
6	1°04.6'	+59.9'	34.8°	1°53.9'	+59.9'	34.8°	2°43.2'	+60.0'	34.8°	3°32.4'	+60.0'	34.9°	4°21.6'	+60.0'	34.9°	5°10.8'	+60.0'	34.9°	6°00.0'	+60.0'	24.3°	6
7	2°04.5'	+59.9'	34.7°	2°53.8'	+59.9'	34.8°	3°43.1'	+60.0'	34.8°	4°32.4'	+60.0'	34.8°	5°21.6'	+60.0'	34.9°	6°10.8'	+60.0'	34.9°	7°00.0'	+60.0'	0.0°	7
8	3°04.4'	+59.9'	34.7°	3°53.8'	+59.9'	34.7°	4°43.1'	+60.0'	34.7°	5°32.4'	+60.0'	34.8°	6°21.6'	+60.0'	34.9°	7°10.8'	+60.0'	34.9°	8°00.0'	+60.0'	0.0°	8
9	4°04.3'	+59.9'	34.6°	4°53.7'	+59.9'	34.7°	5°43.0'	+60.0'	34.7°	6°32.3'	+60.0'	34.8°	7°21.6'	+60.0'	34.8°	8°10.8'	+60.0'	34.9°	9°00.0'	+60.0'	62.7°	9
10	5°04.2'	+59.9'	34.5°	5°53.6'	+59.9'	34.6°	6°43.0'	+60.0'	34.7°	7°32.3'	+60.0'	34.7°	8°21.6'	+60.0'	34.8°	9°10.8'	+60.0'	34.9°	10°00.0'	+60.0'	23.0°	10
11	6°04.1'	+59.9'	34.5°	6°53.5'	+59.9'	34.6°	7°42.9'	+60.0'	34.6°	8°32.3'	+60.0'	34.7°	9°21.6'	+60.0'	34.8°	10°10.8'	+60.0'	34.9°	11°00.0'	+60.0'	22.6°	11
12	7°04.0'	+59.9'	34.4°	7°53.5'	+59.9'	34.5°	8°42.9'	+60.0'	34.6°	9°32.2'	+60.0'	34.7°	10°21.6'	+60.0'	34.8°	11°10.8'	+60.0'	34.9°	12°00.0'	+60.0'	62.4°	12
13	8°03.9'	+59.9'	34.4°	8°53.4'	+59.9'	34.4°	9°42.8'	+60.0'	34.5°	10°32.2'	+60.0'	34.6°	11°21.6'	+60.0'	34.8°	12°10.8'	+60.0'	34.9°	13°00.0'	+60.0'	62.3°	13
14	9°03.8'	+59.9'	34.3°	9°53.3'	+59.9'	34.4°	10°42.8'	+60.0'	34.5°	11°32.2'	+60.0'	34.6°	12°21.5'	+60.0'	34.7°	13°10.8'	+60.0'	34.9°	14°00.0'	+60.0'	0.0°	14
15	10°03.7'	+59.9'	34.2°	10°53.2'	+59.9'	34.3°	11°42.7'	+59.9'	34.5°	12°32.2'	+60.0'	34.6°	13°21.5'	+60.0'	34.7°	14°10.8'	+60.0'	34.9°	15°00.0'	+60.0'	20.3°	15
16	11°03.5'	+59.9'	34.2°	11°53.1'	+59.9'	34.3°	12°42.7'	+59.9'	34.4°	13°32.1'	+60.0'	34.5°	14°21.5'	+60.0'	34.7°	15°10.8'	+60.0'	34.8°	16°00.0'	+60.0'	19.5°	16
17	12°03.4'	+59.9'	34.1°	12°53.1'	+59.9'	34.2°	13°42.6'	+59.9'	34.4°	14°32.1'	+60.0'	34.5°	15°21.5'	+60.0'	34.7°	16°10.8'	+60.0'	34.8°	17°00.0'	+60.0'	18.6°	17
18	13°03.3'	+59.9'	34.1°	13°53.0'	+59.9'	34.2°	14°42.6'	+59.9'	34.3°	15°32.1'	+60.0'	34.5°	16°21.5'	+60.0'	34.6°	17°10.8'	+60.0'	34.8°	18°00.0'	+60.0'	17.7°	18
19	14°03.2'	+59.9'	34.0°	14°52.9'	+59.9'	34.1°	15°42.5'	+59.9'	34.3°	16°32.0'	+60.0'	34.5°	17°21.5'	+60.0'	34.6°	18°10.8'	+60.0'	34.8°	19°00.0'	+60.0'	16.6°	19
20	15°03.1'	+59.9'	33.9°	15°52.8'	+59.9'	34.1°	16°42.5'	+59.9'	34.2°	17°32.0'	+60.0'	34.4°	18°21.5'	+60.0'	34.6°	19°10.8'	+60.0'	34.8°	20°00.0'	+60.0'	15.3°	20
21	16°03.0'	+59.9'	33.9°	16°52.7'	+59.9'	34.0°	17°42.4'	+59.9'	34.2°	18°32.0'	+60.0'	34.4°	19°21.4'	+60.0'	34.6°	20°10.8'	+60.0'	34.8°	21°00.0'	+60.0'	13.9°	21
22	17°02.9'	+59.9'																				

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

34° 326° LHA

Latitude CONTRARY to Declination

34° 326° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	4°58.2'	-59.9'	145.9°	4°08.6'	-59.9'	145.9°	3°18.9'	-60.0'	145.9°	2°29.2'	-60.0'	146.0°	1°39.5'	-60.0'	146.0°	<u>0°49.7'</u>	<u>-60.0'</u>	<u>146.0°</u>	<u>0°00.0'</u>	<u>-60.0'</u>	<u>146.0°</u>	0
1	3°58.3'	-59.9'	145.9°	3°08.7'	-59.9'	145.9°	2°19.0'	-60.0'	146.0°	1°29.2'	-60.0'	146.0°	<u>0°39.5'</u>	<u>-60.0'</u>	<u>146.0°</u>	0°10.3'	+60.0'	34.0°	0°60.0'	+60.0'	31.8°	1
2	2°58.4'	-59.9'	146.0°	2°08.8'	-59.9'	146.0°	1°19.0'	-60.0'	146.0°	<u>0°29.3'</u>	<u>-60.0'</u>	<u>146.0°</u>	0°20.5'	+60.0'	34.0°	1°10.3'	+60.0'	34.0°	2°00.0'	+60.0'	37.5°	2
3	1°58.6'	-59.9'	146.0°	1°08.8'	-59.9'	146.0°	<u>0°19.1'</u>	<u>-60.0'</u>	<u>146.1°</u>	0°30.7'	+60.0'	33.9°	1°20.5'	+60.0'	34.0°	2°10.2'	+60.0'	34.0°	3°00.0'	+60.0'	47.1°	3
4	<u>0°58.7'</u>	<u>-59.9'</u>	<u>146.1°</u>	<u>0°08.9'</u>	<u>-59.9'</u>	<u>146.1°</u>	0°40.9'	+60.0'	33.9°	1°30.7'	+60.0'	33.9°	2°20.5'	+60.0'	33.9°	3°10.2'	+60.0'	34.0°	4°00.0'	+60.0'	24.7°	4
5	0°01.2'	+59.9'	33.9°	0°51.0'	+59.9'	33.9°	1°40.9'	+60.0'	33.9°	2°30.7'	+60.0'	33.9°	3°20.5'	+60.0'	33.9°	4°10.2'	+60.0'	34.0°	5°00.0'	+60.0'	24.5°	5
6	1°01.1'	+59.9'	33.8°	1°51.0'	+59.9'	33.8°	2°40.8'	+60.0'	33.8°	3°30.6'	+60.0'	33.9°	4°20.5'	+60.0'	33.9°	5°10.2'	+60.0'	33.9°	6°00.0'	+60.0'	24.3°	6
7	2°01.0'	+59.9'	33.7°	2°50.9'	+59.9'	33.8°	3°40.8'	+60.0'	33.8°	4°30.6'	+60.0'	33.8°	5°20.4'	+60.0'	33.9°	6°10.2'	+60.0'	33.9°	7°00.0'	+60.0'	0.0°	7
8	3°00.9'	+59.9'	33.7°	3°50.8'	+59.9'	33.7°	4°40.7'	+60.0'	33.8°	5°30.6'	+60.0'	33.8°	6°20.4'	+60.0'	33.9°	7°10.2'	+60.0'	33.9°	8°00.0'	+60.0'	0.0°	8
9	4°00.8'	+59.9'	33.6°	4°50.7'	+59.9'	33.7°	5°40.7'	+60.0'	33.7°	6°30.6'	+60.0'	33.8°	7°20.4'	+60.0'	33.8°	8°10.2'	+60.0'	33.9°	9°00.0'	+60.0'	62.7°	9
10	5°00.7'	+59.9'	33.6°	5°50.7'	+59.9'	33.6°	6°40.6'	+60.0'	33.7°	7°30.5'	+60.0'	33.7°	8°20.4'	+60.0'	33.8°	9°10.2'	+60.0'	33.9°	10°00.0'	+60.0'	23.0°	10
11	6°00.6'	+59.9'	33.5°	6°50.6'	+59.9'	33.6°	7°40.6'	+60.0'	33.6°	8°30.5'	+60.0'	33.7°	9°20.4'	+60.0'	33.8°	10°10.2'	+60.0'	33.9°	11°00.0'	+60.0'	22.6°	11
12	7°00.5'	+59.9'	33.4°	7°50.5'	+59.9'	33.5°	8°40.5'	+60.0'	33.6°	9°30.5'	+60.0'	33.7°	10°20.4'	+60.0'	33.8°	11°10.2'	+60.0'	33.9°	12°00.0'	+60.0'	62.4°	12
13	8°00.4'	+59.9'	33.4°	8°50.5'	+59.9'	33.5°	9°40.5'	+60.0'	33.6°	10°30.5'	+60.0'	33.7°	11°20.4'	+60.0'	33.8°	12°10.2'	+60.0'	33.9°	13°00.0'	+60.0'	62.3°	13
14	9°00.3'	+59.9'	33.3°	9°50.4'	+59.9'	33.4°	10°40.4'	+60.0'	33.5°	11°30.4'	+60.0'	33.6°	12°20.4'	+60.0'	33.7°	13°10.2'	+60.0'	33.9°	14°00.0'	+60.0'	0.0°	14
15	10°00.2'	+59.9'	33.3°	10°50.3'	+59.9'	33.4°	11°40.4'	+60.0'	33.5°	12°30.4'	+60.0'	33.6°	13°20.3'	+60.0'	33.7°	14°10.2'	+60.0'	33.9°	15°00.0'	+60.0'	20.3°	15
16	11°00.1'	+59.9'	33.2°	11°50.2'	+59.9'	33.3°	12°40.3'	+60.0'	33.4°	13°30.4'	+60.0'	33.6°	14°20.3'	+60.0'	33.7°	15°10.2'	+60.0'	33.8°	16°00.0'	+60.0'	19.5°	16
17	12°00.0'	+59.9'	33.1°	12°50.2'	+59.9'	33.3°	13°40.3'	+60.0'	33.4°	14°30.3'	+60.0'	33.5°	15°20.3'	+60.0'	33.7°	16°10.2'	+60.0'	33.8°	17°00.0'	+60.0'	18.6°	17
18	12°59.8'	+59.9'	33.1°	13°50.1'	+59.9'	33.2°	14°40.2'	+60.0'	33.3°	15°30.3'	+60.0'	33.5°	16°20.3'	+60.0'	33.7°	17°10.2'	+60.0'	33.8°	18°00.0'	+60.0'	17.7°	18
19	13°59.7'	+59.9'	33.0°	14°50.0'	+59.9'	33.2°	15°40.2'	+60.0'	33.3°	16°30.3'	+60.0'	33.5°	17°20.3'	+60.0'	33.6°	18°10.2'	+60.0'	33.8°	19°00.0'	+60.0'	16.6°	19
20	14°59.6'	+59.9'	33.0°	15°49.9'	+59.9'	33.1°	16°40.1'	+59.9'	33.3°	17°30.3'	+60.0'	33.4°	18°20.3'	+60.0'	33.6°	19°10.2'	+60.0'	33.8°	20°00.0'	+60.0'	15.3°	20
21	15°59.5'	+59.9'	32.9°	16°49.9'	+59.9'	33.1°	17°40.1'	+59.9'	33.2°	18°30.2'	+60.0'	33.4°	19°20.3'	+60.0'	33.6°	20°10.2'	+60.0'	33.8°	21°00.0'	+60.0'	13.9°	21
22	16°59.4'	+59.9'	32.8°	17°49.8'	+59.9'	33.0°	18°40.0'	+59.9'	33.2°	19°30.2'	+60.0'	33.4°	20°20.3'	+60.0'	33.6°	21°10.2'	+60.0'	33.8°	22°00.0'	+60.0'	12.2°	22
23	17°59.3'	+59.9'	32.8°	18°49.7'	+59.9'	32.9°	19°40.0'	+59.9'	33.1°	20°30.2'	+60.0'	33.3°	21°20.2'	+60.0'	33.5°	22°10.2'	+60.0'	33.8°	23°00.0'	+60.0'	90.0°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

146° 214° LHA

Latitude SAME as DECLINATION

146° 214° 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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	5°01.7'	-59.9'	146.9°	4°11.5'	-59.9'	146.9°	3°21.2'	-60.0'	146.9°	2°30.9'	-60.0'	147.0°	1°40.6'	-60.0'	147.0°	<u>0°50.3'</u>	<u>-60.0'</u>	<u>147.0°</u>	<u>0°00.0'</u>	<u>-60.0'</u>	<u>147.0°</u>	0
1	4°01.8'	-59.9'	146.9°	3°11.6'	-59.9'	146.9°	2°21.3'	-60.0'	147.0°	1°31.0'	-60.0'	147.0°	<u>0°40.6'</u>	<u>-60.0'</u>	<u>147.0°</u>	0°09.7'	+60.0'	33.0°	0°60.0'	+60.0'	31.8°	1
2	3°01.9'	-59.9'	147.0°	2°11.6'	-59.9'	147.0°	1°21.3'	-60.0'	147.0°	<u>0°31.0'</u>	<u>-60.0'</u>	<u>147.0°</u>	0°19.3'	+60.0'	33.0°	1°09.7'	+60.0'	33.0°	2°00.0'	+60.0'	37.5°	2
3	2°02.1'	-59.9'	147.0°	1°11.7'	-59.9'	147.0°	<u>0°21.4'</u>	<u>-60.0'</u>	<u>147.1°</u>	0°29.0'	+60.0'	33.0°	1°19.3'	+60.0'	33.0°	2°09.7'	+60.0'	33.0°	3°00.0'	+60.0'	47.1°	3
4	1°02.1'	-59.9'	147.1°	<u>0°11.8'</u>	<u>-59.9'</u>	<u>147.1°</u>	0°38.6'	+60.0'	32.9°	1°29.0'	+60.0'	32.9°	2°19.3'	+60.0'	32.9°	3°09.7'	+60.0'	33.0°	4°00.0'	+60.0'	24.7°	4
5	<u>0°02.2'</u>	<u>-59.9'</u>	<u>147.1°</u>	0°48.2'	+59.9'	32.9°	1°38.6'	+60.0'	32.9°	2°28.9'	+60.0'	32.9°	3°19.3'	+60.0'	32.9°	4°09.7'	+60.0'	33.0°	5°00.0'	+60.0'	24.5°	5
6	0°57.7'	+59.9'	32.8°	1°48.1'	+59.9'	32.8°	2°38.5'	+60.0'	32.8°	3°28.9'	+60.0'	32.9°	4°19.3'	+60.0'	32.9°	5°09.7'	+60.0'	32.9°	6°00.0'	+60.0'	24.3°	6
7	1°57.6'	+59.9'	32.7°	2°48.0'	+59.9'	32.8°	3°38.5'	+60.0'	32.8°	4°28.9'	+60.0'	32.8°	5°19.3'	+60.0'	32.9°	6°09.7'	+60.0'	32.9°	7°00.0'	+60.0'	0.0°	7
8	2°57.5'	+59.9'	32.7°	3°48.0'	+59.9'	32.7°	4°38.4'	+60.0'	32.8°	5°28.9'	+60.0'	32.8°	6°19.3'	+60.0'	32.9°	7°09.7'	+60.0'	32.9°	8°00.0'	+60.0'	0.0°	8
9	3°57.4'	+59.9'	32.6°	4°47.9'	+59.9'	32.7°	5°38.4'	+60.0'	32.7°	6°28.8'	+60.0'	32.8°	7°19.3'	+60.0'	32.8°	8°09.7'	+60.0'	32.9°	9°00.0'	+60.0'	62.7°	9
10	4°57.3'	+59.9'	32.6°	5°47.8'	+59.9'	32.6°	6°38.3'	+60.0'	32.7°	7°28.8'	+60.0'	32.7°	8°19.3'	+60.0'	32.8°	9°09.7'	+60.0'	32.9°	10°00.0'	+60.0'	23.0°	10
11	5°57.2'	+59.9'	32.5°	6°47.7'	+59.9'	32.6°	7°38.3'	+60.0'	32.6°	8°28.8'	+60.0'	32.7°	9°19.2'	+60.0'	32.8°	10°09.7'	+60.0'	32.9°	11°00.0'	+60.0'	22.6°	11
12	6°57.1'	+59.9'	32.5°	7°47.7'	+59.9'	32.5°	8°38.2'	+60.0'	32.6°	9°28.8'	+60.0'	32.7°	10°19.2'	+60.0'	32.8°	11°09.6'	+60.0'	32.9°	12°00.0'	+60.0'	62.4°	12
13	7°57.0'	+59.9'	32.4°	8°47.6'	+59.9'	32.5°	9°38.2'	+60.0'	32.6°	10°28.7'	+60.0'	32.7°	11°19.2'	+60.0'	32.8°	12°09.6'	+60.0'	32.9°	13°00.0'	+60.0'	62.3°	13
14	8°56.9'	+59.9'	32.3°	9°47.5'	+59.9'	32.4°	10°38.2'	+60.0'	32.5°	11°28.7'	+60.0'	32.6°	12°19.2'	+60.0'	32.7°	13°09.6'	+60.0'	32.9°	14°00.0'	+60.0'	0.0°	14
15	9°56.8'	+59.9'	32.3°	10°47.5'	+59.9'	32.4°	11°38.1'	+60.0'	32.5°	12°28.7'	+60.0'	32.6°	13°19.2'	+60.0'	32.7°	14°09.6'	+60.0'	32.9°	15°00.0'	+60.0'	20.3°	15
16	10°56.7'	+59.9'	32.2°	11°47.4'	+59.9'	32.3°	12°38.1'	+60.0'	32.4°	13°28.7'	+60.0'	32.6°	14°19.2'	+60.0'	32.7°	15°09.6'	+60.0'	32.8°	16°00.0'	+60.0'	19.5°	16
17	11°56.6'	+59.9'	32.2°	12°47.3'	+59.9'	32.3°	13°38.0'	+60.0'	32.4°	14°28.6'	+60.0'	32.5°	15°19.2'	+60.0'	32.7°	16°09.6'	+60.0'	32.8°	17°00.0'	+60.0'	18.6°	17
18	12°56.5'	+59.9'	32.1°	13°47.3'	+59.9'	32.2°	14°38.0'	+60.0'	32.4°	15°28.6'	+60.0'	32.5°	16°19.2'	+60.0'	32.7°	17°09.6'	+60.0'	32.8°	18°00.0'	+60.0'	17.7°	18
19	13°56.4'	+59.9'	32.0°	14°47.2'	+59.9'	32.2°	15°37.9'	+60.0'	32.3°	16°28.6'	+60.0'	32.5°	17°19.2'	+60.0'	32.6°	18°09.6'	+60.0'	32.8°	19°00.0'	+60.0'	16.6°	19
20	14°56.3'	+59.9'	32.0°	15°47.1'	+59.9'	32.1°	16°37.9'	+60.0'	32.3°	17°28.6'	+60.0'	32.4°	18°19.1'	+60.0'	32.6°	19°09.6'	+60.0'	32.8°	20°00.0'	+60.0'	15.3°	20
21	15°56.2'	+59.9'	31.9°	16°47.0'	+59.9'	32.1°	17°37.8'	+60.0'	32.2°	18°28.5'	+60.0'	32.4°	19°19.1'	+60.0'	32.6°	20°09.6'	+60.0'	32.8°	21°00.0'	+60.0'	13.9°	21
22	16°56.1'	+59.9'																				

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

32° 328° LHA

Latitude CONTRARY to Declination

32° 328° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	5°05.1'	-59.9'	147.9°	4°14.3'	-59.9'	147.9°	3°23.5'	-60.0'	147.9°	2°32.6'	-60.0'	148.0°	1°41.8'	-60.0'	148.0°	<u>0°50.9'</u>	<u>-60.0'</u>	<u>148.0°</u>	<u>0°00.0'</u>	<u>-60.0'</u>	<u>148.0°</u>	0
1	4°05.2'	-59.9'	147.9°	3°14.4'	-59.9'	147.9°	2°23.5'	-60.0'	148.0°	1°32.7'	-60.0'	148.0°	<u>0°41.8'</u>	<u>-60.0'</u>	<u>148.0°</u>	0°09.1'	+60.0'	32.0°	0°60.0'	+60.0'	31.8°	1
2	3°05.3'	-59.9'	148.0°	2°14.5'	-59.9'	148.0°	1°23.6'	-60.0'	148.0°	<u>0°32.7'</u>	<u>-60.0'</u>	<u>148.0°</u>	0°18.2'	+60.0'	32.0°	1°09.1'	+60.0'	32.0°	2°00.0'	+60.0'	37.5°	2
3	2°05.4'	-59.9'	148.0°	1°14.5'	-59.9'	148.0°	<u>0°23.6'</u>	<u>-60.0'</u>	<u>148.0°</u>	0°27.3'	+60.0'	32.0°	1°18.2'	+60.0'	32.0°	2°09.1'	+60.0'	32.0°	3°00.0'	+60.0'	47.1°	3
4	1°05.5'	-59.9'	148.1°	<u>0°14.6'</u>	<u>-59.9'</u>	<u>148.1°</u>	0°36.4'	+60.0'	31.9°	1°27.3'	+60.0'	31.9°	2°18.2'	+60.0'	31.9°	3°09.1'	+60.0'	32.0°	4°00.0'	+60.0'	24.7°	4
5	<u>0°05.6'</u>	<u>-59.9'</u>	<u>148.1°</u>	0°45.4'	+59.9'	31.9°	1°36.3'	+60.0'	31.9°	2°27.3'	+60.0'	31.9°	3°18.2'	+60.0'	31.9°	4°09.1'	+60.0'	32.0°	5°00.0'	+60.0'	24.5°	5
6	0°54.3'	+59.9'	31.8°	1°45.3'	+59.9'	31.8°	2°36.3'	+60.0'	31.8°	3°27.2'	+60.0'	31.9°	4°18.2'	+60.0'	31.9°	5°09.1'	+60.0'	31.9°	6°00.0'	+60.0'	24.3°	6
7	1°54.2'	+59.9'	31.8°	2°45.2'	+59.9'	31.8°	3°36.2'	+60.0'	31.8°	4°27.2'	+60.0'	31.8°	5°18.2'	+60.0'	31.9°	6°09.1'	+60.0'	31.9°	7°00.0'	+60.0'	0.0°	7
8	2°54.1'	+59.9'	31.7°	3°45.2'	+59.9'	31.7°	4°36.2'	+60.0'	31.8°	5°27.2'	+60.0'	31.8°	6°18.2'	+60.0'	31.9°	7°09.1'	+60.0'	31.9°	8°00.0'	+60.0'	0.0°	8
9	3°54.0'	+59.9'	31.6°	4°45.1'	+59.9'	31.7°	5°36.1'	+60.0'	31.7°	6°27.2'	+60.0'	31.8°	7°18.1'	+60.0'	31.8°	8°09.1'	+60.0'	31.9°	9°00.0'	+60.0'	62.7°	9
10	4°53.9'	+59.9'	31.6°	5°45.0'	+59.9'	31.6°	6°36.1'	+60.0'	31.7°	7°27.1'	+60.0'	31.8°	8°18.1'	+60.0'	31.8°	9°09.1'	+60.0'	31.9°	10°00.0'	+60.0'	23.0°	10
11	5°53.8'	+59.9'	31.5°	6°45.0'	+59.9'	31.6°	7°36.1'	+60.0'	31.7°	8°27.1'	+60.0'	31.7°	9°18.1'	+60.0'	31.8°	10°09.1'	+60.0'	31.9°	11°00.0'	+60.0'	22.6°	11
12	6°53.8'	+59.9'	31.5°	7°44.9'	+59.9'	31.5°	8°36.0'	+60.0'	31.6°	9°27.1'	+60.0'	31.7°	10°18.1'	+60.0'	31.8°	11°09.1'	+60.0'	31.9°	12°00.0'	+60.0'	62.4°	12
13	7°53.7'	+59.9'	31.4°	8°44.8'	+59.9'	31.5°	9°36.0'	+60.0'	31.6°	10°27.1'	+60.0'	31.7°	11°18.1'	+60.0'	31.8°	12°09.1'	+60.0'	31.9°	13°00.0'	+60.0'	62.3°	13
14	8°53.6'	+59.9'	31.4°	9°44.8'	+59.9'	31.4°	10°35.9'	+60.0'	31.5°	11°27.0'	+60.0'	31.6°	12°18.1'	+60.0'	31.8°	13°09.1'	+60.0'	31.9°	14°00.0'	+60.0'	0.0°	14
15	9°53.5'	+59.9'	31.3°	10°44.7'	+59.9'	31.4°	11°35.9'	+60.0'	31.5°	12°27.0'	+60.0'	31.6°	13°18.1'	+60.0'	31.7°	14°09.1'	+60.0'	31.9°	15°00.0'	+60.0'	20.3°	15
16	10°53.4'	+59.9'	31.2°	11°44.6'	+59.9'	31.4°	12°35.9'	+60.0'	31.5°	13°27.0'	+60.0'	31.6°	14°18.1'	+60.0'	31.7°	15°09.1'	+60.0'	31.9°	16°00.0'	+60.0'	19.5°	16
17	11°53.3'	+59.9'	31.2°	12°44.6'	+59.9'	31.3°	13°35.8'	+60.0'	31.4°	14°27.0'	+60.0'	31.6°	15°18.1'	+60.0'	31.7°	16°09.1'	+60.0'	31.8°	17°00.0'	+60.0'	18.6°	17
18	12°53.2'	+59.9'	31.1°	13°44.5'	+59.9'	31.3°	14°35.8'	+60.0'	31.4°	15°26.9'	+60.0'	31.5°	16°18.1'	+60.0'	31.7°	17°09.1'	+60.0'	31.8°	18°00.0'	+60.0'	17.7°	18
19	13°53.1'	+59.9'	31.1°	14°44.4'	+59.9'	31.2°	15°35.7'	+60.0'	31.3°	16°26.9'	+60.0'	31.5°	17°18.0'	+60.0'	31.7°	18°09.1'	+60.0'	31.8°	19°00.0'	+60.0'	16.6°	19
20	14°53.0'	+59.9'	31.0°	15°44.4'	+59.9'	31.2°	16°35.7'	+60.0'	31.3°	17°26.9'	+60.0'	31.5°	18°18.0'	+60.0'	31.6°	19°09.1'	+60.0'	31.8°	20°00.0'	+60.0'	15.3°	20
21	15°52.9'	+59.9'	31.0°	16°44.3'	+59.9'	31.1°	17°35.6'	+60.0'	31.3°	18°26.9'	+60.0'	31.4°	19°18.0'	+60.0'	31.6°	20°09.1'	+60.0'	31.8°	21°00.0'	+60.0'	13.9°	21
22	16°52.8'	+59.9'	30.9°	17°44.2'	+59.9'	31.1°	18°35.6'	+60.0'	31.2°	19°26.8'	+60.0'	31.4°	20°18.0'	+60.0'	31.6°	21°09.1'	+60.0'	31.8°	22°00.0'	+60.0'	12.2°	22
23	17°52.7'	+59.9'	30.8°	18°44.2'	+59.9'	31.0°	19°35.5'	+60.0'	31.2°	20°26.8'	+60.0'	31.4°	21°18.0'	+60.0'	31.6°	22°09.1'	+60.0'	31.8°	23°00.0'	+60.0'	90.0°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

148° 212° LHA

Latitude SAME as DECLINATION

148° 212° 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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	5°08.4'	-59.9'	148.9°	4°17.1'	-59.9'	148.9°	3°25.7'	-60.0'	148.9°	2°34.3'	-60.0'	149.0°	1°42.9'	-60.0'	149.0°	<u>0°51.4'</u>	<u>-60.0'</u>	<u>149.0°</u>	<u>0°00.0'</u>	<u>-60.0'</u>	<u>149.0°</u>	0
1	4°08.5'	-59.9'	148.9°	3°17.1'	-59.9'	148.9°	2°25.7'	-60.0'	149.0°	1°34.3'	-60.0'	149.0°	<u>0°42.9'</u>	<u>-60.0'</u>	<u>149.0°</u>	0°08.6'	+60.0'	31.0°	0°60.0'	+60.0'	31.8°	1
2	3°08.6'	-59.9'	149.0°	2°17.2'	-59.9'	149.0°	1°25.8'	-60.0'	149.0°	<u>0°34.3'</u>	<u>-60.0'</u>	<u>149.0°</u>	0°17.1'	+60.0'	31.0°	1°08.6'	+60.0'	31.0°	2°00.0'	+60.0'	24.9°	2
3	2°08.7'	-59.9'	149.0°	1°17.2'	-59.9'	149.0°	<u>0°25.8'</u>	<u>-60.0'</u>	<u>149.0°</u>	0°25.7'	+60.0'	31.0°	1°17.1'	+60.0'	31.0°	2°08.6'	+60.0'	31.0°	3°00.0'	+60.0'	37.4°	3
4	1°08.8'	-59.9'	149.1°	<u>0°17.3'</u>	<u>-59.9'</u>	<u>149.1°</u>	0°34.2'	+60.0'	30.9°	1°25.6'	+60.0'	30.9°	2°17.1'	+60.0'	30.9°	3°08.6'	+60.0'	31.0°	4°00.0'	+60.0'	24.7°	4
5	<u>0°08.9'</u>	<u>-59.9'</u>	<u>149.1°</u>	0°42.6'	+59.9'	30.9°	1°34.1'	+60.0'	30.9°	2°25.6'	+60.0'	30.9°	3°17.1'	+60.0'	30.9°	4°08.6'	+60.0'	31.0°	5°00.0'	+60.0'	24.5°	5
6	0°51.0'	+59.9'	30.8°	1°42.6'	+59.9'	30.8°	2°34.1'	+60.0'	30.8°	3°25.6'	+60.0'	30.9°	4°17.1'	+60.0'	30.9°	5°08.6'	+60.0'	30.9°	6°00.0'	+60.0'	24.3°	6
7	1°51.0'	+59.9'	30.8°	2°42.5'	+59.9'	30.8°	3°34.1'	+60.0'	30.8°	4°25.6'	+60.0'	30.8°	5°17.1'	+60.0'	30.9°	6°08.6'	+60.0'	30.9°	7°00.0'	+60.0'	0.0°	7
8	2°50.9'	+59.9'	30.7°	3°42.5'	+59.9'	30.7°	4°34.0'	+60.0'	30.8°	5°25.6'	+60.0'	30.8°	6°17.1'	+60.0'	30.9°	7°08.6'	+60.0'	30.9°	8°00.0'	+60.0'	0.0°	8
9	3°50.8'	+59.9'	30.7°	4°42.4'	+59.9'	30.7°	5°34.0'	+60.0'	30.7°	6°25.5'	+60.0'	30.8°	7°17.1'	+60.0'	30.9°	8°08.5'	+60.0'	30.9°	9°00.0'	+60.0'	62.7°	9
10	4°50.7'	+59.9'	30.6°	5°42.3'	+59.9'	30.6°	6°33.9'	+60.0'	30.7°	7°25.5'	+60.0'	30.8°	8°17.0'	+60.0'	30.8°	9°08.5'	+60.0'	30.9°	10°00.0'	+60.0'	23.0°	10
11	5°50.6'	+59.9'	30.5°	6°42.3'	+59.9'	30.6°	7°33.9'	+60.0'	30.7°	8°25.5'	+60.0'	30.7°	9°17.0'	+60.0'	30.8°	10°08.5'	+60.0'	30.9°	11°00.0'	+60.0'	22.6°	11
12	6°50.5'	+59.9'	30.5°	7°42.2'	+59.9'	30.6°	8°33.9'	+60.0'	30.6°	9°25.5'	+60.0'	30.7°	10°17.0'	+60.0'	30.8°	11°08.5'	+60.0'	30.9°	12°00.0'	+60.0'	62.4°	12
13	7°50.4'	+59.9'	30.4°	8°42.1'	+59.9'	30.5°	9°33.8'	+60.0'	30.6°	10°25.4'	+60.0'	30.7°	11°17.0'	+60.0'	30.8°	12°08.5'	+60.0'	30.9°	13°00.0'	+60.0'	62.3°	13
14	8°50.3'	+59.9'	30.4°	9°42.1'	+59.9'	30.5°	10°33.8'	+60.0'	30.6°	11°25.4'	+60.0'	30.7°	12°17.0'	+60.0'	30.8°	13°08.5'	+60.0'	30.9°	14°00.0'	+60.0'	0.0°	14
15	9°50.3'	+59.9'	30.3°	10°42.0'	+59.9'	30.4°	11°33.7'	+60.0'	30.5°	12°25.4'	+60.0'	30.6°	13°17.0'	+60.0'	30.7°	14°08.5'	+60.0'	30.9°	15°00.0'	+60.0'	20.3°	15
16	10°50.2'	+59.9'	30.3°	11°42.0'	+59.9'	30.4°	12°33.7'	+60.0'	30.5°	13°25.4'	+60.0'	30.6°	14°17.0'	+60.0'	30.7°	15°08.5'	+60.0'	30.9°	16°00.0'	+60.0'	19.5°	16
17	11°50.1'	+59.9'	30.2°	12°41.9'	+59.9'	30.3°	13°33.7'	+60.0'	30.4°	14°25.4'	+60.0'	30.6°	15°17.0'	+60.0'	30.7°	16°08.5'	+60.0'	30.8°	17°00.0'	+60.0'	18.6°	17
18	12°50.0'	+59.9'	30.2°	13°41.8'	+59.9'	30.3°	14°33.6'	+60.0'	30.4°	15°25.3'	+60.0'	30.5°	16°17.0'	+60.0'	30.7°	17°08.5'	+60.0'	30.8°	18°00.0'	+60.0'	17.7°	18
19	13°49.9'	+59.9'	30.1°	14°41.8'	+59.9'	30.2°	15°33.6'	+60.0'	30.4°	16°25.3'	+60.0'	30.5°	17°17.0'	+60.0'	30.7°	18°08.5'	+60.0'	30.8°	19°00.0'	+60.0'	16.6°	19
20	14°49.8'	+59.9'	30.0°	15°41.7'	+59.9'	30.2°	16°33.5'	+60.0'	30.3°	17°25.3'	+60.0'	30.5°	18°16.9'	+60.0'	30.6°	19°08.5'	+60.0'	30.8°	20°00.0'	+60.0'	15.3°	20
21	15°49.7'	+59.9'	30.0°	16°41.6'	+59.9'	30.1°	17°33.5'	+60.0'	30.3°	18°25.3'	+60.0'	30.5°	19°16.9'	+60.0'	30.6°	20°08.5'	+60.0'	30.8°	21°00.0'	+60.0'	13.9°	21
22	16°49.6'	+59.9'																				

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

30° 330° LHA

Latitude CONTRARY to Declination

30° 330° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	5°11.6'	-59.9'	149.9°	4°19.7'	-59.9'	149.9°	3°27.8'	-60.0'	149.9°	2°35.9'	-60.0'	150.0°	1°43.9'	-60.0'	150.0°	<u>0°52.0'</u>	<u>-60.0'</u>	<u>150.0°</u>	<u>0°00.0'</u>	<u>-60.0'</u>	<u>150.0°</u>	0
1	4°11.7'	-59.9'	149.9°	3°19.8'	-59.9'	149.9°	2°27.8'	-60.0'	150.0°	1°35.9'	-60.0'	150.0°	<u>0°43.9'</u>	<u>-60.0'</u>	<u>150.0°</u>	0°08.0'	+60.0'	30.0°	0°60.0'	+60.0'	31.8°	1
2	3°11.7'	-59.9'	150.0°	2°19.8'	-59.9'	150.0°	1°27.9'	-60.0'	150.0°	<u>0°35.9'</u>	<u>-60.0'</u>	<u>150.0°</u>	0°16.1'	+60.0'	30.0°	1°08.0'	+60.0'	30.0°	2°00.0'	+60.0'	24.9°	2
3	2°11.9'	-59.9'	150.0°	1°19.9'	-59.9'	150.0°	<u>0°27.9'</u>	<u>-60.0'</u>	<u>150.0°</u>	0°24.1'	+60.0'	30.0°	1°16.1'	+60.0'	30.0°	2°08.0'	+60.0'	30.0°	3°00.0'	+60.0'	37.4°	3
4	1°12.0'	-59.9'	150.1°	<u>0°20.0'</u>	<u>-59.9'</u>	<u>150.1°</u>	0°32.0'	+60.0'	29.9°	1°24.1'	+60.0'	29.9°	2°16.0'	+60.0'	29.9°	3°08.0'	+60.0'	30.0°	4°00.0'	+60.0'	24.7°	4
5	<u>0°12.0'</u>	<u>-59.9'</u>	<u>150.1°</u>	0°40.0'	+59.9'	29.9°	1°32.0'	+60.0'	29.9°	2°24.0'	+60.0'	29.9°	3°16.0'	+60.0'	29.9°	4°08.0'	+60.0'	30.0°	5°00.0'	+60.0'	24.5°	5
6	0°47.9'	+59.9'	29.8°	1°39.9'	+59.9'	29.8°	2°32.0'	+60.0'	29.9°	3°24.0'	+60.0'	29.9°	4°16.0'	+60.0'	29.9°	5°08.0'	+60.0'	30.0°	6°00.0'	+60.0'	24.3°	6
7	1°47.8'	+59.9'	29.8°	2°39.9'	+59.9'	29.8°	3°31.9'	+60.0'	29.8°	4°24.0'	+60.0'	29.9°	5°16.0'	+60.0'	29.9°	6°08.0'	+60.0'	29.9°	7°00.0'	+60.0'	0.0°	7
8	2°47.7'	+59.9'	29.7°	3°39.8'	+59.9'	29.7°	4°31.9'	+60.0'	29.8°	5°24.0'	+60.0'	29.8°	6°16.0'	+60.0'	29.9°	7°08.0'	+60.0'	29.9°	8°00.0'	+60.0'	0.0°	8
9	3°47.6'	+59.9'	29.7°	4°39.8'	+59.9'	29.7°	5°31.9'	+60.0'	29.7°	6°23.9'	+60.0'	29.8°	7°16.0'	+60.0'	29.9°	8°08.0'	+60.0'	29.9°	9°00.0'	+60.0'	62.7°	9
10	4°47.6'	+59.9'	29.6°	5°39.7'	+59.9'	29.7°	6°31.8'	+60.0'	29.7°	7°23.9'	+60.0'	29.8°	8°16.0'	+60.0'	29.8°	9°08.0'	+60.0'	29.9°	10°00.0'	+60.0'	23.0°	10
11	5°47.5'	+59.9'	29.6°	6°39.6'	+59.9'	29.6°	7°31.8'	+60.0'	29.7°	8°23.9'	+60.0'	29.7°	9°16.0'	+60.0'	29.8°	10°08.0'	+60.0'	29.9°	11°00.0'	+60.0'	22.6°	11
12	6°47.4'	+59.9'	29.5°	7°39.6'	+59.9'	29.6°	8°31.8'	+60.0'	29.6°	9°23.9'	+60.0'	29.7°	10°16.0'	+60.0'	29.8°	11°08.0'	+60.0'	29.9°	12°00.0'	+60.0'	62.4°	12
13	7°47.3'	+59.9'	29.5°	8°39.5'	+59.9'	29.5°	9°31.7'	+60.0'	29.6°	10°23.9'	+60.0'	29.7°	11°16.0'	+60.0'	29.8°	12°08.0'	+60.0'	29.9°	13°00.0'	+60.0'	62.3°	13
14	8°47.2'	+59.9'	29.4°	9°39.5'	+59.9'	29.5°	10°31.7'	+60.0'	29.6°	11°23.8'	+60.0'	29.7°	12°16.0'	+60.0'	29.8°	13°08.0'	+60.0'	29.9°	14°00.0'	+60.0'	0.0°	14
15	9°47.1'	+59.9'	29.3°	10°39.4'	+59.9'	29.4°	11°31.6'	+60.0'	29.5°	12°23.8'	+60.0'	29.6°	13°15.9'	+60.0'	29.7°	14°08.0'	+60.0'	29.9°	15°00.0'	+60.0'	20.3°	15
16	10°47.0'	+59.9'	29.3°	11°39.4'	+59.9'	29.4°	12°31.6'	+60.0'	29.5°	13°23.8'	+60.0'	29.6°	14°15.9'	+60.0'	29.7°	15°08.0'	+60.0'	29.9°	16°00.0'	+60.0'	19.5°	16
17	11°47.0'	+59.9'	29.2°	12°39.3'	+59.9'	29.3°	13°31.6'	+60.0'	29.5°	14°23.8'	+60.0'	29.6°	15°15.9'	+60.0'	29.7°	16°08.0'	+60.0'	29.9°	17°00.0'	+60.0'	18.6°	17
18	12°46.9'	+59.9'	29.2°	13°39.2'	+59.9'	29.3°	14°31.5'	+60.0'	29.4°	15°23.8'	+60.0'	29.6°	16°15.9'	+60.0'	29.7°	17°08.0'	+60.0'	29.8°	18°00.0'	+60.0'	17.7°	18
19	13°46.8'	+59.9'	29.1°	14°39.2'	+59.9'	29.3°	15°31.5'	+60.0'	29.4°	16°23.7'	+60.0'	29.5°	17°15.9'	+60.0'	29.7°	18°08.0'	+60.0'	29.8°	19°00.0'	+60.0'	16.6°	19
20	14°46.7'	+59.9'	29.1°	15°39.1'	+59.9'	29.2°	16°31.4'	+60.0'	29.3°	17°23.7'	+60.0'	29.5°	18°15.9'	+60.0'	29.7°	19°08.0'	+60.0'	29.8°	20°00.0'	+60.0'	15.3°	20
21	15°46.6'	+59.9'	29.0°	16°39.0'	+59.9'	29.2°	17°31.4'	+60.0'	29.3°	18°23.7'	+60.0'	29.5°	19°15.9'	+60.0'	29.6°	20°08.0'	+60.0'	29.8°	21°00.0'	+60.0'	13.9°	21
22	16°46.5'	+59.9'	29.0°	17°39.0'	+59.9'	29.1°	18°31.4'	+60.0'	29.3°	19°23.7'	+60.0'	29.4°	20°15.9'	+60.0'	29.6°	21°08.0'	+60.0'	29.8°	22°00.0'	+60.0'	12.2°	22
23	17°46.4'	+59.9'	28.9°	18°38.9'	+59.9'	29.1°	19°31.3'	+60.0'	29.2°	20°23.6'	+60.0'	29.4°	21°15.9'	+60.0'	29.6°	22°08.0'	+60.0'	29.8°	23°00.0'	+60.0'	90.0°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

150° 210° LHA

Latitude SAME as DECLINATION

150° 210° 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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	5°14.7'	-59.9'	150.9°	4°22.3'	-59.9'	150.9°	3°29.9'	-60.0'	150.9°	2°37.4'	-60.0'	151.0°	1°44.9'	-60.0'	151.0°	<u>0°52.5'</u>	<u>-60.0'</u>	<u>151.0°</u>	<u>0°00.0'</u>	<u>-60.0'</u>	<u>151.0°</u>	0
1	4°14.8'	-59.9'	150.9°	3°22.4'	-59.9'	150.9°	2°29.9'	-60.0'	151.0°	1°37.4'	-60.0'	151.0°	<u>0°45.0'</u>	<u>-60.0'</u>	<u>151.0°</u>	0°07.5'	+60.0'	29.0°	0°60.0'	+60.0'	31.8°	1
2	3°14.8'	-59.9'	151.0°	2°22.4'	-59.9'	151.0°	1°29.9'	-60.0'	151.0°	<u>0°37.5'</u>	<u>-60.0'</u>	<u>151.0°</u>	0°15.0'	+60.0'	29.0°	1°07.5'	+60.0'	29.0°	2°00.0'	+60.0'	24.9°	2
3	2°15.0'	-59.9'	151.0°	1°22.5'	-59.9'	151.0°	<u>0°30.0'</u>	<u>-60.0'</u>	<u>151.0°</u>	0°22.5'	+60.0'	29.0°	1°15.0'	+60.0'	29.0°	2°07.5'	+60.0'	29.0°	3°00.0'	+60.0'	37.4°	3
4	1°15.0'	-59.9'	151.1°	<u>0°22.5'</u>	<u>-59.9'</u>	<u>151.1°</u>	0°30.0'	+60.0'	28.9°	1°22.5'	+60.0'	28.9°	2°15.0'	+60.0'	28.9°	3°07.5'	+60.0'	29.0°	4°00.0'	+60.0'	24.7°	4
5	<u>0°15.1'</u>	<u>-59.9'</u>	<u>151.1°</u>	0°37.4'	+59.9'	28.9°	1°30.0'	+60.0'	28.9°	2°22.5'	+60.0'	28.9°	3°15.0'	+60.0'	28.9°	4°07.5'	+60.0'	29.0°	5°00.0'	+60.0'	24.5°	5
6	0°44.8'	+59.9'	28.8°	1°37.4'	+59.9'	28.8°	2°29.9'	+60.0'	28.9°	3°22.5'	+60.0'	28.9°	4°15.0'	+60.0'	28.9°	5°07.5'	+60.0'	29.0°	6°00.0'	+60.0'	24.3°	6
7	1°44.7'	+59.9'	28.8°	2°37.3'	+59.9'	28.8°	3°29.9'	+60.0'	28.8°	4°22.4'	+60.0'	28.9°	5°15.0'	+60.0'	28.9°	6°07.5'	+60.0'	28.9°	7°00.0'	+60.0'	0.0°	7
8	2°44.7'	+59.9'	28.7°	3°37.3'	+59.9'	28.8°	4°29.9'	+60.0'	28.8°	5°22.4'	+60.0'	28.8°	6°15.0'	+60.0'	28.9°	7°07.5'	+60.0'	28.9°	8°00.0'	+60.0'	0.0°	8
9	3°44.6'	+59.9'	28.7°	4°37.2'	+59.9'	28.7°	5°29.8'	+60.0'	28.8°	6°22.4'	+60.0'	28.8°	7°15.0'	+60.0'	28.9°	8°07.5'	+60.0'	28.9°	9°00.0'	+60.0'	62.7°	9
10	4°44.5'	+59.9'	28.6°	5°37.2'	+59.9'	28.7°	6°29.8'	+60.0'	28.7°	7°22.4'	+60.0'	28.8°	8°15.0'	+60.0'	28.8°	9°07.5'	+60.0'	28.9°	10°00.0'	+60.0'	23.0°	10
11	5°44.4'	+59.9'	28.6°	6°37.1'	+59.9'	28.6°	7°29.8'	+60.0'	28.7°	8°22.4'	+60.0'	28.8°	9°15.0'	+60.0'	28.8°	10°07.5'	+60.0'	28.9°	11°00.0'	+60.0'	22.6°	11
12	6°44.3'	+59.9'	28.5°	7°37.0'	+59.9'	28.6°	8°29.7'	+60.0'	28.7°	9°22.4'	+60.0'	28.7°	10°14.9'	+60.0'	28.8°	11°07.5'	+60.0'	28.9°	12°00.0'	+60.0'	62.4°	12
13	7°44.3'	+59.9'	28.5°	8°37.0'	+59.9'	28.5°	9°29.7'	+60.0'	28.6°	10°22.3'	+60.0'	28.7°	11°14.9'	+60.0'	28.8°	12°07.5'	+60.0'	28.9°	13°00.0'	+60.0'	62.3°	13
14	8°44.2'	+59.9'	28.4°	9°36.9'	+59.9'	28.5°	10°29.6'	+60.0'	28.6°	11°22.3'	+60.0'	28.7°	12°14.9'	+60.0'	28.8°	13°07.5'	+60.0'	28.9°	14°00.0'	+60.0'	0.0°	14
15	9°44.1'	+59.9'	28.4°	10°36.9'	+59.9'	28.5°	11°29.6'	+60.0'	28.5°	12°22.3'	+60.0'	28.6°	13°14.9'	+60.0'	28.8°	14°07.5'	+60.0'	28.9°	15°00.0'	+60.0'	20.3°	15
16	10°44.0'	+59.9'	28.3°	11°36.8'	+59.9'	28.4°	12°29.6'	+60.0'	28.5°	13°22.3'	+60.0'	28.6°	14°14.9'	+60.0'	28.7°	15°07.5'	+60.0'	28.9°	16°00.0'	+60.0'	19.5°	16
17	11°43.9'	+59.9'	28.3°	12°36.8'	+59.9'	28.4°	13°29.5'	+60.0'	28.5°	14°22.3'	+60.0'	28.6°	15°14.9'	+60.0'	28.7°	16°07.5'	+60.0'	28.9°	17°00.0'	+60.0'	18.6°	17
18	12°43.9'	+59.9'	28.2°	13°36.7'	+59.9'	28.3°	14°29.5'	+60.0'	28.4°	15°22.2'	+60.0'	28.6°	16°14.9'	+60.0'	28.7°	17°07.5'	+60.0'	28.8°	18°00.0'	+60.0'	17.7°	18
19	13°43.8'	+59.9'	28.2°	14°36.7'	+59.9'	28.3°	15°29.5'	+60.0'	28.4°	16°22.2'	+60.0'	28.5°	17°14.9'	+60.0'	28.7°	18°07.5'	+60.0'	28.8°	19°00.0'	+60.0'	16.6°	19
20	14°43.7'	+59.9'	28.1°	15°36.6'	+59.9'	28.2°	16°29.4'	+60.0'	28.4°	17°22.2'	+60.0'	28.5°	18°14.9'	+60.0'	28.7°	19°07.5'	+60.0'	28.8°	20°00.0'	+60.0'	15.3°	20
21	15°43.6'	+59.9'	28.0°	16°36.5'	+59.9'	28.2°	17°29.4'	+60.0'	28.3°	18°22.2'	+60.0'	28.5°	19°14.9'	+60.0'	28.6°	20°07.5'	+60.0'	28.8°	21°00.0'	+60.0'	13.9°	21
22	16°43.5'	+59.9'																				

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

28° 332° LHA

Latitude CONTRARY to Declination

28° 332° LHA

Dec°	84			85			86			87			88			89			90			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'	-59.9'	151.9°	4°24.8'	-59.9'	151.9°	3°31.9'	-60.0'	151.9°	2°38.9'	-60.0'	152.0°	1°45.9'	-60.0'	152.0°	<u>0°53.0'</u>	<u>-60.0'</u>	<u>152.0°</u>	<u>0°00.0'</u>	<u>-60.0'</u>	<u>152.0°</u>	0
1	4°17.8'	-59.9'	151.9°	3°24.9'	-59.9'	152.0°	2°31.9'	-60.0'	152.0°	1°38.9'	-60.0'	152.0°	<u>0°46.0'</u>	<u>-60.0'</u>	<u>152.0°</u>	0°07.0'	+60.0'	28.0°	0°60.0'	+60.0'	25.0°	1
2	3°17.8'	-59.9'	152.0°	2°24.9'	-59.9'	152.0°	1°31.9'	-60.0'	152.0°	<u>0°39.0'</u>	<u>-60.0'</u>	<u>152.0°</u>	0°14.0'	+60.0'	28.0°	1°07.0'	+60.0'	28.0°	2°00.0'	+60.0'	24.9°	2
3	2°18.0'	-59.9'	152.0°	1°25.0'	-59.9'	152.0°	<u>0°32.0'</u>	<u>-60.0'</u>	<u>152.0°</u>	0°21.0'	+60.0'	28.0°	1°14.0'	+60.0'	28.0°	2°07.0'	+60.0'	28.0°	3°00.0'	+60.0'	37.4°	3
4	1°18.0'	-59.9'	152.1°	<u>0°25.0'</u>	<u>-59.9'</u>	<u>152.1°</u>	0°28.0'	+60.0'	27.9°	1°21.0'	+60.0'	27.9°	2°14.0'	+60.0'	27.9°	3°07.0'	+60.0'	28.0°	4°00.0'	+60.0'	24.7°	4
5	<u>0°18.1'</u>	<u>-59.9'</u>	<u>152.1°</u>	0°34.9'	+59.9'	27.9°	1°28.0'	+60.0'	27.9°	2°21.0'	+60.0'	27.9°	3°14.0'	+60.0'	27.9°	4°07.0'	+60.0'	28.0°	5°00.0'	+60.0'	24.5°	5
6	0°41.8'	+59.9'	27.8°	1°34.9'	+59.9'	27.8°	2°27.9'	+60.0'	27.9°	3°21.0'	+60.0'	27.9°	4°14.0'	+60.0'	27.9°	5°07.0'	+60.0'	28.0°	6°00.0'	+60.0'	24.3°	6
7	1°41.8'	+59.9'	27.8°	2°34.8'	+59.9'	27.8°	3°27.9'	+60.0'	27.8°	4°21.0'	+60.0'	27.9°	5°14.0'	+60.0'	27.9°	6°07.0'	+60.0'	27.9°	7°00.0'	+60.0'	0.0°	7
8	2°41.7'	+59.9'	27.7°	3°34.8'	+59.9'	27.8°	4°27.9'	+60.0'	27.8°	5°20.9'	+60.0'	27.8°	6°14.0'	+60.0'	27.9°	7°07.0'	+60.0'	27.9°	8°00.0'	+60.0'	0.0°	8
9	3°41.6'	+59.9'	27.7°	4°34.7'	+59.9'	27.7°	5°27.8'	+60.0'	27.8°	6°20.9'	+60.0'	27.8°	7°14.0'	+60.0'	27.9°	8°07.0'	+60.0'	27.9°	9°00.0'	+60.0'	62.7°	9
10	4°41.5'	+59.9'	27.6°	5°34.7'	+59.9'	27.7°	6°27.8'	+60.0'	27.7°	7°20.9'	+60.0'	27.8°	8°14.0'	+60.0'	27.8°	9°07.0'	+60.0'	27.9°	10°00.0'	+60.0'	23.0°	10
11	5°41.5'	+59.9'	27.6°	6°34.6'	+59.9'	27.6°	7°27.8'	+60.0'	27.7°	8°20.9'	+60.0'	27.8°	9°14.0'	+60.0'	27.8°	10°07.0'	+60.0'	27.9°	11°00.0'	+60.0'	22.6°	11
12	6°41.4'	+59.9'	27.5°	7°34.6'	+59.9'	27.6°	8°27.7'	+60.0'	27.7°	9°20.9'	+60.0'	27.7°	10°14.0'	+60.0'	27.8°	11°07.0'	+60.0'	27.9°	12°00.0'	+60.0'	62.4°	12
13	7°41.3'	+59.9'	27.5°	8°34.5'	+59.9'	27.6°	9°27.7'	+60.0'	27.6°	10°20.8'	+60.0'	27.7°	11°13.9'	+60.0'	27.8°	12°07.0'	+60.0'	27.9°	13°00.0'	+60.0'	62.3°	13
14	8°41.2'	+59.9'	27.4°	9°34.5'	+59.9'	27.5°	10°27.7'	+60.0'	27.6°	11°20.8'	+60.0'	27.7°	12°13.9'	+60.0'	27.8°	13°07.0'	+60.0'	27.9°	14°00.0'	+60.0'	0.0°	14
15	9°41.2'	+59.9'	27.4°	10°34.4'	+59.9'	27.5°	11°27.6'	+60.0'	27.6°	12°20.8'	+60.0'	27.7°	13°13.9'	+60.0'	27.8°	14°07.0'	+60.0'	27.9°	15°00.0'	+60.0'	20.3°	15
16	10°41.1'	+59.9'	27.3°	11°34.4'	+59.9'	27.4°	12°27.6'	+60.0'	27.5°	13°20.8'	+60.0'	27.6°	14°13.9'	+60.0'	27.7°	15°07.0'	+60.0'	27.9°	16°00.0'	+60.0'	19.5°	16
17	11°41.0'	+59.9'	27.3°	12°34.3'	+59.9'	27.4°	13°27.6'	+60.0'	27.5°	14°20.8'	+60.0'	27.6°	15°13.9'	+60.0'	27.7°	16°07.0'	+60.0'	27.9°	17°00.0'	+60.0'	18.6°	17
18	12°40.9'	+59.9'	27.2°	13°34.3'	+59.9'	27.3°	14°27.5'	+60.0'	27.5°	15°20.8'	+60.0'	27.6°	16°13.9'	+60.0'	27.7°	17°07.0'	+60.0'	27.9°	18°00.0'	+60.0'	17.7°	18
19	13°40.9'	+59.9'	27.2°	14°34.2'	+59.9'	27.3°	15°27.5'	+60.0'	27.4°	16°20.7'	+60.0'	27.6°	17°13.9'	+60.0'	27.7°	18°07.0'	+60.0'	27.8°	19°00.0'	+60.0'	16.6°	19
20	14°40.8'	+59.9'	27.1°	15°34.2'	+59.9'	27.3°	16°27.5'	+60.0'	27.4°	17°20.7'	+60.0'	27.5°	18°13.9'	+60.0'	27.7°	19°07.0'	+60.0'	27.8°	20°00.0'	+60.0'	15.3°	20
21	15°40.7'	+59.9'	27.1°	16°34.1'	+59.9'	27.2°	17°27.4'	+60.0'	27.4°	18°20.7'	+60.0'	27.5°	19°13.9'	+60.0'	27.6°	20°07.0'	+60.0'	27.8°	21°00.0'	+60.0'	13.9°	21
22	16°40.6'	+59.9'	27.0°	17°34.1'	+59.9'	27.2°	18°27.4'	+60.0'	27.3°	19°20.7'	+60.0'	27.5°	20°13.9'	+60.0'	27.7°	21°07.0'	+60.0'	27.8°	22°00.0'	+60.0'	12.2°	22
23	17°40.6'	+59.9'	27.0°	18°34.0'	+59.9'	27.1°	19°27.4'	+60.0'	27.3°	20°20.7'	+60.0'	27.4°	21°13.9'	+60.0'	27.6°	22°07.0'	+60.0'	27.8°	23°00.0'	+60.0'	90.0°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

152° 208° LHA

Latitude SAME as DECLINATION

152° 208° 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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	5°20.6'	-59.9'	152.9°	4°27.2'	-60.0'	152.9°	3°33.8'	-60.0'	152.9°	2°40.4'	-60.0'	153.0°	1°46.9'	-60.0'	153.0°	<u>0°53.5'</u>	<u>-60.0'</u>	<u>153.0°</u>	<u>0°00.0'</u>	<u>-60.0'</u>	<u>153.0°</u>	0
1	4°20.7'	-59.9'	152.9°	3°27.3'	-60.0'	153.0°	2°33.8'	-60.0'	153.0°	1°40.4'	-60.0'	153.0°	<u>0°46.9'</u>	<u>-60.0'</u>	<u>153.0°</u>	0°06.5'	+60.0'	27.0°	0°60.0'	+60.0'	25.0°	1
2	3°20.7'	-59.9'	153.0°	2°27.3'	-60.0'	153.0°	1°33.9'	-60.0'	153.0°	<u>0°40.4'</u>	<u>-60.0'</u>	<u>153.0°</u>	0°13.1'	+60.0'	27.0°	1°06.5'	+60.0'	27.0°	2°00.0'	+60.0'	24.9°	2
3	2°20.8'	-59.9'	153.0°	1°27.4'	-60.0'	153.0°	<u>0°33.9'</u>	<u>-60.0'</u>	<u>153.0°</u>	0°19.6'	+60.0'	27.0°	1°13.1'	+60.0'	27.0°	2°06.5'	+60.0'	27.0°	3°00.0'	+60.0'	37.4°	3
4	1°20.9'	-59.9'	153.1°	<u>0°27.4'</u>	<u>-60.0'</u>	<u>153.1°</u>	0°26.1'	+60.0'	26.9°	1°19.6'	+60.0'	26.9°	2°13.1'	+60.0'	27.0°	3°06.5'	+60.0'	27.0°	4°00.0'	+60.0'	24.7°	4
5	<u>0°21.0'</u>	<u>-59.9'</u>	<u>153.1°</u>	0°32.5'	+60.0'	26.9°	1°26.0'	+60.0'	26.9°	2°19.5'	+60.0'	26.9°	3°13.0'	+60.0'	26.9°	4°06.5'	+60.0'	27.0°	5°00.0'	+60.0'	24.5°	5
6	0°39.0'	+59.9'	26.8°	1°32.5'	+60.0'	26.9°	2°26.0'	+60.0'	26.9°	3°19.5'	+60.0'	26.9°	4°13.0'	+60.0'	26.9°	5°06.5'	+60.0'	27.0°	6°00.0'	+60.0'	24.3°	6
7	1°38.9'	+59.9'	26.8°	2°32.4'	+60.0'	26.8°	3°26.0'	+60.0'	26.8°	4°19.5'	+60.0'	26.9°	5°13.0'	+60.0'	26.9°	6°06.5'	+60.0'	26.9°	7°00.0'	+60.0'	0.0°	7
8	2°38.8'	+59.9'	26.7°	3°32.4'	+60.0'	26.8°	4°26.0'	+60.0'	26.8°	5°19.5'	+60.0'	26.8°	6°13.0'	+60.0'	26.9°	7°06.5'	+60.0'	26.9°	8°00.0'	+60.0'	0.0°	8
9	3°38.7'	+59.9'	26.7°	4°32.3'	+60.0'	26.7°	5°25.9'	+60.0'	26.8°	6°19.5'	+60.0'	26.8°	7°13.0'	+60.0'	26.9°	8°06.5'	+60.0'	26.9°	9°00.0'	+60.0'	62.7°	9
10	4°38.7'	+59.9'	26.7°	5°32.3'	+60.0'	26.7°	6°25.9'	+60.0'	26.7°	7°19.5'	+60.0'	26.8°	8°13.0'	+60.0'	26.9°	9°06.5'	+60.0'	26.9°	10°00.0'	+60.0'	23.0°	10
11	5°38.6'	+59.9'	26.6°	6°32.2'	+60.0'	26.7°	7°25.9'	+60.0'	26.7°	8°19.4'	+60.0'	26.8°	9°13.0'	+60.0'	26.8°	10°06.5'	+60.0'	26.9°	11°00.0'	+60.0'	22.6°	11
12	6°38.5'	+59.9'	26.6°	7°32.2'	+60.0'	26.6°	8°25.8'	+60.0'	26.7°	9°19.4'	+60.0'	26.7°	10°13.0'	+60.0'	26.8°	11°06.5'	+60.0'	26.9°	12°00.0'	+60.0'	62.4°	12
13	7°38.5'	+59.9'	26.5°	8°32.2'	+60.0'	26.6°	9°25.8'	+60.0'	26.6°	10°19.4'	+60.0'	26.7°	11°13.0'	+60.0'	26.8°	12°06.5'	+60.0'	26.9°	13°00.0'	+60.0'	62.3°	13
14	8°38.4'	+59.9'	26.5°	9°32.1'	+60.0'	26.5°	10°25.8'	+60.0'	26.6°	11°19.4'	+60.0'	26.7°	12°13.0'	+60.0'	26.8°	13°06.5'	+60.0'	26.9°	14°00.0'	+60.0'	0.0°	14
15	9°38.3'	+59.9'	26.4°	10°32.1'	+60.0'	26.5°	11°25.7'	+60.0'	26.6°	12°19.4'	+60.0'	26.7°	13°13.0'	+60.0'	26.8°	14°06.5'	+60.0'	26.9°	15°00.0'	+60.0'	20.3°	15
16	10°38.3'	+59.9'	26.4°	11°32.0'	+60.0'	26.4°	12°25.7'	+60.0'	26.5°	13°19.4'	+60.0'	26.6°	14°13.0'	+60.0'	26.8°	15°06.5'	+60.0'	26.9°	16°00.0'	+60.0'	19.5°	16
17	11°38.2'	+59.9'	26.3°	12°32.0'	+60.0'	26.4°	13°25.7'	+60.0'	26.5°	14°19.3'	+60.0'	26.6°	15°13.0'	+60.0'	26.7°	16°06.5'	+60.0'	26.9°	17°00.0'	+60.0'	18.6°	17
18	12°38.1'	+59.9'	26.3°	13°31.9'	+60.0'	26.4°	14°25.6'	+60.0'	26.5°	15°19.3'	+60.0'	26.6°	16°12.9'	+60.0'	26.7°	17°06.5'	+60.0'	26.9°	18°00.0'	+60.0'	17.7°	18
19	13°38.1'	+59.9'	26.2°	14°31.9'	+59.9'	26.3°	15°25.6'	+60.0'	26.4°	16°19.3'	+60.0'	26.6°	17°12.9'	+60.0'	26.7°	18°06.5'	+60.0'	26.8°	19°00.0'	+60.0'	16.6°	19
20	14°38.0'	+59.9'	26.2°	15°31.8'	+59.9'	26.3°	16°25.6'	+60.0'	26.4°	17°19.3'	+60.0'	26.5°	18°12.9'	+60.0'	26.7°	19°06.5'	+60.0'	26.8°	20°00.0'	+60.0'	15.3°	20
21	15°37.9'	+59.9'	26.1°	16°31.8'	+59.9'	26.2°	17°25.5'	+60.0'	26.4°	18°19.3'	+60.0'	26.5°	19°12.9'	+60.0'	26.7°	20°06.5'	+60.0'	26.8°	21°00.0'	+60.0'	13.9°	21
22	16°37.8'	+59.9'																				

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

26° 334° LHA

Latitude CONTRARY to Declination

26° 334° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	5°23.4'	-59.9'	153.9°	4°29.6'	-60.0'	153.9°	3°35.7'	-60.0'	153.9°	2°41.8'	-60.0'	154.0°	1°47.9'	-60.0'	154.0°	<u>0°53.9'</u>	<u>-60.0'</u>	<u>154.0°</u>	<u>0°00.0'</u>	<u>-60.0'</u>	<u>154.0°</u>	0
1	4°23.5'	-59.9'	153.9°	3°29.6'	-60.0'	154.0°	2°35.7'	-60.0'	154.0°	1°41.8'	-60.0'	154.0°	<u>0°47.9'</u>	<u>-60.0'</u>	<u>154.0°</u>	0°06.1'	+60.0'	26.0°	0°60.0'	+60.0'	25.0°	1
2	3°23.5'	-59.9'	154.0°	2°29.7'	-60.0'	154.0°	1°35.7'	-60.0'	154.0°	<u>0°41.8'</u>	<u>-60.0'</u>	<u>154.0°</u>	0°12.1'	+60.0'	26.0°	1°06.1'	+60.0'	26.0°	2°00.0'	+60.0'	24.9°	2
3	2°23.6'	-59.9'	154.0°	1°29.7'	-60.0'	154.0°	<u>0°35.8'</u>	<u>-60.0'</u>	<u>154.0°</u>	0°18.2'	+60.0'	26.0°	1°12.1'	+60.0'	26.0°	2°06.1'	+60.0'	26.0°	3°00.0'	+60.0'	37.4°	3
4	1°23.7'	-59.9'	154.1°	<u>0°29.7'</u>	<u>-60.0'</u>	<u>154.1°</u>	0°24.2'	+60.0'	25.9°	1°18.2'	+60.0'	25.9°	2°12.1'	+60.0'	26.0°	3°06.1'	+60.0'	26.0°	4°00.0'	+60.0'	24.7°	4
5	<u>0°23.8'</u>	<u>-59.9'</u>	<u>154.1°</u>	0°30.2'	+60.0'	25.9°	1°24.2'	+60.0'	25.9°	2°18.2'	+60.0'	25.9°	3°12.1'	+60.0'	25.9°	4°06.1'	+60.0'	26.0°	5°00.0'	+60.0'	24.5°	5
6	0°36.2'	+59.9'	25.8°	1°30.2'	+60.0'	25.9°	2°24.2'	+60.0'	25.9°	3°18.1'	+60.0'	25.9°	4°12.1'	+60.0'	25.9°	5°06.1'	+60.0'	26.0°	6°00.0'	+60.0'	24.3°	6
7	1°36.1'	+59.9'	25.8°	2°30.1'	+60.0'	25.8°	3°24.1'	+60.0'	25.8°	4°18.1'	+60.0'	25.9°	5°12.1'	+60.0'	25.9°	6°06.1'	+60.0'	25.9°	7°00.0'	+60.0'	0.0°	7
8	2°36.0'	+59.9'	25.8°	3°30.1'	+60.0'	25.8°	4°24.1'	+60.0'	25.8°	5°18.1'	+60.0'	25.8°	6°12.1'	+60.0'	25.9°	7°06.1'	+60.0'	25.9°	8°00.0'	+60.0'	0.0°	8
9	3°36.0'	+59.9'	25.7°	4°30.0'	+60.0'	25.7°	5°24.1'	+60.0'	25.8°	6°18.1'	+60.0'	25.8°	7°12.1'	+60.0'	25.9°	8°06.1'	+60.0'	25.9°	9°00.0'	+60.0'	62.7°	9
10	4°35.9'	+59.9'	25.7°	5°30.0'	+60.0'	25.7°	6°24.0'	+60.0'	25.7°	7°18.1'	+60.0'	25.8°	8°12.1'	+60.0'	25.9°	9°06.1'	+60.0'	25.9°	10°00.0'	+60.0'	23.0°	10
11	5°35.9'	+59.9'	25.6°	6°29.9'	+60.0'	25.7°	7°24.0'	+60.0'	25.7°	8°18.1'	+60.0'	25.8°	9°12.1'	+60.0'	25.8°	10°06.1'	+60.0'	25.9°	11°00.0'	+60.0'	22.6°	11
12	6°35.8'	+59.9'	25.6°	7°29.9'	+60.0'	25.6°	8°24.0'	+60.0'	25.7°	9°18.0'	+60.0'	25.8°	10°12.1'	+60.0'	25.8°	11°06.1'	+60.0'	25.9°	12°00.0'	+60.0'	62.4°	12
13	7°35.7'	+59.9'	25.5°	8°29.9'	+60.0'	25.6°	9°24.0'	+60.0'	25.7°	10°18.0'	+60.0'	25.7°	11°12.1'	+60.0'	25.8°	12°06.0'	+60.0'	25.9°	13°00.0'	+60.0'	62.3°	13
14	8°35.7'	+59.9'	25.5°	9°29.8'	+60.0'	25.5°	10°23.9'	+60.0'	25.6°	11°18.0'	+60.0'	25.7°	12°12.0'	+60.0'	25.8°	13°06.0'	+60.0'	25.9°	14°00.0'	+60.0'	0.0°	14
15	9°35.6'	+59.9'	25.4°	10°29.8'	+60.0'	25.5°	11°23.9'	+60.0'	25.6°	12°18.0'	+60.0'	25.7°	13°12.0'	+60.0'	25.8°	14°06.0'	+60.0'	25.9°	15°00.0'	+60.0'	20.3°	15
16	10°35.5'	+59.9'	25.4°	11°29.7'	+60.0'	25.5°	12°23.9'	+60.0'	25.6°	13°18.0'	+60.0'	25.7°	14°12.0'	+60.0'	25.8°	15°06.0'	+60.0'	25.9°	16°00.0'	+60.0'	19.5°	16
17	11°35.5'	+59.9'	25.3°	12°29.7'	+60.0'	25.4°	13°23.8'	+60.0'	25.5°	14°18.0'	+60.0'	25.6°	15°12.0'	+60.0'	25.7°	16°06.0'	+60.0'	25.9°	17°00.0'	+60.0'	18.6°	17
18	12°35.4'	+59.9'	25.3°	13°29.6'	+60.0'	25.4°	14°23.8'	+60.0'	25.5°	15°17.9'	+60.0'	25.6°	16°12.0'	+60.0'	25.7°	17°06.0'	+60.0'	25.9°	18°00.0'	+60.0'	17.7°	18
19	13°35.3'	+59.9'	25.2°	14°29.6'	+60.0'	25.3°	15°23.8'	+60.0'	25.5°	16°17.9'	+60.0'	25.6°	17°12.0'	+60.0'	25.7°	18°06.0'	+60.0'	25.9°	19°00.0'	+60.0'	16.6°	19
20	14°35.3'	+59.9'	25.2°	15°29.5'	+60.0'	25.3°	16°23.7'	+60.0'	25.4°	17°17.9'	+60.0'	25.6°	18°12.0'	+60.0'	25.7°	19°06.0'	+60.0'	25.8°	20°00.0'	+60.0'	15.3°	20
21	15°35.2'	+59.9'	25.1°	16°29.5'	+60.0'	25.3°	17°23.7'	+60.0'	25.4°	18°17.9'	+60.0'	25.5°	19°12.0'	+60.0'	25.7°	20°06.0'	+60.0'	25.8°	21°00.0'	+60.0'	13.9°	21
22	16°35.1'	+59.9'	25.1°	17°29.4'	+60.0'	25.2°	18°23.7'	+60.0'	25.4°	19°17.9'	+60.0'	25.5°	20°12.0'	+60.0'	25.7°	21°06.0'	+60.0'	25.8°	22°00.0'	+60.0'	12.2°	22
23	17°35.1'	+59.9'	25.0°	18°29.4'	+60.0'	25.2°	19°23.7'	+60.0'	25.3°	20°17.9'	+60.0'	25.5°	21°12.0'	+60.0'	25.6°	22°06.0'	+60.0'	25.8°	23°00.0'	+60.0'	90.0°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

154° 206° LHA

Latitude SAME as DECLINATION

154° 206° 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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	5°26.1'	-59.9'	154.9°	4°31.8'	-60.0'	154.9°	3°37.5'	-60.0'	154.9°	2°43.1'	-60.0'	155.0°	1°48.8'	-60.0'	155.0°	<u>0°54.4'</u>	<u>-60.0'</u>	<u>155.0°</u>	<u>0°00.0'</u>	<u>-60.0'</u>	<u>155.0°</u>	0
1	4°26.2'	-59.9'	154.9°	3°31.9'	-60.0'	155.0°	2°37.5'	-60.0'	155.0°	1°43.1'	-60.0'	155.0°	<u>0°48.8'</u>	<u>-60.0'</u>	<u>155.0°</u>	0°05.6'	+60.0'	25.0°	0°60.0'	+60.0'	25.0°	1
2	3°26.2'	-59.9'	155.0°	2°31.9'	-60.0'	155.0°	1°37.5'	-60.0'	155.0°	<u>0°43.2'</u>	<u>-60.0'</u>	<u>155.0°</u>	0°11.2'	+60.0'	25.0°	1°05.6'	+60.0'	25.0°	2°00.0'	+60.0'	24.9°	2
3	2°26.3'	-59.9'	155.0°	1°32.0'	-60.0'	155.0°	<u>0°37.6'</u>	<u>-60.0'</u>	<u>155.0°</u>	0°16.8'	+60.0'	25.0°	1°11.2'	+60.0'	25.0°	2°05.6'	+60.0'	25.0°	3°00.0'	+60.0'	37.4°	3
4	1°26.4'	-59.9'	155.1°	<u>0°32.0'</u>	<u>-60.0'</u>	<u>155.1°</u>	0°22.4'	+60.0'	24.9°	1°16.8'	+60.0'	24.9°	2°11.2'	+60.0'	25.0°	3°05.6'	+60.0'	25.0°	4°00.0'	+60.0'	24.7°	4
5	<u>0°26.5'</u>	<u>-59.9'</u>	<u>155.1°</u>	0°28.0'	+60.0'	24.9°	1°22.4'	+60.0'	24.9°	2°16.8'	+60.0'	24.9°	3°11.2'	+60.0'	24.9°	4°05.6'	+60.0'	25.0°	5°00.0'	+60.0'	24.5°	5
6	0°33.5'	+59.9'	24.9°	1°27.9'	+60.0'	24.9°	2°22.4'	+60.0'	24.9°	3°16.8'	+60.0'	24.9°	4°11.2'	+60.0'	24.9°	5°05.6'	+60.0'	25.0°	6°00.0'	+60.0'	24.3°	6
7	1°33.4'	+59.9'	24.8°	2°27.9'	+60.0'	24.8°	3°22.3'	+60.0'	24.8°	4°16.8'	+60.0'	24.9°	5°11.2'	+60.0'	24.9°	6°05.6'	+60.0'	25.0°	7°00.0'	+60.0'	0.0°	7
8	2°33.4'	+59.9'	24.8°	3°27.8'	+60.0'	24.8°	4°22.3'	+60.0'	24.8°	5°16.8'	+60.0'	24.9°	6°11.2'	+60.0'	24.9°	7°05.6'	+60.0'	24.9°	8°00.0'	+60.0'	0.0°	8
9	3°33.3'	+59.9'	24.7°	4°27.8'	+60.0'	24.8°	5°22.3'	+60.0'	24.8°	6°16.7'	+60.0'	24.8°	7°11.2'	+60.0'	24.9°	8°05.6'	+60.0'	24.9°	9°00.0'	+60.0'	62.7°	9
10	4°33.2'	+59.9'	24.7°	5°27.8'	+60.0'	24.7°	6°22.3'	+60.0'	24.8°	7°16.7'	+60.0'	24.8°	8°11.2'	+60.0'	24.9°	9°05.6'	+60.0'	24.9°	10°00.0'	+60.0'	23.0°	10
11	5°33.2'	+59.9'	24.6°	6°27.7'	+60.0'	24.7°	7°22.2'	+60.0'	24.7°	8°16.7'	+60.0'	24.8°	9°11.2'	+60.0'	24.8°	10°05.6'	+60.0'	24.9°	11°00.0'	+60.0'	22.6°	11
12	6°33.1'	+59.9'	24.6°	7°27.7'	+60.0'	24.6°	8°22.2'	+60.0'	24.7°	9°16.7'	+60.0'	24.8°	10°11.2'	+60.0'	24.8°	11°05.6'	+60.0'	24.9°	12°00.0'	+60.0'	62.4°	12
13	7°33.1'	+59.9'	24.5°	8°27.6'	+60.0'	24.6°	9°22.2'	+60.0'	24.7°	10°16.7'	+60.0'	24.7°	11°11.2'	+60.0'	24.8°	12°05.6'	+60.0'	24.9°	13°00.0'	+60.0'	62.3°	13
14	8°33.0'	+59.9'	24.5°	9°27.6'	+60.0'	24.6°	10°22.1'	+60.0'	24.6°	11°16.7'	+60.0'	24.7°	12°11.2'	+60.0'	24.8°	13°05.6'	+60.0'	24.9°	14°00.0'	+60.0'	0.0°	14
15	9°33.0'	+59.9'	24.5°	10°27.6'	+60.0'	24.5°	11°22.1'	+60.0'	24.6°	12°16.7'	+60.0'	24.7°	13°11.1'	+60.0'	24.8°	14°05.6'	+60.0'	24.9°	15°00.0'	+60.0'	20.3°	15
16	10°32.9'	+59.9'	24.4°	11°27.5'	+60.0'	24.5°	12°22.1'	+60.0'	24.6°	13°16.6'	+60.0'	24.7°	14°11.1'	+60.0'	24.8°	15°05.6'	+60.0'	24.9°	16°00.0'	+60.0'	19.5°	16
17	11°32.8'	+59.9'	24.4°	12°27.5'	+60.0'	24.4°	13°22.1'	+60.0'	24.5°	14°16.6'	+60.0'	24.6°	15°11.1'	+60.0'	24.8°	16°05.6'	+60.0'	24.9°	17°00.0'	+60.0'	18.6°	17
18	12°32.8'	+59.9'	24.3°	13°27.4'	+60.0'	24.4°	14°22.0'	+60.0'	24.5°	15°16.6'	+60.0'	24.6°	16°11.1'	+60.0'	24.7°	17°05.6'	+60.0'	24.9°	18°00.0'	+60.0'	17.7°	18
19	13°32.7'	+59.9'	24.3°	14°27.4'	+60.0'	24.4°	15°22.0'	+60.0'	24.5°	16°16.6'	+60.0'	24.6°	17°11.1'	+60.0'	24.7°	18°05.6'	+60.0'	24.9°	19°00.0'	+60.0'	16.6°	19
20	14°32.6'	+59.9'	24.2°	15°27.3'	+60.0'	24.3°	16°22.0'	+60.0'	24.5°	17°16.6'	+60.0'	24.6°	18°11.1'	+60.0'	24.7°	19°05.6'	+60.0'	24.9°	20°00.0'	+60.0'	15.3°	20
21	15°32.6'	+59.9'	24.2°	16°27.3'	+60.0'	24.3°	17°22.0'	+60.0'	24.4°	18°16.6'	+60.0'	24.6°	19°11.1'	+60.0'	24.7°	20°05.6'	+60.0'	24.8°	21°00.0'	+60.0'	13.9°	21
22	16°32.5'	+59.9'																				

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

24° 336° LHA

Latitude CONTRARY to Declination

24° 336° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	5°28.7'	-59.9'	155.9°	4°34.0'	-60.0'	155.9°	3°39.2'	-60.0'	155.9°	2°44.4'	-60.0'	156.0°	1°49.6'	-60.0'	156.0°	<u>0°54.8' -60.0' 156.0°</u>	<u>0°00.0' -60.0' 156.0°</u>				0	
1	4°28.8'	-59.9'	155.9°	3°34.0'	-60.0'	156.0°	2°39.2'	-60.0'	156.0°	1°44.4'	-60.0'	156.0°	<u>0°49.6' -60.0' 156.0°</u>	0°05.2'	+60.0'	24.0°	0°60.0'	+60.0'	25.0°			1
2	3°28.8'	-59.9'	156.0°	2°34.1'	-60.0'	156.0°	1°39.3'	-60.0'	156.0°	<u>0°44.5' -60.0' 156.0°</u>	0°10.4'	+60.0'	24.0°	1°05.2'	+60.0'	24.0°	2°00.0'	+60.0'	24.9°			2
3	2°28.9'	-59.9'	156.0°	1°34.1'	-60.0'	156.0°	<u>0°39.3' -60.0' 156.0°</u>	0°15.5'	+60.0'	24.0°	1°10.4'	+60.0'	24.0°	2°05.2'	+60.0'	24.0°	3°00.0'	+60.0'	37.4°			3
4	1°29.0'	-59.9'	156.1°	<u>0°34.2' -60.0' 156.1°</u>	0°20.7'	+60.0'	23.9°	1°15.5'	+60.0'	23.9°	2°10.4'	+60.0'	24.0°	3°05.2'	+60.0'	24.0°	4°00.0'	+60.0'	24.7°			4
5	<u>0°29.0' -59.9' 156.1°</u>	0°25.8'	+60.0'	23.9°	1°20.7'	+60.0'	23.9°	2°15.5'	+60.0'	23.9°	3°10.3'	+60.0'	23.9°	4°05.2'	+60.0'	24.0°	5°00.0'	+60.0'	24.5°			5
6	0°30.9'	+59.9'	23.9°	1°25.8'	+60.0'	23.9°	2°20.6'	+60.0'	23.9°	3°15.5'	+60.0'	23.9°	4°10.3'	+60.0'	23.9°	5°05.2'	+60.0'	24.0°	6°00.0'	+60.0'	24.3°	6
7	1°30.8'	+59.9'	23.8°	2°25.7'	+60.0'	23.8°	3°20.6'	+60.0'	23.9°	4°15.5'	+60.0'	23.9°	5°10.3'	+60.0'	23.9°	6°05.2'	+60.0'	24.0°	7°00.0'	+60.0'	0.0°	7
8	2°30.8'	+59.9'	23.8°	3°25.7'	+60.0'	23.8°	4°20.6'	+60.0'	23.8°	5°15.5'	+60.0'	23.9°	6°10.3'	+60.0'	23.9°	7°05.2'	+60.0'	23.9°	8°00.0'	+60.0'	0.0°	8
9	3°30.7'	+59.9'	23.7°	4°25.7'	+60.0'	23.8°	5°20.6'	+60.0'	23.8°	6°15.5'	+60.0'	23.8°	7°10.3'	+60.0'	23.9°	8°05.2'	+60.0'	23.9°	9°00.0'	+60.0'	62.7°	9
10	4°30.7'	+59.9'	23.7°	5°25.6'	+60.0'	23.7°	6°20.5'	+60.0'	23.8°	7°15.4'	+60.0'	23.8°	8°10.3'	+60.0'	23.9°	9°05.2'	+60.0'	23.9°	10°00.0'	+60.0'	23.0°	10
11	5°30.6'	+59.9'	23.6°	6°25.6'	+60.0'	23.7°	7°20.5'	+60.0'	23.7°	8°15.4'	+60.0'	23.8°	9°10.3'	+60.0'	23.9°	10°05.2'	+60.0'	23.9°	11°00.0'	+60.0'	22.6°	11
12	6°30.6'	+59.9'	23.6°	7°25.5'	+60.0'	23.7°	8°20.5'	+60.0'	23.7°	9°15.4'	+60.0'	23.8°	10°10.3'	+60.0'	23.8°	11°05.2'	+60.0'	23.9°	12°00.0'	+60.0'	62.4°	12
13	7°30.5'	+59.9'	23.6°	8°25.5'	+60.0'	23.6°	9°20.5'	+60.0'	23.7°	10°15.4'	+60.0'	23.8°	11°10.3'	+60.0'	23.8°	12°05.2'	+60.0'	23.9°	13°00.0'	+60.0'	62.3°	13
14	8°30.5'	+59.9'	23.5°	9°25.5'	+60.0'	23.6°	10°20.4'	+60.0'	23.7°	11°15.4'	+60.0'	23.7°	12°10.3'	+60.0'	23.8°	13°05.2'	+60.0'	23.9°	14°00.0'	+60.0'	0.0°	14
15	9°30.4'	+59.9'	23.5°	10°25.4'	+60.0'	23.5°	11°20.4'	+60.0'	23.6°	12°15.4'	+60.0'	23.7°	13°10.3'	+60.0'	23.8°	14°05.2'	+60.0'	23.9°	15°00.0'	+60.0'	20.3°	15
16	10°30.3'	+59.9'	23.4°	11°25.4'	+60.0'	23.5°	12°20.4'	+60.0'	23.6°	13°15.4'	+60.0'	23.7°	14°10.3'	+60.0'	23.8°	15°05.2'	+60.0'	23.9°	16°00.0'	+60.0'	19.5°	16
17	11°30.3'	+59.9'	23.4°	12°25.3'	+60.0'	23.5°	13°20.4'	+60.0'	23.6°	14°15.3'	+60.0'	23.7°	15°10.3'	+60.0'	23.8°	16°05.2'	+60.0'	23.9°	17°00.0'	+60.0'	18.6°	17
18	12°30.2'	+59.9'	23.3°	13°25.3'	+60.0'	23.4°	14°20.3'	+60.0'	23.5°	15°15.3'	+60.0'	23.6°	16°10.3'	+60.0'	23.8°	17°05.2'	+60.0'	23.9°	18°00.0'	+60.0'	17.7°	18
19	13°30.2'	+59.9'	23.3°	14°25.3'	+60.0'	23.4°	15°20.3'	+60.0'	23.5°	16°15.3'	+60.0'	23.6°	17°10.3'	+60.0'	23.7°	18°05.2'	+60.0'	23.9°	19°00.0'	+60.0'	16.6°	19
20	14°30.1'	+59.9'	23.3°	15°25.2'	+60.0'	23.4°	16°20.3'	+60.0'	23.5°	17°15.3'	+60.0'	23.6°	18°10.3'	+60.0'	23.7°	19°05.2'	+60.0'	23.9°	20°00.0'	+60.0'	15.3°	20
21	15°30.1'	+59.9'	23.2°	16°25.2'	+60.0'	23.3°	17°20.3'	+60.0'	23.4°	18°15.3'	+60.0'	23.6°	19°10.2'	+60.0'	23.7°	20°05.2'	+60.0'	23.8°	21°00.0'	+60.0'	13.9°	21
22	16°30.0'	+59.9'	23.2°	17°25.1'	+60.0'	23.3°	18°20.2'	+60.0'	23.4°	19°15.3'	+60.0'	23.5°	20°10.2'	+60.0'	23.7°	21°05.2'	+60.0'	23.8°	22°00.0'	+60.0'	12.2°	22
23	17°29.9'	+59.9'	23.1°	18°25.1'	+60.0'	23.2°	19°20.2'	+60.0'	23.4°	20°15.2'	+60.0'	23.5°	21°10.2'	+60.0'	23.7°	22°05.2'	+60.0'	23.8°	23°00.0'	+60.0'	90.0°	23
Dec°	84			85			86			87			88			89			90			Dec°

156° 204° LHA

Latitude SAME as DECLINATION

156° 204° 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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	5°31.2'	-59.9'	156.9°	4°36.1'	-60.0'	156.9°	3°40.9'	-60.0'	156.9°	2°45.7'	-60.0'	157.0°	1°50.5'	-60.0'	157.0°	<u>0°55.2' -60.0' 157.0°</u>	<u>0°00.0' -60.0' 157.0°</u>				0	
1	4°31.3'	-59.9'	156.9°	3°36.1'	-60.0'	157.0°	2°40.9'	-60.0'	157.0°	1°45.7'	-60.0'	157.0°	<u>0°50.5' -60.0' 157.0°</u>	0°04.8'	+60.0'	23.0°	0°60.0'	+60.0'	25.0°			1
2	3°31.3'	-59.9'	157.0°	2°36.2'	-60.0'	157.0°	1°40.9'	-60.0'	157.0°	<u>0°45.7' -60.0' 157.0°</u>	0°09.5'	+60.0'	23.0°	1°04.8'	+60.0'	23.0°	2°00.0'	+60.0'	24.9°			2
3	2°31.4'	-59.9'	157.0°	1°36.2'	-60.0'	157.0°	<u>0°41.0' -60.0' 157.0°</u>	0°14.3'	+60.0'	23.0°	1°09.5'	+60.0'	23.0°	2°04.8'	+60.0'	23.0°	3°00.0'	+60.0'	37.4°			3
4	1°31.5'	-59.9'	157.1°	<u>0°36.2' -60.0' 157.1°</u>	0°19.0'	+60.0'	22.9°	1°14.3'	+60.0'	22.9°	2°09.5'	+60.0'	23.0°	3°04.8'	+60.0'	23.0°	4°00.0'	+60.0'	24.7°			4
5	<u>0°31.5' -59.9' 157.1°</u>	0°23.7'	+60.0'	22.9°	1°19.0'	+60.0'	22.9°	2°14.3'	+60.0'	22.9°	3°09.5'	+60.0'	22.9°	4°04.8'	+60.0'	23.0°	5°00.0'	+60.0'	24.5°			5
6	0°28.4'	+59.9'	22.9°	1°23.7'	+60.0'	22.9°	2°19.0'	+60.0'	22.9°	3°14.2'	+60.0'	22.9°	4°09.5'	+60.0'	22.9°	5°04.8'	+60.0'	23.0°	6°00.0'	+60.0'	24.3°	6
7	1°28.4'	+59.9'	22.8°	2°23.7'	+60.0'	22.8°	3°19.0'	+60.0'	22.9°	4°14.2'	+60.0'	22.9°	5°09.5'	+60.0'	22.9°	6°04.8'	+60.0'	23.0°	7°00.0'	+60.0'	0.0°	7
8	2°28.3'	+59.9'	22.8°	3°23.6'	+60.0'	22.8°	4°18.9'	+60.0'	22.8°	5°14.2'	+60.0'	22.9°	6°09.5'	+60.0'	22.9°	7°04.8'	+60.0'	22.9°	8°00.0'	+60.0'	0.0°	8
9	3°28.3'	+59.9'	22.7°	4°23.6'	+60.0'	22.8°	5°18.9'	+60.0'	22.8°	6°14.2'	+60.0'	22.8°	7°09.5'	+60.0'	22.9°	8°04.8'	+60.0'	22.9°	9°00.0'	+60.0'	62.7°	9
10	4°28.2'	+59.9'	22.7°	5°23.6'	+60.0'	22.7°	6°18.9'	+60.0'	22.8°	7°14.2'	+60.0'	22.8°	8°09.5'	+60.0'	22.9°	9°04.8'	+60.0'	22.9°	10°00.0'	+60.0'	23.0°	10
11	5°28.2'	+59.9'	22.7°	6°23.5'	+60.0'	22.7°	7°18.9'	+60.0'	22.7°	8°14.2'	+60.0'	22.8°	9°09.5'	+60.0'	22.9°	10°04.8'	+60.0'	22.9°	11°00.0'	+60.0'	22.6°	11
12	6°28.1'	+59.9'	22.6°	7°23.5'	+60.0'	22.7°	8°18.8'	+60.0'	22.7°	9°14.2'	+60.0'	22.8°	10°09.5'	+60.0'	22.8°	11°04.8'	+60.0'	22.9°	12°00.0'	+60.0'	62.4°	12
13	7°28.1'	+59.9'	22.6°	8°23.4'	+60.0'	22.6°	9°18.8'	+60.0'	22.7°	10°14.2'	+60.0'	22.8°	11°09.5'	+60.0'	22.8°	12°04.8'	+60.0'	22.9°	13°00.0'	+60.0'	62.3°	13
14	8°28.0'	+59.9'	22.5°	9°23.4'	+60.0'	22.6°	10°18.8'	+60.0'	22.7°	11°14.1'	+60.0'	22.7°	12°09.5'	+60.0'	22.8°	13°04.8'	+60.0'	22.9°	14°00.0'	+60.0'	0.0°	14
15	9°28.0'	+59.9'	22.5°	10°23.4'	+60.0'	22.6°	11°18.8'	+60.0'	22.6°	12°14.1'	+60.0'	22.7°	13°09.5'	+60.0'	22.8°	14°04.7'	+60.0'	22.9°	15°00.0'	+60.0'	20.3°	15
16	10°27.9'	+59.9'	22.5°	11°23.3'	+60.0'	22.5°	12°18.7'	+60.0'	22.6°	13°14.1'	+60.0'	22.7°	14°09.5'	+60.0'	22.8°	15°04.7'	+60.0'	22.9°	16°00.0'	+60.0'	19.5°	16
17	11°27.9'	+59.9'	22.4°	12°23.3'	+60.0'	22.5°	13°18.7'	+60.0'	22.6°	14°14.1'	+60.0'	22.7°	15°09.4'	+60.0'	22.8°	16°04.7'	+60.0'	22.9°	17°00.0'	+60.0'	18.6°	17
18	12°27.8'	+59.9'	22.4°	13°23.3'	+60.0'	22.5°	14°18.7'	+60.0'	22.6°	15°14.1'	+60.0'	22.7°	16°09.4'	+60.0'	22.8°	17°04.7'	+60.0'	22.9°	18°00.0'	+60.0'	17.7°	18
19	13°27.7'	+59.9'	22.3°	14°23.2'	+60.0'	22.4°	15°18.7'	+60.0'	22.5°	16°14.1'	+60.0'	22.6°	17°09.4'	+60.0'	22.7°	18°04.7'	+60.0'	22.9°	19°00.0'	+60.0'	16.6°	19
20	14°27.7'	+59.9'	22.3°	15°23.2'	+60.0'	22.4°	16°18.7'	+60.0'	22.5°	17°14.1'	+60.0'	22.6°	18°09.4'	+60.0'	22.7°	19°04.7'	+60.0'	22.9°	20°00.0'	+60.0'	15.3°	20
21	15°27.6'	+59.9'	22.2°	16°23.2'	+60.0'	22.3°	17°18.6'	+60.0'	22.5°	18°14.0'	+60.0'	22.6°	19°09.4'	+60.0'	22.7°	20°04.7'	+60.0'	22.9°	21°00.0'	+60.0'	13.9°	21
22	16°27.6'	+59.9'	22.2°	17°23.1'	+60.0'	22.3°	18°18.6'	+60.0'	22.4°	19°14.0'	+60.0'	22.6°	20°09.4'	+60.0'	22.7°	21°04.7'	+60.0'	22.8°	22°00.0'	+60.0'	12.2°	22
23	17°27.5'	+59.9'	22.2°	18°23.1'																		

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

22° 338° LHA

Latitude CONTRARY to Declination

22° 338° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	5°33.7'	-60.0'	157.9°	4°38.1'	-60.0'	157.9°	3°42.5'	-60.0'	158.0°	2°46.9'	-60.0'	158.0°	1°51.3'	-60.0'	158.0°	<u>0°55.6'</u>	-60.0'	<u>158.0°</u>	<u>0°00.0'</u>	-60.0'	<u>158.0°</u>	0
1	4°33.7'	-60.0'	157.9°	3°38.1'	-60.0'	158.0°	2°42.5'	-60.0'	158.0°	1°46.9'	-60.0'	158.0°	<u>0°51.3'</u>	-60.0'	<u>158.0°</u>	0°04.4'	+60.0'	22.0°	0°60.0'	+60.0'	25.0°	1
2	3°33.7'	-60.0'	158.0°	2°38.2'	-60.0'	158.0°	1°42.5'	-60.0'	158.0°	<u>0°46.9'</u>	-60.0'	<u>158.0°</u>	0°08.7'	+60.0'	22.0°	1°04.4'	+60.0'	22.0°	2°00.0'	+60.0'	24.9°	2
3	2°33.8'	-60.0'	158.0°	1°38.2'	-60.0'	158.0°	<u>0°42.6'</u>	-60.0'	<u>158.0°</u>	0°13.1'	+60.0'	22.0°	1°08.7'	+60.0'	22.0°	2°04.4'	+60.0'	22.0°	3°00.0'	+60.0'	37.4°	3
4	1°33.9'	-60.0'	158.0°	<u>0°38.2'</u>	-60.0'	<u>158.1°</u>	0°17.4'	+60.0'	21.9°	1°13.1'	+60.0'	21.9°	2°08.7'	+60.0'	22.0°	3°04.4'	+60.0'	22.0°	4°00.0'	+60.0'	24.7°	4
5	<u>0°33.9'</u>	-60.0'	<u>158.1°</u>	0°21.7'	+60.0'	21.9°	1°17.4'	+60.0'	21.9°	2°13.1'	+60.0'	21.9°	3°08.7'	+60.0'	21.9°	4°04.4'	+60.0'	22.0°	5°00.0'	+60.0'	24.5°	5
6	0°26.0'	+60.0'	21.9°	1°21.7'	+60.0'	21.9°	2°17.4'	+60.0'	21.9°	3°13.0'	+60.0'	21.9°	4°08.7'	+60.0'	21.9°	5°04.4'	+60.0'	22.0°	6°00.0'	+60.0'	24.3°	6
7	1°26.0'	+60.0'	21.8°	2°21.7'	+60.0'	21.8°	3°17.4'	+60.0'	21.9°	4°13.0'	+60.0'	21.9°	5°08.7'	+60.0'	21.9°	6°04.4'	+60.0'	22.0°	7°00.0'	+60.0'	0.0°	7
8	2°25.9'	+60.0'	21.8°	3°21.6'	+60.0'	21.8°	4°17.3'	+60.0'	21.8°	5°13.0'	+60.0'	21.9°	6°08.7'	+60.0'	21.9°	7°04.4'	+60.0'	22.0°	8°00.0'	+60.0'	0.0°	8
9	3°25.9'	+60.0'	21.8°	4°21.6'	+60.0'	21.8°	5°17.3'	+60.0'	21.8°	6°13.0'	+60.0'	21.9°	7°08.7'	+60.0'	21.9°	8°04.4'	+60.0'	21.9°	9°00.0'	+60.0'	62.7°	9
10	4°25.8'	+60.0'	21.7°	5°21.6'	+60.0'	21.7°	6°17.3'	+60.0'	21.8°	7°13.0'	+60.0'	21.8°	8°08.7'	+60.0'	21.9°	9°04.4'	+60.0'	21.9°	10°00.0'	+60.0'	23.0°	10
11	5°25.8'	+60.0'	21.7°	6°21.5'	+60.0'	21.7°	7°17.3'	+60.0'	21.8°	8°13.0'	+60.0'	21.8°	9°08.7'	+60.0'	21.9°	10°04.4'	+60.0'	21.9°	11°00.0'	+60.0'	22.6°	11
12	6°25.7'	+60.0'	21.6°	7°21.5'	+60.0'	21.7°	8°17.3'	+60.0'	21.7°	9°13.0'	+60.0'	21.8°	10°08.7'	+60.0'	21.9°	11°04.4'	+60.0'	21.9°	12°00.0'	+60.0'	62.4°	12
13	7°25.7'	+60.0'	21.6°	8°21.5'	+60.0'	21.6°	9°17.2'	+60.0'	21.7°	10°13.0'	+60.0'	21.8°	11°08.7'	+60.0'	21.8°	12°04.4'	+60.0'	21.9°	13°00.0'	+60.0'	62.3°	13
14	8°25.7'	+60.0'	21.6°	9°21.4'	+60.0'	21.6°	10°17.2'	+60.0'	21.7°	11°13.0'	+60.0'	21.7°	12°08.7'	+60.0'	21.8°	13°04.4'	+60.0'	21.9°	14°00.0'	+60.0'	0.0°	14
15	9°25.6'	+60.0'	21.5°	10°21.4'	+60.0'	21.6°	11°17.2'	+60.0'	21.7°	12°12.9'	+60.0'	21.7°	13°08.7'	+60.0'	21.8°	14°04.3'	+60.0'	21.9°	15°00.0'	+60.0'	20.3°	15
16	10°25.6'	+60.0'	21.5°	11°21.4'	+60.0'	21.5°	12°17.2'	+60.0'	21.6°	13°12.9'	+60.0'	21.7°	14°08.7'	+60.0'	21.8°	15°04.3'	+60.0'	21.9°	16°00.0'	+60.0'	19.5°	16
17	11°25.5'	+60.0'	21.4°	12°21.3'	+60.0'	21.5°	13°17.1'	+60.0'	21.6°	14°12.9'	+60.0'	21.7°	15°08.7'	+60.0'	21.8°	16°04.3'	+60.0'	21.9°	17°00.0'	+60.0'	18.6°	17
18	12°25.5'	+60.0'	21.4°	13°21.3'	+60.0'	21.5°	14°17.1'	+60.0'	21.6°	15°12.9'	+60.0'	21.7°	16°08.6'	+60.0'	21.8°	17°04.3'	+60.0'	21.9°	18°00.0'	+60.0'	17.7°	18
19	13°25.4'	+60.0'	21.4°	14°21.3'	+60.0'	21.4°	15°17.1'	+60.0'	21.5°	16°12.9'	+60.0'	21.6°	17°08.6'	+60.0'	21.8°	18°04.3'	+60.0'	21.9°	19°00.0'	+60.0'	16.6°	19
20	14°25.4'	+60.0'	21.3°	15°21.2'	+60.0'	21.4°	16°17.1'	+60.0'	21.5°	17°12.9'	+60.0'	21.6°	18°08.6'	+60.0'	21.7°	19°04.3'	+60.0'	21.9°	20°00.0'	+60.0'	15.3°	20
21	15°25.3'	+60.0'	21.3°	16°21.2'	+60.0'	21.4°	17°17.1'	+60.0'	21.5°	18°12.9'	+60.0'	21.6°	19°08.6'	+60.0'	21.7°	20°04.3'	+60.0'	21.9°	21°00.0'	+60.0'	13.9°	21
22	16°25.3'	+59.9'	21.2°	17°21.2'	+60.0'	21.3°	18°17.0'	+60.0'	21.5°	19°12.9'	+60.0'	21.6°	20°08.6'	+60.0'	21.7°	21°04.3'	+60.0'	21.9°	22°00.0'	+60.0'	12.2°	22
23	17°25.2'	+59.9'	21.2°	18°21.1'	+60.0'	21.3°	19°17.0'	+60.0'	21.4°	20°12.8'	+60.0'	21.6°	21°08.6'	+60.0'	21.7°	22°04.3'	+60.0'	21.8°	23°00.0'	+60.0'	90.0°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

158° 202° LHA

Latitude SAME as DECLINATION

158° 202° 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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	5°36.0'	-60.0'	158.9°	4°40.0'	-60.0'	158.9°	3°44.0'	-60.0'	159.0°	2°48.0'	-60.0'	159.0°	1°52.0'	-60.0'	159.0°	<u>0°56.0'</u>	-60.0'	<u>159.0°</u>	<u>0°00.0'</u>	-60.0'	<u>159.0°</u>	0
1	4°36.0'	-60.0'	158.9°	3°40.1'	-60.0'	159.0°	2°44.1'	-60.0'	159.0°	1°48.0'	-60.0'	159.0°	<u>0°52.0'</u>	-60.0'	<u>159.0°</u>	0°04.0'	+60.0'	21.0°	0°60.0'	+60.0'	25.0°	1
2	3°36.0'	-60.0'	159.0°	2°40.1'	-60.0'	159.0°	1°44.1'	-60.0'	159.0°	<u>0°48.1'</u>	-60.0'	<u>159.0°</u>	0°08.0'	+60.0'	21.0°	1°04.0'	+60.0'	21.0°	2°00.0'	+60.0'	24.9°	2
3	2°36.1'	-60.0'	159.0°	1°40.1'	-60.0'	159.0°	<u>0°44.1'</u>	-60.0'	<u>159.0°</u>	0°11.9'	+60.0'	21.0°	1°08.0'	+60.0'	21.0°	2°04.0'	+60.0'	21.0°	3°00.0'	+60.0'	37.4°	3
4	1°36.2'	-60.0'	159.0°	<u>0°40.1'</u>	-60.0'	<u>159.1°</u>	0°15.9'	+60.0'	20.9°	1°11.9'	+60.0'	21.0°	2°08.0'	+60.0'	21.0°	3°04.0'	+60.0'	21.0°	4°00.0'	+60.0'	24.7°	4
5	<u>0°36.2'</u>	-60.0'	<u>159.1°</u>	0°19.8'	+60.0'	20.9°	1°15.9'	+60.0'	20.9°	2°11.9'	+60.0'	20.9°	3°07.9'	+60.0'	20.9°	4°04.0'	+60.0'	21.0°	5°00.0'	+60.0'	24.5°	5
6	0°23.7'	+60.0'	20.9°	1°19.8'	+60.0'	20.9°	2°15.9'	+60.0'	20.9°	3°11.9'	+60.0'	20.9°	4°07.9'	+60.0'	20.9°	5°04.0'	+60.0'	21.0°	6°00.0'	+60.0'	24.3°	6
7	1°23.7'	+60.0'	20.8°	2°19.8'	+60.0'	20.9°	3°15.8'	+60.0'	20.9°	4°11.9'	+60.0'	20.9°	5°07.9'	+60.0'	20.9°	6°04.0'	+60.0'	21.0°	7°00.0'	+60.0'	0.0°	7
8	2°23.7'	+60.0'	20.8°	3°19.7'	+60.0'	20.8°	4°15.8'	+60.0'	20.8°	5°11.9'	+60.0'	20.9°	6°07.9'	+60.0'	20.9°	7°04.0'	+60.0'	21.0°	8°00.0'	+60.0'	0.0°	8
9	3°23.6'	+60.0'	20.8°	4°19.7'	+60.0'	20.8°	5°15.8'	+60.0'	20.8°	6°11.9'	+60.0'	20.9°	7°07.9'	+60.0'	20.9°	8°04.0'	+60.0'	20.9°	9°00.0'	+60.0'	62.7°	9
10	4°23.6'	+60.0'	20.7°	5°19.7'	+60.0'	20.8°	6°15.8'	+60.0'	20.8°	7°11.9'	+60.0'	20.8°	8°07.9'	+60.0'	20.9°	9°04.0'	+60.0'	20.9°	10°00.0'	+60.0'	23.0°	10
11	5°23.5'	+60.0'	20.7°	6°19.6'	+60.0'	20.7°	7°15.8'	+60.0'	20.8°	8°11.8'	+60.0'	20.8°	9°07.9'	+60.0'	20.9°	10°04.0'	+60.0'	20.9°	11°00.0'	+60.0'	22.6°	11
12	6°23.5'	+60.0'	20.7°	7°19.6'	+60.0'	20.7°	8°15.7'	+60.0'	20.7°	9°11.8'	+60.0'	20.8°	10°07.9'	+60.0'	20.9°	11°04.0'	+60.0'	20.9°	12°00.0'	+60.0'	62.4°	12
13	7°23.4'	+60.0'	20.6°	8°19.6'	+60.0'	20.7°	9°15.7'	+60.0'	20.7°	10°11.8'	+60.0'	20.8°	11°07.9'	+60.0'	20.8°	12°04.0'	+60.0'	20.9°	13°00.0'	+60.0'	62.3°	13
14	8°23.4'	+60.0'	20.6°	9°19.6'	+60.0'	20.6°	10°15.7'	+60.0'	20.7°	11°11.8'	+60.0'	20.8°	12°07.9'	+60.0'	20.8°	13°04.0'	+60.0'	20.9°	14°00.0'	+60.0'	0.0°	14
15	9°23.4'	+60.0'	20.5°	10°19.5'	+60.0'	20.6°	11°15.7'	+60.0'	20.7°	12°11.8'	+60.0'	20.7°	13°07.9'	+60.0'	20.8°	14°04.0'	+60.0'	20.9°	15°00.0'	+60.0'	20.3°	15
16	10°23.3'	+60.0'	20.5°	11°19.5'	+60.0'	20.6°	12°15.7'	+60.0'	20.6°	13°11.8'	+60.0'	20.7°	14°07.9'	+60.0'	20.8°	15°04.0'	+60.0'	20.9°	16°00.0'	+60.0'	19.5°	16
17	11°23.3'	+60.0'	20.5°	12°19.5'	+60.0'	20.5°	13°15.6'	+60.0'	20.6°	14°11.8'	+60.0'	20.7°	15°07.9'	+60.0'	20.8°	16°04.0'	+60.0'	20.9°	17°00.0'	+60.0'	18.6°	17
18	12°23.2'	+60.0'	20.4°	13°19.4'	+60.0'	20.5°	14°15.6'	+60.0'	20.6°	15°11.8'	+60.0'	20.7°	16°07.9'	+60.0'	20.8°	17°04.0'	+60.0'	20.9°	18°00.0'	+60.0'	17.7°	18
19	13°23.2'	+60.0'	20.4°	14°19.4'	+60.0'	20.5°	15°15.6'	+60.0'	20.6°	16°11.8'	+60.0'	20.7°	17°07.9'	+60.0'	20.8°	18°04.0'	+60.0'	20.9°	19°00.0'	+60.0'	16.6°	19
20	14°23.1'	+60.0'	20.3°	15°19.4'	+60.0'	20.4°	16°15.6'	+60.0'	20.5°	17°11.7'	+60.0'	20.6°	18°07.9'	+60.0'	20.8°	19°04.0'	+60.0'	20.9°	20°00.0'	+60.0'	15.3°	20
21	15°23.1'	+60.0'	20.3°	16°19.3'	+60.0'	20.4°	17°15.6'	+60.0'	20.5°	18°11.7'	+60.0'	20.6°	19°07.9'	+60.0'	20.7°	20°04.0'	+60.0'	20.9°	21°00.0'	+60.0'	13.9°	21
22	16°23.0'	+60.0'	20.3°	17°19.3'	+60.0'	20.4°	18°15.5'	+60														

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

20° 340° LHA

Latitude CONTRARY to Declination

20° 340° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	5°38.2'	-60.0'	159.9°	4°41.9'	-60.0'	159.9°	3°45.5'	-60.0'	160.0°	2°49.1'	-60.0'	160.0°	1°52.8'	-60.0'	160.0°	<u>0°56.4' -60.0' 160.0°</u>	<u>0°00.0' -60.0' 160.0°</u>				0	
1	4°38.2'	-60.0'	159.9°	3°41.9'	-60.0'	160.0°	2°45.5'	-60.0'	160.0°	1°49.1'	-60.0'	160.0°		<u>0°52.8' -60.0' 160.0°</u>	0°03.6'	+60.0'	20.0°	0°60.0'	+60.0'	15.6°	1	
2	3°38.2'	-60.0'	160.0°	2°41.9'	-60.0'	160.0°	1°45.5'	-60.0'	160.0°	<u>0°49.2' -60.0' 160.0°</u>			0°07.2'	+60.0'	20.0°	1°03.6'	+60.0'	20.0°	2°00.0'	+60.0'	24.9°	2
3	2°38.3'	-60.0'	160.0°	1°41.9'	-60.0'	160.0°	<u>0°45.6' -60.0' 160.0°</u>			0°10.8'	+60.0'	20.0°	1°07.2'	+60.0'	20.0°	2°03.6'	+60.0'	20.0°	3°00.0'	+60.0'	37.4°	3
4	1°38.4'	-60.0'	160.0°	<u>0°42.0' -60.0' 160.0°</u>			0°14.4'	+60.0'	19.9°	1°10.8'	+60.0'	20.0°	2°07.2'	+60.0'	20.0°	3°03.6'	+60.0'	20.0°	4°00.0'	+60.0'	24.7°	4
5	<u>0°38.4' -60.0' 160.1°</u>			0°18.0'	+60.0'	19.9°	1°14.4'	+60.0'	19.9°	2°10.8'	+60.0'	19.9°	3°07.2'	+60.0'	20.0°	4°03.6'	+60.0'	20.0°	5°00.0'	+60.0'	24.5°	5
6	0°21.6'	+60.0'	19.9°	1°18.0'	+60.0'	19.9°	2°14.4'	+60.0'	19.9°	3°10.8'	+60.0'	19.9°	4°07.2'	+60.0'	19.9°	5°03.6'	+60.0'	20.0°	6°00.0'	+60.0'	24.3°	6
7	1°21.5'	+60.0'	19.9°	2°17.9'	+60.0'	19.9°	3°14.4'	+60.0'	19.9°	4°10.8'	+60.0'	19.9°	5°07.2'	+60.0'	19.9°	6°03.6'	+60.0'	20.0°	7°00.0'	+60.0'	0.0°	7
8	2°21.5'	+60.0'	19.8°	3°17.9'	+60.0'	19.8°	4°14.4'	+60.0'	19.9°	5°10.8'	+60.0'	19.9°	6°07.2'	+60.0'	19.9°	7°03.6'	+60.0'	20.0°	8°00.0'	+60.0'	0.0°	8
9	3°21.4'	+60.0'	19.8°	4°17.9'	+60.0'	19.8°	5°14.3'	+60.0'	19.8°	6°10.8'	+60.0'	19.9°	7°07.2'	+60.0'	19.9°	8°03.6'	+60.0'	19.9°	9°00.0'	+60.0'	62.7°	9
10	4°21.4'	+60.0'	19.7°	5°17.9'	+60.0'	19.8°	6°14.3'	+60.0'	19.8°	7°10.8'	+60.0'	19.8°	8°07.2'	+60.0'	19.9°	9°03.6'	+60.0'	19.9°	10°00.0'	+60.0'	23.0°	10
11	5°21.4'	+60.0'	19.7°	6°17.8'	+60.0'	19.7°	7°14.3'	+60.0'	19.8°	8°10.8'	+60.0'	19.8°	9°07.2'	+60.0'	19.9°	10°03.6'	+60.0'	19.9°	11°00.0'	+60.0'	22.6°	11
12	6°21.3'	+60.0'	19.7°	7°17.8'	+60.0'	19.7°	8°14.3'	+60.0'	19.8°	9°10.7'	+60.0'	19.8°	10°07.2'	+60.0'	19.9°	11°03.6'	+60.0'	19.9°	12°00.0'	+60.0'	62.4°	12
13	7°21.3'	+60.0'	19.6°	8°17.8'	+60.0'	19.7°	9°14.3'	+60.0'	19.7°	10°10.7'	+60.0'	19.8°	11°07.2'	+60.0'	19.9°	12°03.6'	+60.0'	19.9°	13°00.0'	+60.0'	62.3°	13
14	8°21.2'	+60.0'	19.6°	9°17.8'	+60.0'	19.7°	10°14.3'	+60.0'	19.7°	11°10.7'	+60.0'	19.8°	12°07.2'	+60.0'	19.8°	13°03.6'	+60.0'	19.9°	14°00.0'	+60.0'	0.0°	14
15	9°21.2'	+60.0'	19.6°	10°17.7'	+60.0'	19.6°	11°14.2'	+60.0'	19.7°	12°10.7'	+60.0'	19.8°	13°07.2'	+60.0'	19.8°	14°03.6'	+60.0'	19.9°	15°00.0'	+60.0'	20.3°	15
16	10°21.2'	+60.0'	19.5°	11°17.7'	+60.0'	19.6°	12°14.2'	+60.0'	19.7°	13°10.7'	+60.0'	19.7°	14°07.2'	+60.0'	19.8°	15°03.6'	+60.0'	19.9°	16°00.0'	+60.0'	19.5°	16
17	11°21.1'	+60.0'	19.5°	12°17.7'	+60.0'	19.6°	13°14.2'	+60.0'	19.6°	14°10.7'	+60.0'	19.7°	15°07.2'	+60.0'	19.8°	16°03.6'	+60.0'	19.9°	17°00.0'	+60.0'	18.6°	17
18	12°21.1'	+60.0'	19.5°	13°17.6'	+60.0'	19.5°	14°14.2'	+60.0'	19.6°	15°10.7'	+60.0'	19.7°	16°07.2'	+60.0'	19.8°	17°03.6'	+60.0'	19.9°	18°00.0'	+60.0'	17.7°	18
19	13°21.0'	+60.0'	19.4°	14°17.6'	+60.0'	19.5°	15°14.2'	+60.0'	19.6°	16°10.7'	+60.0'	19.7°	17°07.2'	+60.0'	19.8°	18°03.6'	+60.0'	19.9°	19°00.0'	+60.0'	16.6°	19
20	14°21.0'	+60.0'	19.4°	15°17.6'	+60.0'	19.5°	16°14.1'	+60.0'	19.6°	17°10.7'	+60.0'	19.7°	18°07.2'	+60.0'	19.8°	19°03.6'	+60.0'	19.9°	20°00.0'	+60.0'	15.3°	20
21	15°21.0'	+60.0'	19.3°	16°17.6'	+60.0'	19.4°	17°14.1'	+60.0'	19.5°	18°10.7'	+60.0'	19.6°	19°07.1'	+60.0'	19.8°	20°03.6'	+60.0'	19.9°	21°00.0'	+60.0'	13.9°	21
22	16°20.9'	+60.0'	19.3°	17°17.5'	+60.0'	19.4°	18°14.1'	+60.0'	19.5°	19°10.6'	+60.0'	19.6°	20°07.1'	+60.0'	19.7°	21°03.6'	+60.0'	19.9°	22°00.0'	+60.0'	12.2°	22
23	17°20.9'	+60.0'	19.3°	18°17.5'	+60.0'	19.4°	19°14.1'	+60.0'	19.5°	20°10.6'	+60.0'	19.6°	21°07.1'	+60.0'	19.7°	22°03.6'	+60.0'	19.9°	23°00.0'	+60.0'	90.0°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	84			85			86			87			88			89			90			

160° 200° LHA

Latitude SAME as DECLINATION

160° 200° 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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	5°40.3'	-60.0'	160.9°	4°43.6'	-60.0'	160.9°	3°46.9'	-60.0'	161.0°	2°50.2'	-60.0'	161.0°	1°53.5'	-60.0'	161.0°	<u>0°56.7' -60.0' 161.0°</u>	<u>0°00.0' -60.0' 161.0°</u>				0	
1	4°40.3'	-60.0'	160.9°	3°43.6'	-60.0'	161.0°	2°46.9'	-60.0'	161.0°	1°50.2'	-60.0'	161.0°		<u>0°53.5' -60.0' 161.0°</u>	0°03.3'	+60.0'	19.0°	0°60.0'	+60.0'	15.6°	1	
2	3°40.3'	-60.0'	161.0°	2°43.7'	-60.0'	161.0°	1°46.9'	-60.0'	161.0°	<u>0°50.2' -60.0' 161.0°</u>			0°06.5'	+60.0'	19.0°	1°03.3'	+60.0'	19.0°	2°00.0'	+60.0'	24.9°	2
3	2°40.4'	-60.0'	161.0°	1°43.7'	-60.0'	161.0°	<u>0°47.0' -60.0' 161.0°</u>			0°09.8'	+60.0'	19.0°	1°06.5'	+60.0'	19.0°	2°03.3'	+60.0'	19.0°	3°00.0'	+60.0'	37.4°	3
4	1°40.5'	-60.0'	161.0°	<u>0°43.7' -60.0' 161.0°</u>			0°13.0'	+60.0'	19.0°	1°09.8'	+60.0'	19.0°	2°06.5'	+60.0'	19.0°	3°03.3'	+60.0'	19.0°	4°00.0'	+60.0'	24.7°	4
5	<u>0°40.5' -60.0' 161.1°</u>			0°16.3'	+60.0'	18.9°	1°13.0'	+60.0'	18.9°	2°09.8'	+60.0'	18.9°	3°06.5'	+60.0'	19.0°	4°03.3'	+60.0'	19.0°	5°00.0'	+60.0'	24.5°	5
6	0°19.5'	+60.0'	18.9°	1°16.2'	+60.0'	18.9°	2°13.0'	+60.0'	18.9°	3°09.8'	+60.0'	18.9°	4°06.5'	+60.0'	18.9°	5°03.3'	+60.0'	19.0°	6°00.0'	+60.0'	24.3°	6
7	1°19.4'	+60.0'	18.9°	2°16.2'	+60.0'	18.9°	3°13.0'	+60.0'	18.9°	4°09.8'	+60.0'	18.9°	5°06.5'	+60.0'	18.9°	6°03.3'	+60.0'	19.0°	7°00.0'	+60.0'	0.0°	7
8	2°19.4'	+60.0'	18.8°	3°16.2'	+60.0'	18.8°	4°13.0'	+60.0'	18.9°	5°09.7'	+60.0'	18.9°	6°06.5'	+60.0'	18.9°	7°03.3'	+60.0'	19.0°	8°00.0'	+60.0'	0.0°	8
9	3°19.4'	+60.0'	18.8°	4°16.2'	+60.0'	18.8°	5°13.0'	+60.0'	18.8°	6°09.7'	+60.0'	18.9°	7°06.5'	+60.0'	18.9°	8°03.3'	+60.0'	19.0°	9°00.0'	+60.0'	62.7°	9
10	4°19.3'	+60.0'	18.8°	5°16.1'	+60.0'	18.8°	6°12.9'	+60.0'	18.8°	7°09.7'	+60.0'	18.9°	8°06.5'	+60.0'	18.9°	9°03.3'	+60.0'	18.9°	10°00.0'	+60.0'	23.0°	10
11	5°19.3'	+60.0'	18.7°	6°16.1'	+60.0'	18.8°	7°12.9'	+60.0'	18.8°	8°09.7'	+60.0'	18.8°	9°06.5'	+60.0'	18.9°	10°03.3'	+60.0'	18.9°	11°00.0'	+60.0'	22.6°	11
12	6°19.3'	+60.0'	18.7°	7°16.1'	+60.0'	18.7°	8°12.9'	+60.0'	18.8°	9°09.7'	+60.0'	18.8°	10°06.5'	+60.0'	18.9°	11°03.3'	+60.0'	18.9°	12°00.0'	+60.0'	62.4°	12
13	7°19.2'	+60.0'	18.7°	8°16.1'	+60.0'	18.7°	9°12.9'	+60.0'	18.7°	10°09.7'	+60.0'	18.8°	11°06.5'	+60.0'	18.9°	12°03.3'	+60.0'	18.9°	13°00.0'	+60.0'	62.3°	13
14	8°19.2'	+60.0'	18.6°	9°16.0'	+60.0'	18.7°	10°12.9'	+60.0'	18.7°	11°09.7'	+60.0'	18.8°	12°06.5'	+60.0'	18.8°	13°03.3'	+60.0'	18.9°	14°00.0'	+60.0'	0.0°	14
15	9°19.2'	+60.0'	18.6°	10°16.0'	+60.0'	18.6°	11°12.9'	+60.0'	18.7°	12°09.7'	+60.0'	18.8°	13°06.5'	+60.0'	18.8°	14°03.3'	+60.0'	18.9°	15°00.0'	+60.0'	20.3°	15
16	10°19.1'	+60.0'	18.5°	11°16.0'	+60.0'	18.6°	12°12.8'	+60.0'	18.7°	13°09.7'	+60.0'	18.7°	14°06.5'	+60.0'	18.8°	15°03.3'	+60.0'	18.9°	16°00.0'	+60.0'	19.5°	16
17	11°19.1'	+60.0'	18.5°	12°16.0'	+60.0'	18.6°	13°12.8'	+60.0'	18.7°	14°09.7'	+60.0'	18.7°	15°06.5'	+60.0'	18.8°	16°03.3'	+60.0'	18.9°	17°00.0'	+60.0'	18.6°	17
18	12°19.0'	+60.0'	18.5°	13°15.9'	+60.0'	18.5°	14°12.8'	+60.0'	18.6°	15°09.7'	+60.0'	18.7°	16°06.5'	+60.0'	18.8°	17°03.3'	+60.0'	18.9°	18°00.0'	+60.0'	17.7°	18
19	13°19.0'	+60.0'	18.4°	14°15.9'	+60.0'	18.5°	15°12.8'	+60.0'	18.6°	16°09.6'	+60.0'	18.7°	17°06.5'	+60.0'	18.8°	18°03.3'	+60.0'	18.9°	19°00.0'	+60.0'	16.6°	19
20	14°19.0'	+60.0'	18.4°	15°15.9'	+60.0'	18.5°	16°12.8'	+60.0'	18.6°	17°09.6'	+60.0'	18.7°	18°06.5'	+60.0'	18.8°	19°03.2'	+60.0'	18.9°	20°00.0'	+60.0'	15.3°	20
21	15°18.9'	+60.0'	18.4°	16°15.9'	+60.0'	18.5°	17°12.8'	+60.0'	18.6°	18°09.6'	+60.0'	18.7°	19°06.5'	+60.0'	18.8°	20°03.2'	+60.0'	18.9°	21°00.0'	+60.0'	13.9°	21
22	16°18.9'	+60.0'	18.3°	17°15.8'	+60.0'	18.4°	18°12.7'	+60.0'	18.5°	19°09.6'	+60.0'	18.6°</										

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

18° 342° LHA

Latitude CONTRARY to Declination

18° 342° LHA

Dec°	84			85			86			87			88			89			90			Dec°	
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°		
0	5°42.3'	-60.0'	161.9°	4°45.3'	-60.0'	161.9°	3°48.2'	-60.0'	162.0°	2°51.2'	-60.0'	162.0°	1°54.1'	-60.0'	162.0°	<u>0°57.1' -60.0' 162.0°</u>	<u>0°00.0' -60.0' 162.0°</u>				0		
1	4°42.3'	-60.0'	161.9°	3°45.3'	-60.0'	162.0°	2°48.2'	-60.0'	162.0°	1°51.2'	-60.0'	162.0°	<u>0°54.1' -60.0' 162.0°</u>	0°02.9'	+60.0'	18.0°	0°60.0'	+60.0'	15.6°			1	
2	3°42.3'	-60.0'	162.0°	2°45.3'	-60.0'	162.0°	1°48.3'	-60.0'	162.0°	<u>0°51.2' -60.0' 162.0°</u>	0°05.9'	+60.0'	18.0°	1°02.9'	+60.0'	18.0°	2°00.0'	+60.0'	24.9°			2	
3	2°42.4'	-60.0'	162.0°	1°45.3'	-60.0'	162.0°	<u>0°48.3' -60.0' 162.0°</u>	0°08.8'	+60.0'	18.0°	1°05.9'	+60.0'	18.0°	2°02.9'	+60.0'	18.0°	3°00.0'	+60.0'	37.4°			3	
4	1°42.4'	-60.0'	162.0°	<u>0°45.4' -60.0' 162.0°</u>	0°11.7'	+60.0'	18.0°	1°08.8'	+60.0'	18.0°	2°05.9'	+60.0'	18.0°	3°02.9'	+60.0'	18.0°	4°00.0'	+60.0'	24.7°			4	
5	<u>0°42.5' -60.0' 162.1°</u>	0°14.6'	+60.0'	17.9°	1°11.7'	+60.0'	17.9°	2°08.8'	+60.0'	17.9°	3°05.9'	+60.0'	18.0°	4°02.9'	+60.0'	18.0°	5°00.0'	+60.0'	24.5°			5	
6	0°17.5'	+60.0'	17.9°	1°14.6'	+60.0'	17.9°	2°11.7'	+60.0'	17.9°	3°08.8'	+60.0'	17.9°	4°05.9'	+60.0'	17.9°	5°02.9'	+60.0'	18.0°	6°00.0'	+60.0'	24.3°		6
7	1°17.5'	+60.0'	17.9°	2°14.6'	+60.0'	17.9°	3°11.7'	+60.0'	17.9°	4°08.8'	+60.0'	17.9°	5°05.9'	+60.0'	17.9°	6°02.9'	+60.0'	18.0°	7°00.0'	+60.0'	0.0°		7
8	2°17.4'	+60.0'	17.8°	3°14.5'	+60.0'	17.8°	4°11.7'	+60.0'	17.9°	5°08.8'	+60.0'	17.9°	6°05.8'	+60.0'	17.9°	7°02.9'	+60.0'	18.0°	8°00.0'	+60.0'	0.0°		8
9	3°17.4'	+60.0'	17.8°	4°14.5'	+60.0'	17.8°	5°11.6'	+60.0'	17.8°	6°08.7'	+60.0'	17.9°	7°05.8'	+60.0'	17.9°	8°02.9'	+60.0'	18.0°	9°00.0'	+60.0'	62.7°		9
10	4°17.4'	+60.0'	17.8°	5°14.5'	+60.0'	17.8°	6°11.6'	+60.0'	17.8°	7°08.7'	+60.0'	17.9°	8°05.8'	+60.0'	17.9°	9°02.9'	+60.0'	17.9°	10°00.0'	+60.0'	23.0°		10
11	5°17.3'	+60.0'	17.7°	6°14.5'	+60.0'	17.8°	7°11.6'	+60.0'	17.8°	8°08.7'	+60.0'	17.8°	9°05.8'	+60.0'	17.9°	10°02.9'	+60.0'	17.9°	11°00.0'	+60.0'	22.6°		11
12	6°17.3'	+60.0'	17.7°	7°14.5'	+60.0'	17.7°	8°11.6'	+60.0'	17.8°	9°08.7'	+60.0'	17.8°	10°05.8'	+60.0'	17.9°	11°02.9'	+60.0'	17.9°	12°00.0'	+60.0'	62.4°		12
13	7°17.3'	+60.0'	17.7°	8°14.4'	+60.0'	17.7°	9°11.6'	+60.0'	17.8°	10°08.7'	+60.0'	17.8°	11°05.8'	+60.0'	17.9°	12°02.9'	+60.0'	17.9°	13°00.0'	+60.0'	62.3°		13
14	8°17.2'	+60.0'	17.6°	9°14.4'	+60.0'	17.7°	10°11.6'	+60.0'	17.7°	11°08.7'	+60.0'	17.8°	12°05.8'	+60.0'	17.9°	13°02.9'	+60.0'	17.9°	14°00.0'	+60.0'	0.0°		14
15	9°17.2'	+60.0'	17.6°	10°14.4'	+60.0'	17.7°	11°11.6'	+60.0'	17.7°	12°08.7'	+60.0'	17.8°	13°05.8'	+60.0'	17.8°	14°02.9'	+60.0'	17.9°	15°00.0'	+60.0'	20.3°		15
16	10°17.2'	+60.0'	17.6°	11°14.4'	+60.0'	17.6°	12°11.5'	+60.0'	17.7°	13°08.7'	+60.0'	17.8°	14°05.8'	+60.0'	17.8°	15°02.9'	+60.0'	17.9°	16°00.0'	+60.0'	19.5°		16
17	11°17.1'	+60.0'	17.5°	12°14.3'	+60.0'	17.6°	13°11.5'	+60.0'	17.7°	14°08.7'	+60.0'	17.7°	15°05.8'	+60.0'	17.8°	16°02.9'	+60.0'	17.9°	17°00.0'	+60.0'	18.6°		17
18	12°17.1'	+60.0'	17.5°	13°14.3'	+60.0'	17.6°	14°11.5'	+60.0'	17.6°	15°08.7'	+60.0'	17.7°	16°05.8'	+60.0'	17.8°	17°02.9'	+60.0'	17.9°	18°00.0'	+60.0'	17.7°		18
19	13°17.1'	+60.0'	17.5°	14°14.3'	+60.0'	17.5°	15°11.5'	+60.0'	17.6°	16°08.7'	+60.0'	17.7°	17°05.8'	+60.0'	17.8°	18°02.9'	+60.0'	17.9°	19°00.0'	+60.0'	16.6°		19
20	14°17.0'	+60.0'	17.4°	15°14.3'	+60.0'	17.5°	16°11.5'	+60.0'	17.6°	17°08.7'	+60.0'	17.7°	18°05.8'	+60.0'	17.8°	19°02.9'	+60.0'	17.9°	20°00.0'	+60.0'	15.3°		20
21	15°17.0'	+60.0'	17.4°	16°14.3'	+60.0'	17.5°	17°11.5'	+60.0'	17.6°	18°08.6'	+60.0'	17.7°	19°05.8'	+60.0'	17.8°	20°02.9'	+60.0'	17.9°	21°00.0'	+60.0'	13.9°		21
22	16°17.0'	+60.0'	17.4°	17°14.2'	+60.0'	17.5°	18°11.4'	+60.0'	17.6°	19°08.6'	+60.0'	17.7°	20°05.8'	+60.0'	17.8°	21°02.9'	+60.0'	17.9°	22°00.0'	+60.0'	12.2°		22
23	17°16.9'	+60.0'	17.3°	18°14.2'	+60.0'	17.4°	19°11.4'	+60.0'	17.5°	20°08.6'	+60.0'	17.6°	21°05.8'	+60.0'	17.8°	22°02.9'	+60.0'	17.9°	23°00.0'	+60.0'	90.0°		23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°	
	84			85			86			87			88			89			90				

162° 198° LHA

Latitude SAME as DECLINATION

162° 198° 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°	84			85			86			87			88			89			90			Dec°	
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°		
0	5°44.2'	-60.0'	162.9°	4°46.9'	-60.0'	162.9°	3°49.5'	-60.0'	163.0°	2°52.1'	-60.0'	163.0°	1°54.8'	-60.0'	163.0°	<u>0°57.4' -60.0' 163.0°</u>	<u>0°00.0' -60.0' 163.0°</u>				0		
1	4°44.2'	-60.0'	162.9°	3°46.9'	-60.0'	163.0°	2°49.5'	-60.0'	163.0°	1°52.1'	-60.0'	163.0°	<u>0°54.8' -60.0' 163.0°</u>	0°02.6'	+60.0'	17.0°	0°60.0'	+60.0'	15.6°			1	
2	3°44.2'	-60.0'	163.0°	2°46.9'	-60.0'	163.0°	1°49.5'	-60.0'	163.0°	<u>0°52.1' -60.0' 163.0°</u>	0°05.2'	+60.0'	17.0°	1°02.6'	+60.0'	17.0°	2°00.0'	+60.0'	24.9°			2	
3	2°44.3'	-60.0'	163.0°	1°46.9'	-60.0'	163.0°	<u>0°49.5' -60.0' 163.0°</u>	0°07.9'	+60.0'	17.0°	1°05.2'	+60.0'	17.0°	2°02.6'	+60.0'	17.0°	3°00.0'	+60.0'	37.4°			3	
4	1°44.3'	-60.0'	163.0°	<u>0°46.9' -60.0' 163.0°</u>	0°10.5'	+60.0'	17.0°	1°07.8'	+60.0'	17.0°	2°05.2'	+60.0'	17.0°	3°02.6'	+60.0'	17.0°	4°00.0'	+60.0'	24.7°			4	
5	<u>0°44.4' -60.0' 163.1°</u>	0°13.0'	+60.0'	16.9°	1°10.4'	+60.0'	16.9°	2°07.8'	+60.0'	16.9°	3°05.2'	+60.0'	17.0°	4°02.6'	+60.0'	17.0°	5°00.0'	+60.0'	24.5°			5	
6	0°15.6'	+60.0'	16.9°	1°13.0'	+60.0'	16.9°	2°10.4'	+60.0'	16.9°	3°07.8'	+60.0'	16.9°	4°05.2'	+60.0'	16.9°	5°02.6'	+60.0'	17.0°	6°00.0'	+60.0'	24.3°		6
7	1°15.6'	+60.0'	16.9°	2°13.0'	+60.0'	16.9°	3°10.4'	+60.0'	16.9°	4°07.8'	+60.0'	16.9°	5°05.2'	+60.0'	16.9°	6°02.6'	+60.0'	17.0°	7°00.0'	+60.0'	0.0°		7
8	2°15.6'	+60.0'	16.8°	3°13.0'	+60.0'	16.9°	4°10.4'	+60.0'	16.9°	5°07.8'	+60.0'	16.9°	6°05.2'	+60.0'	16.9°	7°02.6'	+60.0'	17.0°	8°00.0'	+60.0'	0.0°		8
9	3°15.5'	+60.0'	16.8°	4°13.0'	+60.0'	16.8°	5°10.4'	+60.0'	16.9°	6°07.8'	+60.0'	16.9°	7°05.2'	+60.0'	16.9°	8°02.6'	+60.0'	17.0°	9°00.0'	+60.0'	62.7°		9
10	4°15.5'	+60.0'	16.8°	5°12.9'	+60.0'	16.8°	6°10.4'	+60.0'	16.8°	7°07.8'	+60.0'	16.9°	8°05.2'	+60.0'	16.9°	9°02.6'	+60.0'	17.0°	10°00.0'	+60.0'	23.0°		10
11	5°15.5'	+60.0'	16.8°	6°12.9'	+60.0'	16.8°	7°10.4'	+60.0'	16.8°	8°07.8'	+60.0'	16.9°	9°05.2'	+60.0'	16.9°	10°02.6'	+60.0'	16.9°	11°00.0'	+60.0'	22.6°		11
12	6°15.4'	+60.0'	16.7°	7°12.9'	+60.0'	16.8°	8°10.4'	+60.0'	16.8°	9°07.8'	+60.0'	16.8°	10°05.2'	+60.0'	16.9°	11°02.6'	+60.0'	16.9°	12°00.0'	+60.0'	62.4°		12
13	7°15.4'	+60.0'	16.7°	8°12.9'	+60.0'	16.7°	9°10.3'	+60.0'	16.8°	10°07.8'	+60.0'	16.8°	11°05.2'	+60.0'	16.9°	12°02.6'	+60.0'	16.9°	13°00.0'	+60.0'	62.3°		13
14	8°15.4'	+60.0'	16.7°	9°12.9'	+60.0'	16.7°	10°10.3'	+60.0'	16.8°	11°07.8'	+60.0'	16.8°	12°05.2'	+60.0'	16.9°	13°02.6'	+60.0'	16.9°	14°00.0'	+60.0'	0.0°		14
15	9°15.4'	+60.0'	16.6°	10°12.8'	+60.0'	16.7°	11°10.3'	+60.0'	16.7°	12°07.8'	+60.0'	16.8°	13°05.2'	+60.0'	16.9°	14°02.6'	+60.0'	16.9°	15°00.0'	+60.0'	20.3°		15
16	10°15.3'	+60.0'	16.6°	11°12.8'	+60.0'	16.6°	12°10.3'	+60.0'	16.7°	13°07.8'	+60.0'	16.8°	14°05.2'	+60.0'	16.8°	15°02.6'	+60.0'	16.9°	16°00.0'	+60.0'	19.5°		16
17	11°15.3'	+60.0'	16.6°	12°12.8'	+60.0'	16.6°	13°10.3'	+60.0'	16.7°	14°07.8'	+60.0'	16.8°	15°05.2'	+60.0'	16.8°	16°02.6'	+60.0'	16.9°	17°00.0'	+60.0'	18.6°		17
18	12°15.3'	+60.0'	16.5°	13°12.8'	+60.0'	16.6°	14°10.3'	+60.0'	16.7°	15°07.7'	+60.0'	16.7°	16°05.2'	+60.0'	16.8°	17°02.6'	+60.0'	16.9°	18°00.0'	+60.0'	17.7°		18
19	13°15.2'	+60.0'	16.5°	14°12.8'	+60.0'	16.6°	15°10.3'	+60.0'	16.6°	16°07.7'	+60.0'	16.7°	17°05.2'	+60.0'	16.8°	18°02.6'	+60.0'	16.9°	19°00.0'	+60.0'	16.6°		19
20	14°15.2'	+60.0'	16.5°	15°12.7'	+60.0'	16.5°	16°10.2'	+60.0'	16.6°	17°07.7'	+60.0'	16.7°	18°05.2'	+60.0'	16.8°	19°02.6'	+60.0'	16.9°	20°00.0'	+60.0'	15.3°		20
21	15°15.2'	+60.0'	16.4°	16°12.7'	+60.0'	16.5°	17°10.2'	+60.0'	16.6°	18°07.7'	+60.0'	16.7°	19°05.2'	+60.0'	16.8°	20°02.6'	+60.0'	16.9°	21°00.0'	+60.0'	13.9°		21</

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

16° 344° LHA

Latitude CONTRARY to Declination

16° 344° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	5°46.0'	-60.0'	163.9°	4°48.4'	-60.0'	163.9°	3°50.7'	-60.0'	164.0°	2°53.0'	-60.0'	164.0°	1°55.3'	-60.0'	164.0°	<u>0°57.7'</u>	-60.0'	164.0°	<u>0°00.0'</u>	-60.0'	164.0°	0
1	4°46.0'	-60.0'	163.9°	3°48.4'	-60.0'	164.0°	2°50.7'	-60.0'	164.0°	1°53.0'	-60.0'	164.0°	<u>0°55.4'</u>	-60.0'	164.0°	0°02.3'	+60.0'	16.0°	0°60.0'	+60.0'	15.6°	1
2	3°46.0'	-60.0'	164.0°	2°48.4'	-60.0'	164.0°	1°50.7'	-60.0'	164.0°	<u>0°53.0'</u>	-60.0'	164.0°	0°04.6'	+60.0'	16.0°	1°02.3'	+60.0'	16.0°	2°00.0'	+60.0'	24.9°	2
3	2°46.1'	-60.0'	164.0°	1°48.4'	-60.0'	164.0°	<u>0°50.7'</u>	-60.0'	164.0°	0°07.0'	+60.0'	16.0°	1°04.6'	+60.0'	16.0°	2°02.3'	+60.0'	16.0°	3°00.0'	+60.0'	37.4°	3
4	1°46.1'	-60.0'	164.0°	<u>0°48.4'</u>	-60.0'	164.0°	0°09.3'	+60.0'	16.0°	1°07.0'	+60.0'	16.0°	2°04.6'	+60.0'	16.0°	3°02.3'	+60.0'	16.0°	4°00.0'	+60.0'	24.7°	4
5	<u>0°46.1'</u>	-60.0'	164.1°	0°11.6'	+60.0'	15.9°	1°09.3'	+60.0'	15.9°	2°06.9'	+60.0'	15.9°	3°04.6'	+60.0'	16.0°	4°02.3'	+60.0'	16.0°	5°00.0'	+60.0'	24.5°	5
6	0°13.8'	+60.0'	15.9°	1°11.5'	+60.0'	15.9°	2°09.2'	+60.0'	15.9°	3°06.9'	+60.0'	15.9°	4°04.6'	+60.0'	16.0°	5°02.3'	+60.0'	16.0°	6°00.0'	+60.0'	24.3°	6
7	1°13.8'	+60.0'	15.9°	2°11.5'	+60.0'	15.9°	3°09.2'	+60.0'	15.9°	4°06.9'	+60.0'	15.9°	5°04.6'	+60.0'	15.9°	6°02.3'	+60.0'	16.0°	7°00.0'	+60.0'	0.0°	7
8	2°13.8'	+60.0'	15.9°	3°11.5'	+60.0'	15.9°	4°09.2'	+60.0'	15.9°	5°06.9'	+60.0'	15.9°	6°04.6'	+60.0'	15.9°	7°02.3'	+60.0'	16.0°	8°00.0'	+60.0'	0.0°	8
9	3°13.8'	+60.0'	15.8°	4°11.5'	+60.0'	15.8°	5°09.2'	+60.0'	15.9°	6°06.9'	+60.0'	15.9°	7°04.6'	+60.0'	15.9°	8°02.3'	+60.0'	16.0°	9°00.0'	+60.0'	62.7°	9
10	4°13.7'	+60.0'	15.8°	5°11.5'	+60.0'	15.8°	6°09.2'	+60.0'	15.8°	7°06.9'	+60.0'	15.9°	8°04.6'	+60.0'	15.9°	9°02.3'	+60.0'	16.0°	10°00.0'	+60.0'	23.0°	10
11	5°13.7'	+60.0'	15.8°	6°11.5'	+60.0'	15.8°	7°09.2'	+60.0'	15.8°	8°06.9'	+60.0'	15.9°	9°04.6'	+60.0'	15.9°	10°02.3'	+60.0'	15.9°	11°00.0'	+60.0'	22.6°	11
12	6°13.7'	+60.0'	15.7°	7°11.4'	+60.0'	15.8°	8°09.2'	+60.0'	15.8°	9°06.9'	+60.0'	15.8°	10°04.6'	+60.0'	15.9°	11°02.3'	+60.0'	15.9°	12°00.0'	+60.0'	62.4°	12
13	7°13.7'	+60.0'	15.7°	8°11.4'	+60.0'	15.7°	9°09.2'	+60.0'	15.8°	10°06.9'	+60.0'	15.8°	11°04.6'	+60.0'	15.9°	12°02.3'	+60.0'	15.9°	13°00.0'	+60.0'	62.3°	13
14	8°13.6'	+60.0'	15.7°	9°11.4'	+60.0'	15.7°	10°09.2'	+60.0'	15.8°	11°06.9'	+60.0'	15.8°	12°04.6'	+60.0'	15.9°	13°02.3'	+60.0'	15.9°	14°00.0'	+60.0'	0.0°	14
15	9°13.6'	+60.0'	15.6°	10°11.4'	+60.0'	15.7°	11°09.1'	+60.0'	15.7°	12°06.9'	+60.0'	15.8°	13°04.6'	+60.0'	15.9°	14°02.3'	+60.0'	15.9°	15°00.0'	+60.0'	20.3°	15
16	10°13.6'	+60.0'	15.6°	11°11.4'	+60.0'	15.7°	12°09.1'	+60.0'	15.7°	13°06.9'	+60.0'	15.8°	14°04.6'	+60.0'	15.9°	15°02.3'	+60.0'	15.9°	16°00.0'	+60.0'	19.5°	16
17	11°13.6'	+60.0'	15.6°	12°11.4'	+60.0'	15.6°	13°09.1'	+60.0'	15.7°	14°06.9'	+60.0'	15.8°	15°04.6'	+60.0'	15.8°	16°02.3'	+60.0'	15.9°	17°00.0'	+60.0'	18.6°	17
18	12°13.5'	+60.0'	15.6°	13°11.3'	+60.0'	15.6°	14°09.1'	+60.0'	15.7°	15°06.9'	+60.0'	15.8°	16°04.6'	+60.0'	15.8°	17°02.3'	+60.0'	15.9°	18°00.0'	+60.0'	17.7°	18
19	13°13.5'	+60.0'	15.5°	14°11.3'	+60.0'	15.6°	15°09.1'	+60.0'	15.7°	16°06.9'	+60.0'	15.7°	17°04.6'	+60.0'	15.8°	18°02.3'	+60.0'	15.9°	19°00.0'	+60.0'	16.6°	19
20	14°13.5'	+60.0'	15.5°	15°11.3'	+60.0'	15.6°	16°09.1'	+60.0'	15.6°	17°06.9'	+60.0'	15.7°	18°04.6'	+60.0'	15.8°	19°02.3'	+60.0'	15.9°	20°00.0'	+60.0'	15.3°	20
21	15°13.5'	+60.0'	15.5°	16°11.3'	+60.0'	15.5°	17°09.1'	+60.0'	15.6°	18°06.8'	+60.0'	15.7°	19°04.6'	+60.0'	15.8°	20°02.3'	+60.0'	15.9°	21°00.0'	+60.0'	13.9°	21
22	16°13.4'	+60.0'	15.4°	17°11.2'	+60.0'	15.5°	18°09.1'	+60.0'	15.6°	19°06.8'	+60.0'	15.7°	20°04.6'	+60.0'	15.8°	21°02.3'	+60.0'	15.9°	22°00.0'	+60.0'	12.2°	22
23	17°13.4'	+60.0'	15.4°	18°11.2'	+60.0'	15.5°	19°09.0'	+60.0'	15.6°	20°06.8'	+60.0'	15.7°	21°04.6'	+60.0'	15.8°	22°02.3'	+60.0'	15.9°	23°00.0'	+60.0'	90.0°	23
Dec°	84			85			86			87			88			89			90			Dec°

164° 196° LHA

Latitude SAME as DECLINATION

164° 196° 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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	5°47.6'	-60.0'	164.9°	4°49.8'	-60.0'	164.9°	3°51.8'	-60.0'	165.0°	2°53.9'	-60.0'	165.0°	1°55.9'	-60.0'	165.0°	<u>0°58.0'</u>	-60.0'	165.0°	<u>0°00.0'</u>	-60.0'	165.0°	0
1	4°47.7'	-60.0'	164.9°	3°49.8'	-60.0'	165.0°	2°51.8'	-60.0'	165.0°	1°53.9'	-60.0'	165.0°	<u>0°55.9'</u>	-60.0'	165.0°	0°02.0'	+60.0'	15.0°	0°60.0'	+60.0'	15.6°	1
2	3°47.7'	-60.0'	165.0°	2°49.8'	-60.0'	165.0°	1°51.8'	-60.0'	165.0°	<u>0°53.9'</u>	-60.0'	165.0°	0°04.1'	+60.0'	15.0°	1°02.0'	+60.0'	15.0°	2°00.0'	+60.0'	0.0°	2
3	2°47.8'	-60.0'	165.0°	1°49.8'	-60.0'	165.0°	<u>0°51.8'</u>	-60.0'	165.0°	0°06.1'	+60.0'	15.0°	1°04.1'	+60.0'	15.0°	2°02.0'	+60.0'	15.0°	3°00.0'	+60.0'	24.8°	3
4	1°47.8'	-60.0'	165.0°	<u>0°49.8'</u>	-60.0'	165.0°	0°08.2'	+60.0'	15.0°	1°06.1'	+60.0'	15.0°	2°04.1'	+60.0'	15.0°	3°02.0'	+60.0'	15.0°	4°00.0'	+60.0'	24.7°	4
5	<u>0°47.8'</u>	-60.0'	165.1°	0°10.2'	+60.0'	14.9°	1°08.1'	+60.0'	14.9°	2°06.1'	+60.0'	15.0°	3°04.1'	+60.0'	15.0°	4°02.0'	+60.0'	15.0°	5°00.0'	+60.0'	24.5°	5
6	0°12.2'	+60.0'	14.9°	1°10.2'	+60.0'	14.9°	2°08.1'	+60.0'	14.9°	3°06.1'	+60.0'	14.9°	4°04.1'	+60.0'	15.0°	5°02.0'	+60.0'	15.0°	6°00.0'	+60.0'	24.3°	6
7	1°12.2'	+60.0'	14.9°	2°10.1'	+60.0'	14.9°	3°08.1'	+60.0'	14.9°	4°06.1'	+60.0'	14.9°	5°04.1'	+60.0'	14.9°	6°02.0'	+60.0'	15.0°	7°00.0'	+60.0'	0.0°	7
8	2°12.1'	+60.0'	14.9°	3°10.1'	+60.0'	14.9°	4°08.1'	+60.0'	14.9°	5°06.1'	+60.0'	14.9°	6°04.1'	+60.0'	14.9°	7°02.0'	+60.0'	15.0°	8°00.0'	+60.0'	0.0°	8
9	3°12.1'	+60.0'	14.8°	4°10.1'	+60.0'	14.9°	5°08.1'	+60.0'	14.9°	6°06.1'	+60.0'	14.9°	7°04.1'	+60.0'	14.9°	8°02.0'	+60.0'	15.0°	9°00.0'	+60.0'	62.7°	9
10	4°12.1'	+60.0'	14.8°	5°10.1'	+60.0'	14.8°	6°08.1'	+60.0'	14.9°	7°06.1'	+60.0'	14.9°	8°04.1'	+60.0'	14.9°	9°02.0'	+60.0'	15.0°	10°00.0'	+60.0'	23.0°	10
11	5°12.1'	+60.0'	14.8°	6°10.1'	+60.0'	14.8°	7°08.1'	+60.0'	14.8°	8°06.1'	+60.0'	14.9°	9°04.1'	+60.0'	14.9°	10°02.0'	+60.0'	15.0°	11°00.0'	+60.0'	22.6°	11
12	6°12.0'	+60.0'	14.8°	7°10.1'	+60.0'	14.8°	8°08.1'	+60.0'	14.8°	9°06.1'	+60.0'	14.9°	10°04.1'	+60.0'	14.9°	11°02.0'	+60.0'	14.9°	12°00.0'	+60.0'	62.4°	12
13	7°12.0'	+60.0'	14.7°	8°10.0'	+60.0'	14.8°	9°08.1'	+60.0'	14.8°	10°06.1'	+60.0'	14.8°	11°04.1'	+60.0'	14.9°	12°02.0'	+60.0'	14.9°	13°00.0'	+60.0'	62.3°	13
14	8°12.0'	+60.0'	14.7°	9°10.0'	+60.0'	14.7°	10°08.1'	+60.0'	14.8°	11°06.1'	+60.0'	14.8°	12°04.1'	+60.0'	14.9°	13°02.0'	+60.0'	14.9°	14°00.0'	+60.0'	0.0°	14
15	9°12.0'	+60.0'	14.7°	10°10.0'	+60.0'	14.7°	11°08.0'	+60.0'	14.8°	12°06.1'	+60.0'	14.8°	13°04.1'	+60.0'	14.9°	14°02.0'	+60.0'	14.9°	15°00.0'	+60.0'	20.3°	15
16	10°12.0'	+60.0'	14.6°	11°10.0'	+60.0'	14.7°	12°08.0'	+60.0'	14.7°	13°06.0'	+60.0'	14.8°	14°04.1'	+60.0'	14.9°	15°02.0'	+60.0'	14.9°	16°00.0'	+60.0'	19.5°	16
17	11°11.9'	+60.0'	14.6°	12°10.0'	+60.0'	14.7°	13°08.0'	+60.0'	14.7°	14°06.0'	+60.0'	14.8°	15°04.0'	+60.0'	14.9°	16°02.0'	+60.0'	14.9°	17°00.0'	+60.0'	18.6°	17
18	12°11.9'	+60.0'	14.6°	13°10.0'	+60.0'	14.6°	14°08.0'	+60.0'	14.7°	15°06.0'	+60.0'	14.8°	16°04.0'	+60.0'	14.8°	17°02.0'	+60.0'	14.9°	18°00.0'	+60.0'	17.7°	18
19	13°11.9'	+60.0'	14.6°	14°10.0'	+60.0'	14.6°	15°08.0'	+60.0'	14.7°	16°06.0'	+60.0'	14.8°	17°04.0'	+60.0'	14.8°	18°02.0'	+60.0'	14.9°	19°00.0'	+60.0'	16.6°	19
20	14°11.9'	+60.0'	14.5°	15°09.9'	+60.0'	14.6°	16°08.0'	+60.0'	14.7°	17°06.0'	+60.0'	14.7°	18°04.0'	+60.0'	14.8°	19°02.0'	+60.0'	14.9°	20°00.0'	+60.0'	15.3°	20
21	15°11.8'	+60.0'	14.5°	16°09.9'	+60.0'	14.6°	17°08.0'	+60.0'	14.6°	18°06.0'	+60.0'	14.7°	19°04.0'	+60.0'	14.8°	20°02.0'	+60.0'	14.9°	21°00.0'	+60.0'	13.9°	21
22	16°11.8'	+60.0'	14.5°	17°09.9'	+60.0'	14.5°	18°08.0'	+60.0'	14.6°	19°06.0'	+60.0'	14.7°	20°04.0'	+60.0'	14.8°	21°02.0'	+60.0'	14.9°	22°00.0'	+60.0'	12.2°	22
23	17°11.8'	+60.0'	14.4°	18°09.9'	+60.0'	14.5°																

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

14° 346° LHA

Latitude CONTRARY to Declination

14° 346° LHA

Dec°	84			85			86			87			88			89			90			Dec°	
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°		
0	5°49.2'	-60.0'	165.9°	4°51.1'	-60.0'	165.9°	3°52.9'	-60.0'	166.0°	2°54.6'	-60.0'	166.0°	1°56.4'	-60.0'	166.0°	<u>0°58.2' -60.0' 166.0°</u>	<u>0°00.0' -60.0' 166.0°</u>					0	
1	4°49.2'	-60.0'	166.0°	3°51.1'	-60.0'	166.0°	2°52.9'	-60.0'	166.0°	1°54.7'	-60.0'	166.0°	<u>0°56.4' -60.0' 166.0°</u>	0°01.8'	+60.0'	14.0°	0°60.0'	+60.0'	15.6°				1
2	3°49.3'	-60.0'	166.0°	2°51.1'	-60.0'	166.0°	1°52.9'	-60.0'	166.0°	<u>0°54.7' -60.0' 166.0°</u>	0°03.6'	+60.0'	14.0°	1°01.8'	+60.0'	14.0°	2°00.0'	+60.0'	0.0°				2
3	2°49.3'	-60.0'	166.0°	1°51.1'	-60.0'	166.0°	<u>0°52.9' -60.0' 166.0°</u>	0°05.3'	+60.0'	14.0°	1°03.6'	+60.0'	14.0°	2°01.8'	+60.0'	14.0°	3°00.0'	+60.0'	24.8°				3
4	1°49.3'	-60.0'	166.0°	<u>0°51.1' -60.0' 166.0°</u>	0°07.1'	+60.0'	14.0°	1°05.3'	+60.0'	14.0°	2°03.6'	+60.0'	14.0°	3°01.8'	+60.0'	14.0°	4°00.0'	+60.0'	24.7°				4
5	<u>0°49.4' -60.0' 166.1°</u>	0°08.9'	+60.0'	13.9°	1°07.1'	+60.0'	13.9°	2°05.3'	+60.0'	14.0°	3°03.6'	+60.0'	14.0°	4°01.8'	+60.0'	14.0°	5°00.0'	+60.0'	24.5°				5
6	0°10.6'	+60.0'	13.9°	1°08.9'	+60.0'	13.9°	2°07.1'	+60.0'	13.9°	3°05.3'	+60.0'	13.9°	4°03.6'	+60.0'	14.0°	5°01.8'	+60.0'	14.0°	6°00.0'	+60.0'	24.3°		6
7	1°10.6'	+60.0'	13.9°	2°08.8'	+60.0'	13.9°	3°07.1'	+60.0'	13.9°	4°05.3'	+60.0'	13.9°	5°03.6'	+60.0'	13.9°	6°01.8'	+60.0'	14.0°	7°00.0'	+60.0'	0.0°		7
8	2°10.6'	+60.0'	13.9°	3°08.8'	+60.0'	13.9°	4°07.1'	+60.0'	13.9°	5°05.3'	+60.0'	13.9°	6°03.5'	+60.0'	13.9°	7°01.8'	+60.0'	14.0°	8°00.0'	+60.0'	0.0°		8
9	3°10.6'	+60.0'	13.8°	4°08.8'	+60.0'	13.9°	5°07.1'	+60.0'	13.9°	6°05.3'	+60.0'	13.9°	7°03.5'	+60.0'	13.9°	8°01.8'	+60.0'	14.0°	9°00.0'	+60.0'	62.7°		9
10	4°10.5'	+60.0'	13.8°	5°08.8'	+60.0'	13.8°	6°07.1'	+60.0'	13.9°	7°05.3'	+60.0'	13.9°	8°03.5'	+60.0'	13.9°	9°01.8'	+60.0'	14.0°	10°00.0'	+60.0'	23.0°		10
11	5°10.5'	+60.0'	13.8°	6°08.8'	+60.0'	13.8°	7°07.0'	+60.0'	13.8°	8°05.3'	+60.0'	13.9°	9°03.5'	+60.0'	13.9°	10°01.8'	+60.0'	14.0°	11°00.0'	+60.0'	22.6°		11
12	6°10.5'	+60.0'	13.8°	7°08.8'	+60.0'	13.8°	8°07.0'	+60.0'	13.8°	9°05.3'	+60.0'	13.9°	10°03.5'	+60.0'	13.9°	11°01.8'	+60.0'	14.0°	12°00.0'	+60.0'	62.4°		12
13	7°10.5'	+60.0'	13.7°	8°08.8'	+60.0'	13.8°	9°07.0'	+60.0'	13.8°	10°05.3'	+60.0'	13.9°	11°03.5'	+60.0'	13.9°	12°01.8'	+60.0'	13.9°	13°00.0'	+60.0'	62.3°		13
14	8°10.5'	+60.0'	13.7°	9°08.7'	+60.0'	13.8°	10°07.0'	+60.0'	13.8°	11°05.3'	+60.0'	13.8°	12°03.5'	+60.0'	13.9°	13°01.8'	+60.0'	13.9°	14°00.0'	+60.0'	0.0°		14
15	9°10.4'	+60.0'	13.7°	10°08.7'	+60.0'	13.7°	11°07.0'	+60.0'	13.8°	12°05.3'	+60.0'	13.8°	13°03.5'	+60.0'	13.9°	14°01.8'	+60.0'	13.9°	15°00.0'	+60.0'	20.3°		15
16	10°10.4'	+60.0'	13.7°	11°08.7'	+60.0'	13.7°	12°07.0'	+60.0'	13.8°	13°05.3'	+60.0'	13.8°	14°03.5'	+60.0'	13.9°	15°01.8'	+60.0'	13.9°	16°00.0'	+60.0'	19.5°		16
17	11°10.4'	+60.0'	13.6°	12°08.7'	+60.0'	13.7°	13°07.0'	+60.0'	13.7°	14°05.3'	+60.0'	13.8°	15°03.5'	+60.0'	13.9°	16°01.8'	+60.0'	13.9°	17°00.0'	+60.0'	18.6°		17
18	12°10.4'	+60.0'	13.6°	13°08.7'	+60.0'	13.7°	14°07.0'	+60.0'	13.7°	15°05.3'	+60.0'	13.8°	16°03.5'	+60.0'	13.9°	17°01.8'	+60.0'	13.9°	18°00.0'	+60.0'	17.7°		18
19	13°10.4'	+60.0'	13.6°	14°08.7'	+60.0'	13.6°	15°07.0'	+60.0'	13.7°	16°05.3'	+60.0'	13.8°	17°03.5'	+60.0'	13.8°	18°01.8'	+60.0'	13.9°	19°00.0'	+60.0'	16.6°		19
20	14°10.3'	+60.0'	13.6°	15°08.7'	+60.0'	13.6°	16°07.0'	+60.0'	13.7°	17°05.3'	+60.0'	13.8°	18°03.5'	+60.0'	13.8°	19°01.8'	+60.0'	13.9°	20°00.0'	+60.0'	15.3°		20
21	15°10.3'	+60.0'	13.5°	16°08.6'	+60.0'	13.6°	17°07.0'	+60.0'	13.7°	18°05.2'	+60.0'	13.7°	19°03.5'	+60.0'	13.8°	20°01.8'	+60.0'	13.9°	21°00.0'	+60.0'	13.9°		21
22	16°10.3'	+60.0'	13.5°	17°08.6'	+60.0'	13.6°	18°06.9'	+60.0'	13.7°	19°05.2'	+60.0'	13.7°	20°03.5'	+60.0'	13.8°	21°01.8'	+60.0'	13.9°	22°00.0'	+60.0'	12.2°		22
23	17°10.3'	+60.0'	13.5°	18°08.6'	+60.0'	13.6°	19°06.9'	+60.0'	13.6°	20°05.2'	+60.0'	13.7°	21°03.5'	+60.0'	13.8°	22°01.8'	+60.0'	13.9°	23°00.0'	+60.0'	90.0°		23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°	
	84			85			86			87			88			89			90				

166° 194° LHA

Latitude SAME as DECLINATION

166° 194° 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°	84			85			86			87			88			89			90			Dec°	
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°		
0	5°50.7'	-60.0'	166.9°	4°52.3'	-60.0'	167.0°	3°53.8'	-60.0'	167.0°	2°55.4'	-60.0'	167.0°	1°56.9'	-60.0'	167.0°	<u>0°58.5' -60.0' 167.0°</u>	<u>0°00.0' -60.0' 167.0°</u>					0	
1	4°50.7'	-60.0'	167.0°	3°52.3'	-60.0'	167.0°	2°53.8'	-60.0'	167.0°	1°55.4'	-60.0'	167.0°	<u>0°56.9' -60.0' 167.0°</u>	0°01.5'	+60.0'	13.0°	0°60.0'	+60.0'	15.6°				1
2	3°50.7'	-60.0'	167.0°	2°52.3'	-60.0'	167.0°	1°53.9'	-60.0'	167.0°	<u>0°55.4' -60.0' 167.0°</u>	0°03.1'	+60.0'	13.0°	1°01.5'	+60.0'	13.0°	2°00.0'	+60.0'	0.0°				2
3	2°50.8'	-60.0'	167.0°	1°52.3'	-60.0'	167.0°	<u>0°53.9' -60.0' 167.0°</u>	0°04.6'	+60.0'	13.0°	1°03.1'	+60.0'	13.0°	2°01.5'	+60.0'	13.0°	3°00.0'	+60.0'	24.8°				3
4	1°50.8'	-60.0'	167.0°	<u>0°52.3' -60.0' 167.0°</u>	0°06.1'	+60.0'	13.0°	1°04.6'	+60.0'	13.0°	2°03.1'	+60.0'	13.0°	3°01.5'	+60.0'	13.0°	4°00.0'	+60.0'	24.7°				4
5	<u>0°50.8' -60.0' 167.0°</u>	0°07.7'	+60.0'	12.9°	1°06.1'	+60.0'	13.0°	2°04.6'	+60.0'	13.0°	3°03.1'	+60.0'	13.0°	4°01.5'	+60.0'	13.0°	5°00.0'	+60.0'	24.5°				5
6	0°09.2'	+60.0'	12.9°	1°07.6'	+60.0'	12.9°	2°06.1'	+60.0'	12.9°	3°04.6'	+60.0'	12.9°	4°03.1'	+60.0'	13.0°	5°01.5'	+60.0'	13.0°	6°00.0'	+60.0'	24.3°		6
7	1°09.1'	+60.0'	12.9°	2°07.6'	+60.0'	12.9°	3°06.1'	+60.0'	12.9°	4°04.6'	+60.0'	12.9°	5°03.1'	+60.0'	13.0°	6°01.5'	+60.0'	13.0°	7°00.0'	+60.0'	0.0°		7
8	2°09.1'	+60.0'	12.9°	3°07.6'	+60.0'	12.9°	4°06.1'	+60.0'	12.9°	5°04.6'	+60.0'	12.9°	6°03.1'	+60.0'	12.9°	7°01.5'	+60.0'	13.0°	8°00.0'	+60.0'	0.0°		8
9	3°09.1'	+60.0'	12.9°	4°07.6'	+60.0'	12.9°	5°06.1'	+60.0'	12.9°	6°04.6'	+60.0'	12.9°	7°03.1'	+60.0'	12.9°	8°01.5'	+60.0'	13.0°	9°00.0'	+60.0'	62.7°		9
10	4°09.1'	+60.0'	12.8°	5°07.6'	+60.0'	12.9°	6°06.1'	+60.0'	12.9°	7°04.6'	+60.0'	12.9°	8°03.1'	+60.0'	12.9°	9°01.5'	+60.0'	13.0°	10°00.0'	+60.0'	23.0°		10
11	5°09.1'	+60.0'	12.8°	6°07.6'	+60.0'	12.8°	7°06.1'	+60.0'	12.9°	8°04.6'	+60.0'	12.9°	9°03.1'	+60.0'	12.9°	10°01.5'	+60.0'	13.0°	11°00.0'	+60.0'	22.6°		11
12	6°09.1'	+60.0'	12.8°	7°07.6'	+60.0'	12.8°	8°06.1'	+60.0'	12.8°	9°04.6'	+60.0'	12.9°	10°03.1'	+60.0'	12.9°	11°01.5'	+60.0'	13.0°	12°00.0'	+60.0'	62.4°		12
13	7°09.0'	+60.0'	12.8°	8°07.6'	+60.0'	12.8°	9°06.1'	+60.0'	12.8°	10°04.6'	+60.0'	12.9°	11°03.1'	+60.0'	12.9°	12°01.5'	+60.0'	13.0°	13°00.0'	+60.0'	62.3°		13
14	8°09.0'	+60.0'	12.7°	9°07.5'	+60.0'	12.8°	10°06.1'	+60.0'	12.8°	11°04.6'	+60.0'	12.9°	12°03.1'	+60.0'	12.9°	13°01.5'	+60.0'	12.9°	14°00.0'	+60.0'	0.0°		14
15	9°09.0'	+60.0'	12.7°	10°07.5'	+60.0'	12.8°	11°06.0'	+60.0'	12.8°	12°04.6'	+60.0'	12.8°	13°03.0'	+60.0'	12.9°	14°01.5'	+60.0'	12.9°	15°00.0'	+60.0'	20.3°		15
16	10°09.0'	+60.0'	12.7°	11°07.5'	+60.0'	12.7°	12°06.0'	+60.0'	12.8°	13°04.5'	+60.0'	12.8°	14°03.0'	+60.0'	12.9°	15°01.5'	+60.0'	12.9°	16°00.0'	+60.0'	19.5°		16
17	11°09.0'	+60.0'	12.7°	12°07.5'	+60.0'	12.7°	13°06.0'	+60.0'	12.8°	14°04.5'	+60.0'	12.8°	15°03.0'	+60.0'	12.9°	16°01.5'	+60.0'	12.9°	17°00.0'	+60.0'	18.6°		17
18	12°09.0'	+60.0'	12.6°	13°07.5'	+60.0'	12.7°	14°06.0'	+60.0'	12.7°	15°04.5'	+60.0'	12.8°	16°03.0'	+60.0'	12.9°	17°01.5'	+60.0'	12.9°	18°00.0'	+60.0'	17.7°		18
19	13°08.9'	+60.0'	12.6°	14°07.5'	+60.0'	12.7°	15°06.0'	+60.0'	12.7°	16°04.5'	+60.0'	12.8°	17°03.0'	+60.0'	12.9°	18°01.5'	+60.0'	12.9°	19°00.0'	+60.0'	16.6°		19
20	14°08.9'	+60.0'	12.6°	15°07.5'	+60.0'	12.6°	16°06.0'	+60.0'	12.7°	17°04.5'	+60.0'	12.8°	18°03.0'	+60.0'	12.8°	19°01.5'	+60.0'	12.9°	20°00.0'	+60.0'	15.3°		20
21	15°08.9'	+60.0'	12.6°	16°07.5'	+60.0'	12.6°	17°06.0'	+60.0'	12.7°	18°04.5'	+60.0'	12.8°	19°03.0'	+60.0'	12.8°	20°01.5'	+60.						

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

12° 348° LHA

Latitude CONTRARY to Declination

12° 348° LHA

Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	5°52.1'	-60.0'	167.9°	4°53.4'	-60.0'	168.0°	3°54.7'	-60.0'	168.0°	2°56.1'	-60.0'	168.0°	1°57.4'	-60.0'	168.0°	<u>0°58.7'</u>	-60.0'	<u>168.0°</u>	<u>0°00.0'</u>	-60.0'	<u>168.0°</u>	0
1	4°52.1'	-60.0'	168.0°	3°53.4'	-60.0'	168.0°	2°54.8'	-60.0'	168.0°	1°56.1'	-60.0'	168.0°	<u>0°57.4'</u>	-60.0'	<u>168.0°</u>	0°01.3'	+60.0'	12.0°	0°60.0'	+60.0'	15.6°	1
2	3°52.1'	-60.0'	168.0°	2°53.4'	-60.0'	168.0°	1°54.8'	-60.0'	168.0°	<u>0°56.1'</u>	-60.0'	<u>168.0°</u>	0°02.6'	+60.0'	12.0°	1°01.3'	+60.0'	12.0°	2°00.0'	+60.0'	0.0°	2
3	2°52.1'	-60.0'	168.0°	1°53.5'	-60.0'	168.0°	<u>0°54.8'</u>	-60.0'	<u>168.0°</u>	0°03.9'	+60.0'	12.0°	1°02.6'	+60.0'	12.0°	2°01.3'	+60.0'	12.0°	3°00.0'	+60.0'	24.8°	3
4	1°52.2'	-60.0'	168.0°	<u>0°53.5'</u>	-60.0'	<u>168.0°</u>	0°05.2'	+60.0'	12.0°	1°03.9'	+60.0'	12.0°	2°02.6'	+60.0'	12.0°	3°01.3'	+60.0'	12.0°	4°00.0'	+60.0'	24.7°	4
5	<u>0°52.2'</u>	-60.0'	<u>168.0°</u>	0°06.5'	+60.0'	12.0°	1°05.2'	+60.0'	12.0°	2°03.9'	+60.0'	12.0°	3°02.6'	+60.0'	12.0°	4°01.3'	+60.0'	12.0°	5°00.0'	+60.0'	24.5°	5
6	0°07.8'	+60.0'	11.9°	1°06.5'	+60.0'	11.9°	2°05.2'	+60.0'	11.9°	3°03.9'	+60.0'	12.0°	4°02.6'	+60.0'	12.0°	5°01.3'	+60.0'	12.0°	6°00.0'	+60.0'	24.3°	6
7	1°07.8'	+60.0'	11.9°	2°06.5'	+60.0'	11.9°	3°05.2'	+60.0'	11.9°	4°03.9'	+60.0'	11.9°	5°02.6'	+60.0'	12.0°	6°01.3'	+60.0'	12.0°	7°00.0'	+60.0'	0.0°	7
8	2°07.8'	+60.0'	11.9°	3°06.5'	+60.0'	11.9°	4°05.2'	+60.0'	11.9°	5°03.9'	+60.0'	11.9°	6°02.6'	+60.0'	11.9°	7°01.3'	+60.0'	12.0°	8°00.0'	+60.0'	0.0°	8
9	3°07.8'	+60.0'	11.9°	4°06.5'	+60.0'	11.9°	5°05.2'	+60.0'	11.9°	6°03.9'	+60.0'	11.9°	7°02.6'	+60.0'	11.9°	8°01.3'	+60.0'	12.0°	9°00.0'	+60.0'	62.7°	9
10	4°07.8'	+60.0'	11.8°	5°06.5'	+60.0'	11.9°	6°05.2'	+60.0'	11.9°	7°03.9'	+60.0'	11.9°	8°02.6'	+60.0'	11.9°	9°01.3'	+60.0'	12.0°	10°00.0'	+60.0'	23.0°	10
11	5°07.7'	+60.0'	11.8°	6°06.5'	+60.0'	11.8°	7°05.2'	+60.0'	11.9°	8°03.9'	+60.0'	11.9°	9°02.6'	+60.0'	11.9°	10°01.3'	+60.0'	12.0°	11°00.0'	+60.0'	22.6°	11
12	6°07.7'	+60.0'	11.8°	7°06.5'	+60.0'	11.8°	8°05.2'	+60.0'	11.9°	9°03.9'	+60.0'	11.9°	10°02.6'	+60.0'	11.9°	11°01.3'	+60.0'	12.0°	12°00.0'	+60.0'	62.4°	12
13	7°07.7'	+60.0'	11.8°	8°06.4'	+60.0'	11.8°	9°05.2'	+60.0'	11.8°	10°03.9'	+60.0'	11.9°	11°02.6'	+60.0'	11.9°	12°01.3'	+60.0'	12.0°	13°00.0'	+60.0'	62.3°	13
14	8°07.7'	+60.0'	11.8°	9°06.4'	+60.0'	11.8°	10°05.2'	+60.0'	11.8°	11°03.9'	+60.0'	11.9°	12°02.6'	+60.0'	11.9°	13°01.3'	+60.0'	12.0°	14°00.0'	+60.0'	0.0°	14
15	9°07.7'	+60.0'	11.7°	10°06.4'	+60.0'	11.8°	11°05.2'	+60.0'	11.8°	12°03.9'	+60.0'	11.9°	13°02.6'	+60.0'	11.9°	14°01.3'	+60.0'	11.9°	15°00.0'	+60.0'	20.3°	15
16	10°07.7'	+60.0'	11.7°	11°06.4'	+60.0'	11.8°	12°05.2'	+60.0'	11.8°	13°03.9'	+60.0'	11.8°	14°02.6'	+60.0'	11.9°	15°01.3'	+60.0'	11.9°	16°00.0'	+60.0'	19.5°	16
17	11°07.7'	+60.0'	11.7°	12°06.4'	+60.0'	11.7°	13°05.1'	+60.0'	11.8°	14°03.9'	+60.0'	11.8°	15°02.6'	+60.0'	11.9°	16°01.3'	+60.0'	11.9°	17°00.0'	+60.0'	18.6°	17
18	12°07.6'	+60.0'	11.7°	13°06.4'	+60.0'	11.7°	14°05.1'	+60.0'	11.8°	15°03.9'	+60.0'	11.8°	16°02.6'	+60.0'	11.9°	17°01.3'	+60.0'	11.9°	18°00.0'	+60.0'	17.7°	18
19	13°07.6'	+60.0'	11.6°	14°06.4'	+60.0'	11.7°	15°05.1'	+60.0'	11.7°	16°03.9'	+60.0'	11.8°	17°02.6'	+60.0'	11.9°	18°01.3'	+60.0'	11.9°	19°00.0'	+60.0'	16.6°	19
20	14°07.6'	+60.0'	11.6°	15°06.4'	+60.0'	11.7°	16°05.1'	+60.0'	11.7°	17°03.9'	+60.0'	11.8°	18°02.6'	+60.0'	11.9°	19°01.3'	+60.0'	11.9°	20°00.0'	+60.0'	15.3°	20
21	15°07.6'	+60.0'	11.6°	16°06.4'	+60.0'	11.7°	17°05.1'	+60.0'	11.7°	18°03.9'	+60.0'	11.8°	19°02.6'	+60.0'	11.8°	20°01.3'	+60.0'	11.9°	21°00.0'	+60.0'	13.9°	21
22	16°07.6'	+60.0'	11.6°	17°06.3'	+60.0'	11.6°	18°05.1'	+60.0'	11.7°	19°03.9'	+60.0'	11.8°	20°02.6'	+60.0'	11.8°	21°01.3'	+60.0'	11.9°	22°00.0'	+60.0'	12.2°	22
23	17°07.6'	+60.0'	11.6°	18°06.3'	+60.0'	11.6°	19°05.1'	+60.0'	11.7°	20°03.9'	+60.0'	11.8°	21°02.6'	+60.0'	11.8°	22°01.3'	+60.0'	11.9°	23°00.0'	+60.0'	90.0°	23
Dec°	84			85			86			87			88			89			90			Dec°

168° 192° LHA

Latitude SAME as DECLINATION

168° 192° 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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	5°53.3'	-60.0'	168.9°	4°54.5'	-60.0'	169.0°	3°55.6'	-60.0'	169.0°	2°56.7'	-60.0'	169.0°	1°57.8'	-60.0'	169.0°	<u>0°58.9'</u>	-60.0'	<u>169.0°</u>	<u>0°00.0'</u>	-60.0'	<u>169.0°</u>	0
1	4°53.3'	-60.0'	169.0°	3°54.5'	-60.0'	169.0°	2°55.6'	-60.0'	169.0°	1°56.7'	-60.0'	169.0°	<u>0°57.8'</u>	-60.0'	<u>169.0°</u>	0°01.1'	+60.0'	11.0°	0°60.0'	+60.0'	15.6°	1
2	3°53.3'	-60.0'	169.0°	2°54.5'	-60.0'	169.0°	1°55.6'	-60.0'	169.0°	<u>0°56.7'</u>	-60.0'	<u>169.0°</u>	0°02.2'	+60.0'	11.0°	1°01.1'	+60.0'	11.0°	2°00.0'	+60.0'	0.0°	2
3	2°53.4'	-60.0'	169.0°	1°54.5'	-60.0'	169.0°	<u>0°55.6'</u>	-60.0'	<u>169.0°</u>	0°03.3'	+60.0'	11.0°	1°02.2'	+60.0'	11.0°	2°01.1'	+60.0'	11.0°	3°00.0'	+60.0'	24.8°	3
4	1°53.4'	-60.0'	169.0°	<u>0°54.5'</u>	-60.0'	<u>169.0°</u>	0°04.4'	+60.0'	11.0°	1°03.3'	+60.0'	11.0°	2°02.2'	+60.0'	11.0°	3°01.1'	+60.0'	11.0°	4°00.0'	+60.0'	24.7°	4
5	<u>0°53.4'</u>	-60.0'	<u>169.0°</u>	0°05.5'	+60.0'	11.0°	1°04.4'	+60.0'	11.0°	2°03.3'	+60.0'	11.0°	3°02.2'	+60.0'	11.0°	4°01.1'	+60.0'	11.0°	5°00.0'	+60.0'	24.5°	5
6	0°06.6'	+60.0'	10.9°	1°05.5'	+60.0'	10.9°	2°04.4'	+60.0'	10.9°	3°03.3'	+60.0'	11.0°	4°02.2'	+60.0'	11.0°	5°01.1'	+60.0'	11.0°	6°00.0'	+60.0'	24.3°	6
7	1°06.6'	+60.0'	10.9°	2°05.5'	+60.0'	10.9°	3°04.4'	+60.0'	10.9°	4°03.3'	+60.0'	10.9°	5°02.2'	+60.0'	11.0°	6°01.1'	+60.0'	11.0°	7°00.0'	+60.0'	0.0°	7
8	2°06.5'	+60.0'	10.9°	3°05.5'	+60.0'	10.9°	4°04.4'	+60.0'	10.9°	5°03.3'	+60.0'	10.9°	6°02.2'	+60.0'	11.0°	7°01.1'	+60.0'	11.0°	8°00.0'	+60.0'	0.0°	8
9	3°06.5'	+60.0'	10.9°	4°05.5'	+60.0'	10.9°	5°04.4'	+60.0'	10.9°	6°03.3'	+60.0'	10.9°	7°02.2'	+60.0'	10.9°	8°01.1'	+60.0'	11.0°	9°00.0'	+60.0'	62.7°	9
10	4°06.5'	+60.0'	10.9°	5°05.4'	+60.0'	10.9°	6°04.4'	+60.0'	10.9°	7°03.3'	+60.0'	10.9°	8°02.2'	+60.0'	10.9°	9°01.1'	+60.0'	11.0°	10°00.0'	+60.0'	23.0°	10
11	5°06.5'	+60.0'	10.8°	6°05.4'	+60.0'	10.9°	7°04.4'	+60.0'	10.9°	8°03.3'	+60.0'	10.9°	9°02.2'	+60.0'	10.9°	10°01.1'	+60.0'	11.0°	11°00.0'	+60.0'	22.6°	11
12	6°06.5'	+60.0'	10.8°	7°05.4'	+60.0'	10.8°	8°04.4'	+60.0'	10.9°	9°03.3'	+60.0'	10.9°	10°02.2'	+60.0'	10.9°	11°01.1'	+60.0'	11.0°	12°00.0'	+60.0'	62.4°	12
13	7°06.5'	+60.0'	10.8°	8°05.4'	+60.0'	10.8°	9°04.3'	+60.0'	10.9°	10°03.3'	+60.0'	10.9°	11°02.2'	+60.0'	10.9°	12°01.1'	+60.0'	11.0°	13°00.0'	+60.0'	62.3°	13
14	8°06.5'	+60.0'	10.8°	9°05.4'	+60.0'	10.8°	10°04.3'	+60.0'	10.8°	11°03.3'	+60.0'	10.9°	12°02.2'	+60.0'	10.9°	13°01.1'	+60.0'	11.0°	14°00.0'	+60.0'	0.0°	14
15	9°06.5'	+60.0'	10.8°	10°05.4'	+60.0'	10.8°	11°04.3'	+60.0'	10.8°	12°03.3'	+60.0'	10.9°	13°02.2'	+60.0'	10.9°	14°01.1'	+60.0'	11.0°	15°00.0'	+60.0'	20.3°	15
16	10°06.4'	+60.0'	10.7°	11°05.4'	+60.0'	10.8°	12°04.3'	+60.0'	10.8°	13°03.3'	+60.0'	10.9°	14°02.2'	+60.0'	10.9°	15°01.1'	+60.0'	10.9°	16°00.0'	+60.0'	19.5°	16
17	11°06.4'	+60.0'	10.7°	12°05.4'	+60.0'	10.8°	13°04.3'	+60.0'	10.8°	14°03.3'	+60.0'	10.8°	15°02.2'	+60.0'	10.9°	16°01.1'	+60.0'	10.9°	17°00.0'	+60.0'	18.6°	17
18	12°06.4'	+60.0'	10.7°	13°05.4'	+60.0'	10.7°	14°04.3'	+60.0'	10.8°	15°03.3'	+60.0'	10.8°	16°02.2'	+60.0'	10.9°	17°01.1'	+60.0'	10.9°	18°00.0'	+60.0'	17.7°	18
19	13°06.4'	+60.0'	10.7°	14°05.4'	+60.0'	10.7°	15°04.3'	+60.0'	10.8°	16°03.3'	+60.0'	10.8°	17°02.2'	+60.0'	10.9°	18°01.1'	+60.0'	10.9°	19°00.0'	+60.0'	16.6°	19
20	14°06.4'	+60.0'	10.7°	15°05.4'	+60.0'	10.7°	16°04.3'	+60.0'	10.8°	17°03.2'	+60.0'	10.8°	18°02.2'	+60.0'	10.9°	19°01.1'	+60.0'	10.9°	20°00.0'	+60.0'	15.3°	20
21	15°06.4'	+60.0'	10.6°	16°05.3'	+60.0'	10.7°	17°04.3'	+60.0'	10.7°	18°03.2'	+60.0'	10.8°	19°02.2'	+60.0'	10.9°	20°01.1'	+60.0'	10.9°	21°00.0'	+60.0'	13.9°	21
22	16°06.4'	+60.0'	10.6°	17°05.3'	+60.0'	10.7°	18°04.3'	+60.0'	10.7°	19°03.2'	+60.0'	10.8°	20°02.2'	+60.0'	10.9°	21°01.1'	+60.0'	10.9°	22°00.0'	+60.0'	12.2°	22
23	17°06.4'	+60																				

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

10° 350° LHA

Latitude CONTRARY to Declination

10° 350° LHA

Dec°	84			85			86			87			88			89			90			Dec°	
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°		
0	5°54.5'	-60.0'	169.9°	4°55.4'	-60.0'	170.0°	3°56.3'	-60.0'	170.0°	2°57.3'	-60.0'	170.0°	1°58.2'	-60.0'	170.0°	<u>0°59.1' -60.0' 170.0°</u>	<u>0°00.0' -60.0' 170.0°</u>				0		
1	4°54.5'	-60.0'	170.0°	3°55.4'	-60.0'	170.0°	2°56.4'	-60.0'	170.0°	1°57.3'	-60.0'	170.0°	<u>0°58.2' -60.0' 170.0°</u>	0°00.9'	+60.0'	10.0°	0°60.0'	+60.0'	15.6°			1	
2	3°54.5'	-60.0'	170.0°	2°55.4'	-60.0'	170.0°	1°56.4'	-60.0'	170.0°	<u>0°57.3' -60.0' 170.0°</u>	0°01.8'	+60.0'	10.0°	1°00.9'	+60.0'	10.0°	2°00.0'	+60.0'	0.0°			2	
3	2°54.5'	-60.0'	170.0°	1°55.5'	-60.0'	170.0°	<u>0°56.4' -60.0' 170.0°</u>	0°02.7'	+60.0'	10.0°	1°01.8'	+60.0'	10.0°	2°00.9'	+60.0'	10.0°	3°00.0'	+60.0'	24.8°			3	
4	1°54.6'	-60.0'	170.0°	<u>0°55.5' -60.0' 170.0°</u>	0°03.6'	+60.0'	10.0°	1°02.7'	+60.0'	10.0°	2°01.8'	+60.0'	10.0°	3°00.9'	+60.0'	10.0°	4°00.0'	+60.0'	24.7°			4	
5	<u>0°54.6' -60.0' 170.0°</u>	0°04.5'	+60.0'	10.0°	1°03.6'	+60.0'	10.0°	2°02.7'	+60.0'	10.0°	3°01.8'	+60.0'	10.0°	4°00.9'	+60.0'	10.0°	5°00.0'	+60.0'	24.5°			5	
6	0°05.4'	+60.0'	9.9°	1°04.5'	+60.0'	9.9°	2°03.6'	+60.0'	10.0°	3°02.7'	+60.0'	10.0°	4°01.8'	+60.0'	10.0°	5°00.9'	+60.0'	10.0°	6°00.0'	+60.0'	24.3°		6
7	1°05.4'	+60.0'	9.9°	2°04.5'	+60.0'	9.9°	3°03.6'	+60.0'	9.9°	4°02.7'	+60.0'	9.9°	5°01.8'	+60.0'	10.0°	6°00.9'	+60.0'	10.0°	7°00.0'	+60.0'	0.0°		7
8	2°05.4'	+60.0'	9.9°	3°04.5'	+60.0'	9.9°	4°03.6'	+60.0'	9.9°	5°02.7'	+60.0'	9.9°	6°01.8'	+60.0'	10.0°	7°00.9'	+60.0'	10.0°	8°00.0'	+60.0'	0.0°		8
9	3°05.4'	+60.0'	9.9°	4°04.5'	+60.0'	9.9°	5°03.6'	+60.0'	9.9°	6°02.7'	+60.0'	9.9°	7°01.8'	+60.0'	10.0°	8°00.9'	+60.0'	10.0°	9°00.0'	+60.0'	62.7°		9
10	4°05.4'	+60.0'	9.9°	5°04.5'	+60.0'	9.9°	6°03.6'	+60.0'	9.9°	7°02.7'	+60.0'	9.9°	8°01.8'	+60.0'	9.9°	9°00.9'	+60.0'	10.0°	10°00.0'	+60.0'	23.0°		10
11	5°05.4'	+60.0'	9.9°	6°04.5'	+60.0'	9.9°	7°03.6'	+60.0'	9.9°	8°02.7'	+60.0'	9.9°	9°01.8'	+60.0'	9.9°	10°00.9'	+60.0'	10.0°	11°00.0'	+60.0'	22.6°		11
12	6°05.4'	+60.0'	9.8°	7°04.5'	+60.0'	9.9°	8°03.6'	+60.0'	9.9°	9°02.7'	+60.0'	9.9°	10°01.8'	+60.0'	9.9°	11°00.9'	+60.0'	10.0°	12°00.0'	+60.0'	62.4°		12
13	7°05.4'	+60.0'	9.8°	8°04.5'	+60.0'	9.8°	9°03.6'	+60.0'	9.9°	10°02.7'	+60.0'	9.9°	11°01.8'	+60.0'	9.9°	12°00.9'	+60.0'	10.0°	13°00.0'	+60.0'	62.3°		13
14	8°05.3'	+60.0'	9.8°	9°04.5'	+60.0'	9.8°	10°03.6'	+60.0'	9.9°	11°02.7'	+60.0'	9.9°	12°01.8'	+60.0'	9.9°	13°00.9'	+60.0'	10.0°	14°00.0'	+60.0'	0.0°		14
15	9°05.3'	+60.0'	9.8°	10°04.5'	+60.0'	9.8°	11°03.6'	+60.0'	9.8°	12°02.7'	+60.0'	9.9°	13°01.8'	+60.0'	9.9°	14°00.9'	+60.0'	10.0°	15°00.0'	+60.0'	20.3°		15
16	10°05.3'	+60.0'	9.8°	11°04.5'	+60.0'	9.8°	12°03.6'	+60.0'	9.8°	13°02.7'	+60.0'	9.9°	14°01.8'	+60.0'	9.9°	15°00.9'	+60.0'	10.0°	16°00.0'	+60.0'	19.5°		16
17	11°05.3'	+60.0'	9.7°	12°04.5'	+60.0'	9.8°	13°03.6'	+60.0'	9.8°	14°02.7'	+60.0'	9.9°	15°01.8'	+60.0'	9.9°	16°00.9'	+60.0'	9.9°	17°00.0'	+60.0'	18.6°		17
18	12°05.3'	+60.0'	9.7°	13°04.4'	+60.0'	9.8°	14°03.6'	+60.0'	9.8°	15°02.7'	+60.0'	9.8°	16°01.8'	+60.0'	9.9°	17°00.9'	+60.0'	9.9°	18°00.0'	+60.0'	17.7°		18
19	13°05.3'	+60.0'	9.7°	14°04.4'	+60.0'	9.7°	15°03.6'	+60.0'	9.8°	16°02.7'	+60.0'	9.8°	17°01.8'	+60.0'	9.9°	18°00.9'	+60.0'	9.9°	19°00.0'	+60.0'	16.6°		19
20	14°05.3'	+60.0'	9.7°	15°04.4'	+60.0'	9.7°	16°03.6'	+60.0'	9.8°	17°02.7'	+60.0'	9.8°	18°01.8'	+60.0'	9.9°	19°00.9'	+60.0'	9.9°	20°00.0'	+60.0'	15.3°		20
21	15°05.3'	+60.0'	9.7°	16°04.4'	+60.0'	9.7°	17°03.6'	+60.0'	9.8°	18°02.7'	+60.0'	9.8°	19°01.8'	+60.0'	9.9°	20°00.9'	+60.0'	9.9°	21°00.0'	+60.0'	13.9°		21
22	16°05.3'	+60.0'	9.6°	17°04.4'	+60.0'	9.7°	18°03.6'	+60.0'	9.7°	19°02.7'	+60.0'	9.8°	20°01.8'	+60.0'	9.9°	21°00.9'	+60.0'	9.9°	22°00.0'	+60.0'	12.2°		22
23	17°05.3'	+60.0'	9.6°	18°04.4'	+60.0'	9.7°	19°03.6'	+60.0'	9.7°	20°02.7'	+60.0'	9.8°	21°01.8'	+60.0'	9.9°	22°00.9'	+60.0'	9.9°	23°00.0'	+60.0'	90.0°		23
Dec°	84			85			86			87			88			89			90			Dec°	

170° 190° LHA

Latitude SAME as DECLINATION

170° 190° 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°	84			85			86			87			88			89			90			Dec°	
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°		
0	5°55.5'	-60.0'	171.0°	4°56.3'	-60.0'	171.0°	3°57.0'	-60.0'	171.0°	2°57.8'	-60.0'	171.0°	1°58.5'	-60.0'	171.0°	<u>0°59.3' -60.0' 171.0°</u>	<u>0°00.0' -60.0' 171.0°</u>				0		
1	4°55.5'	-60.0'	171.0°	3°56.3'	-60.0'	171.0°	2°57.0'	-60.0'	171.0°	1°57.8'	-60.0'	171.0°	<u>0°58.5' -60.0' 171.0°</u>	0°00.7'	+60.0'	9.0°	0°60.0'	+60.0'	15.6°			1	
2	3°55.5'	-60.0'	171.0°	2°56.3'	-60.0'	171.0°	1°57.0'	-60.0'	171.0°	<u>0°57.8' -60.0' 171.0°</u>	0°01.5'	+60.0'	9.0°	1°00.7'	+60.0'	9.0°	2°00.0'	+60.0'	0.0°			2	
3	2°55.6'	-60.0'	171.0°	1°56.3'	-60.0'	171.0°	<u>0°57.1' -60.0' 171.0°</u>	0°02.2'	+60.0'	9.0°	1°01.5'	+60.0'	9.0°	2°00.7'	+60.0'	9.0°	3°00.0'	+60.0'	24.8°			3	
4	1°55.6'	-60.0'	171.0°	<u>0°56.3' -60.0' 171.0°</u>	0°02.9'	+60.0'	9.0°	1°02.2'	+60.0'	9.0°	2°01.5'	+60.0'	9.0°	3°00.7'	+60.0'	9.0°	4°00.0'	+60.0'	24.7°			4	
5	<u>0°55.6' -60.0' 171.0°</u>	0°03.7'	+60.0'	9.0°	1°02.9'	+60.0'	9.0°	2°02.2'	+60.0'	9.0°	3°01.5'	+60.0'	9.0°	4°00.7'	+60.0'	9.0°	5°00.0'	+60.0'	24.5°			5	
6	0°04.4'	+60.0'	9.0°	1°03.7'	+60.0'	9.0°	2°02.9'	+60.0'	9.0°	3°02.2'	+60.0'	9.0°	4°01.5'	+60.0'	9.0°	5°00.7'	+60.0'	9.0°	6°00.0'	+60.0'	24.3°		6
7	1°04.4'	+60.0'	8.9°	2°03.7'	+60.0'	8.9°	3°02.9'	+60.0'	8.9°	4°02.2'	+60.0'	9.0°	5°01.5'	+60.0'	9.0°	6°00.7'	+60.0'	9.0°	7°00.0'	+60.0'	0.0°		7
8	2°04.4'	+60.0'	8.9°	3°03.7'	+60.0'	8.9°	4°02.9'	+60.0'	8.9°	5°02.2'	+60.0'	8.9°	6°01.5'	+60.0'	9.0°	7°00.7'	+60.0'	9.0°	8°00.0'	+60.0'	0.0°		8
9	3°04.4'	+60.0'	8.9°	4°03.7'	+60.0'	8.9°	5°02.9'	+60.0'	8.9°	6°02.2'	+60.0'	8.9°	7°01.5'	+60.0'	9.0°	8°00.7'	+60.0'	9.0°	9°00.0'	+60.0'	62.7°		9
10	4°04.4'	+60.0'	8.9°	5°03.6'	+60.0'	8.9°	6°02.9'	+60.0'	8.9°	7°02.2'	+60.0'	8.9°	8°01.5'	+60.0'	9.0°	9°00.7'	+60.0'	9.0°	10°00.0'	+60.0'	23.0°		10
11	5°04.4'	+60.0'	8.9°	6°03.6'	+60.0'	8.9°	7°02.9'	+60.0'	8.9°	8°02.2'	+60.0'	8.9°	9°01.5'	+60.0'	8.9°	10°00.7'	+60.0'	9.0°	11°00.0'	+60.0'	22.6°		11
12	6°04.4'	+60.0'	8.9°	7°03.6'	+60.0'	8.9°	8°02.9'	+60.0'	8.9°	9°02.2'	+60.0'	8.9°	10°01.5'	+60.0'	8.9°	11°00.7'	+60.0'	9.0°	12°00.0'	+60.0'	62.4°		12
13	7°04.3'	+60.0'	8.8°	8°03.6'	+60.0'	8.9°	9°02.9'	+60.0'	8.9°	10°02.2'	+60.0'	8.9°	11°01.5'	+60.0'	8.9°	12°00.7'	+60.0'	9.0°	13°00.0'	+60.0'	62.3°		13
14	8°04.3'	+60.0'	8.8°	9°03.6'	+60.0'	8.8°	10°02.9'	+60.0'	8.9°	11°02.2'	+60.0'	8.9°	12°01.5'	+60.0'	8.9°	13°00.7'	+60.0'	9.0°	14°00.0'	+60.0'	0.0°		14
15	9°04.3'	+60.0'	8.8°	10°03.6'	+60.0'	8.8°	11°02.9'	+60.0'	8.9°	12°02.2'	+60.0'	8.9°	13°01.5'	+60.0'	8.9°	14°00.7'	+60.0'	9.0°	15°00.0'	+60.0'	20.3°		15
16	10°04.3'	+60.0'	8.8°	11°03.6'	+60.0'	8.8°	12°02.9'	+60.0'	8.8°	13°02.2'	+60.0'	8.9°	14°01.5'	+60.0'	8.9°	15°00.7'	+60.0'	9.0°	16°00.0'	+60.0'	19.5°		16
17	11°04.3'	+60.0'	8.8°	12°03.6'	+60.0'	8.8°	13°02.9'	+60.0'	8.8°	14°02.2'	+60.0'	8.9°	15°01.5'	+60.0'	8.9°	16°00.7'	+60.0'	9.0°	17°00.0'	+60.0'	18.6°		17
18	12°04.3'	+60.0'	8.8°	13°03.6'	+60.0'	8.8°	14°02.9'	+60.0'	8.8°	15°02.2'	+60.0'	8.9°	16°01.5'	+60.0'	8.9°	17°00.7'	+60.0'	9.0°	18°00.0'	+60.0'	17.7°		18
19	13°04.3'	+60.0'	8.7°	14°03.6'	+60.0'	8.8°	15°02.9'	+60.0'	8.8°	16°02.2'	+60.0'	8.9°	17°01.5'	+60.0'	8.9°	18°00.7'	+60.0'	8.9°	19°00.0'	+60.0'	16.6°		19
20	14°04.3'	+60.0'	8.7°	15°03.6'	+60.0'	8.8°	16°02.9'	+60.0'	8.8°	17°02.2'	+60.0'	8.8°	18°01.5'	+60.0'	8.9°	19°00.7'	+60.0'	8.9°	20°00.0'	+60.0'	15.3°		20
21	15°04.3'	+60.0'	8.7°	16°03.6'	+60.0'	8.7°	17°02.9'	+60.0'	8.8°	18°02.2'	+60.0'	8.8°	19°01.5'	+60.0'	8.9°	20°00.7'	+60.0'	8.9°	21°00.0'	+60.0'	13.9°		21
22	16°04.3'	+60.0'	8.7°	17°03.6'	+60.0'	8.7°	18°02.9'	+60.0'	8.8°	19°02.2'	+60.0'	8.8°	20°01.5'	+60.0'	8.9°	21°00.7'	+60.0'	8.9°	22°00.0'	+60.0'	12.2°		22
23	17°04.3'	+60.0'	8.7°	18°03.6'	+60.0'	8.7°	19°02.9'	+60.0'	8.8°	20°02.2'	+60.0'	8											

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

8° 352° LHA			Latitude CONTRARY to Declination						8° 352° LHA																
Dec°	84			85			86			87			88			89			90			Dec°			
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°				
0	5°56.4'	-60.0'	172.0°	4°57.1'	-60.0'	172.0°	3°57.7'	-60.0'	172.0°	2°58.2'	-60.0'	172.0°	1°58.8'	-60.0'	172.0°	<u>0°59.4' -60.0' 172.0°</u>	<u>0°00.0' -60.0' 172.0°</u>					0			
1	4°56.4'	-60.0'	172.0°	3°57.1'	-60.0'	172.0°	2°57.7'	-60.0'	172.0°	1°58.2'	-60.0'	172.0°	<u>0°58.8' -60.0' 172.0°</u>	0°00.6'	+60.0'	8.0°	0°00.6'	+60.0'	8.0°	0°00.6'	+60.0'	15.6°	1		
2	3°56.4'	-60.0'	172.0°	2°57.1'	-60.0'	172.0°	1°57.7'	-60.0'	172.0°	<u>0°58.2' -60.0' 172.0°</u>	0°01.2'	+60.0'	8.0°	1°00.6'	+60.0'	8.0°	1°00.6'	+60.0'	8.0°	2°00.0'	+60.0'	0.0°	2		
3	2°56.5'	-60.0'	172.0°	1°57.1'	-60.0'	172.0°	<u>0°57.7' -60.0' 172.0°</u>	0°01.7'	+60.0'	8.0°	1°01.2'	+60.0'	8.0°	2°00.6'	+60.0'	8.0°	2°00.6'	+60.0'	8.0°	3°00.0'	+60.0'	24.8°	3		
4	1°56.5'	-60.0'	172.0°	<u>0°57.1' -60.0' 172.0°</u>	0°02.3'	+60.0'	8.0°	1°01.7'	+60.0'	8.0°	2°01.2'	+60.0'	8.0°	3°00.6'	+60.0'	8.0°	3°00.6'	+60.0'	8.0°	4°00.0'	+60.0'	24.7°	4		
5	<u>0°56.5' -60.0' 172.0°</u>	0°02.9'	+60.0'	8.0°	1°02.3'	+60.0'	8.0°	2°01.7'	+60.0'	8.0°	3°01.2'	+60.0'	8.0°	4°00.6'	+60.0'	8.0°	4°00.6'	+60.0'	8.0°	5°00.0'	+60.0'	24.5°	5		
6	0°03.5'	+60.0'	8.0°	1°02.9'	+60.0'	8.0°	2°02.3'	+60.0'	8.0°	3°01.7'	+60.0'	8.0°	4°01.2'	+60.0'	8.0°	5°00.6'	+60.0'	8.0°	5°00.6'	+60.0'	8.0°	6°00.0'	+60.0'	24.3°	6
7	1°03.5'	+60.0'	7.9°	2°02.9'	+60.0'	7.9°	3°02.3'	+60.0'	8.0°	4°01.7'	+60.0'	8.0°	5°01.2'	+60.0'	8.0°	6°00.6'	+60.0'	8.0°	6°00.6'	+60.0'	8.0°	7°00.0'	+60.0'	0.0°	7
8	2°03.5'	+60.0'	7.9°	3°02.9'	+60.0'	7.9°	4°02.3'	+60.0'	7.9°	5°01.7'	+60.0'	8.0°	6°01.2'	+60.0'	8.0°	7°00.6'	+60.0'	8.0°	7°00.6'	+60.0'	8.0°	8°00.0'	+60.0'	0.0°	8
9	3°03.5'	+60.0'	7.9°	4°02.9'	+60.0'	7.9°	5°02.3'	+60.0'	7.9°	6°01.7'	+60.0'	7.9°	7°01.2'	+60.0'	8.0°	8°00.6'	+60.0'	8.0°	8°00.6'	+60.0'	8.0°	9°00.0'	+60.0'	62.7°	9
10	4°03.5'	+60.0'	7.9°	5°02.9'	+60.0'	7.9°	6°02.3'	+60.0'	7.9°	7°01.7'	+60.0'	7.9°	8°01.2'	+60.0'	8.0°	9°00.6'	+60.0'	8.0°	9°00.6'	+60.0'	8.0°	10°00.0'	+60.0'	23.0°	10
11	5°03.4'	+60.0'	7.9°	6°02.9'	+60.0'	7.9°	7°02.3'	+60.0'	7.9°	8°01.7'	+60.0'	7.9°	9°01.2'	+60.0'	8.0°	10°00.6'	+60.0'	8.0°	10°00.6'	+60.0'	8.0°	11°00.0'	+60.0'	22.6°	11
12	6°03.4'	+60.0'	7.9°	7°02.9'	+60.0'	7.9°	8°02.3'	+60.0'	7.9°	9°01.7'	+60.0'	7.9°	10°01.2'	+60.0'	7.9°	11°00.6'	+60.0'	8.0°	11°00.6'	+60.0'	8.0°	12°00.0'	+60.0'	62.4°	12
13	7°03.4'	+60.0'	7.9°	8°02.9'	+60.0'	7.9°	9°02.3'	+60.0'	7.9°	10°01.7'	+60.0'	7.9°	11°01.2'	+60.0'	7.9°	12°00.6'	+60.0'	8.0°	12°00.6'	+60.0'	8.0°	13°00.0'	+60.0'	62.3°	13
14	8°03.4'	+60.0'	7.8°	9°02.9'	+60.0'	7.9°	10°02.3'	+60.0'	7.9°	11°01.7'	+60.0'	7.9°	12°01.2'	+60.0'	7.9°	13°00.6'	+60.0'	8.0°	13°00.6'	+60.0'	8.0°	14°00.0'	+60.0'	0.0°	14
15	9°03.4'	+60.0'	7.8°	10°02.9'	+60.0'	7.8°	11°02.3'	+60.0'	7.9°	12°01.7'	+60.0'	7.9°	13°01.2'	+60.0'	7.9°	14°00.6'	+60.0'	8.0°	14°00.6'	+60.0'	8.0°	15°00.0'	+60.0'	20.3°	15
16	10°03.4'	+60.0'	7.8°	11°02.9'	+60.0'	7.8°	12°02.3'	+60.0'	7.9°	13°01.7'	+60.0'	7.9°	14°01.2'	+60.0'	7.9°	15°00.6'	+60.0'	8.0°	15°00.6'	+60.0'	8.0°	16°00.0'	+60.0'	19.5°	16
17	11°03.4'	+60.0'	7.8°	12°02.9'	+60.0'	7.8°	13°02.3'	+60.0'	7.9°	14°01.7'	+60.0'	7.9°	15°01.2'	+60.0'	7.9°	16°00.6'	+60.0'	8.0°	16°00.6'	+60.0'	8.0°	17°00.0'	+60.0'	18.6°	17
18	12°03.4'	+60.0'	7.8°	13°02.8'	+60.0'	7.8°	14°02.3'	+60.0'	7.8°	15°01.7'	+60.0'	7.9°	16°01.2'	+60.0'	7.9°	17°00.6'	+60.0'	8.0°	17°00.6'	+60.0'	8.0°	18°00.0'	+60.0'	17.7°	18
19	13°03.4'	+60.0'	7.8°	14°02.8'	+60.0'	7.8°	15°02.3'	+60.0'	7.8°	16°01.7'	+60.0'	7.9°	17°01.2'	+60.0'	7.9°	18°00.6'	+60.0'	8.0°	18°00.6'	+60.0'	8.0°	19°00.0'	+60.0'	16.6°	19
20	14°03.4'	+60.0'	7.7°	15°02.8'	+60.0'	7.8°	16°02.3'	+60.0'	7.8°	17°01.7'	+60.0'	7.9°	18°01.2'	+60.0'	7.9°	19°00.6'	+60.0'	8.0°	19°00.6'	+60.0'	8.0°	20°00.0'	+60.0'	15.3°	20
21	15°03.4'	+60.0'	7.7°	16°02.8'	+60.0'	7.8°	17°02.3'	+60.0'	7.8°	18°01.7'	+60.0'	7.9°	19°01.2'	+60.0'	7.9°	20°00.6'	+60.0'	8.0°	20°00.6'	+60.0'	8.0°	21°00.0'	+60.0'	13.9°	21
22	16°03.4'	+60.0'	7.7°	17°02.8'	+60.0'	7.8°	18°02.3'	+60.0'	7.8°	19°01.7'	+60.0'	7.8°	20°01.2'	+60.0'	7.9°	21°00.6'	+60.0'	8.0°	21°00.6'	+60.0'	8.0°	22°00.0'	+60.0'	12.2°	22
23	17°03.4'	+60.0'	7.7°	18°02.8'	+60.0'	7.7°	19°02.3'	+60.0'	7.8°	20°01.7'	+60.0'	7.8°	21°01.2'	+60.0'	7.9°	22°00.6'	+60.0'	8.0°	22°00.6'	+60.0'	8.0°	23°00.0'	+60.0'	90.0°	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°
	84			85			86			87			88			89			90						

172° 188° LHA

Latitude SAME as DECLINATION

172° 188° 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°	84			85			86			87			88			89			90			Dec°			
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°				
0	5°57.3'	-60.0'	173.0°	4°57.8'	-60.0'	173.0°	3°58.2'	-60.0'	173.0°	2°58.7'	-60.0'	173.0°	1°59.1'	-60.0'	173.0°	<u>0°59.6' -60.0' 173.0°</u>	<u>0°00.0' -60.0' 173.0°</u>					0			
1	4°57.3'	-60.0'	173.0°	3°57.8'	-60.0'	173.0°	2°58.2'	-60.0'	173.0°	1°58.7'	-60.0'	173.0°	<u>0°59.1' -60.0' 173.0°</u>	0°00.4'	+60.0'	7.0°	0°00.4'	+60.0'	7.0°	0°00.4'	+60.0'	0.0°	1		
2	3°57.3'	-60.0'	173.0°	2°57.8'	-60.0'	173.0°	1°58.2'	-60.0'	173.0°	<u>0°58.7' -60.0' 173.0°</u>	0°00.9'	+60.0'	7.0°	1°00.4'	+60.0'	7.0°	1°00.4'	+60.0'	7.0°	2°00.0'	+60.0'	0.0°	2		
3	2°57.3'	-60.0'	173.0°	1°57.8'	-60.0'	173.0°	<u>0°58.2' -60.0' 173.0°</u>	0°01.3'	+60.0'	7.0°	1°00.9'	+60.0'	7.0°	2°00.4'	+60.0'	7.0°	2°00.4'	+60.0'	7.0°	3°00.0'	+60.0'	24.8°	3		
4	1°57.3'	-60.0'	173.0°	<u>0°57.8' -60.0' 173.0°</u>	0°01.8'	+60.0'	7.0°	1°01.3'	+60.0'	7.0°	2°00.9'	+60.0'	7.0°	3°00.4'	+60.0'	7.0°	3°00.4'	+60.0'	7.0°	4°00.0'	+60.0'	24.7°	4		
5	<u>0°57.3' -60.0' 173.0°</u>	0°02.2'	+60.0'	7.0°	1°01.8'	+60.0'	7.0°	2°01.3'	+60.0'	7.0°	3°00.9'	+60.0'	7.0°	4°00.4'	+60.0'	7.0°	4°00.4'	+60.0'	7.0°	5°00.0'	+60.0'	24.5°	5		
6	0°02.7'	+60.0'	7.0°	1°02.2'	+60.0'	7.0°	2°01.8'	+60.0'	7.0°	3°01.3'	+60.0'	7.0°	4°00.9'	+60.0'	7.0°	5°00.4'	+60.0'	7.0°	5°00.4'	+60.0'	7.0°	6°00.0'	+60.0'	24.3°	6
7	1°02.7'	+60.0'	6.9°	2°02.2'	+60.0'	7.0°	3°01.8'	+60.0'	7.0°	4°01.3'	+60.0'	7.0°	5°00.9'	+60.0'	7.0°	6°00.4'	+60.0'	7.0°	6°00.4'	+60.0'	7.0°	7°00.0'	+60.0'	0.0°	7
8	2°02.7'	+60.0'	6.9°	3°02.2'	+60.0'	6.9°	4°01.8'	+60.0'	6.9°	5°01.3'	+60.0'	7.0°	6°00.9'	+60.0'	7.0°	7°00.4'	+60.0'	7.0°	7°00.4'	+60.0'	7.0°	8°00.0'	+60.0'	0.0°	8
9	3°02.6'	+60.0'	6.9°	4°02.2'	+60.0'	6.9°	5°01.8'	+60.0'	6.9°	6°01.3'	+60.0'	7.0°	7°00.9'	+60.0'	7.0°	8°00.4'	+60.0'	7.0°	8°00.4'	+60.0'	7.0°	9°00.0'	+60.0'	62.7°	9
10	4°02.6'	+60.0'	6.9°	5°02.2'	+60.0'	6.9°	6°01.8'	+60.0'	6.9°	7°01.3'	+60.0'	6.9°	8°00.9'	+60.0'	7.0°	9°00.4'	+60.0'	7.0°	9°00.4'	+60.0'	7.0°	10°00.0'	+60.0'	23.0°	10
11	5°02.6'	+60.0'	6.9°	6°02.2'	+60.0'	6.9°	7°01.8'	+60.0'	6.9°	8°01.3'	+60.0'	6.9°	9°00.9'	+60.0'	7.0°	10°00.4'	+60.0'	7.0°	10°00.4'	+60.0'	7.0°	11°00.0'	+60.0'	22.6°	11
12	6°02.6'	+60.0'	6.9°	7°02.2'	+60.0'	6.9°	8°01.8'	+60.0'	6.9°	9°01.3'	+60.0'	6.9°	10°00.9'	+60.0'	7.0°	11°00.4'	+60.0'	7.0°	11°00.4'	+60.0'	7.0°	12°00.0'	+60.0'	62.4°	12
13	7°02.6'	+60.0'	6.9°	8°02.2'	+60.0'	6.9°	9°01.8'	+60.0'	6.9°	10°01.3'	+60.0'	6.9°	11°00.9'	+60.0'	6.9°	12°00.4'	+60.0'	7.0°	12°00.4'	+60.0'	7.0°	13°00.0'	+60.0'	62.3°	13
14	8°02.6'	+60.0'	6.9°	9°02.2'	+60.0'	6.9°	10°01.8'	+60.0'	6.9°	11°01.3'	+60.0'	6.9°	12°00.9'	+60.0'	6.9°	13°00.4'	+60.0'	7.0°	13°00.4'	+60.0'	7.0°	14°00.0'	+60.0'	0.0°	14
15	9°02.6'	+60.0'	6.8°	10°02.2'	+60.0'	6.9°	11°01.8'	+60.0'	6.9°	12°01.3'	+60.0'	6.9°	13°00.9'	+60.0'	6.9°	14°00.4'	+60.0'	7.0°	14°00.4'	+60.0'	7.0°	15°00.0'	+60.0'	20.3°	15
16	10°02.6'	+60.0'	6.8°	11°02.2'	+60.0'	6.9°	12°01.8'	+60.0'	6.9°	13°01.3'	+60.0'	6.9°	14°00.9'	+60.0'	6.9°	15°00.4'	+60.0'	7.0°	15°00.4'	+60.0'	7.0°	16°00.0'	+60.0'	19.5°	16
17	11°02.6'	+60.0'	6.8°	12°02.2'	+60.0'	6.8°	13°01.8'	+60.0'	6.9°	14°01.3'	+60.0'	6.9°	15°00.9'	+60.0'	6.9°	16°00.4'	+60.0'	7.0°	16°00.4'	+60.0'	7.0°	17°00.0'	+60.0'	18.6°	17
18	12°02.6'	+60.0'	6.8°	13°02.2'	+60.0'	6.8°	14°01.8'	+60.0'	6.9°	15°01.3'	+60.0'	6.9°	16°00.9'	+60.0'	6.9°	17°00.4'	+60.0'	7.0°	17°00.4'	+60.0'	7.0°	18°00.0'	+60.0'	17.7°	18
19	13°02.6'	+60.0'	6.8°																						

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

6° 354° LHA			Latitude CONTRARY to Declination						6° 354° LHA													
Dec°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	5°58.0'	-60.0'	174.0°	4°58.4'	-60.0'	174.0°	3°58.7'	-60.0'	174.0°	2°59.0'	-60.0'	174.0°	1°59.3'	-60.0'	174.0°	0°59.7'	-60.0'	174.0°	0°00.0'	-60.0'	174.0°	0
1	4°58.0'	-60.0'	174.0°	3°58.4'	-60.0'	174.0°	2°58.7'	-60.0'	174.0°	1°59.0'	-60.0'	174.0°	0°59.3'	-60.0'	174.0°	0°00.3'	+60.0'	6.0°	0°00.0'	+60.0'	0.0°	1
2	3°58.0'	-60.0'	174.0°	2°58.4'	-60.0'	174.0°	1°58.7'	-60.0'	174.0°	0°59.0'	-60.0'	174.0°	0°00.7'	+60.0'	6.0°	1°00.3'	+60.0'	6.0°	2°00.0'	+60.0'	0.0°	2
3	2°58.0'	-60.0'	174.0°	1°58.4'	-60.0'	174.0°	0°58.7'	-60.0'	174.0°	0°01.0'	+60.0'	6.0°	1°00.7'	+60.0'	6.0°	2°00.3'	+60.0'	6.0°	3°00.0'	+60.0'	24.8°	3
4	1°58.0'	-60.0'	174.0°	0°58.4'	-60.0'	174.0°	0°01.3'	+60.0'	6.0°	1°01.0'	+60.0'	6.0°	2°00.7'	+60.0'	6.0°	3°00.3'	+60.0'	6.0°	4°00.0'	+60.0'	24.7°	4
5	0°58.0'	-60.0'	174.0°	0°01.6'	+60.0'	6.0°	1°01.3'	+60.0'	6.0°	2°01.0'	+60.0'	6.0°	3°00.7'	+60.0'	6.0°	4°00.3'	+60.0'	6.0°	5°00.0'	+60.0'	24.5°	5
6	0°02.0'	+60.0'	6.0°	1°01.6'	+60.0'	6.0°	2°01.3'	+60.0'	6.0°	3°01.0'	+60.0'	6.0°	4°00.7'	+60.0'	6.0°	5°00.3'	+60.0'	6.0°	6°00.0'	+60.0'	24.3°	6
7	1°02.0'	+60.0'	6.0°	2°01.6'	+60.0'	6.0°	3°01.3'	+60.0'	6.0°	4°01.0'	+60.0'	6.0°	5°00.7'	+60.0'	6.0°	6°00.3'	+60.0'	6.0°	7°00.0'	+60.0'	0.0°	7
8	2°02.0'	+60.0'	5.9°	3°01.6'	+60.0'	5.9°	4°01.3'	+60.0'	6.0°	5°01.0'	+60.0'	6.0°	6°00.7'	+60.0'	6.0°	7°00.3'	+60.0'	6.0°	8°00.0'	+60.0'	0.0°	8
9	3°01.9'	+60.0'	5.9°	4°01.6'	+60.0'	5.9°	5°01.3'	+60.0'	5.9°	6°01.0'	+60.0'	6.0°	7°00.7'	+60.0'	6.0°	8°00.3'	+60.0'	6.0°	9°00.0'	+60.0'	62.7°	9
10	4°01.9'	+60.0'	5.9°	5°01.6'	+60.0'	5.9°	6°01.3'	+60.0'	5.9°	7°01.0'	+60.0'	6.0°	8°00.7'	+60.0'	6.0°	9°00.3'	+60.0'	6.0°	10°00.0'	+60.0'	23.0°	10
11	5°01.9'	+60.0'	5.9°	6°01.6'	+60.0'	5.9°	7°01.3'	+60.0'	5.9°	8°01.0'	+60.0'	5.9°	9°00.7'	+60.0'	6.0°	10°00.3'	+60.0'	6.0°	11°00.0'	+60.0'	22.6°	11
12	6°01.9'	+60.0'	5.9°	7°01.6'	+60.0'	5.9°	8°01.3'	+60.0'	5.9°	9°01.0'	+60.0'	5.9°	10°00.7'	+60.0'	6.0°	11°00.3'	+60.0'	6.0°	12°00.0'	+60.0'	62.4°	12
13	7°01.9'	+60.0'	5.9°	8°01.6'	+60.0'	5.9°	9°01.3'	+60.0'	5.9°	10°01.0'	+60.0'	5.9°	11°00.7'	+60.0'	6.0°	12°00.3'	+60.0'	6.0°	13°00.0'	+60.0'	62.3°	13
14	8°01.9'	+60.0'	5.9°	9°01.6'	+60.0'	5.9°	10°01.3'	+60.0'	5.9°	11°01.0'	+60.0'	5.9°	12°00.7'	+60.0'	6.0°	13°00.3'	+60.0'	6.0°	14°00.0'	+60.0'	0.0°	14
15	9°01.9'	+60.0'	5.9°	10°01.6'	+60.0'	5.9°	11°01.3'	+60.0'	5.9°	12°01.0'	+60.0'	5.9°	13°00.7'	+60.0'	5.9°	14°00.3'	+60.0'	6.0°	15°00.0'	+60.0'	20.3°	15
16	10°01.9'	+60.0'	5.9°	11°01.6'	+60.0'	5.9°	12°01.3'	+60.0'	5.9°	13°01.0'	+60.0'	5.9°	14°00.7'	+60.0'	5.9°	15°00.3'	+60.0'	6.0°	16°00.0'	+60.0'	19.5°	16
17	11°01.9'	+60.0'	5.8°	12°01.6'	+60.0'	5.9°	13°01.3'	+60.0'	5.9°	14°01.0'	+60.0'	5.9°	15°00.7'	+60.0'	5.9°	16°00.3'	+60.0'	6.0°	17°00.0'	+60.0'	18.6°	17
18	12°01.9'	+60.0'	5.8°	13°01.6'	+60.0'	5.9°	14°01.3'	+60.0'	5.9°	15°01.0'	+60.0'	5.9°	16°00.7'	+60.0'	5.9°	17°00.3'	+60.0'	6.0°	18°00.0'	+60.0'	17.7°	18
19	13°01.9'	+60.0'	5.8°	14°01.6'	+60.0'	5.8°	15°01.3'	+60.0'	5.9°	16°01.0'	+60.0'	5.9°	17°00.6'	+60.0'	5.9°	18°00.3'	+60.0'	6.0°	19°00.0'	+60.0'	16.6°	19
20	14°01.9'	+60.0'	5.8°	15°01.6'	+60.0'	5.8°	16°01.3'	+60.0'	5.9°	17°01.0'	+60.0'	5.9°	18°00.6'	+60.0'	5.9°	19°00.3'	+60.0'	6.0°	20°00.0'	+60.0'	15.3°	20
21	15°01.9'	+60.0'	5.8°	16°01.6'	+60.0'	5.8°	17°01.3'	+60.0'	5.9°	18°01.0'	+60.0'	5.9°	19°00.6'	+60.0'	5.9°	20°00.3'	+60.0'	6.0°	21°00.0'	+60.0'	13.9°	21
22	16°01.9'	+60.0'	5.8°	17°01.6'	+60.0'	5.8°	18°01.3'	+60.0'	5.8°	19°01.0'	+60.0'	5.9°	20°00.6'	+60.0'	5.9°	21°00.3'	+60.0'	6.0°	22°00.0'	+60.0'	12.2°	22
23	17°01.9'	+60.0'	5.8°	18°01.6'	+60.0'	5.8°	19°01.3'	+60.0'	5.8°	20°01.0'	+60.0'	5.9°	21°00.6'	+60.0'	5.9°	22°00.3'	+60.0'	6.0°	23°00.0'	+60.0'	90.0°	23
Dec°	84			85			86			87			88			89			90			Dec°

174° 186° LHA

Latitude SAME as DECLINATION

174° 186° 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°	84			85			86			87			88			89			90			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	5°58.6'	-60.0'	175.0°	4°58.9'	-60.0'	175.0°	3°59.1'	-60.0'	175.0°	2°59.3'	-60.0'	175.0°	1°59.5'	-60.0'	175.0°	0°59.8'	-60.0'	175.0°	0°00.0'	-60.0'	175.0°	0
1	4°58.6'	-60.0'	175.0°	3°58.9'	-60.0'	175.0°	2°59.1'	-60.0'	175.0°	1°59.3'	-60.0'	175.0°	0°59.5'	-60.0'	175.0°	0°00.2'	+60.0'	5.0°	0°00.0'	+60.0'	0.0°	1
2	3°58.6'	-60.0'	175.0°	2°58.9'	-60.0'	175.0°	1°59.1'	-60.0'	175.0°	0°59.3'	-60.0'	175.0°	0°00.5'	+60.0'	5.0°	1°00.2'	+60.0'	5.0°	2°00.0'	+60.0'	0.0°	2
3	2°58.6'	-60.0'	175.0°	1°58.9'	-60.0'	175.0°	0°59.1'	-60.0'	175.0°	0°00.7'	+60.0'	5.0°	1°00.5'	+60.0'	5.0°	2°00.2'	+60.0'	5.0°	3°00.0'	+60.0'	24.8°	3
4	1°58.6'	-60.0'	175.0°	0°58.9'	-60.0'	175.0°	0°00.9'	+60.0'	5.0°	1°00.7'	+60.0'	5.0°	2°00.5'	+60.0'	5.0°	3°00.2'	+60.0'	5.0°	4°00.0'	+60.0'	24.7°	4
5	0°58.6'	-60.0'	175.0°	0°01.1'	+60.0'	5.0°	1°00.9'	+60.0'	5.0°	2°00.7'	+60.0'	5.0°	3°00.5'	+60.0'	5.0°	4°00.2'	+60.0'	5.0°	5°00.0'	+60.0'	24.5°	5
6	0°01.4'	+60.0'	5.0°	1°01.1'	+60.0'	5.0°	2°00.9'	+60.0'	5.0°	3°00.7'	+60.0'	5.0°	4°00.5'	+60.0'	5.0°	5°00.2'	+60.0'	5.0°	6°00.0'	+60.0'	24.3°	6
7	1°01.4'	+60.0'	5.0°	2°01.1'	+60.0'	5.0°	3°00.9'	+60.0'	5.0°	4°00.7'	+60.0'	5.0°	5°00.5'	+60.0'	5.0°	6°00.2'	+60.0'	5.0°	7°00.0'	+60.0'	0.0°	7
8	2°01.4'	+60.0'	5.0°	3°01.1'	+60.0'	5.0°	4°00.9'	+60.0'	5.0°	5°00.7'	+60.0'	5.0°	6°00.5'	+60.0'	5.0°	7°00.2'	+60.0'	5.0°	8°00.0'	+60.0'	0.0°	8
9	3°01.4'	+60.0'	4.9°	4°01.1'	+60.0'	5.0°	5°00.9'	+60.0'	5.0°	6°00.7'	+60.0'	5.0°	7°00.5'	+60.0'	5.0°	8°00.2'	+60.0'	5.0°	9°00.0'	+60.0'	62.7°	9
10	4°01.3'	+60.0'	4.9°	5°01.1'	+60.0'	4.9°	6°00.9'	+60.0'	5.0°	7°00.7'	+60.0'	5.0°	8°00.5'	+60.0'	5.0°	9°00.2'	+60.0'	5.0°	10°00.0'	+60.0'	23.0°	10
11	5°01.3'	+60.0'	4.9°	6°01.1'	+60.0'	4.9°	7°00.9'	+60.0'	4.9°	8°00.7'	+60.0'	5.0°	9°00.5'	+60.0'	5.0°	10°00.2'	+60.0'	5.0°	11°00.0'	+60.0'	22.6°	11
12	6°01.3'	+60.0'	4.9°	7°01.1'	+60.0'	4.9°	8°00.9'	+60.0'	4.9°	9°00.7'	+60.0'	5.0°	10°00.5'	+60.0'	5.0°	11°00.2'	+60.0'	5.0°	12°00.0'	+60.0'	62.4°	12
13	7°01.3'	+60.0'	4.9°	8°01.1'	+60.0'	4.9°	9°00.9'	+60.0'	4.9°	10°00.7'	+60.0'	4.9°	11°00.5'	+60.0'	5.0°	12°00.2'	+60.0'	5.0°	13°00.0'	+60.0'	62.3°	13
14	8°01.3'	+60.0'	4.9°	9°01.1'	+60.0'	4.9°	10°00.9'	+60.0'	4.9°	11°00.7'	+60.0'	4.9°	12°00.5'	+60.0'	5.0°	13°00.2'	+60.0'	5.0°	14°00.0'	+60.0'	0.0°	14
15	9°01.3'	+60.0'	4.9°	10°01.1'	+60.0'	4.9°	11°00.9'	+60.0'	4.9°	12°00.7'	+60.0'	4.9°	13°00.5'	+60.0'	5.0°	14°00.2'	+60.0'	5.0°	15°00.0'	+60.0'	20.3°	15
16	10°01.3'	+60.0'	4.9°	11°01.1'	+60.0'	4.9°	12°00.9'	+60.0'	4.9°	13°00.7'	+60.0'	4.9°	14°00.5'	+60.0'	5.0°	15°00.2'	+60.0'	5.0°	16°00.0'	+60.0'	19.5°	16
17	11°01.3'	+60.0'	4.9°	12°01.1'	+60.0'	4.9°	13°00.9'	+60.0'	4.9°	14°00.7'	+60.0'	4.9°	15°00.5'	+60.0'	5.0°	16°00.2'	+60.0'	5.0°	17°00.0'	+60.0'	18.6°	17
18	12°01.3'	+60.0'	4.9°	13°01.1'	+60.0'	4.9°	14°00.9'	+60.0'	4.9°	15°00.7'	+60.0'	4.9°	16°00.5'	+60.0'	4.9°	17°00.2'	+60.0'	5.0°	18°00.0'	+60.0'	17.7°	18
19	13°01.3'	+60.0'	4.9°	14°01.1'	+60.0'	4.9°	15°00.9'	+60.0'	4.9°	16°00.7'	+60.0'	4.9°	17°00.5'	+60.0'	4.9°	18°00.2'	+60.0'	5.0°	19°00.0'	+60.0'	16.6°	19
20	14°01.3'	+60.0'	4.8°	15°01.1'	+60.0'	4.9°	16°00.9'	+60.0'	4.9°	17°00.7'	+60.0'	4.9°	18°00.5'	+60.0'	4.9°	19°00.2'	+60.0'	5.0°	20°00.0'	+60.0'	15.3°	20
21	15°01.3'	+60.0'	4.8°	16°01.1'	+60.0'	4.9°	17°00.9'	+60.0'	4.9°	18°00.7'	+60.0'	4.9°	19°00.5'	+60.0'	4.9°	20°00.2'	+60.0'	5.0°	21°00.0'	+60.0'	13.9°	21
22	16°01.3'	+60.0'	4.8°	17°01.1'	+60.0'	4.8°	18°00.9'	+60.0'	4.9°	19°00.7'	+60.0'	4.9°	20°00.5'	+60.0'	4.9°	21°00.2'	+60.0'	5.0°	22°00.0'	+60.0'	12.2°	22
23	17°01.3'	+60.0'	4.8°	18°01.1'	+60.0'	4.8°	19°00.9'	+60.0'	4.9°	20°00.7'	+60.0'	4.9°	21°00.5'	+60.0'	4.9°	22°00.2'	+60.0'	5.0°	23°00.0'	+60.0'	90.0°	23
Dec°	84			85			86			87			88			89			90			Dec°

175° 185° LHA

Latitude SAME as DECLINATION

175° 185° LHA

South Lat. LHA > 180°

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

4° 356° LHA			Latitude CONTRARY to Declination							4° 356° LHA															
Dec°	84			85			86			87			88			89			90			Dec°			
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°				
0	5°59.1'	-60.0'	176.0°	4°59.3'	-60.0'	176.0°	3°59.4'	-60.0'	176.0°	2°59.6'	-60.0'	176.0°	1°59.7'	-60.0'	176.0°	<u>0°59.9' -60.0' 176.0°</u>	<u>0°00.0' -60.0' 176.0°</u>	0°00.0'	-60.0'	176.0°	0				
1	4°59.1'	-60.0'	176.0°	3°59.3'	-60.0'	176.0°	2°59.4'	-60.0'	176.0°	1°59.6'	-60.0'	176.0°	<u>0°59.7' -60.0' 176.0°</u>	0°00.1'	+60.0'	4.0°	0°00.1'	+60.0'	4.0°	0°60.0'	+60.0'	0.0°	1		
2	3°59.1'	-60.0'	176.0°	2°59.3'	-60.0'	176.0°	1°59.4'	-60.0'	176.0°	<u>0°59.6' -60.0' 176.0°</u>	0°00.3'	+60.0'	4.0°	1°00.1'	+60.0'	4.0°	1°00.1'	+60.0'	4.0°	2°00.0'	+60.0'	0.0°	2		
3	2°59.1'	-60.0'	176.0°	1°59.3'	-60.0'	176.0°	<u>0°59.4' -60.0' 176.0°</u>	0°00.4'	+60.0'	4.0°	1°00.3'	+60.0'	4.0°	2°00.1'	+60.0'	4.0°	2°00.1'	+60.0'	4.0°	3°00.0'	+60.0'	24.8°	3		
4	1°59.1'	-60.0'	176.0°	<u>0°59.3' -60.0' 176.0°</u>	0°00.6'	+60.0'	4.0°	1°00.4'	+60.0'	4.0°	2°00.3'	+60.0'	4.0°	3°00.1'	+60.0'	4.0°	3°00.1'	+60.0'	4.0°	4°00.0'	+60.0'	24.7°	4		
5	<u>0°59.1' -60.0' 176.0°</u>	0°00.7'	+60.0'	4.0°	1°00.6'	+60.0'	4.0°	2°00.4'	+60.0'	4.0°	3°00.3'	+60.0'	4.0°	4°00.1'	+60.0'	4.0°	4°00.1'	+60.0'	4.0°	5°00.0'	+60.0'	24.5°	5		
6	0°00.9'	+60.0'	4.0°	1°00.7'	+60.0'	4.0°	2°00.6'	+60.0'	4.0°	3°00.4'	+60.0'	4.0°	4°00.3'	+60.0'	4.0°	5°00.1'	+60.0'	4.0°	5°00.1'	+60.0'	4.0°	6°00.0'	+60.0'	24.3°	6
7	1°00.9'	+60.0'	4.0°	2°00.7'	+60.0'	4.0°	3°00.6'	+60.0'	4.0°	4°00.4'	+60.0'	4.0°	5°00.3'	+60.0'	4.0°	6°00.1'	+60.0'	4.0°	6°00.1'	+60.0'	4.0°	7°00.0'	+60.0'	0.0°	7
8	2°00.9'	+60.0'	4.0°	3°00.7'	+60.0'	4.0°	4°00.6'	+60.0'	4.0°	5°00.4'	+60.0'	4.0°	6°00.3'	+60.0'	4.0°	7°00.1'	+60.0'	4.0°	7°00.1'	+60.0'	4.0°	8°00.0'	+60.0'	0.0°	8
9	3°00.9'	+60.0'	4.0°	4°00.7'	+60.0'	4.0°	5°00.6'	+60.0'	4.0°	6°00.4'	+60.0'	4.0°	7°00.3'	+60.0'	4.0°	8°00.1'	+60.0'	4.0°	8°00.1'	+60.0'	4.0°	9°00.0'	+60.0'	62.7°	9
10	4°00.9'	+60.0'	3.9°	5°00.7'	+60.0'	4.0°	6°00.6'	+60.0'	4.0°	7°00.4'	+60.0'	4.0°	8°00.3'	+60.0'	4.0°	9°00.1'	+60.0'	4.0°	9°00.1'	+60.0'	4.0°	10°00.0'	+60.0'	23.0°	10
11	5°00.9'	+60.0'	3.9°	6°00.7'	+60.0'	3.9°	7°00.6'	+60.0'	4.0°	8°00.4'	+60.0'	4.0°	9°00.3'	+60.0'	4.0°	10°00.1'	+60.0'	4.0°	10°00.1'	+60.0'	4.0°	11°00.0'	+60.0'	22.6°	11
12	6°00.9'	+60.0'	3.9°	7°00.7'	+60.0'	3.9°	8°00.6'	+60.0'	4.0°	9°00.4'	+60.0'	4.0°	10°00.3'	+60.0'	4.0°	11°00.1'	+60.0'	4.0°	11°00.1'	+60.0'	4.0°	12°00.0'	+60.0'	62.4°	12
13	7°00.9'	+60.0'	3.9°	8°00.7'	+60.0'	3.9°	9°00.6'	+60.0'	3.9°	10°00.4'	+60.0'	4.0°	11°00.3'	+60.0'	4.0°	12°00.1'	+60.0'	4.0°	12°00.1'	+60.0'	4.0°	13°00.0'	+60.0'	62.3°	13
14	8°00.9'	+60.0'	3.9°	9°00.7'	+60.0'	3.9°	10°00.6'	+60.0'	3.9°	11°00.4'	+60.0'	4.0°	12°00.3'	+60.0'	4.0°	13°00.1'	+60.0'	4.0°	13°00.1'	+60.0'	4.0°	14°00.0'	+60.0'	0.0°	14
15	9°00.9'	+60.0'	3.9°	10°00.7'	+60.0'	3.9°	11°00.6'	+60.0'	3.9°	12°00.4'	+60.0'	4.0°	13°00.3'	+60.0'	4.0°	14°00.1'	+60.0'	4.0°	14°00.1'	+60.0'	4.0°	15°00.0'	+60.0'	20.3°	15
16	10°00.9'	+60.0'	3.9°	11°00.7'	+60.0'	3.9°	12°00.6'	+60.0'	3.9°	13°00.4'	+60.0'	3.9°	14°00.3'	+60.0'	4.0°	15°00.1'	+60.0'	4.0°	15°00.1'	+60.0'	4.0°	16°00.0'	+60.0'	19.5°	16
17	11°00.9'	+60.0'	3.9°	12°00.7'	+60.0'	3.9°	13°00.6'	+60.0'	3.9°	14°00.4'	+60.0'	3.9°	15°00.3'	+60.0'	4.0°	16°00.1'	+60.0'	4.0°	16°00.1'	+60.0'	4.0°	17°00.0'	+60.0'	18.6°	17
18	12°00.9'	+60.0'	3.9°	13°00.7'	+60.0'	3.9°	14°00.6'	+60.0'	3.9°	15°00.4'	+60.0'	3.9°	16°00.3'	+60.0'	4.0°	17°00.1'	+60.0'	4.0°	17°00.1'	+60.0'	4.0°	18°00.0'	+60.0'	17.7°	18
19	13°00.8'	+60.0'	3.9°	14°00.7'	+60.0'	3.9°	15°00.6'	+60.0'	3.9°	16°00.4'	+60.0'	3.9°	17°00.3'	+60.0'	4.0°	18°00.1'	+60.0'	4.0°	18°00.1'	+60.0'	4.0°	19°00.0'	+60.0'	16.6°	19
20	14°00.8'	+60.0'	3.9°	15°00.7'	+60.0'	3.9°	16°00.6'	+60.0'	3.9°	17°00.4'	+60.0'	3.9°	18°00.3'	+60.0'	4.0°	19°00.1'	+60.0'	4.0°	19°00.1'	+60.0'	4.0°	20°00.0'	+60.0'	15.3°	20
21	15°00.8'	+60.0'	3.9°	16°00.7'	+60.0'	3.9°	17°00.6'	+60.0'	3.9°	18°00.4'	+60.0'	3.9°	19°00.3'	+60.0'	3.9°	20°00.1'	+60.0'	4.0°	20°00.1'	+60.0'	4.0°	21°00.0'	+60.0'	13.9°	21
22	16°00.8'	+60.0'	3.9°	17°00.7'	+60.0'	3.9°	18°00.6'	+60.0'	3.9°	19°00.4'	+60.0'	3.9°	20°00.3'	+60.0'	3.9°	21°00.1'	+60.0'	4.0°	21°00.1'	+60.0'	4.0°	22°00.0'	+60.0'	12.2°	22
23	17°00.8'	+60.0'	3.9°	18°00.7'	+60.0'	3.9°	19°00.6'	+60.0'	3.9°	20°00.4'	+60.0'	3.9°	21°00.3'	+60.0'	3.9°	22°00.1'	+60.0'	4.0°	22°00.1'	+60.0'	4.0°	23°00.0'	+60.0'	90.0°	23
Dec°	84			85			86			87			88			89			90			Dec°			

176° 184° LHA

Latitude SAME as DECLINATION

176° 184° 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°	84			85			86			87			88			89			90			Dec°			
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°				
0	5°59.5'	-60.0'	177.0°	4°59.6'	-60.0'	177.0°	3°59.7'	-60.0'	177.0°	2°59.8'	-60.0'	177.0°	1°59.8'	-60.0'	177.0°	<u>0°59.9' -60.0' 177.0°</u>	<u>0°00.0' -60.0' 177.0°</u>	0°00.0'	-60.0'	177.0°	0				
1	4°59.5'	-60.0'	177.0°	3°59.6'	-60.0'	177.0°	2°59.7'	-60.0'	177.0°	1°59.8'	-60.0'	177.0°	<u>0°59.8' -60.0' 177.0°</u>	0°00.1'	+60.0'	3.0°	0°00.1'	+60.0'	3.0°	0°60.0'	+60.0'	0.0°	1		
2	3°59.5'	-60.0'	177.0°	2°59.6'	-60.0'	177.0°	1°59.7'	-60.0'	177.0°	<u>0°59.8' -60.0' 177.0°</u>	0°00.2'	+60.0'	3.0°	1°00.1'	+60.0'	3.0°	1°00.1'	+60.0'	3.0°	2°00.0'	+60.0'	0.0°	2		
3	2°59.5'	-60.0'	177.0°	1°59.6'	-60.0'	177.0°	<u>0°59.7' -60.0' 177.0°</u>	0°00.2'	+60.0'	3.0°	1°00.2'	+60.0'	3.0°	2°00.1'	+60.0'	3.0°	2°00.1'	+60.0'	3.0°	3°00.0'	+60.0'	24.8°	3		
4	1°59.5'	-60.0'	177.0°	<u>0°59.6' -60.0' 177.0°</u>	0°00.3'	+60.0'	3.0°	1°00.3'	+60.0'	3.0°	2°00.2'	+60.0'	3.0°	3°00.1'	+60.0'	3.0°	3°00.1'	+60.0'	3.0°	4°00.0'	+60.0'	24.7°	4		
5	<u>0°59.5' -60.0' 177.0°</u>	0°00.4'	+60.0'	3.0°	1°00.3'	+60.0'	3.0°	2°00.3'	+60.0'	3.0°	3°00.2'	+60.0'	3.0°	4°00.1'	+60.0'	3.0°	4°00.1'	+60.0'	3.0°	5°00.0'	+60.0'	24.5°	5		
6	0°00.5'	+60.0'	3.0°	1°00.4'	+60.0'	3.0°	2°00.3'	+60.0'	3.0°	3°00.2'	+60.0'	3.0°	4°00.2'	+60.0'	3.0°	5°00.1'	+60.0'	3.0°	5°00.1'	+60.0'	3.0°	6°00.0'	+60.0'	24.3°	6
7	1°00.5'	+60.0'	3.0°	2°00.4'	+60.0'	3.0°	3°00.3'	+60.0'	3.0°	4°00.2'	+60.0'	3.0°	5°00.2'	+60.0'	3.0°	6°00.1'	+60.0'	3.0°	6°00.1'	+60.0'	3.0°	7°00.0'	+60.0'	0.0°	7
8	2°00.5'	+60.0'	3.0°	3°00.4'	+60.0'	3.0°	4°00.3'	+60.0'	3.0°	5°00.2'	+60.0'	3.0°	6°00.2'	+60.0'	3.0°	7°00.1'	+60.0'	3.0°	7°00.1'	+60.0'	3.0°	8°00.0'	+60.0'	0.0°	8
9	3°00.5'	+60.0'	3.0°	4°00.4'	+60.0'	3.0°	5°00.3'	+60.0'	3.0°	6°00.2'	+60.0'	3.0°	7°00.2'	+60.0'	3.0°	8°00.1'	+60.0'	3.0°	8°00.1'	+60.0'	3.0°	9°00.0'	+60.0'	62.7°	9
10	4°00.5'	+60.0'	3.0°	5°00.4'	+60.0'	3.0°	6°00.3'	+60.0'	3.0°	7°00.2'	+60.0'	3.0°	8°00.2'	+60.0'	3.0°	9°00.1'	+60.0'	3.0°	9°00.1'	+60.0'	3.0°	10°00.0'	+60.0'	23.0°	10
11	5°00.5'	+60.0'	3.0°	6°00.4'	+60.0'	3.0°	7°00.3'	+60.0'	3.0°	8°00.2'	+60.0'	3.0°	9°00.2'	+60.0'	3.0°	10°00.1'	+60.0'	3.0°	10°00.1'	+60.0'	3.0°	11°00.0'	+60.0'	22.6°	11
12	6°00.5'	+60.0'	3.0°	7°00.4'	+60.0'	3.0°	8°00.3'	+60.0'	3.0°	9°00.2'	+60.0'	3.0°	10°00.2'	+60.0'	3.0°	11°00.1'	+60.0'	3.0°	11°00.1'	+60.0'	3.0°	12°00.0'	+60.0'	62.4°	12
13	7°00.5'	+60.0'	2.9°	8°00.4'	+60.0'	3.0°	9°00.3'	+60.0'	3.0°	10°00.2'	+60.0'	3.0°	11°00.2'	+60.0'	3.0°	12°00.1'	+60.0'	3.0°	12°00.1'	+60.0'	3.0°	13°00.0'	+60.0'	62.3°	13
14	8°00.5'	+60.0'	2.9°	9°00.4'	+60.0'	2.9°	10°00.3'	+60.0'	3.0°	11°00.2'	+60.0'	3.0°	12°00.2'	+60.0'	3.0°	13°00.1'	+60.0'	3.0°	13°00.1'	+60.0'	3.0°	14°00.0'	+60.0'	0.0°	14
15	9°00.5'	+60.0'	2.9°	10°00.4'	+60.0'	2.9°	11°00.3'	+60.0'	3.0°	12°00.2'	+60.0'	3.0°	13°00.2'	+60.0'	3.0°	14°00.1'	+60.0'	3.0°	14°00.1'	+60.0'	3.0°	15°00.0'	+60.0'	20.3°	15
16	10°00.5'	+60.0'	2.9°	11°00.4'	+60.0'	2.9°	12°00.3'	+60.0'	2.9°	13°00.2'	+60.0'	3.0°	14°00.2'	+60.0'	3.0°	15°00.1'	+60.0'	3.0°	15°00.1'	+60.0'	3.0°	16°00.0'	+60.0'	19.5°	16
17	11°00.5'	+60.0'	2.9°	12°00.4'	+60.0'	2.9°	13°00.3'	+60.0'	2.9°	14°00.2'	+60.0'	3.0°	15°00.2'	+60.0'	3.0°	16°00.1'	+60.0'	3.0°	16°00.1'	+60.0'	3.0°	17°00.0'	+60.0'	18.6°	17
18	12°00.5'	+60.0'	2.9°	13°00.4'	+60.0'	2.9°	14°00.3'	+60.0'	2.9°	15°00.2'	+60.0'	3.0°	16°00.2'	+60.0'	3.0°	17°00.1'	+60.0'	3.0°	17°00.1'	+60.0'	3.0°	18°00.0'	+60.0'	17.7°	18
19	13°00.5'	+60.0'	2.9°	14°00.4'	+60.0'	2.9°	15°00.3'	+60.0'	2.9°	16°00.2'	+60.0'	3.0°	17°00.2'	+60.0'	3.0°	18°00.1'	+60.0'	3.0°	18°00.						

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

0° 360° LHA				Latitude CONTRARY to Declination												0° 360° LHA									
Dec°	84			85			86			87			88			89			90			Dec°			
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°				
0	6°00.0'	-60.0'	180.0°	5°00.0'	-60.0'	180.0°	4°00.0'	-60.0'	180.0°	3°00.0'	-60.0'	180.0°	2°00.0'	-60.0'	180.0°	1°00.0'	-60.0'	180.0°	<u>0°00.0' -60.0' 180.0°</u>	0°00.0'	-60.0'	180.0°	0		
1	5°00.0'	-60.0'	180.0°	4°00.0'	-60.0'	180.0°	3°00.0'	-60.0'	180.0°	2°00.0'	-60.0'	180.0°	1°00.0'	-60.0'	180.0°	<u>0°00.0' -60.0' 180.0°</u>	0°00.0'	-60.0'	180.0°	0°60.0'	+60.0'	0.0°	1		
2	4°00.0'	-60.0'	180.0°	3°00.0'	-60.0'	180.0°	2°00.0'	-60.0'	180.0°	1°00.0'	-60.0'	180.0°	<u>0°00.0' -60.0' 180.0°</u>	0°00.0'	-60.0'	180.0°	0°60.0'	+60.0'	0.0°	2°00.0'	+60.0'	0.0°	2		
3	3°00.0'	-60.0'	180.0°	2°00.0'	-60.0'	180.0°	<u>0°60.0' -60.0' 180.0°</u>	0°00.0'	-60.0'	180.0°	<u>0°00.0' -60.0' 180.0°</u>	0°00.0'	-60.0'	180.0°	0°60.0'	+60.0'	0.0°	2°00.0'	+60.0'	0.0°	3°00.0'	+60.0'	24.8°	3	
4	2°00.0'	-60.0'	180.0°	<u>0°60.0' -60.0' 180.0°</u>	0°00.0'	+60.0'	0.0°	0°00.0'	+60.0'	0.0°	0°60.0'	+60.0'	0.0°	1°60.0'	+60.0'	0.0°	3°00.0'	+60.0'	0.0°	4°00.0'	+60.0'	24.7°	4		
5	<u>1°00.0' -60.0' 180.0°</u>	0°00.0'	+60.0'	0.0°	1°00.0'	+60.0'	0.0°	1°00.0'	+60.0'	0.0°	1°60.0'	+60.0'	0.0°	2°60.0'	+60.0'	0.0°	4°00.0'	+60.0'	0.0°	5°00.0'	+60.0'	24.5°	5		
6	0°00.0'	+60.0'	0.0°	1°00.0'	+60.0'	0.0°	2°00.0'	+60.0'	0.0°	2°60.0'	+60.0'	0.0°	3°60.0'	+60.0'	0.0°	5°00.0'	+60.0'	0.0°	6°00.0'	+60.0'	24.3°	6			
7	1°00.0'	+60.0'	0.0°	2°00.0'	+60.0'	0.0°	3°00.0'	+60.0'	0.0°	3°60.0'	+60.0'	0.0°	4°60.0'	+60.0'	0.0°	6°00.0'	+60.0'	0.0°	7°00.0'	+60.0'	0.0°	7			
8	2°00.0'	+60.0'	0.0°	3°00.0'	+60.0'	0.0°	4°00.0'	+60.0'	0.0°	4°60.0'	+60.0'	0.0°	5°60.0'	+60.0'	0.0°	6°60.0'	+60.0'	0.0°	8°00.0'	+60.0'	0.0°	8			
9	3°00.0'	+60.0'	0.0°	4°00.0'	+60.0'	0.0°	5°00.0'	+60.0'	0.0°	5°60.0'	+60.0'	0.0°	6°60.0'	+60.0'	0.0°	8°00.0'	+60.0'	0.0°	9°00.0'	+60.0'	62.7°	9			
10	4°00.0'	+60.0'	0.0°	5°00.0'	+60.0'	0.0°	6°00.0'	+60.0'	0.0°	6°60.0'	+60.0'	0.0°	7°60.0'	+60.0'	0.0°	8°60.0'	+60.0'	0.0°	10°00.0'	+60.0'	23.0°	10			
11	5°00.0'	+60.0'	0.0°	6°00.0'	+60.0'	0.0°	7°00.0'	+60.0'	0.0°	7°60.0'	+60.0'	0.0°	8°60.0'	+60.0'	0.0°	10°00.0'	+60.0'	0.0°	11°00.0'	+60.0'	22.6°	11			
12	6°00.0'	+60.0'	0.0°	7°00.0'	+60.0'	0.0°	8°00.0'	+60.0'	0.0°	8°60.0'	+60.0'	0.0°	9°60.0'	+60.0'	0.0°	11°00.0'	+60.0'	0.0°	12°00.0'	+60.0'	62.4°	12			
13	7°00.0'	+60.0'	0.0°	8°00.0'	+60.0'	0.0°	9°00.0'	+60.0'	0.0°	9°60.0'	+60.0'	0.0°	11°00.0'	+60.0'	0.0°	12°00.0'	+60.0'	0.0°	13°00.0'	+60.0'	62.3°	13			
14	8°00.0'	+60.0'	0.0°	9°00.0'	+60.0'	0.0°	10°00.0'	+60.0'	0.0°	11°00.0'	+60.0'	0.0°	12°00.0'	+60.0'	0.0°	13°00.0'	+60.0'	0.0°	14°00.0'	+60.0'	0.0°	14			
15	9°00.0'	+60.0'	0.0°	10°00.0'	+60.0'	0.0°	11°00.0'	+60.0'	0.0°	12°00.0'	+60.0'	0.0°	13°00.0'	+60.0'	0.0°	14°00.0'	+60.0'	0.0°	15°00.0'	+60.0'	20.3°	15			
16	10°00.0'	+60.0'	0.0°	11°00.0'	+60.0'	0.0°	12°00.0'	+60.0'	0.0°	13°00.0'	+60.0'	0.0°	14°00.0'	+60.0'	0.0°	15°00.0'	+60.0'	0.0°	16°00.0'	+60.0'	19.5°	16			
17	11°00.0'	+60.0'	0.0°	12°00.0'	+60.0'	0.0°	13°00.0'	+60.0'	0.0°	14°00.0'	+60.0'	0.0°	15°00.0'	+60.0'	0.0°	16°00.0'	+60.0'	0.0°	17°00.0'	+60.0'	18.6°	17			
18	12°00.0'	+60.0'	0.0°	13°00.0'	+60.0'	0.0°	14°00.0'	+60.0'	0.0°	15°00.0'	+60.0'	0.0°	16°00.0'	+60.0'	0.0°	17°00.0'	+60.0'	0.0°	18°00.0'	+60.0'	17.7°	18			
19	13°00.0'	+60.0'	0.0°	14°00.0'	+60.0'	0.0°	15°00.0'	+60.0'	0.0°	16°00.0'	+60.0'	0.0°	17°00.0'	+60.0'	0.0°	18°00.0'	+60.0'	0.0°	19°00.0'	+60.0'	16.6°	19			
20	14°00.0'	+60.0'	0.0°	15°00.0'	+60.0'	0.0°	16°00.0'	+60.0'	0.0°	17°00.0'	+60.0'	0.0°	18°00.0'	+60.0'	0.0°	19°00.0'	+60.0'	0.0°	20°00.0'	+60.0'	15.3°	20			
21	15°00.0'	+60.0'	0.0°	16°00.0'	+60.0'	0.0°	17°00.0'	+60.0'	0.0°	18°00.0'	+60.0'	0.0°	19°00.0'	+60.0'	0.0°	20°00.0'	+60.0'	0.0°	21°00.0'	+60.0'	13.9°	21			
22	16°00.0'	+60.0'	0.0°	17°00.0'	+60.0'	0.0°	18°00.0'	+60.0'	0.0°	19°00.0'	+60.0'	0.0°	20°00.0'	+60.0'	0.0°	21°00.0'	+60.0'	0.0°	22°00.0'	+60.0'	12.2°	22			
23	17°00.0'	+60.0'	0.0°	18°00.0'	+60.0'	0.0°	19°00.0'	+60.0'	0.0°	20°00.0'	+60.0'	0.0°	21°00.0'	+60.0'	0.0°	22°00.0'	+60.0'	0.0°	23°00.0'	+60.0'	90.0°	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°
	84			85			86			87			88			89			90						

180° 180° LHA

Latitude SAME as DECLINATION

180° 180° LHA

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

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

