

Sight Reduction Tables

Latitude 7° to 13°

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

0° 360° LHA			Latitude SAME as Declination									0° 360° LHA										
Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	83°00.0'	+60.0'	180.0°	82°00.0'	+60.0'	180.0°	81°00.0'	+60.0'	180.0°	80°00.0'	+60.0'	180.0°	79°00.0'	+60.0'	180.0°	78°00.0'	+60.0'	180.0°	77°00.0'	+60.0'	180.0°	0
1	84°00.0'	+60.0'	180.0°	83°00.0'	+60.0'	180.0°	82°00.0'	+60.0'	180.0°	81°00.0'	+60.0'	180.0°	80°00.0'	+60.0'	180.0°	79°00.0'	+60.0'	180.0°	78°00.0'	+60.0'	180.0°	1
2	85°00.0'	+60.0'	180.0°	84°00.0'	+60.0'	180.0°	83°00.0'	+60.0'	180.0°	82°00.0'	+60.0'	180.0°	81°00.0'	+60.0'	180.0°	80°00.0'	+60.0'	180.0°	79°00.0'	+60.0'	180.0°	2
3	86°00.0'	+60.0'	180.0°	85°00.0'	+60.0'	180.0°	84°00.0'	+60.0'	180.0°	83°00.0'	+60.0'	180.0°	82°00.0'	+60.0'	180.0°	81°00.0'	+60.0'	180.0°	80°00.0'	+60.0'	180.0°	3
4	87°00.0'	+60.0'	179.9°	86°00.0'	+60.0'	180.0°	85°00.0'	+60.0'	180.0°	84°00.0'	+60.0'	180.0°	83°00.0'	+60.0'	180.0°	82°00.0'	+60.0'	180.0°	81°00.0'	+60.0'	180.0°	4
5	88°00.0'	+60.0'	180.0°	87°00.0'	+60.0'	179.9°	86°00.0'	+60.0'	180.0°	85°00.0'	+60.0'	180.0°	84°00.0'	+60.0'	180.0°	83°00.0'	+60.0'	180.0°	82°00.0'	+60.0'	180.0°	5
6	89°00.0'	+60.0'	180.0°	88°00.0'	+60.0'	180.0°	87°00.0'	+60.0'	179.9°	86°00.0'	+60.0'	180.0°	85°00.0'	+60.0'	180.0°	84°00.0'	+60.0'	180.0°	83°00.0'	+60.0'	180.0°	6
7	90°00.0'	-60.0'	90.0°	89°00.0'	+60.0'	180.0°	88°00.0'	+60.0'	180.0°	87°00.0'	+60.0'	179.9°	86°00.0'	+60.0'	180.0°	85°00.0'	+60.0'	180.0°	84°00.0'	+60.0'	180.0°	7
8	89°00.0'	-60.0'	0.0°	90°00.0'	-60.0'	90.0°	89°00.0'	+60.0'	180.0°	88°00.0'	+60.0'	180.0°	87°00.0'	+60.0'	179.9°	86°00.0'	+60.0'	180.0°	85°00.0'	+60.0'	180.0°	8
9	88°00.0'	-60.0'	0.0°	89°00.0'	-60.0'	0.0°	90°00.0'	-60.0'	90.0°	89°00.0'	+60.0'	180.0°	88°00.0'	+60.0'	180.0°	87°00.0'	+60.0'	179.9°	86°00.0'	+60.0'	180.0°	9
10	87°00.0'	-60.0'	0.1°	88°00.0'	-60.0'	0.0°	89°00.0'	-60.0'	0.0°	90°00.0'	-60.0'	90.0°	89°00.0'	+60.0'	180.0°	88°00.0'	+60.0'	180.0°	87°00.0'	+60.0'	179.9°	10
11	86°00.0'	-60.0'	0.0°	87°00.0'	-60.0'	0.1°	88°00.0'	-60.0'	0.0°	89°00.0'	-60.0'	0.0°	90°00.0'	-60.0'	90.0°	89°00.0'	+60.0'	180.0°	88°00.0'	+60.0'	180.0°	11
12	85°00.0'	-60.0'	0.0°	86°00.0'	-60.0'	0.0°	87°00.0'	-60.0'	0.1°	88°00.0'	-60.0'	0.0°	89°00.0'	-60.0'	0.0°	90°00.0'	-60.0'	90.0°	89°00.0'	+60.0'	180.0°	12
13	84°00.0'	-60.0'	0.0°	85°00.0'	-60.0'	0.0°	86°00.0'	-60.0'	0.0°	87°00.0'	-60.0'	0.1°	88°00.0'	-60.0'	0.0°	89°00.0'	-60.0'	0.0°	90°00.0'	-60.0'	90.0°	13
14	83°00.0'	-60.0'	0.0°	84°00.0'	-60.0'	0.0°	85°00.0'	-60.0'	0.0°	86°00.0'	-60.0'	0.0°	87°00.0'	-60.0'	0.1°	88°00.0'	-60.0'	0.0°	89°00.0'	-60.0'	0.0°	14
15	82°00.0'	-60.0'	0.0°	83°00.0'	-60.0'	0.0°	84°00.0'	-60.0'	0.0°	85°00.0'	-60.0'	0.0°	86°00.0'	-60.0'	0.0°	87°00.0'	-60.0'	0.1°	88°00.0'	-60.0'	0.0°	15
16	81°00.0'	-60.0'	0.0°	82°00.0'	-60.0'	0.0°	83°00.0'	-60.0'	0.0°	84°00.0'	-60.0'	0.0°	85°00.0'	-60.0'	0.0°	86°00.0'	-60.0'	0.0°	87°00.0'	-60.0'	0.1°	16
17	80°00.0'	-60.0'	0.0°	81°00.0'	-60.0'	0.0°	82°00.0'	-60.0'	0.0°	83°00.0'	-60.0'	0.0°	84°00.0'	-60.0'	0.0°	85°00.0'	-60.0'	0.0°	86°00.0'	-60.0'	0.0°	17
18	79°00.0'	-60.0'	0.0°	80°00.0'	-60.0'	0.0°	81°00.0'	-60.0'	0.0°	82°00.0'	-60.0'	0.0°	83°00.0'	-60.0'	0.0°	84°00.0'	-60.0'	0.0°	85°00.0'	-60.0'	0.0°	18
19	78°00.0'	-60.0'	0.0°	79°00.0'	-60.0'	0.0°	80°00.0'	-60.0'	0.0°	81°00.0'	-60.0'	0.0°	82°00.0'	-60.0'	0.0°	83°00.0'	-60.0'	0.0°	84°00.0'	-60.0'	0.0°	19
20	77°00.0'	-60.0'	0.0°	78°00.0'	-60.0'	0.0°	79°00.0'	-60.0'	0.0°	80°00.0'	-60.0'	0.0°	81°00.0'	-60.0'	0.0°	82°00.0'	-60.0'	0.0°	83°00.0'	-60.0'	0.0°	20
21	76°00.0'	-60.0'	0.0°	77°00.0'	-60.0'	0.0°	78°00.0'	-60.0'	0.0°	79°00.0'	-60.0'	0.0°	80°00.0'	-60.0'	0.0°	81°00.0'	-60.0'	0.0°	82°00.0'	-60.0'	0.0°	21
22	75°00.0'	-60.0'	0.0°	76°00.0'	-60.0'	0.0°	77°00.0'	-60.0'	0.0°	78°00.0'	-60.0'	0.0°	79°00.0'	-60.0'	0.0°	80°00.0'	-60.0'	0.0°	81°00.0'	-60.0'	0.0°	22
23	74°00.0'	-60.0'	0.0°	75°00.0'	-60.0'	0.0°	76°00.0'	-60.0'	0.0°	77°00.0'	-60.0'	0.0°	78°00.0'	-60.0'	0.0°	79°00.0'	-60.0'	0.0°	80°00.0'	-60.0'	0.0°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	7			8			9			10			11			12			13			

0° 360° LHA

Latitude SAME as Declination

0° 360° LHA

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

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

1° 359° LHA			Latitude SAME as Declination									1° 359° LHA										
Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	82°55.8'	+59.3'	171.8°	81°56.3'	+59.5'	172.9°	80°56.7'	+59.6'	173.6°	79°57.0'	+59.7'	174.3°	78°57.3'	+59.7'	174.8°	77°57.5'	+59.8'	175.2°	76°57.7'	+59.8'	175.6°	0
1	83°55.1'	+59.0'	170.5°	82°55.8'	+59.3'	171.9°	81°56.3'	+59.5'	172.9°	80°56.7'	+59.6'	173.6°	79°57.0'	+59.7'	174.3°	78°57.3'	+59.7'	174.8°	77°57.6'	+59.8'	175.2°	1
2	84°54.1'	+58.6'	168.7°	83°55.1'	+59.0'	170.5°	82°55.8'	+59.3'	171.9°	81°56.3'	+59.5'	172.9°	80°56.7'	+59.6'	173.6°	79°57.1'	+59.7'	174.3°	78°57.3'	+59.7'	174.8°	2
3	85°52.7'	+57.7'	166.0°	84°54.1'	+58.6'	168.7°	83°55.1'	+59.0'	170.5°	82°55.8'	+59.3'	171.9°	81°56.3'	+59.5'	172.9°	80°56.7'	+59.6'	173.6°	79°57.1'	+59.7'	174.3°	3
4	86°50.4'	+55.6'	161.6°	85°52.7'	+57.7'	166.0°	84°54.1'	+58.6'	168.7°	83°55.1'	+59.1'	170.5°	82°55.8'	+59.3'	171.9°	81°56.3'	+59.5'	172.9°	80°56.8'	+59.6'	173.6°	4
5	87°46.0'	+53.7'	153.5°	86°50.4'	+58.3'	161.6°	85°52.7'	+59.6'	166.0°	84°54.2'	+60.0'	168.7°	83°55.1'	+60.2'	170.6°	82°55.8'	+60.3'	171.9°	81°56.4'	+60.3'	172.9°	5
6	88°39.7'	+27.0'	138.3°	87°48.7'	+51.1'	156.0°	86°52.3'	+56.5'	163.5°	85°54.2'	+58.1'	167.4°	84°55.3'	+58.9'	169.9°	83°56.1'	+59.2'	171.5°	82°56.7'	+59.5'	172.7°	6
7	89°06.7'	-26.9'	89.9°	88°39.8'	+27.0'	138.4°	87°48.7'	+51.1'	156.0°	86°52.3'	+56.5'	163.5°	85°54.2'	+58.2'	167.5°	84°55.4'	+58.9'	169.9°	83°56.1'	+59.3'	171.6°	7
8	88°39.8'	-51.0'	41.5°	89°06.8'	-27.0'	89.9°	88°39.9'	+27.1'	138.4°	87°48.8'	+51.2'	156.1°	86°52.4'	+56.5'	163.5°	85°54.2'	+58.2'	167.5°	84°55.4'	+58.9'	169.9°	8
9	87°48.7'	-56.4'	23.8°	88°39.9'	-51.1'	41.4°	89°07.0'	-27.0'	89.9°	88°40.0'	+27.1'	138.5°	87°48.9'	+51.2'	156.1°	86°52.4'	+56.5'	163.6°	85°54.3'	+58.2'	167.5°	9
10	86°52.3'	-58.1'	16.4°	87°48.8'	-56.4'	23.8°	88°40.0'	-51.1'	41.4°	89°07.1'	-27.0'	89.9°	88°40.1'	+27.2'	138.6°	87°48.9'	+51.3'	156.2°	86°52.5'	+56.5'	163.6°	10
11	85°54.2'	-58.8'	12.4°	86°52.4'	-58.1'	16.3°	87°48.9'	-56.4'	23.7°	88°40.1'	-51.1'	41.3°	89°07.3'	-27.1'	89.9°	88°40.2'	+27.3'	138.7°	87°49.0'	+51.3'	156.3°	11
12	84°55.4'	-59.2'	9.9°	85°54.2'	-58.9'	12.4°	86°52.4'	-58.1'	16.3°	87°48.9'	-56.5'	23.6°	88°40.2'	-51.2'	41.2°	89°07.5'	-27.2'	89.9°	88°40.3'	+27.4'	138.8°	12
13	83°56.1'	-59.4'	8.3°	84°55.4'	-59.2'	9.9°	85°54.3'	-58.9'	12.3°	86°52.5'	-58.1'	16.2°	87°49.0'	-56.5'	23.5°	88°40.3'	-51.2'	41.1°	89°07.7'	-27.2'	89.9°	13
14	82°56.7'	-59.6'	7.1°	83°56.2'	-59.4'	8.2°	84°55.4'	-59.2'	9.9°	85°54.3'	-58.9'	12.3°	86°52.5'	-58.2'	16.1°	87°49.1'	-56.5'	23.5°	88°40.5'	-51.3'	40.9°	14
15	81°57.1'	-59.7'	6.2°	82°56.7'	-59.6'	7.1°	83°56.2'	-59.4'	8.2°	84°55.5'	-59.2'	9.8°	85°54.4'	-58.9'	12.2°	86°52.6'	-58.2'	16.1°	87°49.2'	-56.5'	23.4°	15
16	80°57.4'	-59.7'	5.5°	81°57.1'	-59.7'	6.2°	82°56.7'	-59.6'	7.0°	83°56.2'	-59.5'	8.2°	84°55.5'	-59.2'	9.8°	85°54.4'	-58.9'	12.1°	86°52.6'	-58.2'	16.0°	16
17	79°57.7'	-59.8'	4.9°	80°57.5'	-59.7'	5.5°	81°57.2'	-59.7'	6.1°	82°56.8'	-59.6'	7.0°	83°56.3'	-59.5'	8.1°	84°55.5'	-59.2'	9.7°	85°54.5'	-58.9'	12.1°	17
18	78°57.9'	-59.8'	4.5°	79°57.7'	-59.8'	4.9°	80°57.5'	-59.7'	5.4°	81°57.2'	-59.7'	6.1°	82°56.8'	-59.6'	6.9°	83°56.3'	-59.5'	8.1°	84°55.6'	-59.3'	9.7°	18
19	77°58.1'	-59.8'	4.1°	78°57.9'	-59.8'	4.4°	79°57.7'	-59.8'	4.9°	80°57.5'	-59.7'	5.4°	81°57.2'	-59.7'	6.1°	82°56.8'	-59.6'	6.9°	83°56.3'	-59.5'	8.0°	19
20	76°58.3'	-59.9'	3.7°	77°58.1'	-59.8'	4.0°	78°58.0'	-59.8'	4.4°	79°57.8'	-59.8'	4.8°	80°57.5'	-59.7'	5.4°	81°57.2'	-59.7'	6.0°	82°56.9'	-59.6'	6.9°	20
21	75°58.4'	-59.9'	3.4°	76°58.3'	-59.9'	3.7°	77°58.1'	-59.8'	4.0°	78°58.0'	-59.8'	4.4°	79°57.8'	-59.8'	4.8°	80°57.6'	-59.7'	5.3°	81°57.3'	-59.7'	6.0°	21
22	74°58.5'	-59.9'	3.2°	75°58.4'	-59.9'	3.4°	76°58.3'	-59.9'	3.7°	77°58.2'	-59.8'	4.0°	78°58.0'	-59.8'	4.3°	79°57.8'	-59.8'	4.8°	80°57.6'	-59.7'	5.3°	

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

2° 358° LHA			Latitude SAME as Declination						2° 358° LHA													
Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	82°43.3'	+57.4'	164.0°	81°45.3'	+58.0'	165.9°	80°46.9'	+58.4'	167.4°	79°48.2'	+58.7'	168.6°	78°49.3'	+59.0'	169.6°	77°50.2'	+59.1'	170.5°	76°51.0'	+59.3'	171.2°	0
1	83°40.6'	+56.4'	161.5°	82°43.3'	+57.4'	164.0°	81°45.4'	+58.0'	165.9°	80°47.0'	+58.4'	167.4°	79°48.3'	+58.7'	168.6°	78°49.4'	+59.0'	169.6°	77°50.3'	+59.1'	170.5°	1
2	84°37.0'	+54.8'	158.2°	83°40.7'	+56.4'	161.5°	82°43.4'	+57.4'	164.0°	81°45.4'	+58.0'	165.9°	80°47.0'	+58.4'	167.4°	79°48.3'	+58.8'	168.6°	78°49.4'	+59.0'	169.6°	2
3	85°31.9'	+52.1'	153.4°	84°37.1'	+54.9'	158.2°	83°40.8'	+56.4'	161.5°	82°43.4'	+57.4'	164.0°	81°45.5'	+58.0'	165.9°	80°47.1'	+58.5'	167.4°	79°48.4'	+58.8'	168.6°	3
4	86°24.0'	+46.8'	146.3°	85°32.0'	+52.1'	153.4°	84°37.2'	+54.9'	158.2°	83°40.8'	+56.5'	161.6°	82°43.5'	+57.4'	164.0°	81°45.5'	+58.0'	165.9°	80°47.1'	+58.5'	167.4°	4
5	87°10.8'	+95.9'	135.0°	86°24.1'	+88.7'	146.4°	85°32.1'	+83.1'	153.5°	84°37.3'	+79.1'	158.2°	83°40.9'	+76.2'	161.6°	82°43.6'	+74.0'	164.1°	81°45.6'	+72.3'	166.0°	5
6	88°46.7'	+31.2'	144.8°	87°52.8'	+53.9'	160.6°	86°55.1'	+57.7'	166.8°	85°56.3'	+58.8'	170.0°	84°57.1'	+59.3'	172.0°	83°57.6'	+59.5'	173.3°	82°57.9'	+59.7'	174.2°	6
7	89°17.9'	-31.2'	90.0°	88°46.7'	+31.2'	144.9°	87°52.8'	+53.9'	160.6°	86°55.2'	+57.7'	166.8°	85°56.4'	+58.8'	170.0°	84°57.1'	+59.3'	172.0°	83°57.6'	+59.5'	173.3°	7
8	88°46.7'	-53.9'	35.0°	89°18.0'	-31.2'	90.0°	88°46.8'	+31.3'	145.0°	87°52.9'	+53.9'	160.7°	86°55.2'	+57.7'	166.8°	85°56.4'	+58.8'	170.1°	84°57.1'	+59.3'	172.0°	8
9	87°52.8'	-57.7'	19.3°	88°46.8'	-53.9'	34.9°	89°18.1'	-31.2'	89.9°	88°46.8'	+31.4'	145.0°	87°52.9'	+54.0'	160.7°	86°55.2'	+57.7'	166.9°	85°56.4'	+58.8'	170.1°	9
10	86°55.2'	-58.8'	13.1°	87°52.9'	-57.7'	19.2°	88°46.8'	-53.9'	34.9°	89°18.2'	-31.3'	89.9°	88°46.9'	+31.4'	145.1°	87°53.0'	+54.0'	160.8°	86°55.3'	+57.8'	166.9°	10
11	85°56.4'	-59.3'	9.9°	86°55.2'	-58.8'	13.0°	87°52.9'	-57.7'	19.2°	88°46.9'	-53.9'	34.8°	89°18.3'	-31.3'	89.9°	88°47.0'	+31.5'	145.2°	87°53.0'	+54.1'	160.8°	11
12	84°57.1'	-59.5'	7.9°	85°56.4'	-59.3'	9.8°	86°55.2'	-58.8'	13.0°	87°53.0'	-57.7'	19.1°	88°47.0'	-54.0'	34.7°	89°18.5'	-31.4'	89.9°	88°47.1'	+31.6'	145.3°	12
13	83°57.6'	-59.6'	6.6°	84°57.1'	-59.5'	7.9°	85°56.4'	-59.3'	9.8°	86°55.3'	-58.8'	12.9°	87°53.0'	-57.7'	19.0°	88°47.1'	-54.0'	34.6°	89°18.6'	-31.5'	89.9°	13
14	82°57.9'	-59.7'	5.6°	83°57.6'	-59.7'	6.5°	84°57.1'	-59.5'	7.8°	85°56.4'	-59.3'	9.7°	86°55.3'	-58.8'	12.9°	87°53.1'	-57.7'	18.9°	88°47.2'	-54.0'	34.5°	14
15	81°58.2'	-59.8'	4.9°	82°57.9'	-59.7'	5.6°	83°57.6'	-59.7'	6.5°	84°57.2'	-59.5'	7.8°	85°56.5'	-59.3'	9.7°	86°55.3'	-58.8'	12.8°	87°53.1'	-57.8'	18.9°	15
16	80°58.4'	-59.8'	4.3°	81°58.2'	-59.8'	4.9°	82°58.0'	-59.7'	5.6°	83°57.6'	-59.7'	6.5°	84°57.2'	-59.5'	7.8°	85°56.5'	-59.3'	9.7°	86°55.4'	-58.8'	12.8°	16
17	79°58.6'	-59.9'	3.9°	80°58.4'	-59.8'	4.3°	81°58.2'	-59.8'	4.9°	82°58.0'	-59.7'	5.5°	83°57.7'	-59.7'	6.4°	84°57.2'	-59.5'	7.7°	85°56.5'	-59.3'	9.6°	17
18	78°58.7'	-59.9'	3.5°	79°58.6'	-59.9'	3.9°	80°58.4'	-59.8'	4.3°	81°58.2'	-59.8'	4.8°	82°58.0'	-59.7'	5.5°	83°57.7'	-59.7'	6.4°	84°57.2'	-59.5'	7.7°	18
19	77°58.8'	-59.9'	3.2°	78°58.7'	-59.9'	3.5°	79°58.6'	-59.9'	3.8°	80°58.4'	-59.8'	4.3°	81°58.3'	-59.8'	4.8°	82°58.0'	-59.7'	5.5°	83°57.7'	-59.7'	6.4°	19
20	76°58.9'	-59.9'	3.0°	77°58.8'	-59.9'	3.2°	78°58.7'	-59.9'	3.5°	79°58.6'	-59.9'	3.8°	80°58.5'	-59.8'	4.2°	81°58.3'	-59.8'	4.8°	82°58.0'	-59.7'	5.4°	20
21	75°59.0'	-59.9'	2.7°	76°58.9'	-59.9'	2.9°	77°58.8'	-59.9'	3.2°	78°58.7'	-59.9'	3.5°	79°58.6'	-59.9'	3.8°	80°58.5'	-59.8'	4.2°	81°58.3'	-59.8'	4.7°	21
22	74°59.1'	-59.9'	2.5°	75°59.0'	-59.9'	2.7°	76°58.9'	-59.9'	2.9°	77°58.8'	-59.9'	3.2°	78°58.8'	-59.9'	3.4°	79°58.6'	-59.9'	3.8°	80°58.5'	-59.8'	4.2°	22
23	73°59.1'	-59.9'	2.4°	74°59.1'	-59.9'	2.5°	75°59.0'	-59.9'	2.7°	76°58.9'	-59.9'	2.9°	77°58.9'	-59.9'	3.1°	78°58.8'	-59.9'	3.4°	79°58.6'	-59.9'	3.7°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	7			8			9			10			11			12			13			

2° 358° LHA Latitude SAME as Declination 2° 358° LHA
 South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

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

3° 357° LHA			Latitude SAME as Declination						3° 357° LHA													
Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	82°23.2'	+54.5'	156.7°	81°27.6'	+55.8'	159.4°	80°31.0'	+56.6'	161.5°	79°33.8'	+57.3'	163.2°	78°36.2'	+57.7'	164.6°	77°38.2'	+58.1'	165.9°	76°39.8'	+58.4'	166.9°	0
1	83°17.7'	+52.7'	153.4°	82°23.3'	+54.5'	156.7°	81°27.7'	+55.8'	159.4°	80°31.1'	+56.6'	161.5°	79°33.9'	+57.3'	163.2°	78°36.3'	+57.8'	164.6°	77°38.2'	+58.1'	165.9°	1
2	84°10.5'	+50.0'	149.0°	83°17.9'	+52.7'	153.4°	82°23.4'	+54.6'	156.7°	81°27.8'	+55.8'	159.4°	80°31.2'	+56.7'	161.5°	79°34.0'	+57.3'	163.2°	78°36.4'	+57.8'	164.6°	2
3	85°00.4'	+45.6'	143.1°	84°10.6'	+50.0'	149.0°	83°18.0'	+52.8'	153.4°	82°23.6'	+54.6'	156.7°	81°27.9'	+55.8'	159.4°	80°31.3'	+56.7'	161.5°	79°34.2'	+57.3'	163.2°	3
4	85°46.0'	+38.5'	135.0°	85°00.6'	+45.7'	143.1°	84°10.8'	+50.1'	149.0°	83°18.1'	+52.8'	153.4°	82°23.7'	+54.6'	156.8°	81°28.0'	+55.8'	159.4°	80°31.5'	+56.7'	161.5°	4
5	86°24.5'	+26.9'	123.7°	85°46.3'	+38.5'	135.0°	85°00.8'	+45.7'	143.1°	84°11.0'	+50.1'	149.0°	83°18.3'	+52.9'	153.4°	82°23.9'	+54.7'	156.8°	81°28.2'	+55.9'	159.4°	5
6	86°51.4'	+10.0'	108.4°	86°24.8'	+26.9'	123.7°	85°46.5'	+38.6'	135.0°	85°01.1'	+45.8'	143.2°	84°11.2'	+50.2'	149.1°	83°18.5'	+52.9'	153.5°	82°24.1'	+54.7'	156.8°	6
7	87°01.3'	-09.6'	89.8°	86°51.7'	+10.0'	108.4°	86°25.1'	+27.0'	123.7°	85°46.9'	+38.7'	135.1°	85°01.3'	+45.8'	143.2°	84°11.4'	+50.2'	149.1°	83°18.8'	+53.0'	153.5°	7
8	86°51.7'	-26.6'	71.2°	87°01.8'	-09.6'	89.8°	86°52.1'	+10.1'	108.4°	86°25.5'	+27.1'	123.8°	85°47.2'	+38.7'	135.1°	85°01.7'	+45.9'	143.3°	84°11.7'	+50.3'	149.2°	8
9	86°25.1'	-38.3'	55.8°	86°52.1'	-26.6'	71.2°	87°02.2'	-09.6'	89.8°	86°52.6'	+10.1'	108.4°	86°25.9'	+27.2'	123.8°	85°47.6'	+38.8'	135.2°	85°02.0'	+46.0'	143.3°	9
10	85°46.9'	-45.5'	44.5°	86°25.5'	-38.3'	55.8°	86°52.6'	-26.7'	71.1°	87°02.7'	-09.6'	89.7°	86°53.1'	+10.2'	108.4°	86°26.4'	+27.3'	123.9°	85°48.0'	+38.9'	135.3°	10
11	85°01.3'	-49.9'	36.3°	85°47.2'	-45.5'	44.4°	86°25.9'	-38.4'	55.7°	86°53.1'	-26.7'	71.0°	87°03.3'	-09.6'	89.7°	86°53.7'	+10.2'	108.5°	86°26.9'	+27.4'	124.0°	11
12	84°11.4'	-52.7'	30.4°	85°01.7'	-49.9'	36.2°	85°47.6'	-45.6'	44.3°	86°26.4'	-38.4'	55.5°	86°53.7'	-26.8'	70.9°	87°03.9'	-09.6'	89.7°	86°54.3'	+10.3'	108.5°	12
13	83°18.8'	-54.5'	26.0°	84°11.7'	-52.7'	30.3°	85°02.0'	-50.0'	36.1°	86°26.4'	-45.6'	44.1°	86°26.9'	-38.5'	55.4°	86°54.3'	-26.8'	70.8°	87°04.6'	-09.6'	89.7°	13
14	82°24.3'	-55.7'	22.6°	83°19.0'	-54.5'	25.9°	84°12.0'	-52.7'	30.2°	85°02.4'	-50.0'	36.0°	86°26.9'	-45.7'	44.0°	86°54.5'	-38.5'	55.3°	86°55.0'	-26.9'	70.7°	14
15	81°28.6'	-56.6'	19.9°	82°24.5'	-55.7'	22.5°	83°19.3'	-54.5'	25.8°	84°12.4'	-52.8'	30.0°	85°02.8'	-50.1'	35.8°	86°54.9'	-45.7'	43.9°	86°55.4'	-27.0'	70.6°	15
16	80°32.0'	-57.2'	17.8°	81°28.8'	-56.6'	19.8°	82°24.8'	-55.7'	22.4°	83°19.6'	-54.6'	25.7°	84°12.7'	-52.8'	29.9°	85°03.2'	-50.1'	35.7°	86°55.8'	-27.1'	70.5°	16
17	79°34.8'	-57.7'	16.1°	80°32.2'	-57.2'	17.7°	81°29.0'	-56.6'	19.8°	82°25.0'	-55.8'	22.3°	83°19.9'	-54.6'	25.5°	84°13.1'	-52.8'	29.8°	85°03.7'	-50.2'	35.5°	17
18	78°37.1'	-58.1'	14.6°	79°35.0'	-57.7'	16.0°	80°32.4'	-57.2'	17.6°	81°29.3'	-56.6'	19.6°	82°25.3'	-55.8'	22.2°	83°20.3'	-54.6'	25.4°	84°13.5'	-52.9'	29.6°	18
19	77°39.0'	-58.3'	13.4°	78°37.3'	-58.1'	14.5°	79°35.2'	-57.7'	15.9°	80°32.6'	-57.3'	17.5°	81°29.5'	-56.6'	19.5°	82°25.6'	-55.8'	22.1°	83°20.6'	-54.6'	25.3°	19
20	76°40.7'	-58.6'	12.3°	77°39.2'	-58.3'	13.3°	78°37.5'	-58.1'	14.4°	79°35.4'	-57.7'	15.8°	80°32.9'	-57.3'	17.4°	81°29.8'	-56.7'	19.4°	82°26.0'	-55.8'	21.9°	20
21	75°42.1'	-58.7'	11.4°	76°40.9'	-58.6'	12.2°	77°39.4'	-58.3'	13.2°	78°37.7'	-58.1'	14.3°	79°35.6'	-57.7'	15.7°	80°33.2'	-57.3'	17.3°	81°30.1'	-56.7'	19.3°	21
22	74°43.4'	-58.9'	10.6°	75°42.3'	-58.7'	11.3°	76°41.0'	-58.6'	12.2°	77°39.6'	-58.4'	13.1°	78°37.9'	-58.1'	14.3°	79°35.9'	-57.7'	15.6°	80°33.4'	-57.3'	17.2°	22
23	73°44.5'</																					

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

4° 356° LHA				Latitude SAME as Declination								4° 356° LHA										
Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	81°56.6'	+51.2'	150.2°	81°03.7'	+53.0'	153.3°	80°09.5'	+54.4'	155.9°	79°14.2'	+55.4'	158.1°	78°18.2'	+56.2'	159.9°	77°21.6'	+56.8'	161.4°	76°24.5'	+57.2'	162.7°	0
1	82°47.7'	+48.6'	146.2°	81°56.7'	+51.2'	150.1°	81°03.8'	+53.0'	153.3°	80°09.6'	+54.4'	155.9°	79°14.4'	+55.4'	158.1°	78°18.4'	+56.2'	159.9°	77°21.8'	+56.8'	161.4°	1
2	83°36.3'	+44.9'	141.2°	82°47.9'	+48.6'	146.2°	81°56.9'	+51.2'	150.2°	81°04.0'	+53.1'	153.3°	80°09.8'	+54.4'	155.9°	79°14.6'	+55.4'	158.1°	78°18.5'	+56.2'	159.9°	2
3	84°21.3'	+39.6'	134.9°	83°36.6'	+45.0'	141.3°	82°48.1'	+48.7'	146.2°	81°57.1'	+51.3'	150.2°	81°04.2'	+53.1'	153.3°	80°10.0'	+54.5'	155.9°	79°14.8'	+55.5'	158.1°	3
4	85°00.9'	+32.0'	126.8°	84°21.6'	+39.7'	134.9°	83°36.8'	+45.1'	141.3°	82°48.4'	+48.8'	146.2°	81°57.4'	+51.3'	150.2°	81°04.5'	+53.2'	153.4°	80°10.2'	+54.5'	155.9°	4
5	85°32.9'	+21.3'	116.5°	85°01.3'	+32.0'	126.8°	84°21.9'	+39.8'	135.0°	83°37.1'	+45.1'	141.3°	82°48.7'	+48.8'	146.3°	81°57.6'	+51.4'	150.2°	81°04.8'	+53.2'	153.4°	5
6	85°54.1'	+07.7'	103.9°	85°33.3'	+21.3'	116.5°	85°01.7'	+32.1'	126.8°	84°22.3'	+39.9'	135.0°	83°37.5'	+45.2'	141.3°	82°49.0'	+48.9'	146.3°	81°58.0'	+51.4'	150.2°	6
7	86°01.8'	-07.2'	89.8°	85°54.6'	+07.7'	103.9°	85°33.8'	+21.4'	116.5°	85°02.1'	+32.2'	126.9°	84°22.7'	+39.9'	135.0°	83°37.9'	+45.3'	141.4°	82°49.4'	+49.0'	146.3°	7
8	85°54.6'	-20.8'	75.6°	86°02.3'	-07.2'	89.7°	85°55.2'	+07.8'	103.9°	85°34.3'	+21.5'	116.5°	85°02.7'	+32.3'	126.9°	84°23.2'	+40.0'	135.1°	83°38.4'	+45.4'	141.4°	8
9	85°33.8'	-31.6'	62.9°	85°55.2'	-20.9'	75.5°	86°03.0'	-07.1'	89.7°	85°55.8'	+07.8'	103.9°	85°34.9'	+21.6'	116.6°	85°03.2'	+32.4'	127.0°	84°23.7'	+40.1'	135.1°	9
10	85°02.1'	-39.4'	52.5°	85°34.3'	-31.7'	62.8°	85°55.8'	-20.9'	75.5°	86°03.6'	-07.1'	89.7°	85°56.5'	+07.9'	103.9°	85°35.6'	+21.7'	116.6°	85°03.9'	+32.5'	127.0°	10
11	84°22.7'	-44.8'	44.3°	85°02.7'	-39.5'	52.4°	85°34.9'	-31.7'	62.7°	85°56.5'	-20.9'	75.4°	86°04.4'	-07.1'	89.6°	85°57.3'	+08.0'	103.9°	85°36.4'	+21.8'	116.6°	11
12	83°37.9'	-48.5'	38.0°	84°23.2'	-44.8'	44.2°	85°03.2'	-39.5'	52.3°	85°35.6'	-31.8'	62.6°	85°57.3'	-20.9'	75.3°	86°05.2'	-07.1'	89.6°	85°58.1'	+08.0'	103.9°	12
13	82°49.4'	-51.1'	33.0°	83°38.4'	-48.5'	37.8°	84°23.7'	-44.9'	44.1°	85°03.9'	-39.5'	52.2°	85°36.4'	-31.8'	62.5°	85°58.1'	-21.0'	75.2°	86°06.2'	-07.1'	89.5°	13
14	81°58.3'	-52.9'	29.0°	82°49.8'	-51.1'	32.8°	83°38.9'	-48.6'	37.7°	84°24.3'	-44.9'	44.0°	85°04.6'	-39.6'	52.0°	85°37.2'	-31.9'	62.4°	85°59.0'	-21.0'	75.1°	14
15	81°05.4'	-54.3'	25.8°	81°58.7'	-53.0'	28.9°	82°50.3'	-51.1'	32.7°	83°39.4'	-48.6'	37.6°	84°25.0'	-45.0'	43.8°	85°05.3'	-39.7'	51.9°	85°38.0'	-31.9'	62.3°	15
16	80°11.1'	-55.3'	23.2°	81°05.8'	-54.3'	25.7°	81°59.1'	-53.0'	28.7°	82°50.8'	-51.2'	32.6°	83°40.0'	-48.7'	37.4°	84°25.6'	-45.0'	43.7°	85°06.1'	-39.7'	51.7°	16
17	79°15.8'	-56.1'	21.0°	80°11.5'	-55.3'	23.1°	81°06.2'	-54.3'	25.6°	81°59.6'	-53.0'	28.6°	82°51.3'	-51.2'	32.4°	83°40.6'	-48.7'	37.3°	84°26.4'	-45.1'	43.5°	17
18	78°19.8'	-56.7'	19.1°	79°16.2'	-56.1'	20.9°	80°11.8'	-55.3'	22.9°	81°06.6'	-54.3'	25.4°	82°00.1'	-53.0'	28.5°	82°51.9'	-51.3'	32.3°	83°41.3'	-48.8'	37.1°	18
19	77°23.1'	-57.1'	17.6°	78°20.1'	-56.7'	19.0°	79°16.5'	-56.1'	20.8°	80°12.2'	-55.3'	22.8°	81°07.1'	-54.4'	25.3°	82°00.6'	-53.1'	28.3°	82°52.5'	-51.3'	32.1°	19
20	76°26.0'	-57.5'	16.2°	77°23.4'	-57.1'	17.5°	78°20.4'	-56.7'	18.9°	79°16.9'	-56.1'	20.6°	80°12.7'	-55.4'	22.7°	81°07.5'	-54.4'	25.1°	82°01.2'	-53.1'	28.2°	20
21	75°28.5'	-57.8'	15.0°	76°26.3'	-57.5'	16.1°	77°23.8'	-57.1'	17.4°	78°20.8'	-56.7'	18.8°	79°17.3'	-56.1'	20.5°	80°13.1'	-55.4'	22.5°	81°08.1'	-54.4'	25.0°	21
22	74°30.7'	-58.1'	14.0°	75°28.8'	-57.8'	14.9°	76°26.6'	-57.5'	16.0°	77°24.1'	-57.2'	17.2°	78°21.2'	-56.7'	18.7°	79°17.7'	-56.1'	20.4°	80°13.6'	-55.4'	22.4°	22
23	73°32.6'	-58.3'	13.1°	74°31.0'	-58.1'	13.9°	75°29.1'	-57.8'	14.8°	76°26.9'	-57.5'	15.9°	77°24.5'	-57.2'	17.1°	78°21.6'	-56.7'	18.6°	79°18.2'	-56.2'	20.2°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	7			8			9			10			11			12			13			

4° 356° LHA Latitude SAME as Declination 4° 356° LHA
 South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

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

5° 355° LHA				Latitude SAME as Declination								5° 355° LHA										
Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	81°24.3'	+47.6'	144.3°	80°34.5'	+50.0'	147.8°	79°42.9'	+51.8'	150.8°	78°49.9'	+53.2'	153.3°	77°55.8'	+54.3'	155.4°	77°00.8'	+55.2'	157.2°	76°05.2'	+55.9'	158.7°	0
1	82°11.9'	+44.5'	140.1°	81°24.5'	+47.7'	144.3°	80°34.7'	+50.1'	147.8°	79°43.1'	+51.9'	150.8°	78°50.1'	+53.3'	153.3°	77°56.0'	+54.3'	155.4°	77°01.1'	+55.2'	157.2°	1
2	82°56.5'	+40.3'	134.9°	82°12.2'	+44.6'	140.1°	81°24.8'	+47.8'	144.3°	80°35.0'	+50.1'	147.8°	79°43.4'	+51.9'	150.8°	78°50.4'	+53.3'	153.3°	77°56.3'	+54.4'	155.4°	2
3	83°36.8'	+34.6'	128.5°	82°56.8'	+40.4'	134.9°	82°12.5'	+44.6'	140.1°	81°25.1'	+47.8'	144.3°	80°35.3'	+50.2'	147.8°	79°43.7'	+52.0'	150.8°	77°56.6'	+54.4'	155.4°	3
4	84°11.4'	+27.1'	120.8°	83°37.1'	+34.7'	128.5°	82°57.2'	+40.4'	134.9°	82°12.9'	+44.7'	140.1°	81°25.5'	+47.9'	144.3°	80°35.6'	+50.2'	147.9°	79°44.0'	+52.0'	150.8°	4
5	84°38.4'	+17.5'	111.6°	84°11.8'	+27.2'	120.8°	83°37.6'	+34.8'	128.5°	82°57.6'	+40.5'	134.9°	82°13.3'	+44.8'	140.1°	81°25.9'	+48.0'	144.4°	80°36.0'	+50.3'	147.9°	5
6	84°56.0'	+06.3'	101.1°	84°39.0'	+17.6'	111.6°	84°12.4'	+27.2'	120.8°	83°38.1'	+34.9'	128.6°	82°58.1'	+40.6'	134.9°	82°13.8'	+44.9'	140.1°	81°26.4'	+48.0'	144.4°	6
7	85°02.2'	-05.7'	89.7°	84°56.6'	+06.3'	101.1°	84°39.6'	+17.7'	111.6°	84°13.0'	+27.3'	120.9°	83°38.7'	+35.0'	128.6°	82°58.7'	+40.7'	135.0°	82°14.4'	+45.0'	140.2°	7
8	84°56.6'	-17.0'	78.3°	85°02.9'	-05.6'	89.7°	84°57.3'	+06.4'	101.1°	84°40.3'	+17.8'	111.6°	84°13.7'	+27.4'	120.9°	83°39.4'	+35.1'	128.6°	82°59.3'	+40.8'	135.0°	8
9	84°39.6'	-26.6'	67.7°	84°57.3'	-17.0'	78.2°	85°03.7'	-05.6'	89.6°	84°58.1'	+06.5'	101.0°	84°41.1'	+17.9'	111.7°	84°14.5'	+27.5'	120.9°	83°40.2'	+35.2'	128.7°	9
10	84°13.0'	-34.3'	58.4°	84°40.3'	-26.6'	67.6°	84°58.1'	-17.0'	78.1°	85°04.6'	-05.6'	89.6°	84°59.0'	+06.5'	101.0°	84°42.0'	+18.0'	111.7°	84°15.3'	+27.7'	121.0°	10
11	83°38.7'	-40.0'	50.6°	84°13.7'	-34.3'	58.3°	84°41.1'	-26.7'	67.5°	84°59.0'	-17.0'	78.1°	85°05.5'	-05.5'	89.5°	85°00.0'	+06.6'	101.0°	84°43.0'	+18.1'	111.7°	11
12	82°58.7'	-44.3'	44.2°	83°39.4'	-40.1'	50.5°	84°14.5'	-34.3'	58.2°	84°42.0'	-26.7'	67.4°	85°00.0'	-17.0'	78.0°	85°06.6'	-05.5'	89.5°	85°01.0'	+06.7'	101.0°	12
13	82°14.4'	-47.5'	39.0°	82°59.3'	-44.4'	44.1°	83°40.2'	-40.1'	50.4°	84°15.3'	-34.4'	58.0°	84°43.0'	-26.7'	67.3°	85°01.0'	-17.0'	77.9°	85°07.7'	-05.5'	89.4°	13
14	81°26.9'	-49.9'	34.7°	82°15.0'	-47.5'	38.8°	83°00.0'	-44.4'	43.9°	83°41.0'	-40.2'	50.2°	84°16.3'	-34.4'	57.9°	84°44.0'	-26.8'	67.1°	85°02.2'	-17.0'	77.8°	14
15	80°37.0'	-51.7'	31.1°	81°27.5'	-49.9'	34.5°	82°15.7'	-47.6'	38.7°	83°00.8'	-44.4'	43.8°	83°41.8'	-40.2'	50.1°	84°17.3'	-34.5'	57.8°	84°45.2'	-26.8'	67.0°	15
16	79°45.3'	-53.1'	28.1°	80°37.6'	-51.7'	31.0°	81°28.1'	-49.9'	34.4°	82°16.4'	-47.6'	38.5°	83°01.6'	-44.5'	43.6°	83°42.8'	-40.3'	49.9°	84°18.3'	-34.5'	57.6°	16
17	78°52.3'	-54.1'	25.6°	79°45.9'	-53.1'	28.0°	80°38.1'	-51.7'	30.8°	81°28.8'	-50.0'	34.2°	82°17.1'	-47.7'	38.4°	83°02.5'	-44.6'	43.5°	83°43.8'	-40.3'	49.7°	17
18	77°58.1'	-55.0'	23.4°	78°52.8'	-54.2'	25.5°	79°46.4'	-53.1'	27.8°	80°38.8'	-51.8'	30.7°	81°29.5'	-50.0'	34.1°	82°18.0'	-47.7'	38.2°	83°03.5'	-44.6'	43.3°	18
19	77°03.2'	-55.7'	21.6°	77°58.6'	-55.0'	23.3°	78°53.3'	-54.2'	25.3°	79°47.0'	-53.1'	27.7°	80°39.5'	-51.8'	30.5°	81°30.3'	-50.1'	33.9°	82°18.8'	-47.8'	38.0°	19
20	76°07.5'	-56.2'	20.0°	77°03.6'	-55.7'	21.5°	77°59.1'	-55.0'	23.2°	78°53.9'	-54.2'	25.2°	79°47.7'	-53.2'	27.5°	80°40.2'	-51.8'	30.3°	81°31.1'	-50.1'	33.7°	20
21	75°11.3'	-56.7'	18.6°	76°07.9'	-56.2'	19.8°	77°04.1'	-55.7'	21.3°	77°59.7'	-55.0'	23.0°	78°54.5'	-54.2'	25.0°	79°48.3'	-53.2'	27.4°	80°41.0'	-51.9'	30.2°	21
22	74°14.6'	-57.1'	17.3°	75°11.7'	-56.7'	18.4°	76°08.4'	-56.2'	19.7°	77°04.6'	-55.7'	21.2°	7									

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

6° 354° LHA				Latitude SAME as Declination								6° 354° LHA										
Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	80°47.4'	+44.2'	139.2°	80°00.7'	+47.0'	142.9°	79°11.8'	+49.2'	146.1°	78°21.2'	+50.9'	148.8°	77°29.3'	+52.3'	151.2°	76°36.2'	+53.4'	153.2°	75°42.2'	+54.3'	155.0°	0
1	81°31.6'	+40.7'	134.8°	80°47.7'	+44.3'	139.2°	80°01.0'	+47.1'	142.9°	79°12.1'	+49.2'	146.1°	78°21.5'	+51.0'	148.8°	77°29.6'	+52.3'	151.1°	76°36.5'	+53.4'	153.2°	1
2	82°12.3'	+36.2'	129.6°	81°32.0'	+40.8'	134.8°	80°48.1'	+44.3'	139.2°	80°01.4'	+47.1'	142.9°	79°12.5'	+49.3'	146.1°	78°21.9'	+51.0'	148.8°	77°29.9'	+52.4'	151.1°	2
3	82°48.5'	+30.5'	123.5°	82°12.7'	+36.3'	129.6°	81°32.4'	+40.9'	134.8°	80°48.5'	+44.4'	139.2°	80°01.8'	+47.2'	142.9°	79°12.9'	+49.4'	146.1°	78°22.3'	+51.1'	148.8°	3
4	83°19.0'	+23.4'	116.4°	82°49.0'	+30.6'	123.5°	82°13.3'	+36.4'	129.6°	81°32.9'	+40.9'	134.8°	80°49.0'	+44.5'	139.2°	80°02.3'	+47.3'	142.9°	79°13.4'	+49.4'	146.1°	4
5	83°42.4'	+14.9'	108.2°	83°19.6'	+23.5'	116.3°	82°49.6'	+30.7'	123.5°	82°13.8'	+36.5'	129.6°	81°33.5'	+41.0'	134.8°	80°49.5'	+44.6'	139.2°	80°02.8'	+47.3'	143.0°	5
6	83°57.3'	+05.4'	99.2°	83°43.1'	+15.0'	108.2°	83°20.3'	+23.6'	116.3°	82°50.3'	+30.8'	123.5°	82°14.5'	+36.6'	129.6°	81°34.1'	+41.1'	134.8°	80°50.2'	+44.7'	139.2°	6
7	84°02.7'	-04.6'	89.6°	83°58.1'	+05.4'	99.1°	83°43.9'	+15.1'	108.2°	83°21.1'	+23.7'	116.4°	82°51.1'	+30.9'	123.5°	82°15.3'	+36.7'	129.7°	81°34.9'	+41.2'	134.9°	7
8	83°58.1'	-14.2'	80.1°	84°03.5'	-04.6'	89.6°	83°58.9'	+05.5'	99.1°	83°44.8'	+15.2'	108.2°	83°22.0'	+23.8'	116.4°	82°51.9'	+31.0'	123.5°	82°16.1'	+36.8'	129.7°	8
9	83°43.9'	-22.8'	71.0°	83°58.9'	-14.2'	80.0°	84°04.4'	-04.5'	89.5°	84°00.0'	+05.6'	99.1°	83°45.7'	+15.3'	108.2°	83°22.9'	+23.9'	116.4°	82°52.9'	+31.1'	123.6°	9
10	83°21.1'	-30.0'	62.8°	83°44.8'	-22.8'	70.9°	84°00.0'	-14.2'	79.9°	84°05.5'	-04.5'	89.5°	84°01.0'	+05.6'	99.1°	83°46.8'	+15.4'	108.2°	83°24.0'	+24.0'	116.4°	10
11	82°51.1'	-35.8'	55.5°	83°22.0'	-30.0'	62.6°	83°45.7'	-22.8'	70.8°	84°01.0'	-14.2'	79.8°	84°06.6'	-04.4'	89.4°	84°02.2'	+05.7'	99.0°	83°48.0'	+15.5'	108.2°	11
12	82°15.3'	-40.4'	49.3°	82°51.9'	-35.8'	55.4°	83°22.9'	-30.0'	62.5°	83°46.8'	-22.8'	70.7°	84°02.2'	-14.2'	79.8°	84°07.9'	-04.4'	89.4°	84°03.5'	+05.8'	99.0°	12
13	81°34.9'	-44.0'	44.1°	82°16.1'	-40.4'	49.2°	82°52.9'	-35.9'	55.3°	83°24.0'	-30.1'	62.4°	83°48.0'	-22.8'	70.6°	84°03.5'	-14.2'	79.7°	84°09.2'	-04.4'	89.3°	13
14	80°50.9'	-46.8'	39.6°	81°35.7'	-44.0'	43.9°	82°17.0'	-40.5'	49.1°	82°53.9'	-35.9'	55.1°	83°25.2'	-30.1'	62.3°	83°49.3'	-22.9'	70.5°	84°04.9'	-14.2'	79.6°	14
15	80°04.1'	-48.9'	35.8°	80°51.7'	-46.8'	39.5°	81°36.5'	-44.0'	43.8°	82°18.0'	-40.5'	48.9°	82°55.1'	-36.0'	55.0°	83°26.4'	-30.2'	62.1°	83°50.7'	-22.9'	70.3°	15
16	79°15.2'	-50.6'	32.6°	80°04.9'	-49.0'	35.7°	80°52.5'	-46.8'	39.3°	81°37.5'	-44.1'	43.6°	82°56.3'	-40.6'	48.7°	82°56.3'	-36.0'	54.8°	83°27.8'	-30.2'	62.0°	16
17	78°24.6'	-52.0'	29.8°	79°15.9'	-50.7'	32.5°	80°05.7'	-49.0'	35.5°	80°53.4'	-46.9'	39.2°	81°38.5'	-44.1'	43.4°	82°20.2'	-40.6'	48.6°	82°57.6'	-36.1'	54.6°	17
18	77°32.5'	-53.1'	27.4°	78°25.3'	-52.0'	29.7°	79°16.7'	-50.7'	32.3°	80°06.6'	-49.0'	35.4°	80°54.4'	-46.9'	39.0°	81°39.6'	-44.2'	43.3°	82°21.5'	-40.7'	48.4°	18
19	76°39.4'	-54.0'	25.4°	77°33.2'	-53.1'	27.3°	78°26.0'	-52.1'	29.5°	79°17.5'	-50.7'	32.1°	80°07.5'	-49.1'	35.2°	80°55.4'	-47.0'	38.8°	81°40.8'	-44.3'	43.1°	19
20	75°45.4'	-54.7'	23.5°	76°40.1'	-54.0'	25.2°	77°33.9'	-53.2'	27.1°	78°26.8'	-52.1'	29.4°	79°18.4'	-50.8'	32.0°	80°08.5'	-49.1'	35.0°	80°56.5'	-47.0'	38.6°	20
21	74°50.7'	-55.4'	21.9°	75°46.0'	-54.8'	23.4°	76°40.8'	-54.1'	25.1°	77°34.7'	-53.2'	27.0°	78°27.6'	-52.1'	29.2°	79°19.4'	-50.8'	31.8°	80°09.5'	-49.2'	34.8°	21
22	73°55.3'	-55.9'	20.5°	74°51.3'	-55.4'	21.8°	75°46.7'	-54.8'	23.2°	76°41.5'	-54.1'	24.9°	77°35.5'	-53.2'	26.8°	78°28.5'	-52.2'	29.0°	79°20.3'	-50.9'	31.6°	22
23	72°59.4'	-56.3'	19.2°	73°55.9'	-55.9'	20.3°	74°51.9'	-55.4'	21.6°	75°47.4'	-54.8'	23.1°	76°42.3'	-54.1'	24.7°	77°36.4'	-53.3'	26.6°	78°29.5'	-52.2'	28.8°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	7			8			9			10			11			12			13			

6° 354° LHA Latitude SAME as Declination 6° 354° LHA
 South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

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

7° 353° LHA				Latitude SAME as Declination								7° 353° LHA										
Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	80°06.8'	+41.0'	134.8°	79°23.1'	+44.0'	138.6°	78°37.0'	+46.5'	141.9°	77°48.8'	+48.5'	144.7°	76°59.1'	+50.2'	147.2°	76°08.0'	+51.5'	149.4°	75°15.8'	+52.6'	151.4°	0
1	80°47.8'	+37.3'	130.4°	80°07.1'	+41.1'	134.8°	79°23.5'	+44.1'	138.6°	78°37.4'	+46.6'	141.9°	77°49.2'	+48.6'	144.7°	76°59.5'	+50.2'	147.2°	76°08.4'	+51.6'	149.4°	1
2	81°25.0'	+32.7'	125.3°	80°48.2'	+37.4'	130.4°	80°07.6'	+41.1'	134.7°	79°23.9'	+44.2'	138.5°	78°37.8'	+46.7'	141.8°	77°49.7'	+48.7'	144.7°	77°00.0'	+50.3'	147.2°	2
3	81°57.7'	+27.1'	119.5°	81°25.5'	+32.8'	125.3°	80°48.7'	+37.4'	130.3°	80°08.1'	+41.2'	134.7°	79°24.5'	+44.3'	138.5°	78°38.4'	+46.7'	141.8°	77°50.3'	+48.7'	144.7°	3
4	82°24.9'	+20.6'	112.9°	81°58.3'	+27.2'	119.5°	81°26.2'	+32.9'	125.3°	80°49.4'	+37.5'	130.3°	80°08.8'	+41.3'	134.7°	79°25.1'	+44.4'	138.5°	78°39.0'	+46.8'	141.8°	4
5	82°45.4'	+13.0'	105.6°	82°25.6'	+20.6'	112.9°	81°59.1'	+27.3'	119.5°	81°26.9'	+33.0'	125.3°	80°50.1'	+37.6'	130.3°	80°09.5'	+41.4'	134.7°	79°25.8'	+44.5'	138.6°	5
6	82°58.4'	+04.7'	97.8°	82°46.2'	+13.1'	105.6°	82°26.4'	+20.7'	112.9°	81°59.9'	+27.5'	119.5°	81°27.7'	+33.1'	125.3°	80°50.9'	+37.8'	130.4°	80°10.3'	+41.5'	134.8°	6
7	83°03.1'	-03.8'	89.6°	82°59.3'	+04.8'	97.7°	82°47.1'	+13.2'	105.6°	82°27.3'	+20.8'	112.9°	82°00.8'	+27.6'	119.5°	81°28.7'	+33.2'	125.3°	80°51.8'	+37.9'	130.4°	7
8	82°59.3'	-12.2'	81.4°	83°04.1'	-03.8'	89.5°	83°00.3'	+04.9'	97.7°	82°48.2'	+13.3'	105.6°	82°28.4'	+21.0'	112.9°	82°01.9'	+27.7'	119.5°	81°29.7'	+33.3'	125.3°	8
9	82°47.1'	-19.8'	73.4°	83°00.3'	-12.1'	81.3°	83°05.2'	-03.7'	89.5°	83°01.4'	+04.9'	97.7°	82°49.4'	+13.4'	105.6°	82°29.6'	+21.1'	112.9°	82°03.0'	+27.8'	119.5°	9
10	82°27.3'	-26.5'	66.1°	82°48.2'	-19.8'	73.3°	83°01.4'	-12.1'	81.2°	83°06.4'	-03.7'	89.4°	83°02.7'	+05.0'	97.6°	82°50.6'	+13.5'	105.5°	82°30.8'	+21.2'	112.9°	10
11	82°00.8'	-32.2'	59.4°	82°28.4'	-26.5'	66.0°	82°49.4'	-19.8'	73.2°	83°02.7'	-12.1'	81.1°	83°07.7'	-03.6'	89.3°	83°04.1'	+05.1'	97.6°	82°52.0'	+13.6'	105.5°	11
12	81°28.7'	-36.8'	53.6°	82°01.9'	-32.2'	59.3°	82°29.6'	-26.5'	65.8°	82°50.6'	-19.8'	73.1°	83°04.1'	-12.1'	81.0°	83°09.2'	-03.6'	89.3°	83°05.6'	+05.2'	97.6°	12
13	80°51.8'	-40.6'	48.4°	81°29.7'	-36.9'	53.4°	82°03.0'	-32.2'	59.2°	82°30.8'	-26.5'	65.7°	82°52.0'	-19.8'	73.0°	83°05.6'	-12.0'	80.9°	83°10.8'	-03.5'	89.2°	13
14	80°11.2'	-43.7'	43.9°	80°52.8'	-40.7'	48.3°	81°30.8'	-36.9'	53.3°	82°04.3'	-32.2'	59.0°	82°32.2'	-26.6'	65.6°	82°53.6'	-19.8'	72.9°	83°07.2'	-12.0'	80.8°	14
15	79°27.5'	-46.2'	40.0°	80°12.2'	-43.7'	43.8°	80°53.9'	-40.7'	48.1°	81°32.1'	-36.9'	53.1°	82°05.7'	-32.3'	58.9°	82°33.8'	-26.6'	65.4°	82°55.2'	-19.8'	72.8°	15
16	78°41.3'	-48.2'	36.7°	79°28.5'	-46.2'	39.9°	80°13.2'	-43.8'	43.6°	80°55.1'	-40.7'	47.9°	81°33.4'	-37.0'	52.9°	82°07.2'	-32.3'	58.7°	82°35.4'	-26.6'	65.3°	16
17	77°53.2'	-49.8'	33.7°	78°42.3'	-48.2'	36.5°	79°29.5'	-46.2'	39.7°	80°14.4'	-43.8'	43.4°	80°56.4'	-40.8'	47.7°	81°34.8'	-37.0'	52.7°	82°08.7'	-32.4'	58.5°	17
18	77°03.4'	-51.1'	31.2°	77°54.1'	-49.8'	33.6°	78°43.3'	-48.2'	36.3°	79°30.6'	-46.3'	39.5°	80°15.6'	-43.8'	43.2°	80°57.8'	-40.8'	47.6°	81°36.4'	-37.1'	52.6°	18
19	76°12.3'	-52.2'	28.9°	77°04.3'	-51.1'	31.0°	77°55.0'	-49.8'	33.4°	78°44.3'	-48.3'	36.2°	79°31.8'	-46.3'	39.4°	80°17.0'	-43.9'	43.1°	80°59.3'	-40.9'	47.4°	19
20	75°20.0'	-53.1'	26.9°	76°13.1'	-52.2'	28.7°	77°05.2'	-51.2'	30.8°	77°56.1'	-49.9'	33.2°	78°45.5'	-48.3'	36.0°	79°33.1'	-46.4'	39.2°	80°18.4'	-44.0'	42.9°	20
21	74°26.9'	-53.9'	25.1°	75°20.9'	-53.2'	26.7°	76°14.0'	-52.3'	28.6°	77°06.2'	-51.2'	30.6°	77°57.2'	-49.9'	33.0°	78°46.7'	-48.4'	35.8°	79°34.4'	-46.4'	39.0°	21
22	73°33.0'	-54.6'	23.5°	74°27.7'	-53.9'	24.9°	75°21.8'	-53.2'	26.6°	76°15.0'	-52.3'	28.4°	77°07.3'	-51.								

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

8° 352° LHA				Latitude SAME as Declination								8° 352° LHA										
Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	79°23.1'	+38.0'	130.9°	78°42.3'	+41.2'	134.7°	77°58.8'	+43.9'	138.1°	77°13.2'	+46.2'	141.0°	76°25.7'	+48.0'	143.6°	75°36.6'	+49.5'	145.9°	74°46.3'	+50.8'	148.0°	0
1	80°01.1'	+34.2'	126.6°	79°23.5'	+38.1'	130.9°	78°42.8'	+41.3'	134.7°	77°59.3'	+44.0'	138.0°	77°13.7'	+46.2'	141.0°	76°26.2'	+48.1'	143.6°	75°37.2'	+49.6'	145.9°	1
2	80°35.3'	+29.7'	121.7°	80°01.6'	+34.3'	126.6°	79°24.1'	+38.2'	130.9°	78°43.3'	+41.4'	134.7°	77°59.9'	+44.1'	138.0°	77°14.3'	+46.3'	141.0°	76°26.8'	+48.2'	143.6°	2
3	81°05.1'	+24.4'	116.3°	80°36.0'	+29.8'	121.7°	80°02.3'	+34.4'	126.5°	79°24.7'	+38.3'	130.9°	78°44.0'	+41.5'	134.7°	78°00.6'	+44.2'	138.0°	77°14.9'	+46.4'	141.0°	3
4	81°29.5'	+18.3'	110.2°	81°05.8'	+24.5'	116.2°	80°36.7'	+29.9'	121.7°	80°03.0'	+34.5'	126.5°	79°25.5'	+38.4'	130.8°	78°44.8'	+41.6'	134.7°	78°01.3'	+44.3'	138.0°	4
5	81°47.8'	+11.5'	103.7°	81°30.3'	+18.4'	110.2°	81°06.6'	+24.6'	116.2°	80°37.6'	+30.0'	121.7°	80°03.9'	+34.6'	126.5°	79°26.4'	+38.5'	130.8°	78°45.6'	+41.7'	134.7°	5
6	81°59.3'	+04.2'	96.7°	81°48.7'	+11.6'	103.6°	81°31.3'	+18.5'	110.2°	81°07.6'	+24.7'	116.2°	80°38.6'	+30.2'	121.6°	80°04.9'	+34.8'	126.5°	79°27.4'	+38.6'	130.9°	6
7	82°03.6'	-03.2'	89.5°	82°00.4'	+04.3'	96.7°	81°49.8'	+11.7'	103.6°	81°32.4'	+18.6'	110.1°	81°08.7'	+24.9'	116.2°	80°39.7'	+30.3'	121.6°	80°06.0'	+34.9'	126.5°	7
8	82°00.4'	-10.6'	82.3°	82°04.7'	-03.2'	89.4°	82°01.5'	+04.4'	96.6°	81°51.0'	+11.8'	103.6°	81°33.6'	+18.8'	110.1°	81°10.0'	+25.0'	116.2°	80°40.9'	+30.4'	121.7°	8
9	81°49.8'	-17.4'	75.3°	82°01.5'	-10.5'	82.2°	82°05.9'	-03.1'	89.4°	82°02.8'	+04.5'	96.6°	81°52.3'	+11.9'	103.5°	81°34.9'	+18.9'	110.1°	81°11.3'	+25.1'	116.2°	9
10	81°32.4'	-23.6'	68.7°	81°51.0'	-17.4'	75.2°	82°02.8'	-10.5'	82.1°	82°07.3'	-03.0'	89.3°	82°04.3'	+04.6'	96.5°	81°53.8'	+12.0'	103.5°	81°36.4'	+19.0'	110.1°	10
11	81°08.7'	-29.0'	62.6°	81°33.6'	-23.6'	68.6°	81°52.3'	-17.4'	75.1°	82°04.3'	-10.4'	82.0°	82°08.8'	-03.0'	89.2°	82°05.8'	+04.7'	96.5°	81°55.4'	+12.1'	103.5°	11
12	80°39.7'	-33.7'	57.0°	81°10.0'	-29.0'	62.4°	81°34.9'	-23.6'	68.4°	81°53.8'	-17.4'	75.0°	82°05.8'	-10.4'	81.9°	82°10.5'	-02.9'	89.2°	82°07.6'	+04.7'	96.4°	12
13	80°06.0'	-37.5'	52.1°	80°40.9'	-33.7'	56.9°	81°11.3'	-29.1'	62.3°	81°36.4'	-23.6'	68.3°	81°55.4'	-17.4'	74.9°	82°07.6'	-10.4'	81.8°	82°12.3'	-02.9'	89.1°	13
14	79°28.5'	-40.8'	47.7°	80°07.2'	-37.6'	51.9°	80°42.3'	-33.7'	56.7°	81°12.8'	-29.1'	62.1°	81°38.1'	-23.6'	68.2°	81°57.2'	-17.4'	74.7°	82°09.4'	-10.4'	81.8°	14
15	78°47.7'	-43.5'	43.8°	79°29.7'	-40.8'	47.5°	80°08.6'	-37.6'	51.7°	80°43.7'	-33.7'	56.6°	81°14.4'	-29.1'	62.0°	81°39.8'	-23.7'	68.0°	81°59.1'	-17.4'	74.6°	15
16	78°04.2'	-45.7'	40.3°	78°48.9'	-43.5'	43.6°	79°31.0'	-40.8'	47.3°	80°10.0'	-37.6'	51.6°	80°45.3'	-33.8'	56.4°	81°16.2'	-29.1'	61.8°	81°41.7'	-23.7'	67.9°	16
17	77°18.6'	-47.5'	37.3°	78°05.4'	-45.7'	40.2°	78°50.1'	-43.5'	43.4°	79°32.4'	-40.9'	47.1°	80°11.6'	-37.7'	51.4°	80°47.0'	-33.8'	56.2°	81°18.0'	-29.2'	61.6°	17
18	76°31.0'	-49.1'	34.6°	77°19.7'	-47.5'	37.1°	78°06.6'	-45.7'	40.0°	78°51.5'	-43.6'	43.2°	79°33.9'	-40.9'	47.0°	80°13.2'	-37.7'	51.2°	80°48.9'	-33.9'	56.0°	18
19	75°42.0'	-50.3'	32.2°	76°32.1'	-49.1'	34.4°	77°20.9'	-47.6'	36.9°	78°08.0'	-45.8'	39.8°	78°53.0'	-43.6'	43.0°	79°35.5'	-41.0'	46.8°	80°15.0'	-37.8'	51.0°	19
20	74°51.6'	-51.4'	30.0°	75°43.1'	-50.4'	32.0°	76°33.3'	-49.1'	34.2°	77°22.2'	-47.6'	36.7°	78°09.4'	-45.8'	39.6°	78°54.5'	-43.6'	42.8°	79°37.2'	-41.0'	46.5°	20
21	74°00.2'	-52.4'	28.1°	74°52.7'	-51.5'	29.9°	75°44.2'	-50.4'	31.8°	76°34.6'	-49.1'	34.0°	77°23.6'	-47.7'	36.5°	78°10.9'	-45.9'	39.4°	78°56.2'	-43.7'	42.6°	21
22	73°07.8'	-53.1'	26.4°	74°01.2'	-52.4'	28.0°	74°53.8'	-51.5'	29.7°	75°45.4'	-50.4'	31.6°	76°35.9'	-49.2'	33.8°	77°25.0'	-47.7'	36.3°	78°12.5'	-45.9'	39.2°	22
23	72°14.7'	-53.8'	24.8°	73°08.9'	-53.2'	26.2°	74°02.3'	-52.4'	27.8°	74°55.0'	-51.5'	29.5°	75°46.7'	-50.5'	31.4°	76°37.3'	-49.2'	33.6°	77°26.6'	-47.8'	36.1°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	7			8			9			10			11			12			13			

8° 352° LHA Latitude SAME as Declination 8° 352° LHA
 South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

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

9° 351° LHA				Latitude SAME as Declination								9° 351° LHA										
Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	78°37.0'	+35.3'	127.6°	77°58.8'	+38.7'	131.3°	77°17.9'	+41.5'	134.6°	76°34.6'	+43.9'	137.6°	75°49.4'	+45.9'	140.3°	75°02.4'	+47.6'	142.7°	74°14.0'	+49.1'	144.9°	0
1	79°12.3'	+31.6'	123.4°	78°37.5'	+35.4'	127.5°	77°59.4'	+38.8'	131.3°	77°18.5'	+41.6'	134.6°	76°35.2'	+44.0'	137.6°	75°50.0'	+46.0'	140.3°	75°03.0'	+47.7'	142.7°	1
2	79°43.9'	+27.2'	118.7°	79°12.9'	+31.7'	123.3°	78°38.1'	+35.5'	127.5°	78°00.1'	+38.9'	131.2°	77°19.2'	+41.7'	134.6°	76°35.9'	+44.0'	137.6°	75°50.7'	+46.1'	140.3°	2
3	80°11.1'	+22.2'	113.6°	79°44.6'	+27.3'	118.7°	79°13.7'	+31.8'	123.3°	78°38.9'	+35.7'	127.5°	78°00.9'	+39.0'	131.2°	77°20.0'	+41.8'	134.6°	76°36.8'	+44.2'	137.6°	3
4	80°33.2'	+16.5'	108.0°	80°11.9'	+22.3'	113.6°	79°45.5'	+27.4'	118.6°	79°14.6'	+31.9'	123.3°	78°39.8'	+35.8'	127.4°	78°01.8'	+39.1'	131.2°	77°20.9'	+41.9'	134.6°	4
5	80°49.7'	+10.4'	102.1°	80°34.1'	+16.6'	108.0°	80°12.9'	+22.4'	113.5°	79°46.5'	+27.5'	118.6°	79°15.6'	+32.0'	123.3°	78°40.9'	+35.9'	127.4°	78°02.8'	+39.2'	131.2°	5
6	81°00.1'	+03.9'	95.9°	80°50.8'	+10.5'	102.0°	80°35.2'	+16.8'	108.0°	80°14.0'	+22.5'	113.5°	79°47.6'	+32.1'	123.2°	79°16.8'	+32.1'	123.2°	78°42.0'	+36.0'	127.4°	6
7	81°04.0'	-02.7'	89.5°	81°01.3'	+04.0'	95.8°	80°52.0'	+10.6'	102.0°	80°36.5'	+16.9'	107.9°	80°15.3'	+22.6'	113.5°	79°48.9'	+27.8'	118.6°	79°18.0'	+32.3'	123.2°	7
8	81°01.3'	-09.3'	83.0°	81°05.3'	-02.7'	89.4°	81°02.6'	+04.1'	95.7°	80°53.4'	+10.7'	101.9°	80°37.9'	+17.0'	107.9°	80°16.7'	+22.8'	113.5°	79°50.3'	+27.9'	118.6°	8
9	80°52.0'	-15.5'	76.8°	81°02.6'	-09.2'	82.9°	81°06.7'	-02.6'	89.3°	81°04.1'	+04.2'	95.7°	80°54.9'	+10.8'	101.9°	80°39.4'	+17.1'	107.9°	80°18.2'	+22.9'	113.4°	9
10	80°36.5'	-21.2'	70.7°	80°53.4'	-15.5'	76.6°	81°04.1'	-09.2'	82.8°	81°08.2'	-02.5'	89.2°	81°05.7'	+04.3'	95.6°	80°56.6'	+10.9'	101.9°	80°41.1'	+17.2'	107.8°	10
11	80°15.3'	-26.4'	65.1°	80°37.9'	-21.2'	70.6°	80°54.9'	-15.4'	76.5°	81°05.7'	-09.1'	82.7°	81°09.9'	-02.5'	89.1°	81°07.5'	+04.3'	95.6°	80°58.4'	+11.0'	101.8°	11
12	79°48.9'	-30.9'	59.9°	80°16.7'	-26.3'	65.0°	80°39.4'	-21.2'	70.5°	80°56.6'	-15.4'	76.4°	81°07.5'	-09.1'	82.6°	81°11.8'	-02.4'	89.1°	81°09.4'	+04.4'	95.5°	12
13	79°18.0'	-34.7'	55.2°	79°50.3'	-30.9'	59.8°	80°18.2'	-26.3'	64.8°	80°41.1'	-21.2'	70.4°	80°58.4'	-15.4'	76.3°	81°09.4'	-09.0'	82.5°	81°13.9'	-02.3'	89.0°	13
14	78°43.3'	-38.1'	50.9°	79°19.5'	-34.7'	55.0°	79°51.9'	-30.9'	59.6°	80°20.0'	-26.4'	64.7°	80°43.0'	-21.2'	70.2°	81°00.4'	-15.4'	76.2°	81°11.5'	-09.0'	82.4°	14
15	78°05.3'	-40.9'	47.1°	78°44.7'	-38.1'	50.7°	79°21.0'	-34.8'	54.9°	79°53.6'	-30.9'	59.4°	80°21.8'	-26.4'	64.5°	80°45.0'	-21.2'	70.1°	81°02.5'	-15.4'	76.0°	15
16	77°24.4'	-43.2'	43.6°	78°06.7'	-40.9'	46.9°	78°46.3'	-38.1'	50.6°	79°22.7'	-34.8'	54.7°	79°55.5'	-30.9'	59.3°	80°23.8'	-26.4'	64.3°	80°47.2'	-21.2'	69.9°	16
17	76°41.1'	-45.3'	40.5°	77°25.8'	-43.3'	43.4°	78°08.2'	-40.9'	46.7°	78°47.9'	-38.1'	50.4°	79°24.5'	-34.8'	54.5°	79°57.4'	-30.9'	59.1°	80°26.0'	-26.4'	64.2°	17
18	75°55.9'	-47.0'	37.7°	76°42.5'	-45.3'	40.3°	77°27.3'	-43.3'	43.2°	78°09.8'	-40.9'	46.5°	78°49.7'	-38.2'	50.2°	79°26.5'	-34.9'	54.3°	79°59.6'	-31.0'	58.9°	18
19	75°08.9'	-48.4'	35.2°	75°57.2'	-47.0'	37.5°	76°44.0'	-45.3'	40.1°	77°28.9'	-43.3'	43.0°	78°11.6'	-41.0'	46.3°	78°51.6'	-38.2'	50.0°	79°28.6'	-34.9'	54.1°	19
20	74°20.5'	-49.7'	33.0°	75°10.2'	-48.4'	35.1°	75°58.6'	-47.0'	37.3°	76°45.5'	-45.4'	39.9°	77°30.6'	-43.4'	42.8°	78°13.4'	-41.0'	46.1°	78°53.7'	-38.3'	49.7°	20
21	73°30.8'	-50.7'	31.0°	74°21.8'	-49.7'	32.8°	75°11.6'	-48.5'	34.9°	76°00.2'	-47.1'	37.1°	76°47.2'	-45.4'	39.7°	77°32.4'	-43.4'	42.6°	78°15.4'	-41.1'	45.9°	21
22	72°40.1'	-51.6'	29.1°	73°32.1'	-50.7'	30.8°	74°23.1'	-49.7'	32.6°	75°13.1'	-48.5'	34.6°	76°01.8'	-47.1'	36.9°	76°49.0'	-45.4'	39.5°	77			

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

10° 350° LHA

Latitude SAME as Declination

10° 350° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	77°48.8'	+32.9'	124.7°	77°13.2'	+36.3'	128.3°	76°34.6'	+39.2'	131.6°	75°53.6'	+41.7'	134.6°	75°10.5'	+43.8'	137.3°	74°25.6'	+45.7'	139.7°	73°39.1'	+47.3'	141.9°	0
1	78°21.8'	+29.2'	120.6°	77°49.4'	+33.1'	124.6°	77°13.8'	+36.4'	128.2°	76°35.3'	+39.3'	131.5°	75°54.4'	+41.8'	134.5°	75°11.3'	+43.9'	137.2°	74°26.4'	+45.8'	139.7°	1
2	78°51.0'	+25.0'	116.2°	78°22.5'	+29.3'	120.5°	77°50.2'	+33.2'	124.5°	77°14.6'	+36.5'	128.2°	76°36.1'	+39.4'	131.5°	75°55.2'	+41.9'	134.5°	75°12.1'	+44.0'	137.2°	2
3	79°16.0'	+20.3'	111.4°	78°51.8'	+25.1'	116.1°	78°23.4'	+29.5'	120.5°	77°51.1'	+33.3'	124.5°	77°15.5'	+36.6'	128.2°	76°37.1'	+39.5'	131.5°	75°56.2'	+42.0'	134.5°	3
4	79°36.3'	+15.1'	106.2°	79°17.0'	+20.4'	111.3°	78°52.8'	+25.2'	116.1°	78°24.4'	+29.6'	120.5°	77°52.1'	+33.4'	124.5°	77°16.6'	+36.7'	128.1°	76°38.2'	+39.6'	131.5°	4
5	79°51.4'	+09.5'	100.8°	79°37.4'	+15.2'	106.2°	79°18.1'	+20.5'	111.3°	78°54.0'	+25.4'	116.0°	78°25.5'	+29.7'	120.4°	77°53.3'	+33.5'	124.5°	77°17.8'	+36.9'	128.1°	5
6	80°00.9'	+03.6'	95.2°	79°52.5'	+09.6'	100.8°	79°38.6'	+15.3'	106.1°	79°19.3'	+20.6'	111.2°	78°55.3'	+25.5'	116.0°	78°26.9'	+29.9'	120.4°	77°54.7'	+33.7'	124.5°	6
7	80°04.5'	-02.3'	89.4°	80°02.1'	+03.7'	95.1°	79°53.9'	+09.7'	100.7°	79°40.0'	+15.4'	106.1°	79°20.8'	+20.8'	111.2°	78°56.7'	+25.6'	116.0°	78°28.4'	+30.0'	120.4°	7
8	80°02.1'	-08.2'	83.6°	80°05.9'	-02.3'	89.3°	80°03.6'	+03.8'	95.0°	79°55.4'	+09.8'	100.6°	79°41.5'	+15.6'	106.0°	79°22.4'	+20.9'	111.2°	78°58.4'	+25.8'	116.0°	8
9	79°53.9'	-13.9'	77.9°	80°03.6'	-08.2'	83.5°	80°07.4'	-02.2'	89.2°	80°05.2'	+03.9'	94.9°	79°57.1'	+09.9'	100.6°	79°43.3'	+15.7'	106.0°	79°24.2'	+21.1'	111.2°	9
10	79°40.0'	-19.2'	72.4°	79°55.4'	-13.9'	77.8°	80°05.2'	-08.1'	83.4°	80°09.1'	-02.1'	89.1°	80°07.0'	+04.0'	94.9°	79°59.0'	+10.0'	100.5°	79°45.2'	+15.8'	106.0°	10
11	79°20.8'	-24.0'	67.2°	79°41.5'	-19.2'	72.3°	79°57.1'	-13.8'	77.7°	80°07.0'	-08.1'	83.3°	80°11.1'	-02.0'	89.0°	80°09.0'	+04.1'	94.8°	80°01.0'	+10.2'	100.5°	11
12	78°56.7'	-28.4'	62.4°	79°22.4'	-24.0'	67.1°	79°43.3'	-19.1'	72.2°	79°59.0'	-13.8'	77.6°	80°09.0'	-08.0'	83.2°	80°13.1'	-01.9'	89.0°	80°11.2'	+04.2'	94.7°	12
13	78°28.4'	-32.2'	57.9°	78°58.4'	-28.4'	62.2°	79°24.2'	-24.0'	66.9°	79°45.2'	-19.1'	72.0°	80°01.0'	-13.7'	77.4°	80°11.2'	-07.9'	83.1°	80°15.4'	-01.9'	88.9°	13
14	77°56.2'	-35.5'	53.7°	78°30.0'	-32.2'	57.7°	79°00.1'	-28.4'	62.0°	79°26.1'	-24.0'	66.8°	79°47.3'	-19.1'	71.9°	80°03.3'	-13.7'	77.3°	80°13.5'	-07.9'	83.0°	14
15	77°20.6'	-38.4'	50.0°	77°57.8'	-35.5'	53.5°	78°31.8'	-32.2'	57.5°	79°02.1'	-28.4'	61.9°	79°28.2'	-24.0'	66.6°	79°49.6'	-19.1'	71.7°	80°05.7'	-13.7'	77.2°	15
16	76°42.2'	-40.9'	46.5°	77°22.3'	-38.4'	49.8°	77°59.6'	-35.6'	53.4°	78°33.7'	-32.2'	57.3°	79°04.2'	-28.4'	61.7°	79°30.5'	-24.0'	66.4°	79°52.0'	-19.1'	71.6°	16
17	76°01.3'	-43.1'	43.4°	76°43.8'	-40.9'	46.3°	77°24.0'	-38.5'	49.6°	78°01.5'	-35.6'	53.2°	78°35.8'	-32.2'	57.1°	79°06.5'	-28.4'	61.5°	79°32.9'	-24.0'	66.3°	17
18	75°18.2'	-44.9'	40.6°	76°02.9'	-43.1'	43.2°	76°45.6'	-41.0'	46.1°	77°25.9'	-38.5'	49.4°	78°03.6'	-35.6'	53.0°	78°38.1'	-32.3'	56.9°	79°08.9'	-28.4'	61.3°	18
19	74°33.3'	-46.5'	38.1°	75°19.8'	-44.9'	40.4°	76°04.6'	-43.1'	43.0°	76°47.4'	-41.0'	45.9°	77°28.0'	-38.5'	49.2°	78°05.8'	-35.6'	52.7°	78°40.4'	-32.3'	56.7°	19
20	73°46.9'	-47.9'	35.7°	74°34.9'	-46.5'	37.9°	75°21.5'	-45.0'	40.2°	76°06.5'	-43.1'	42.8°	76°49.4'	-41.0'	45.7°	77°30.1'	-38.6'	48.9°	78°08.1'	-35.7'	52.5°	20
21	72°59.0'	-49.1'	33.6°	73°48.4'	-47.9'	35.5°	74°36.6'	-46.5'	37.7°	75°23.3'	-45.0'	40.0°	76°08.4'	-43.2'	42.6°	76°51.6'	-41.1'	45.5°	77°32.4'	-38.6'	48.7°	21
22	72°09.9'	-50.1'	31.7°	73°00.5'	-49.1'	33.4°	73°50.0'	-47.9'	35.3°	74°38.3'	-46.6'	37.4°	75°25.2'	-45.0'	39.8°	76°10.5'	-43.2'	42.4°	76°53.8'	-41.1'	45.3°	22
23	71°19.8'	-51.0'	30.0°	72°11.4'	-50.1'	31.5°	73°02.1'	-49.1'	33.2°	73°51.8'	-48.0'	35.1°	74°40.2'	-46.6'	37.2°	75°27.3'	-45.1'	39.5°	76°12.7'	-43.3'	42.1°	23

10° 350° LHA

Latitude SAME as Declination

10° 350° LHA

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

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

11° 349° LHA

Latitude SAME as Declination

11° 349° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	76°59.1'	+30.8'	122.1°	76°25.7'	+34.1'	125.6°	75°49.4'	+37.0'	128.8°	75°10.5'	+39.6'	131.8°	74°29.5'	+41.8'	134.5°	73°46.6'	+43.8'	136.9°	73°01.9'	+45.5'	139.2°	0
1	77°29.9'	+27.2'	118.2°	76°59.8'	+30.9'	122.0°	76°26.4'	+34.2'	125.5°	75°50.1'	+37.2'	128.8°	75°11.4'	+39.7'	131.7°	74°30.4'	+42.0'	134.4°	73°47.4'	+43.9'	136.9°	1
2	77°57.1'	+23.1'	114.0°	77°30.7'	+27.3'	118.1°	77°00.6'	+31.0'	122.0°	76°27.3'	+34.4'	125.5°	75°51.1'	+37.3'	128.7°	75°12.3'	+39.8'	131.7°	74°31.4'	+42.1'	134.4°	2
3	78°20.2'	+18.7'	109.5°	77°58.0'	+23.3'	113.9°	77°31.7'	+27.4'	118.1°	77°01.6'	+31.2'	121.9°	76°28.3'	+34.5'	125.5°	75°52.2'	+37.4'	128.7°	75°13.4'	+40.0'	131.7°	3
4	78°38.9'	+13.9'	104.7°	78°21.3'	+18.8'	109.4°	77°59.1'	+23.4'	113.9°	77°32.8'	+27.6'	118.0°	77°02.8'	+31.3'	121.9°	76°29.6'	+34.6'	125.4°	75°53.4'	+37.5'	128.7°	4
5	78°52.8'	+08.7'	99.8°	78°40.1'	+14.0'	104.7°	78°22.5'	+18.9'	109.4°	78°00.4'	+23.5'	113.8°	77°34.1'	+27.7'	118.0°	77°04.2'	+31.4'	121.8°	76°30.9'	+34.8'	125.4°	5
6	79°01.5'	+03.4'	94.6°	78°54.1'	+08.9'	99.7°	78°41.4'	+14.1'	104.6°	78°23.9'	+19.1'	109.3°	78°01.8'	+23.7'	113.8°	77°35.6'	+27.8'	118.0°	77°05.7'	+31.6'	121.8°	6
7	79°04.9'	-02.0'	89.3°	79°02.9'	+03.5'	94.5°	78°55.6'	+09.0'	99.6°	78°43.0'	+14.2'	104.6°	78°25.5'	+19.2'	109.3°	78°03.5'	+23.8'	113.8°	77°37.3'	+28.0'	117.9°	7
8	79°02.9'	-07.4'	84.1°	79°06.4'	-01.9'	89.2°	79°04.5'	+03.6'	94.4°	78°57.2'	+09.1'	99.5°	78°44.7'	+14.4'	104.5°	78°27.3'	+19.4'	109.2°	78°05.3'	+24.0'	113.7°	8
9	78°55.6'	-12.6'	78.9°	79°04.5'	-07.3'	83.9°	79°08.2'	-01.8'	89.1°	79°06.3'	+03.7'	94.3°	78°59.1'	+09.2'	99.5°	78°46.7'	+14.5'	104.4°	78°29.3'	+19.5'	109.2°	9
10	78°43.0'	-17.5'	73.8°	78°57.2'	-12.5'	78.7°	79°06.3'	-07.2'	83.8°	79°10.1'	-01.7'	89.0°	79°08.3'	+03.8'	94.3°	79°01.2'	+09.3'	99.4°	78°48.8'	+14.7'	104.4°	10
11	78°25.5'	-22.0'	69.0°	78°44.7'	-17.4'	73.7°	78°59.1'	-12.4'	78.6°	79°08.3'	-07.1'	83.7°	79°12.2'	-01.6'	88.9°	79°10.5'	+03.9'	94.2°	79°03.4'	+09.5'	99.4°	11
12	78°03.5'	-26.2'	64.4°	78°27.3'	-22.0'	68.8°	78°46.7'	-17.4'	73.5°	79°01.2'	-12.4'	78.5°	79°10.5'	-07.1'	83.6°	79°14.5'	-01.6'	88.9°	79°12.9'	+04.1'	94.1°	12
13	77°37.3'	-29.9'	60.1°	78°05.3'	-26.2'	64.3°	78°29.3'	-22.0'	68.7°	78°48.8'	-17.4'	73.4°	79°03.4'	-12.3'	78.4°	79°12.9'	-07.0'	83.5°	79°17.0'	-01.5'	88.8°	13
14	77°07.4'	-33.2'	56.2°	77°39.1'	-29.9'	60.0°	78°07.3'	-26.1'	64.1°	78°31.4'	-21.9'	68.5°	78°51.1'	-17.3'	73.2°	79°05.9'	-12.3'	78.2°	79°15.5'	-06.9'	83.4°	14
15	76°34.2'	-36.1'	52.5°	77°09.3'	-33.2'	56.0°	77°41.2'	-29.9'	59.8°	78°09.5'	-26.1'	63.9°	78°33.8'	-21.9'	68.4°	78°53.6'	-17.3'	73.1°	79°08.6'	-12.3'	78.1°	15
16	75°58.1'	-38.7'	49.2°	76°36.0'	-36.1'	52.3°	77°11.3'	-33.2'	55.8°	77°43.3'	-29.9'	59.6°	78°11.8'	-26.1'	63.7°	78°36.3'	-21.9'	68.2°	78°56.3'	-17.3'	72.9°	16
17	75°19.4'	-40.9'	46.1°	76°00.0'	-38.7'	49.0°	76°38.1'	-36.1'	52.1°	77°13.5'	-33.2'	55.6°	77°45.7'	-29.9'	59.4°	78°14.4'	-26.1'	63.5°	78°39.0'	-21.9'	68.0°	17
18	74°38.4'	-42.9'	43.2°	75°21.2'	-40.9'	45.9°	76°01.9'	-38.7'	48.7°	76°40.2'	-36.2'	51.9°	77°15.8'	-33.3'	55.4°	77°48.2'	-29.9'	59.2°	78°17.1'	-26.2'	63.3°	18
19	73°55.6'	-44.6'	40.7°	74°40.3'	-42.9'	43.0°	75°23.2'	-41.0'	45.7°	76°04.1'	-38.7'	48.5°	76°42.5'	-36.2'	51.7°	77°18.3'	-33.3'	55.2°	77°50.9'	-30.0'	59.0°	19
20	73°11.0'	-46.1'	38.3°	73°57.4'	-44.6'	40.4°	74°42.2'	-42.9'	42.8°	75°25.3'	-41.0'	45.4°	76°06.3'	-38.8'	48.3°	76°45.0'	-36.2'	51.5°	77°21.0'	-33.3'	55.0°	20
21	72°24.9'	-47.4'	36.1°	73°12.8'	-46.1'	38.1°	73°59.3'	-44.6'	40.2°	74°44.3'	-43.0'	42.6°	75°27.6'	-41.0'	45.2°	76°08.8'	-38.8'	48.1°	76°47.6'	-36.3'	51.2°	21
22	71°37.5'	-48.5'	34.1°	72°26.7'	-47.4'	35.9°	73°14.7'	-46.1'	37.9°	74°01.4'	-44.7'	40.0°	74°46.5'	-43.0'	42.4°	75°30.0'	-41.1'	45.0°	76°11.4'	-3		

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

12° 348° LHA

Latitude SAME as Declination

12° 348° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	76°08.0'	+28.9'	119.8°	75°36.6'	+32.1'	123.2°	75°02.4'	+35.1'	126.4°	74°25.6'	+37.7'	129.2°	73°46.6'	+40.0'	131.9°	73°05.5'	+42.0'	134.4°	72°22.7'	+43.8'	136.6°	0
1	76°36.9'	+25.4'	116.1°	76°08.8'	+29.0'	119.8°	75°37.5'	+32.3'	123.1°	75°03.3'	+35.2'	126.3°	74°26.5'	+37.8'	129.2°	73°47.5'	+40.1'	131.9°	73°06.5'	+42.1'	134.3°	1
2	77°02.3'	+21.5'	112.1°	76°37.8'	+25.5'	116.0°	76°09.7'	+29.1'	119.7°	75°38.5'	+32.4'	123.1°	75°04.3'	+35.3'	126.2°	74°27.6'	+37.9'	129.1°	73°48.7'	+40.2'	131.8°	2
3	77°23.8'	+17.3'	107.9°	77°03.3'	+21.7'	112.1°	76°38.9'	+25.6'	116.0°	76°10.9'	+29.3'	119.6°	75°39.6'	+32.5'	123.0°	75°05.6'	+35.5'	126.2°	74°28.9'	+38.1'	129.1°	3
4	77°41.1'	+12.9'	103.5°	77°25.0'	+17.5'	107.8°	77°04.5'	+21.8'	112.0°	76°40.1'	+25.8'	115.9°	76°12.2'	+29.4'	119.6°	75°41.0'	+32.7'	123.0°	75°07.0'	+35.6'	126.2°	4
5	77°54.0'	+08.1'	98.8°	77°42.4'	+13.0'	103.4°	77°26.3'	+17.6'	107.8°	77°05.9'	+21.9'	111.9°	76°41.6'	+25.9'	115.9°	76°13.7'	+29.6'	119.5°	75°42.6'	+32.8'	123.0°	5
6	78°02.1'	+03.2'	94.1°	77°55.4'	+08.3'	98.8°	77°43.9'	+13.1'	103.3°	77°27.9'	+17.8'	107.7°	77°07.5'	+22.1'	111.9°	76°43.3'	+26.1'	115.8°	76°15.4'	+29.7'	119.5°	6
7	78°05.4'	-01.7'	89.3°	78°03.7'	+03.4'	94.0°	77°57.0'	+08.4'	98.7°	77°45.6'	+13.3'	103.2°	77°29.6'	+17.9'	107.6°	77°09.4'	+22.2'	111.8°	76°45.1'	+26.2'	115.8°	7
8	78°03.7'	-06.6'	84.4°	78°07.0'	-01.6'	89.2°	78°05.4'	+03.5'	93.9°	77°58.9'	+08.5'	98.6°	77°47.5'	+13.4'	103.2°	77°31.6'	+18.1'	107.6°	77°11.4'	+22.4'	111.8°	8
9	77°57.0'	-11.4'	79.6°	78°05.4'	-06.5'	84.3°	78°08.9'	-01.5'	89.1°	78°07.4'	+03.6'	93.8°	78°00.9'	+08.6'	98.5°	77°49.7'	+13.5'	103.1°	77°33.8'	+18.2'	107.5°	9
10	77°45.6'	-16.0'	75.0°	77°58.9'	-11.3'	79.5°	78°07.4'	-06.5'	84.2°	78°11.0'	-01.4'	89.0°	78°09.6'	+03.7'	93.7°	78°03.2'	+08.8'	98.5°	77°52.0'	+13.7'	103.1°	10
11	77°29.6'	-20.3'	70.5°	77°47.5'	-15.9'	74.8°	78°00.9'	-11.3'	79.4°	78°09.6'	-06.4'	84.1°	78°13.3'	-01.3'	88.9°	78°12.0'	+03.8'	93.6°	78°05.7'	+08.9'	98.4°	11
12	77°09.4'	-24.2'	66.2°	77°31.6'	-20.2'	70.3°	77°49.7'	-15.9'	74.7°	78°03.2'	-11.2'	79.2°	78°12.0'	-06.3'	84.0°	78°15.8'	-01.2'	88.7°	78°14.6'	+03.9'	93.6°	12
13	76°45.1'	-27.8'	62.1°	77°11.4'	-24.2'	66.0°	77°33.8'	-20.2'	70.2°	77°52.0'	-15.8'	74.5°	78°05.7'	-11.1'	79.1°	78°14.6'	-06.2'	83.8°	78°18.5'	-01.1'	88.6°	13
14	76°17.3'	-31.1'	58.3°	76°47.2'	-27.8'	62.0°	77°13.6'	-24.2'	65.8°	77°36.2'	-20.2'	70.0°	77°54.5'	-15.8'	74.4°	78°08.4'	-11.1'	79.0°	78°17.4'	-06.1'	83.7°	14
15	75°46.2'	-34.0'	54.8°	76°19.4'	-31.1'	58.1°	76°49.4'	-27.8'	61.8°	77°16.0'	-24.2'	65.7°	77°38.8'	-20.1'	69.8°	77°57.3'	-15.7'	74.2°	78°11.3'	-11.0'	78.8°	15
16	75°12.2'	-36.6'	51.5°	75°48.3'	-34.0'	54.6°	76°21.6'	-31.1'	57.9°	76°51.9'	-27.8'	61.6°	77°18.6'	-24.1'	65.5°	77°41.5'	-20.1'	69.7°	78°00.2'	-15.7'	74.1°	16
17	74°35.6'	-38.9'	48.5°	75°14.3'	-36.6'	51.3°	75°50.6'	-34.0'	54.4°	76°24.1'	-31.1'	57.7°	76°54.5'	-27.8'	61.4°	77°21.4'	-24.1'	65.3°	77°44.5'	-20.1'	69.5°	17
18	73°56.7'	-40.9'	45.6°	74°37.7'	-38.9'	48.2°	75°16.6'	-36.6'	51.1°	75°53.0'	-34.0'	54.2°	76°26.7'	-31.1'	57.5°	76°57.3'	-27.8'	61.2°	77°24.4'	-24.1'	65.1°	18
19	73°15.8'	-42.7'	43.1°	73°58.8'	-40.9'	45.4°	74°40.0'	-38.9'	48.0°	75°19.0'	-36.6'	50.9°	75°55.6'	-34.0'	53.9°	76°29.5'	-31.1'	57.3°	77°00.3'	-27.8'	61.0°	19
20	72°33.1'	-44.3'	40.7°	73°17.9'	-42.7'	42.8°	74°01.0'	-40.9'	45.2°	74°42.4'	-38.9'	47.8°	75°21.6'	-36.6'	50.6°	75°58.4'	-34.1'	53.7°	76°32.5'	-31.1'	57.1°	20
21	71°48.8'	-45.7'	38.5°	72°35.2'	-44.3'	40.4°	73°20.1'	-42.7'	42.6°	74°03.4'	-41.0'	45.0°	74°44.9'	-39.0'	47.6°	75°24.3'	-36.7'	50.4°	76°01.3'	-34.1'	53.5°	21
22	71°03.1'	-46.9'	36.4°	71°50.9'	-45.7'	38.2°	72°37.4'	-44.3'	40.2°	73°22.5'	-42.8'	42.4°	74°06.0'	-41.0'	44.7°	74°47.6'	-39.0'	47.3°	75°27.2'	-36.7'	50.1°	22
23	70°16.2'	-48.0'	34.5°	71°05.2'	-46.9'	36.2°	71°53.0'	-45.7'	38.0°	72°39.7'	-44.4'	40.0°	73°25.0'	-42.8'	42.1°	74°08.6'	-41.0'	44.5°	74°50.5'	-39.0'	47.0°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	7			8			9			10			11			12			13			

12° 348° LHA

Latitude SAME as Declination

12° 348° LHA

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

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

13° 347° LHA

Latitude SAME as Declination

13° 347° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	75°15.8'	+27.2'	117.8°	74°46.3'	+30.4'	121.1°	74°14.0'	+33.3'	124.1°	73°39.1'	+35.9'	126.9°	73°01.9'	+38.2'	129.6°	72°22.7'	+40.3'	132.0°	71°41.7'	+42.2'	134.3°	0
1	75°43.0'	+23.8'	114.3°	75°16.7'	+27.3'	117.7°	74°47.2'	+30.5'	121.0°	74°15.0'	+33.4'	124.0°	73°40.1'	+36.0'	126.9°	73°03.0'	+38.3'	129.5°	72°23.9'	+40.4'	131.9°	1
2	76°06.8'	+20.1'	110.5°	75°44.0'	+23.9'	114.2°	75°17.7'	+27.4'	117.7°	74°48.3'	+30.6'	120.9°	74°16.1'	+33.5'	124.0°	73°41.4'	+36.1'	126.8°	73°04.3'	+38.5'	129.5°	2
3	76°26.9'	+16.2'	106.5°	76°07.9'	+20.3'	110.4°	75°45.2'	+24.1'	114.1°	75°19.0'	+27.6'	117.6°	74°49.7'	+30.8'	120.9°	74°17.5'	+33.7'	123.9°	73°42.8'	+36.3'	126.8°	3
4	76°43.1'	+12.0'	102.4°	76°28.2'	+16.3'	106.4°	76°09.2'	+20.4'	110.3°	75°46.6'	+24.2'	114.0°	75°20.5'	+27.7'	117.5°	74°51.2'	+30.9'	120.8°	74°19.1'	+33.8'	123.9°	4
5	76°55.1'	+07.6'	98.1°	76°44.5'	+12.1'	102.3°	76°29.6'	+16.5'	106.4°	76°10.8'	+20.6'	110.3°	75°48.2'	+24.4'	114.0°	75°22.1'	+27.9'	117.5°	74°52.9'	+31.1'	120.8°	5
6	77°02.7'	+03.1'	93.7°	76°56.6'	+07.8'	98.0°	76°46.1'	+12.3'	102.2°	76°31.4'	+16.6'	106.3°	76°12.6'	+20.7'	110.2°	75°50.0'	+24.5'	113.9°	75°24.0'	+28.1'	117.4°	6
7	77°05.8'	-01.5'	89.2°	77°04.4'	+03.2'	93.6°	76°58.4'	+07.9'	97.9°	76°48.0'	+12.4'	102.1°	76°33.3'	+16.8'	106.2°	76°14.6'	+20.9'	110.1°	75°52.1'	+24.7'	113.9°	7
8	77°04.4'	-06.0'	84.7°	77°07.6'	-01.3'	89.1°	77°06.3'	+03.4'	93.5°	77°00.4'	+08.0'	97.8°	76°50.1'	+12.6'	102.0°	76°35.4'	+16.9'	106.1°	76°16.8'	+21.0'	110.1°	8
9	76°58.4'	-10.4'	80.3°	77°06.3'	-05.9'	84.6°	77°09.6'	-01.2'	89.0°	77°08.4'	+03.5'	93.4°	77°02.6'	+08.2'	97.7°	76°52.4'	+12.7'	102.0°	76°37.8'	+17.1'	106.1°	9
10	76°48.0'	-14.7'	76.0°	77°00.4'	-10.3'	80.2°	77°08.4'	-05.8'	84.5°	77°11.9'	-01.1'	88.9°	77°10.8'	+03.6'	93.3°	77°05.1'	+08.3'	97.6°	76°54.9'	+12.9'	101.9°	10
11	76°33.3'	-18.7'	71.7°	76°50.1'	-14.6'	75.8°	77°02.6'	-10.3'	80.0°	77°10.8'	-05.7'	84.4°	77°14.4'	-01.0'	88.8°	77°13.4'	+03.7'	93.2°	77°07.8'	+08.4'	97.5°	11
12	76°14.6'	-22.5'	67.7°	76°35.4'	-18.7'	71.6°	76°52.4'	-14.5'	75.7°	77°05.1'	-10.2'	79.9°	77°13.4'	-05.6'	84.2°	77°17.1'	-00.9'	88.6°	77°16.2'	+03.9'	93.1°	12
13	75°52.1'	-26.0'	63.9°	76°16.8'	-22.4'	67.5°	76°37.8'	-18.6'	71.4°	76°54.9'	-14.5'	75.5°	77°07.8'	-10.1'	79.7°	77°16.2'	-05.5'	84.1°	77°20.1'	-00.8'	88.5°	13
14	75°26.1'	-29.1'	60.2°	75°54.3'	-25.9'	63.7°	76°19.2'	-22.4'	67.4°	76°40.4'	-18.6'	71.3°	76°57.7'	-14.4'	75.3°	77°10.7'	-10.0'	79.6°	77°19.3'	-05.4'	84.0°	14
15	74°57.0'	-32.0'	56.8°	75°28.4'	-29.1'	60.0°	75°56.8'	-25.9'	63.5°	76°21.9'	-22.4'	67.2°	76°43.2'	-18.5'	71.1°	77°00.7'	-14.4'	75.2°	77°13.9'	-10.0'	79.4°	15
16	74°24.9'	-34.6'	53.6°	74°59.3'	-32.0'	56.6°	75°30.9'	-29.1'	59.8°	75°59.5'	-25.9'	63.3°	76°24.7'	-22.4'	67.0°	76°46.3'	-18.5'	70.9°	77°03.9'	-14.3'	75.0°	16
17	73°50.3'	-36.9'	50.6°	74°27.3'	-34.6'	53.4°	75°01.8'	-32.0'	56.4°	75°33.6'	-29.1'	59.6°	76°02.4'	-25.9'	63.1°	76°27.8'	-22.3'	66.8°	76°49.6'	-18.5'	70.7°	17
18	73°13.4'	-39.0'	47.8°	73°52.6'	-36.9'	50.4°	74°29.8'	-34.6'	53.2°	75°04.5'	-32.0'	56.2°	75°36.5'	-29.1'	59.4°	76°05.5'	-25.9'	62.9°	76°31.1'	-22.3'	66.6°	18
19	72°34.3'	-40.9'	45.2°	73°15.7'	-39.0'	47.6°	73°55.2'	-37.0'	50.2°	74°32.5'	-34.6'	52.9°	75°07.4'	-32.0'	55.9°	75°39.6'	-29.1'	59.2°	76°08.8'	-25.9'	62.7°	19
20	71°53.4'	-42.5'	42.8°	72°36.7'	-40.9'	45.0°	73°18.2'	-39.0'	47.4°	73°57.9'	-37.0'	49.9°	74°35.4'	-34.6'	52.7°	75°10.5'	-32.0'	55.7°	75°42.9'	-29.1'	58.9°	20
21	71°10.9'	-44.0'	40.6°	71°55.8'	-42.5'	42.6°	72°39.2'	-40.9'	44.8°	73°20.9'	-39.1'	47.1°	74°00.7'</									

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

14° 346° LHA

Latitude SAME as Declination

14° 346° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	74°22.7'	+25.6'	116.0°	73°54.9'	+28.7'	119.2°	73°24.3'	+31.6'	122.1°	72°51.2'	+34.2'	124.9°	72°15.8'	+36.6'	127.4°	71°38.4'	+38.7'	129.8°	70°59.0'	+40.6'	132.1°	0
1	74°48.4'	+22.4'	112.6°	74°23.7'	+25.8'	116.0°	73°55.9'	+28.9'	119.1°	73°25.4'	+31.7'	122.0°	72°52.4'	+34.3'	124.8°	72°17.0'	+36.7'	127.4°	71°39.6'	+38.8'	129.8°	1
2	75°10.7'	+18.9'	109.1°	74°49.4'	+22.5'	112.6°	74°24.8'	+25.9'	115.9°	73°57.2'	+29.0'	119.0°	73°26.7'	+31.9'	121.9°	72°53.7'	+34.5'	124.7°	72°18.5'	+36.8'	127.3°	2
3	75°29.6'	+15.2'	105.3°	75°12.0'	+19.0'	109.0°	74°50.7'	+22.7'	112.5°	74°26.2'	+26.1'	115.8°	73°58.6'	+29.2'	118.9°	73°28.2'	+32.0'	121.9°	72°55.3'	+34.6'	124.7°	3
4	75°44.8'	+11.3'	101.4°	75°31.0'	+15.3'	105.2°	75°13.4'	+19.2'	108.9°	74°52.3'	+22.8'	112.4°	74°27.8'	+26.2'	115.7°	74°00.3'	+29.4'	118.9°	73°30.0'	+32.2'	121.8°	4
5	75°56.1'	+07.2'	97.4°	75°46.3'	+11.4'	101.3°	75°32.6'	+15.5'	105.1°	75°15.1'	+19.4'	108.8°	74°54.0'	+23.0'	112.3°	74°29.6'	+26.4'	115.6°	74°02.2'	+29.5'	118.8°	5
6	76°03.3'	+03.0'	93.3°	75°57.7'	+07.3'	97.3°	75°48.1'	+11.6'	101.2°	75°34.5'	+15.6'	105.0°	75°17.0'	+19.5'	108.7°	74°56.0'	+23.2'	112.2°	74°31.7'	+26.6'	115.6°	6
7	76°06.3'	-01.2'	89.1°	76°05.1'	+03.1'	93.2°	75°59.6'	+07.5'	97.2°	75°50.1'	+11.7'	101.1°	75°36.5'	+15.8'	105.0°	75°19.2'	+19.7'	108.6°	74°58.3'	+23.3'	112.2°	7
8	76°05.1'	-05.4'	85.0°	76°08.2'	-01.1'	89.0°	76°07.1'	+03.3'	93.1°	76°01.8'	+07.6'	97.1°	75°52.3'	+11.9'	101.0°	75°38.9'	+16.0'	104.9°	75°21.6'	+19.9'	108.6°	8
9	75°59.6'	-09.6'	80.9°	76°07.1'	-05.3'	84.8°	76°10.4'	-01.0'	88.9°	76°09.4'	+03.4'	93.0°	76°04.2'	+07.8'	97.0°	75°54.8'	+12.0'	101.0°	75°41.5'	+16.1'	104.8°	9
10	75°50.1'	-13.5'	76.8°	76°01.8'	-09.5'	80.7°	76°09.4'	-05.2'	84.7°	76°12.8'	-00.9'	88.8°	76°12.0'	+03.5'	92.9°	76°06.9'	+07.9'	96.9°	75°57.6'	+12.2'	100.9°	10
11	75°36.5'	-17.4'	72.8°	75°52.3'	-13.5'	76.6°	76°04.2'	-09.4'	80.6°	76°12.0'	-05.1'	84.6°	76°15.5'	-00.7'	88.7°	76°14.8'	+03.7'	92.7°	76°09.8'	+08.1'	96.8°	11
12	75°19.2'	-20.9'	69.0°	75°38.9'	-17.3'	72.7°	75°54.8'	-13.4'	76.5°	76°06.9'	-09.3'	80.4°	76°14.8'	-05.0'	84.4°	76°18.4'	-00.6'	88.5°	76°17.8'	+03.8'	92.6°	12
13	74°58.3'	-24.3'	65.4°	75°21.6'	-20.9'	68.9°	75°41.5'	-17.2'	72.5°	75°57.6'	-13.3'	76.3°	76°09.8'	-09.2'	80.3°	76°17.8'	-04.9'	84.3°	76°21.6'	-00.5'	88.4°	13
14	74°34.0'	-27.4'	61.9°	75°00.7'	-24.2'	65.2°	75°24.3'	-20.8'	68.7°	75°44.3'	-17.2'	72.3°	76°00.6'	-13.2'	76.2°	76°12.9'	-09.1'	80.1°	76°21.1'	-04.8'	84.2°	14
15	74°06.6'	-30.2'	58.6°	74°36.5'	-27.3'	61.7°	75°03.4'	-24.2'	65.0°	75°27.1'	-20.8'	68.5°	75°47.4'	-17.1'	72.2°	76°03.8'	-13.2'	76.0°	76°16.3'	-09.0'	80.0°	15
16	73°36.4'	-32.8'	55.5°	74°09.2'	-30.2'	58.4°	74°39.2'	-27.3'	61.5°	75°06.3'	-24.2'	64.8°	75°30.2'	-20.7'	68.3°	75°50.7'	-17.1'	72.0°	76°07.3'	-13.1'	75.8°	16
17	73°03.6'	-35.1'	52.6°	73°39.0'	-32.8'	55.3°	74°11.9'	-30.2'	58.2°	74°42.2'	-27.3'	61.3°	75°09.5'	-24.1'	64.6°	75°33.6'	-20.7'	68.1°	75°54.2'	-17.0'	71.8°	17
18	72°28.5'	-37.2'	49.8°	73°06.2'	-35.1'	52.3°	73°41.8'	-32.8'	55.0°	74°14.9'	-30.1'	57.9°	74°45.4'	-27.3'	61.1°	75°12.9'	-24.1'	64.4°	75°37.2'	-20.7'	67.9°	18
19	71°51.3'	-39.1'	47.3°	72°31.1'	-37.2'	49.6°	73°09.0'	-35.1'	52.1°	73°44.7'	-32.8'	54.8°	74°18.1'	-30.1'	57.7°	74°48.8'	-27.3'	60.8°	75°16.5'	-24.1'	64.1°	19
20	71°12.2'	-40.8'	44.9°	71°53.9'	-39.1'	47.0°	72°33.9'	-37.2'	49.4°	73°12.0'	-35.1'	51.9°	73°47.9'	-32.8'	54.6°	74°21.5'	-30.2'	57.5°	74°52.4'	-27.3'	60.6°	20
21	70°31.3'	-42.4'	42.6°	71°14.8'	-40.8'	44.6°	71°56.7'	-39.1'	46.8°	72°36.9'	-37.2'	49.1°	73°15.2'	-35.1'	51.6°	73°51.3'	-32.8'	54.3°	74°25.1'	-30.2'	57.2°	21
22	69°49.0'	-43.8'	40.5°	70°33.9'	-42.4'	42.4°	71°17.5'	-40.9'	44.4°	71°59.6'	-39.2'	46.5°	72°40.0'	-37.3'	48.8°	73°18.5'	-35.1'	51.4°	73°54.9'	-32.8'	54.1°	22
23	69°05.2'	-45.0'	38.6°	69°51.5'	-43.8'	40.3°	70°36.7'	-42.4'	42.1°	71°20.5'	-40.9'	44.1°	72°02.8'	-39.2'	46.3°	72°43.4'	-37.3'	48.6°	73°22.1'	-35.2'	51.1°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	7			8			9			10			11			12			13			

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°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	73°28.9'	+24.2'	114.5°	73°02.6'	+27.3'	117.4°	72°33.6'	+30.1'	120.3°	72°02.2'	+32.6'	122.9°	71°28.4'	+35.0'	125.5°	70°52.6'	+37.1'	127.8°	70°14.9'	+39.1'	130.0°	0
1	73°53.1'	+21.1'	111.2°	73°29.9'	+24.4'	114.4°	73°03.7'	+27.4'	117.3°	72°34.8'	+30.2'	120.2°	72°03.4'	+32.8'	122.9°	71°29.8'	+35.2'	125.4°	70°54.0'	+37.3'	127.7°	1
2	74°14.2'	+17.8'	107.8°	73°54.3'	+21.3'	111.1°	73°31.1'	+24.5'	114.3°	73°05.0'	+27.6'	117.3°	72°36.2'	+30.4'	120.1°	72°04.9'	+33.0'	122.8°	71°31.3'	+35.3'	125.3°	2
3	74°32.1'	+14.3'	104.2°	74°15.5'	+18.0'	107.7°	73°55.7'	+21.4'	111.0°	73°32.6'	+24.7'	114.2°	73°06.6'	+27.7'	117.2°	72°37.9'	+30.6'	120.0°	72°06.6'	+33.1'	122.7°	3
4	74°46.4'	+10.6'	100.6°	74°33.5'	+14.5'	104.1°	74°17.1'	+18.1'	107.6°	73°57.3'	+21.6'	110.9°	73°34.4'	+24.9'	114.1°	73°08.4'	+27.9'	117.1°	72°39.8'	+30.7'	120.0°	4
5	74°57.0'	+06.8'	96.8°	74°48.0'	+10.8'	100.5°	74°35.3'	+14.6'	104.0°	74°18.9'	+18.3'	107.5°	73°59.2'	+21.8'	110.8°	73°36.4'	+25.1'	114.0°	73°10.5'	+28.1'	117.0°	5
6	75°03.8'	+02.9'	93.0°	74°58.8'	+07.0'	96.7°	74°49.9'	+10.9'	100.4°	74°37.2'	+14.8'	103.9°	74°21.0'	+18.5'	107.4°	74°01.4'	+22.0'	110.7°	73°38.6'	+25.2'	113.9°	6
7	75°06.7'	-01.0'	89.1°	75°05.7'	+03.1'	92.8°	75°00.8'	+07.1'	96.6°	74°52.0'	+11.1'	100.3°	74°39.5'	+15.0'	103.8°	74°23.4'	+18.6'	107.3°	74°03.8'	+22.1'	110.7°	7
8	75°05.7'	-04.9'	85.2°	75°08.8'	-00.9'	89.0°	75°07.9'	+03.2'	92.7°	75°03.1'	+07.3'	96.5°	74°54.5'	+11.3'	100.2°	74°42.0'	+15.1'	103.8°	74°26.0'	+18.8'	107.2°	8
9	75°00.8'	-08.8'	81.3°	75°07.9'	-04.8'	85.1°	75°11.1'	-00.7'	88.8°	75°10.4'	+03.4'	92.6°	75°05.7'	+07.4'	96.4°	74°57.1'	+11.4'	100.1°	74°44.8'	+15.3'	103.7°	9
10	74°52.0'	-12.5'	77.5°	75°03.1'	-08.7'	81.2°	75°10.4'	-04.7'	84.9°	75°13.7'	-00.6'	88.7°	75°13.1'	+03.5'	92.5°	75°08.6'	+07.6'	96.3°	75°00.1'	+11.6'	100.0°	10
11	74°39.5'	-16.1'	73.8°	74°54.5'	-12.4'	77.4°	75°05.7'	-08.6'	81.0°	75°13.1'	-04.6'	84.8°	75°16.6'	-00.5'	88.6°	75°16.1'	+03.6'	92.4°	75°11.7'	+07.7'	96.1°	11
12	74°23.4'	-19.5'	70.2°	74°42.0'	-16.0'	73.6°	74°57.1'	-12.3'	77.2°	75°08.6'	-08.5'	80.9°	75°16.1'	-04.5'	84.6°	75°19.8'	-00.4'	88.4°	75°19.4'	+03.8'	92.3°	12
13	74°03.8'	-22.7'	66.7°	74°26.0'	-19.5'	70.0°	74°44.8'	-16.0'	73.4°	75°00.1'	-12.3'	77.0°	75°11.7'	-08.4'	80.7°	75°19.4'	-04.3'	84.5°	75°23.2'	-00.2'	88.3°	13
14	73°41.1'	-25.7'	63.4°	74°06.5'	-22.7'	66.5°	74°28.8'	-19.4'	69.8°	74°47.8'	-15.9'	73.3°	75°03.3'	-12.2'	76.9°	75°15.1'	-08.3'	80.6°	75°23.0'	-04.2'	84.3°	14
15	73°15.3'	-28.5'	60.2°	73°43.8'	-25.7'	63.2°	74°09.4'	-22.6'	66.3°	74°31.9'	-19.3'	69.6°	74°51.1'	-15.8'	73.1°	75°06.8'	-12.1'	76.7°	75°18.7'	-08.2'	80.4°	15
16	72°46.8'	-31.1'	57.2°	73°18.1'	-28.5'	60.0°	73°46.8'	-25.7'	63.0°	74°12.6'	-22.6'	66.1°	74°35.3'	-19.3'	69.4°	74°54.7'	-15.8'	72.9°	75°10.5'	-12.0'	76.5°	16
17	72°15.8'	-33.4'	54.3°	72°49.6'	-31.0'	57.0°	73°21.1'	-28.4'	59.8°	73°50.0'	-25.6'	62.7°	74°16.0'	-22.6'	65.9°	74°38.9'	-19.3'	69.2°	74°58.5'	-15.7'	72.7°	17
18	71°42.4'	-35.5'	51.6°	72°18.6'	-33.4'	54.1°	72°52.7'	-31.0'	56.7°	73°24.4'	-28.4'	59.5°	73°53.5'	-25.6'	62.5°	74°19.7'	-22.5'	65.7°	74°42.8'	-19.2'	69.0°	18
19	71°06.9'	-37.4'	49.1°	71°45.3'	-35.5'	51.4°	72°21.7'	-33.4'	53.9°	72°56.0'	-31.0'	56.5°	73°27.9'	-28.4'	59.3°	73°57.1'	-25.6'	62.3°	74°23.6'	-22.5'	65.5°	19
20	70°29.5'	-39.2'	46.7°	71°09.8'	-37.4'	48.9°	71°48.3'	-35.5'	51.2°	72°25.0'	-33.3'	53.6°	72°59.4'	-31.0'	56.2°	73°31.6'	-28.4'	59.1°	74°01.1'	-25.6'	62.0°	20
21	69°50.3'	-40.8'	44.5°	70°32.3'	-39.2'	46.5°	71°12.8'	-37.4'	48.6°	71°51.6'	-35.5'	50.9°	72°28.4'</									

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

16° 344° LHA

Latitude SAME as Declination

16° 344° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	72°34.3'	+23.0'	113.0°	72°09.5'	+25.9'	115.9°	71°42.0'	+28.7'	118.6°	71°12.1'	+31.2'	121.2°	70°39.9'	+33.6'	123.6°	70°05.7'	+35.7'	125.9°	69°29.5'	+37.7'	128.1°	0
1	72°57.3'	+20.0'	109.9°	72°35.4'	+23.2'	112.9°	72°10.7'	+26.1'	115.8°	71°43.3'	+28.8'	118.5°	71°13.5'	+31.4'	121.1°	70°41.4'	+33.7'	123.5°	70°07.2'	+35.9'	125.9°	1
2	73°17.4'	+16.9'	106.7°	72°58.6'	+20.2'	109.8°	72°36.8'	+23.3'	112.8°	72°12.1'	+26.3'	115.7°	71°44.8'	+29.0'	118.4°	71°15.1'	+31.5'	121.0°	70°43.1'	+33.9'	123.5°	2
3	73°34.2'	+13.5'	103.3°	73°18.8'	+17.0'	106.5°	73°00.1'	+20.3'	109.7°	72°38.4'	+23.5'	112.7°	72°13.8'	+26.4'	115.6°	71°46.6'	+29.2'	118.3°	71°17.0'	+31.7'	120.9°	3
4	73°47.8'	+10.1'	99.8°	73°35.8'	+13.7'	103.2°	73°20.4'	+17.2'	106.4°	73°01.9'	+20.5'	109.6°	72°40.3'	+23.7'	112.6°	72°15.8'	+26.6'	115.5°	71°48.7'	+29.4'	118.2°	4
5	73°57.8'	+06.5'	96.3°	73°49.5'	+10.2'	99.7°	73°37.6'	+13.9'	103.1°	73°22.4'	+17.4'	106.3°	73°03.9'	+20.7'	109.5°	72°42.4'	+23.8'	112.5°	72°18.1'	+26.8'	115.4°	5
6	74°04.3'	+02.9'	92.7°	73°59.7'	+06.7'	96.1°	73°51.5'	+10.4'	99.6°	73°39.8'	+14.0'	103.0°	73°24.6'	+17.5'	106.2°	73°06.3'	+20.9'	109.4°	72°44.9'	+24.0'	112.4°	6
7	74°07.2'	-00.8'	89.0°	74°06.4'	+03.0'	92.5°	74°01.9'	+06.8'	96.0°	73°53.8'	+10.6'	99.5°	73°42.2'	+14.2'	102.9°	73°27.2'	+17.7'	106.1°	73°08.9'	+21.1'	109.3°	7
8	74°06.4'	-04.5'	85.4°	74°09.4'	-00.7'	88.9°	74°08.7'	+03.2'	92.4°	74°04.4'	+07.0'	95.9°	73°56.4'	+10.7'	99.4°	73°44.9'	+14.4'	102.8°	73°30.0'	+17.9'	106.0°	8
9	74°01.9'	-08.1'	81.7°	74°08.7'	-04.3'	85.2°	74°11.9'	-00.5'	88.7°	74°11.4'	+03.3'	92.3°	74°07.1'	+07.1'	95.8°	73°59.3'	+10.9'	99.3°	73°47.9'	+14.6'	102.7°	9
10	73°53.8'	-11.6'	78.1°	74°04.4'	-08.0'	81.6°	74°11.4'	-04.2'	85.1°	74°14.7'	-00.4'	88.6°	74°14.3'	+03.5'	92.1°	74°10.2'	+07.3'	95.7°	74°02.4'	+11.1'	99.2°	10
11	73°42.2'	-15.0'	74.6°	73°56.4'	-11.5'	78.0°	74°07.1'	-07.9'	81.4°	74°14.3'	-04.1'	84.9°	74°17.8'	-00.3'	88.5°	74°17.5'	+03.6'	92.0°	74°13.5'	+07.5'	95.6°	11
12	73°27.2'	-18.3'	71.2°	73°44.9'	-14.9'	74.4°	73°59.3'	-11.4'	77.8°	74°10.2'	-07.7'	81.3°	74°17.5'	-04.0'	84.8°	74°21.1'	-00.1'	88.3°	74°21.0'	+03.8'	91.9°	12
13	73°08.9'	-21.4'	67.9°	73°30.0'	-18.2'	71.0°	73°47.9'	-14.8'	74.3°	74°02.4'	-11.3'	77.6°	74°13.5'	-07.6'	81.1°	74°21.0'	-03.8'	84.6°	74°24.8'	+00.0'	88.2°	13
14	72°47.5'	-24.2'	64.7°	73°11.8'	-21.3'	67.7°	73°33.0'	-18.1'	70.8°	73°51.1'	-14.8'	74.1°	74°05.9'	-11.2'	77.5°	74°17.1'	-07.5'	80.9°	74°24.8'	-03.7'	84.5°	14
15	72°23.3'	-26.9'	61.6°	72°50.5'	-24.2'	64.5°	73°14.9'	-21.2'	67.5°	73°36.4'	-18.0'	70.6°	73°54.7'	-14.7'	73.9°	74°09.6'	-11.1'	77.3°	74°21.1'	-07.4'	80.8°	15
16	71°56.4'	-29.4'	58.7°	72°26.3'	-26.9'	61.4°	72°53.7'	-24.1'	64.3°	73°18.3'	-21.2'	67.3°	73°40.0'	-18.0'	70.4°	73°58.5'	-14.6'	73.7°	74°13.6'	-11.0'	77.1°	16
17	71°26.9'	-31.7'	55.9°	71°59.4'	-29.4'	58.5°	72°29.6'	-26.9'	61.2°	72°57.2'	-24.1'	64.0°	73°22.0'	-21.1'	67.1°	73°43.9'	-17.9'	70.2°	74°02.6'	-14.5'	73.5°	17
18	70°55.2'	-33.9'	53.3°	71°30.0'	-31.7'	55.7°	72°02.7'	-29.4'	58.3°	72°33.1'	-26.8'	61.0°	73°00.9'	-24.1'	63.8°	73°26.0'	-21.1'	66.8°	73°48.0'	-17.9'	70.0°	18
19	70°21.3'	-35.8'	50.8°	70°58.3'	-33.8'	53.1°	71°33.3'	-31.7'	55.5°	72°06.3'	-29.4'	58.0°	72°36.8'	-26.8'	60.7°	73°04.9'	-24.0'	63.6°	73°30.2'	-21.0'	66.6°	19
20	69°45.5'	-37.6'	48.5°	70°24.4'	-35.8'	50.6°	71°01.6'	-33.8'	52.8°	71°36.9'	-31.7'	55.2°	72°10.0'	-29.3'	57.8°	72°40.9'	-26.8'	60.5°	73°09.1'	-24.0'	63.3°	20
21	69°07.9'	-39.2'	46.3°	69°48.6'	-37.6'	48.2°	70°27.8'	-35.8'	50.3°	71°05.2'	-33.8'	52.6°	71°40.7'	-31.7'	54.9°	72°14.1'	-29.3'	57.5°	72°45.1'	-26.8'	60.2°	21
22	68°28.7'	-40.7'	44.2°	69°11.1'	-39.2'	46.0°	69°52.0'	-37.6'	47.9°	70°31.4'	-35.8'	50.0°	71°09.0'	-33.8'	52.3°	71°44.7'	-31.7'	54.7°	72°18.3'	-29.3'	57.2°	22
23	67°48.0'	-42.0'	42.2°	68°31.8'	-40.7'	43.9°	69°14.4'	-39.2'	45.7°	69°55.6'	-37.6'	47.7°	70°35.2'	-35.8'	49.8°	71°13.0'	-33.8'	52.0°	71°49.0'	-31.7'	54.4°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	7			8			9			10			11			12			13			

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°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	71°39.3'	+21.9'	111.7°	71°15.7'	+24.7'	114.5°	70°49.6'	+27.4'	117.1°	70°21.1'	+29.9'	119.6°	69°50.4'	+32.2'	122.0°	69°17.6'	+34.3'	124.2°	68°43.0'	+36.3'	126.3°	0
1	72°01.1'	+19.0'	108.7°	71°40.4'	+22.0'	111.6°	71°17.0'	+24.9'	114.4°	70°51.0'	+27.6'	117.0°	70°22.6'	+30.1'	119.5°	69°52.0'	+32.4'	121.9°	69°19.3'	+34.5'	124.1°	1
2	72°20.2'	+16.0'	105.6°	72°02.5'	+19.2'	108.6°	71°41.9'	+22.2'	111.5°	71°18.6'	+25.1'	114.2°	70°52.7'	+27.7'	116.9°	70°24.4'	+30.2'	119.4°	69°53.8'	+32.6'	121.8°	2
3	72°36.2'	+12.9'	102.4°	72°21.7'	+16.2'	105.5°	72°04.1'	+19.4'	108.5°	71°43.6'	+22.4'	111.4°	71°20.4'	+25.2'	114.1°	70°54.6'	+27.9'	116.8°	70°26.4'	+30.4'	119.3°	3
4	72°49.0'	+09.6'	99.2°	72°37.8'	+13.0'	102.3°	72°23.5'	+16.4'	105.4°	72°06.0'	+19.5'	108.4°	71°45.6'	+22.6'	111.3°	71°22.5'	+25.4'	114.0°	70°56.8'	+28.1'	116.7°	4
5	72°58.6'	+06.2'	95.8°	72°50.9'	+09.8'	99.0°	72°39.8'	+13.2'	102.2°	72°25.6'	+16.5'	105.3°	72°08.2'	+19.7'	108.3°	71°48.0'	+22.8'	111.2°	71°24.9'	+25.6'	114.0°	5
6	73°04.8'	+02.8'	92.4°	73°00.6'	+06.4'	95.7°	72°53.0'	+09.9'	98.9°	72°42.1'	+13.4'	102.1°	72°27.9'	+16.7'	105.2°	72°10.7'	+19.9'	108.2°	71°50.6'	+23.0'	111.1°	6
7	73°07.7'	-00.6'	89.0°	73°07.0'	+03.0'	92.3°	73°02.9'	+06.6'	95.5°	72°55.5'	+10.1'	98.8°	72°44.7'	+13.6'	102.0°	72°30.6'	+16.9'	105.1°	72°13.5'	+20.1'	108.1°	7
8	73°07.0'	-04.1'	85.5°	73°10.0'	-00.5'	88.8°	73°09.5'	+03.1'	92.1°	73°05.6'	+06.7'	95.4°	72°58.2'	+10.3'	98.7°	72°47.5'	+13.8'	101.9°	72°33.6'	+17.1'	105.0°	8
9	73°02.9'	-07.5'	82.1°	73°09.5'	-03.9'	85.4°	73°12.6'	-00.3'	88.7°	73°12.3'	+03.3'	92.0°	73°08.5'	+06.9'	95.3°	73°01.3'	+10.5'	98.5°	72°50.7'	+13.9'	101.7°	9
10	72°55.5'	-10.8'	78.7°	73°05.6'	-07.3'	81.9°	73°12.3'	-03.8'	85.2°	73°15.6'	-00.2'	88.5°	73°15.4'	+03.5'	91.8°	73°11.8'	+07.1'	95.2°	73°04.7'	+10.6'	98.4°	10
11	72°44.7'	-14.0'	75.4°	72°58.2'	-10.7'	78.5°	73°08.5'	-07.2'	81.8°	73°15.4'	-03.7'	85.0°	73°18.9'	00.0'	88.4°	73°18.8'	+03.6'	91.7°	73°15.3'	+07.2'	95.0°	11
12	72°30.6'	-17.1'	72.1°	72°47.5'	-13.9'	75.2°	73°01.3'	-10.6'	78.3°	73°11.8'	-07.1'	81.6°	73°18.8'	-03.5'	84.9°	73°22.4'	+00.1'	88.2°	73°22.6'	+03.8'	91.6°	12
13	72°13.5'	-20.1'	68.9°	72°33.6'	-17.0'	71.9°	72°50.7'	-13.8'	75.0°	73°04.7'	-10.5'	78.2°	73°15.3'	-07.0'	81.4°	73°22.6'	-03.4'	84.7°	73°26.3'	+00.3'	88.1°	13
14	71°53.4'	-22.9'	65.9°	72°16.6'	-20.0'	68.7°	72°36.9'	-16.9'	71.7°	72°54.2'	-13.7'	74.8°	73°08.3'	-10.4'	78.0°	73°19.2'	-06.9'	81.2°	73°26.6'	-03.3'	84.6°	14
15	71°30.6'	-25.5'	62.9°	71°56.6'	-22.8'	65.7°	72°20.0'	-19.9'	68.5°	72°40.5'	-16.9'	71.5°	72°58.0'	-13.6'	74.6°	73°12.3'	-10.3'	77.8°	73°23.3'	-06.7'	81.1°	15
16	71°05.1'	-27.9'	60.1°	71°33.8'	-25.4'	62.7°	72°00.0'	-22.7'	65.4°	72°23.6'	-19.9'	68.3°	72°44.3'	-16.8'	71.3°	73°02.1'	-13.5'	74.4°	73°16.6'	-10.2'	77.6°	16
17	70°37.1'	-30.2'	57.4°	71°08.4'	-27.9'	59.9°	71°37.3'	-25.4'	62.5°	72°03.8'	-22.7'	65.2°	72°27.6'	-19.8'	68.1°	72°48.5'	-16.7'	71.1°	73°06.4'	-13.5'	74.2°	17
18	70°06.9'	-32.3'	54.8°	70°40.5'	-30.2'	57.2°	71°11.9'	-27.8'	59.6°	71°41.1'	-25.3'	62.2°	72°07.8'	-22.6'	65.0°	72°31.8'	-19.7'	67.9°	72°52.9'	-16.7'	70.9°	18
19	69°34.6'	-34.3'	52.4°	70°10.3'	-32.3'	54.6°	70°44.1'	-30.1'	56.9°	71°15.8'	-27.8'	59.4°	71°45.1'	-25.3'	62.0°	72°12.1'	-22.6'	64.7°	72°36.3'	-19.7'	67.6°	19
20	69°00.3'	-36.1'	50.1°	69°38.0'	-34.2'	52.1°	70°13.9'	-32.3'	54.3°	70°47.9'	-30.1'	56.7°	71°19.8'	-27.8'	59.1°	71°49.5'	-25.3'	61.7°	72°16.6'	-22.6'	64.5°	20
21	68°24.3'	-37.7'	47.9°	69°03.8'	-36.0'	49.8°	69°41.7'	-34.2'	51.9°	70°17.8'	-32.3'	54.1°	70°52.1'	-30.1'	5							

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

18° 342° LHA

Latitude SAME as Declination

18° 342° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	70°43.7'	+20.8'	110.6°	70°21.4'	+23.6'	113.2°	69°56.5'	+26.2'	115.7°	69°29.4'	+28.7'	118.1°	69°00.0'	+30.9'	120.4°	68°28.7'	+33.1'	122.6°	67°55.4'	+35.1'	124.7°	0
1	71°04.6'	+18.1'	107.7°	70°45.0'	+21.0'	110.4°	70°22.7'	+23.8'	113.1°	69°58.0'	+26.4'	115.6°	69°31.0'	+28.8'	118.0°	69°01.7'	+31.1'	120.3°	68°30.5'	+33.3'	122.5°	1
2	71°22.7'	+15.2'	104.7°	71°06.0'	+18.3'	107.6°	70°46.5'	+21.2'	110.3°	70°24.4'	+24.0'	112.9°	69°59.8'	+26.6'	115.5°	69°32.9'	+29.0'	117.9°	69°03.7'	+31.3'	120.2°	2
3	71°37.9'	+12.3'	101.7°	71°24.3'	+15.4'	104.6°	71°07.7'	+18.5'	107.4°	70°48.4'	+21.4'	110.2°	70°26.4'	+24.2'	112.8°	70°01.9'	+26.8'	115.4°	69°35.0'	+29.2'	117.8°	3
4	71°50.2'	+09.2'	98.6°	71°39.7'	+12.4'	101.5°	71°26.2'	+15.6'	104.5°	71°09.8'	+18.7'	107.3°	70°50.5'	+21.6'	110.1°	70°28.7'	+24.4'	112.7°	70°04.3'	+27.0'	115.3°	4
5	71°59.3'	+06.0'	95.4°	71°52.1'	+09.3'	98.4°	71°41.8'	+12.6'	101.4°	71°28.4'	+15.8'	104.3°	71°12.1'	+18.9'	107.2°	70°53.0'	+21.8'	109.9°	70°31.2'	+24.6'	112.6°	5
6	72°05.3'	+02.8'	92.1°	72°01.5'	+06.2'	95.2°	71°54.4'	+09.5'	98.3°	71°44.2'	+12.8'	101.3°	71°31.0'	+16.0'	104.2°	71°14.8'	+19.1'	107.1°	70°55.8'	+22.0'	109.8°	6
7	72°08.1'	-00.5'	88.9°	72°07.6'	+02.9'	92.0°	72°03.9'	+06.3'	95.1°	71°57.0'	+09.7'	98.1°	71°47.0'	+13.0'	101.2°	71°33.8'	+16.2'	104.1°	71°17.8'	+19.3'	107.0°	7
8	72°07.6'	-03.7'	85.6°	72°10.6'	-00.3'	88.7°	72°10.3'	+03.1'	91.8°	72°06.7'	+06.5'	94.9°	72°00.0'	+09.9'	98.0°	71°50.0'	+13.2'	101.0°	71°37.0'	+16.4'	104.0°	8
9	72°03.9'	-06.9'	82.4°	72°10.3'	-03.6'	85.5°	72°13.4'	-00.1'	88.6°	72°13.3'	+03.3'	91.7°	72°09.9'	+06.7'	94.8°	72°03.2'	+10.1'	97.9°	71°53.4'	+13.4'	100.9°	9
10	71°57.0'	-10.1'	79.2°	72°06.7'	-06.8'	82.2°	72°13.3'	-03.4'	85.3°	72°16.5'	+00.0'	88.4°	72°16.6'	+03.5'	91.6°	72°13.3'	+06.9'	94.7°	72°06.8'	+10.3'	97.8°	10
11	71°47.0'	-13.1'	76.0°	72°00.0'	-09.9'	79.0°	72°09.9'	-06.6'	82.0°	72°16.6'	-03.3'	85.1°	72°20.0'	+00.2'	88.3°	72°20.2'	+03.6'	91.4°	72°17.1'	+07.1'	94.5°	11
12	71°33.8'	-16.1'	72.9°	71°50.0'	-13.0'	75.8°	72°03.2'	-09.8'	78.8°	72°13.3'	-06.5'	81.9°	72°20.2'	-03.1'	85.0°	72°23.8'	+00.3'	88.1°	72°24.1'	+03.8'	91.3°	12
13	71°17.8'	-18.9'	69.9°	71°37.0'	-16.0'	72.7°	71°53.4'	-12.9'	75.6°	72°06.8'	-09.7'	78.6°	72°17.1'	-06.4'	81.7°	72°24.1'	-03.0'	84.8°	72°27.9'	+00.5'	88.0°	13
14	70°58.9'	-21.6'	66.9°	71°21.1'	-18.8'	69.7°	71°40.5'	-15.9'	72.5°	71°57.1'	-12.8'	75.4°	72°10.7'	-09.6'	78.4°	72°21.1'	-06.2'	81.5°	72°28.4'	-02.8'	84.6°	14
15	70°37.3'	-24.1'	64.1°	71°02.2'	-21.5'	66.7°	71°24.6'	-18.7'	69.4°	71°44.3'	-15.8'	72.3°	72°01.1'	-12.7'	75.2°	72°14.9'	-09.5'	78.2°	72°25.5'	-06.1'	81.3°	15
16	70°13.1'	-26.5'	61.4°	70°40.7'	-24.1'	63.9°	71°05.9'	-21.4'	66.5°	71°28.5'	-18.6'	69.2°	71°48.4'	-15.7'	72.1°	72°05.4'	-12.6'	75.0°	72°19.4'	-09.3'	78.0°	16
17	69°46.6'	-28.8'	58.7°	70°16.7'	-26.5'	61.1°	70°44.5'	-24.0'	63.6°	71°09.9'	-21.4'	66.3°	71°32.7'	-18.6'	69.0°	71°52.9'	-15.6'	71.8°	72°10.1'	-12.5'	74.8°	17
18	69°17.8'	-30.9'	56.2°	69°50.2'	-28.7'	58.5°	70°20.5'	-26.4'	60.9°	70°48.5'	-23.9'	63.4°	71°14.2'	-21.3'	66.0°	71°37.3'	-18.5'	68.8°	71°57.6'	-15.5'	71.6°	18
19	68°47.0'	-32.8'	53.8°	69°21.5'	-30.8'	56.0°	69°54.1'	-28.7'	58.2°	70°24.6'	-26.4'	60.6°	70°52.9'	-23.9'	63.1°	71°18.8'	-21.3'	65.8°	71°42.1'	-18.4'	68.5°	19
20	68°14.2'	-34.6'	51.6°	68°50.7'	-32.8'	53.6°	69°25.4'	-30.8'	55.7°	69°58.2'	-28.6'	58.0°	70°29.0'	-26.3'	60.4°	70°57.5'	-23.9'	62.9°	71°23.6'	-21.2'	65.5°	20
21	67°39.6'	-36.2'	49.4°	68°17.9'	-34.6'	51.3°	68°54.6'	-32.7'	53.3°	69°29.6'	-30.8'	55.4°	70°02.6'	-28.6'	57.7°	70°33.6'	-26.3'	60.1°	71°02.4'	-23.8'	62.6°	21
22	67°03.3'	-37.8'	47.3°	67°43.3'	-36.2'	49.1°	68°21.9'	-34.5'	51.0°	68°58.8'	-32.7'	53.0°	69°34.0'	-30.7'	55.2°	70°07.3'	-28.6'	57.4°	70°38.6'	-26.3'	59.8°	22
23	66°25.6'	-39.2'	45.3°	67°07.1'	-37.8'	47.0°	67°47.3'	-36.2'	48.8°	68°26.1'	-34.5'	50.7°	69°03.3'	-32.7'	52.7°	69°38.7'	-30.7'	54.9°	70°12.3'	-28.6'	57.1°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	7			8			9			10			11			12			13			

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°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	69°47.8'	+19.9'	109.5°	69°26.5'	+22.6'	112.0°	69°02.9'	+25.1'	114.4°	68°36.9'	+27.5'	116.8°	68°08.9'	+29.8'	119.0°	67°38.8'	+31.9'	121.1°	67°06.9'	+33.9'	123.2°	0
1	70°07.7'	+17.3'	106.7°	69°49.1'	+20.1'	109.3°	69°28.0'	+22.8'	111.9°	69°04.4'	+25.3'	114.3°	68°38.6'	+27.7'	116.6°	68°10.7'	+30.0'	118.9°	67°40.7'	+32.1'	121.0°	1
2	70°25.0'	+14.6'	103.9°	70°09.2'	+17.5'	106.6°	69°50.7'	+20.3'	109.2°	69°29.8'	+23.0'	111.7°	69°06.3'	+25.5'	114.2°	68°40.7'	+27.9'	116.5°	68°12.8'	+30.2'	118.8°	2
3	70°39.5'	+11.7'	101.0°	70°26.7'	+14.7'	103.8°	70°11.0'	+17.7'	106.5°	69°52.7'	+20.5'	109.1°	69°31.9'	+23.2'	111.6°	69°08.6'	+25.7'	114.1°	68°43.0'	+28.1'	116.4°	3
4	70°51.2'	+08.8'	98.0°	70°41.4'	+11.9'	100.8°	70°28.7'	+14.9'	103.6°	70°13.2'	+17.9'	106.3°	69°55.0'	+20.7'	108.9°	69°34.3'	+23.4'	111.5°	69°11.1'	+25.9'	113.9°	4
5	71°00.0'	+05.8'	95.0°	70°53.3'	+09.0'	97.9°	70°43.6'	+12.1'	100.7°	70°31.1'	+15.1'	103.5°	70°15.7'	+18.1'	106.2°	69°57.6'	+20.9'	108.8°	69°37.0'	+23.6'	111.4°	5
6	71°05.8'	+02.8'	91.9°	71°02.3'	+06.0'	94.8°	70°55.7'	+09.2'	97.7°	70°46.2'	+12.3'	100.6°	70°33.8'	+15.3'	103.3°	70°33.8'	+15.3'	103.3°	70°00.6'	+21.1'	108.7°	6
7	71°08.6'	-00.3'	88.8°	71°08.3'	+02.9'	91.8°	71°04.9'	+06.2'	94.7°	70°58.5'	+09.4'	97.6°	70°49.1'	+12.5'	100.4°	70°36.8'	+15.5'	103.2°	70°21.7'	+18.5'	106.0°	7
8	71°08.3'	-03.4'	85.7°	71°11.2'	-00.1'	88.7°	71°11.1'	+03.1'	91.6°	71°07.8'	+06.3'	94.5°	71°01.6'	+09.5'	97.4°	70°52.4'	+12.7'	100.3°	70°40.2'	+15.7'	103.1°	8
9	71°04.9'	-06.4'	82.7°	71°11.1'	-03.2'	85.6°	71°14.2'	+00.0'	88.5°	71°14.2'	+03.3'	91.4°	71°11.1'	+06.5'	94.4°	71°05.0'	+09.7'	97.3°	70°55.9'	+12.9'	100.2°	9
10	70°58.5'	-09.4'	79.6°	71°07.8'	-06.3'	82.5°	71°14.2'	-03.0'	85.4°	71°17.5'	+00.2'	88.3°	71°17.7'	+03.5'	91.3°	71°14.8'	+06.7'	94.2°	71°08.8'	+09.9'	97.2°	10
11	70°49.1'	-12.3'	76.6°	71°01.6'	-09.2'	79.4°	71°11.1'	-06.1'	82.3°	71°17.7'	-02.9'	85.2°	71°21.1'	+00.4'	88.2°	71°21.5'	+03.6'	91.1°	71°18.8'	+06.9'	94.1°	11
12	70°36.8'	-15.1'	73.6°	70°52.4'	-12.2'	76.4°	71°05.0'	-09.1'	79.2°	71°14.8'	-06.0'	82.1°	71°21.5'	-02.7'	85.0°	71°25.1'	+00.5'	88.0°	71°25.7'	+03.8'	91.0°	12
13	70°21.7'	-17.8'	70.7°	70°40.2'	-15.0'	73.4°	70°55.9'	-12.0'	76.2°	71°08.8'	-09.0'	79.0°	71°18.8'	-05.8'	81.9°	71°25.7'	-02.6'	84.9°	71°29.5'	+00.7'	87.8°	13
14	70°03.9'	-20.4'	67.9°	70°25.2'	-17.7'	70.5°	70°43.9'	-14.9'	73.2°	70°59.8'	-11.9'	76.0°	71°12.9'	-08.8'	78.8°	71°23.1'	-05.7'	81.7°	71°30.2'	-02.4'	84.7°	14
15	69°43.5'	-22.9'	65.2°	70°07.5'	-20.3'	67.7°	70°29.0'	-17.6'	70.3°	70°47.9'	-14.8'	73.0°	71°04.1'	-11.8'	75.8°	71°17.4'	-08.7'	78.6°	71°27.7'	-05.5'	81.5°	15
16	69°20.6'	-25.2'	62.5°	69°47.1'	-22.8'	64.9°	70°11.4'	-20.2'	67.4°	70°33.1'	-17.5'	70.0°	70°52.3'	-14.7'	72.8°	71°08.7'	-11.7'	75.5°	71°22.2'	-08.6'	78.4°	16
17	68°55.4'	-27.4'	60.0°	69°24.3'	-25.1'	62.3°	69°51.1'	-22.7'	64.7°	70°15.6'	-20.2'	67.2°	70°37.6'	-17.4'	69.8°	70°57.0'	-14.6'	72.5°	71°13.6'	-11.6'	75.3°	17
18	68°27.9'	-29.5'	57.5°	68°59.2'	-27.3'	59.7°	69°28.4'	-25.1'	62.0°	69°55.5'	-22.7'	64.4°	70°20.2'	-20.1'	66.9°	70°42.4'	-17.4'	69.6°	71°02.0'	-14.5'	72.3°	18
19	67°58.5'	-31.4'	55.2°	68°31.9'	-29.4'	57.3°	69°03.3'	-27.3'	59.4°	69°32.8'	-25.0'	61.8°	70°00.1'	-22.6'	64.2°	70°25.0'	-20.0'	66.7°	70°47.5'	-17.3'	69.3°	19
20	67°27.1'	-33.2'	52.9°	68°02.4'	-31.3'	54.9°	68°36.1'	-29.4'	57.0°	69°07.8'	-27.2'	59.2°	69°37.5'	-25.0'	61.5°	70°05.0'	-22.5'	63.9°	70°30.2'	-20.0'	66.4°	20
21	66°53.9'	-34.8'	50.8°	67°31.1'	-33.1'	52.6°	68°06.7'	-31.3'	54.6°	68°40.5'	-29.3'	56.7°	69°12.5'	-27.2'	5							

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

20° 340° LHA

Latitude SAME as Declination

20° 340° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	68°51.5'	+19.1'	108.5°	68°31.2'	+21.6'	110.9°	68°08.6'	+24.1'	113.3°	67°43.9'	+26.5'	115.5°	67°17.0'	+28.7'	117.7°	66°48.2'	+30.8'	119.7°	66°17.5'	+32.7'	121.7°	0
1	69°10.5'	+16.5'	105.9°	68°52.9'	+19.3'	108.4°	68°32.8'	+21.8'	110.8°	68°10.3'	+24.3'	113.1°	67°45.7'	+26.7'	115.4°	67°19.0'	+28.9'	117.5°	66°50.3'	+31.0'	119.6°	1
2	69°27.1'	+13.9'	103.1°	69°12.1'	+16.7'	105.7°	68°54.6'	+19.5'	108.2°	68°34.7'	+22.0'	110.6°	68°12.4'	+24.5'	113.0°	67°47.9'	+26.9'	115.2°	67°21.2'	+29.1'	117.4°	2
3	69°41.0'	+11.2'	100.4°	69°28.9'	+14.1'	103.0°	69°14.1'	+16.9'	105.6°	68°56.7'	+19.7'	108.1°	68°36.9'	+22.3'	110.5°	68°14.7'	+24.7'	112.8°	67°50.3'	+27.1'	115.1°	3
4	69°52.2'	+08.5'	97.5°	69°43.0'	+11.4'	100.2°	69°31.0'	+14.3'	102.8°	69°16.4'	+17.2'	105.4°	68°59.1'	+19.9'	107.9°	68°39.5'	+22.5'	110.4°	68°17.4'	+25.0'	112.7°	4
5	70°00.7'	+05.6'	94.6°	69°54.4'	+08.6'	97.4°	69°45.3'	+11.6'	100.0°	69°33.5'	+14.5'	102.7°	69°19.0'	+17.4'	105.3°	69°01.9'	+20.1'	107.8°	68°42.4'	+22.7'	110.2°	5
6	70°06.3'	+02.7'	91.7°	70°03.1'	+05.8'	94.5°	69°57.0'	+08.8'	97.2°	69°48.1'	+11.8'	99.9°	69°36.4'	+14.7'	102.5°	69°22.0'	+17.6'	105.1°	69°05.1'	+20.3'	107.7°	6
7	70°09.0'	-00.2'	88.8°	70°08.9'	+02.9'	91.5°	70°05.8'	+06.0'	94.3°	69°59.9'	+09.0'	97.0°	69°51.1'	+12.0'	99.8°	69°39.6'	+15.0'	102.4°	69°25.4'	+17.8'	105.0°	7
8	70°08.9'	-03.1'	85.8°	70°11.8'	+00.0'	88.6°	70°11.8'	+03.1'	91.4°	70°08.9'	+06.2'	94.1°	70°03.2'	+09.2'	96.9°	69°54.5'	+12.2'	99.6°	69°43.1'	+15.2'	102.3°	8
9	70°05.8'	-05.9'	82.9°	70°11.8'	-02.9'	85.6°	70°14.9'	+00.2'	88.4°	70°15.1'	+03.3'	91.2°	70°12.4'	+06.4'	94.0°	70°06.8'	+09.4'	96.7°	69°58.3'	+12.5'	99.5°	9
10	69°59.9'	-08.8'	80.0°	70°08.9'	-05.8'	82.7°	70°15.1'	-02.7'	85.5°	70°18.4'	+00.4'	88.2°	70°18.8'	+03.5'	91.0°	70°16.2'	+06.6'	93.8°	70°10.8'	+09.7'	96.6°	10
11	69°51.1'	-11.5'	77.1°	70°03.2'	-08.6'	79.8°	70°12.4'	-05.6'	82.5°	70°18.8'	-02.6'	85.3°	70°22.3'	+00.5'	88.1°	70°22.8'	+03.7'	90.9°	70°20.4'	+06.8'	93.7°	11
12	69°39.6'	-14.2'	74.3°	69°54.5'	-11.4'	76.9°	70°06.8'	-08.5'	79.6°	70°16.2'	-05.5'	82.3°	70°22.8'	-02.4'	85.1°	70°26.5'	+00.7'	87.9°	70°27.2'	+03.9'	90.7°	12
13	69°25.4'	-16.8'	71.5°	69°43.1'	-14.1'	74.0°	69°58.3'	-11.3'	76.7°	70°10.8'	-08.3'	79.4°	70°20.4'	-05.3'	82.1°	70°27.2'	-02.2'	84.9°	70°31.1'	+00.9'	87.7°	13
14	69°08.5'	-19.3'	68.8°	69°29.1'	-16.7'	71.2°	69°47.1'	-14.0'	73.8°	70°02.5'	-11.1'	76.5°	70°15.1'	-08.2'	79.2°	70°25.0'	-05.2'	81.9°	70°32.0'	-02.1'	84.7°	14
15	68°49.2'	-21.7'	66.1°	69°12.3'	-19.2'	68.5°	69°33.1'	-16.6'	71.0°	69°51.3'	-13.9'	73.6°	70°06.9'	-11.0'	76.2°	70°19.8'	-08.0'	79.0°	70°29.9'	-05.0'	81.7°	15
16	68°27.5'	-24.0'	63.6°	68°53.1'	-21.6'	65.9°	69°16.5'	-19.1'	68.3°	69°37.5'	-16.5'	70.8°	69°55.9'	-13.7'	73.4°	70°11.8'	-10.9'	76.0°	70°24.9'	-07.9'	78.8°	16
17	68°03.5'	-26.1'	61.1°	68°31.5'	-23.9'	63.3°	68°57.4'	-21.5'	65.6°	69°21.0'	-19.0'	68.0°	69°42.2'	-16.4'	70.5°	70°00.9'	-13.6'	73.1°	70°17.0'	-10.8'	75.8°	17
18	67°37.4'	-28.1'	58.7°	68°07.6'	-26.1'	60.8°	68°35.8'	-23.8'	63.0°	69°02.0'	-21.4'	65.4°	69°25.8'	-18.9'	67.8°	69°47.3'	-16.3'	70.3°	70°06.2'	-13.5'	72.9°	18
19	67°09.2'	-30.0'	56.4°	67°41.6'	-28.1'	58.4°	68°12.0'	-26.0'	60.6°	68°40.5'	-23.8'	62.8°	69°06.9'	-21.4'	65.1°	69°31.0'	-18.9'	67.5°	69°52.7'	-16.2'	70.1°	19
20	66°39.2'	-31.8'	54.2°	67°13.5'	-30.0'	56.1°	67°46.0'	-28.0'	58.1°	68°16.8'	-25.9'	60.3°	68°45.5'	-23.7'	62.5°	69°12.1'	-21.3'	64.8°	69°36.5'	-18.8'	67.3°	20
21	66°07.4'	-33.5'	52.1°	66°43.5'	-31.8'	53.9°	67°18.0'	-29.9'	55.8°	67°50.8'	-28.0'	57.9°	68°21.8'	-25.9'	60.0°	68°50.8'	-23.6'	62.2°	69°17.7'	-21.3'	64.6°	21
22	65°33.9'	-35.0'	50.0°	66°11.7'	-33.5'	51.8°	66°48.1'	-31.7'	53.6°	67°48.1'	-29.9'	55.5°	67°55.9'	-27.9'	57.6°	68°27.2'	-25.8'	59.7°	68°56.4'	-23.6'	61.9°	22
23	64°58.8'	-36.5'	48.1°	65°38.2'	-35.0'	49.7°	66°16.3'	-33.4'	51.5°	66°52.9'	-31.7'	53.3°	67°28.0'	-29.9'	55.2°	68°01.3'	-27.9'	57.3°	68°32.8'	-25.8'	59.4°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	7			8			9			10			11			12			13			

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°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	67°54.9'	+18.3'	107.6°	67°35.5'	+20.8'	109.9°	67°14.0'	+23.2'	112.2°	66°50.3'	+25.5'	114.3°	66°24.6'	+27.7'	116.4°	65°56.9'	+29.7'	118.4°	65°27.4'	+31.7'	120.4°	0
1	68°13.1'	+15.9'	105.1°	67°56.3'	+18.5'	107.4°	67°37.2'	+21.0'	109.8°	67°15.8'	+23.4'	112.0°	66°52.2'	+25.7'	114.2°	66°26.6'	+27.9'	116.3°	65°59.1'	+29.9'	118.3°	1
2	68°29.0'	+13.4'	102.4°	68°14.8'	+16.1'	104.9°	67°58.2'	+18.7'	107.3°	67°39.2'	+21.2'	109.6°	67°17.9'	+23.6'	111.9°	66°54.5'	+25.9'	114.1°	66°29.0'	+28.1'	116.2°	2
3	68°42.4'	+10.8'	99.8°	68°30.9'	+13.6'	102.3°	68°16.9'	+16.3'	104.7°	68°00.4'	+18.9'	107.1°	67°41.5'	+21.4'	109.5°	67°20.4'	+23.8'	111.7°	66°57.1'	+26.1'	113.9°	3
4	68°53.2'	+08.2'	97.1°	68°44.5'	+11.0'	99.6°	68°33.1'	+13.8'	102.1°	68°19.3'	+16.5'	104.6°	68°03.0'	+19.1'	107.0°	67°44.3'	+21.6'	109.3°	67°23.3'	+24.1'	111.6°	4
5	69°01.3'	+05.5'	94.3°	68°55.5'	+08.4'	96.9°	68°46.9'	+11.2'	99.4°	68°35.8'	+14.0'	102.0°	68°22.1'	+16.7'	104.4°	68°05.9'	+19.3'	106.8°	67°47.3'	+21.9'	109.2°	5
6	69°06.8'	+02.7'	91.5°	69°03.8'	+05.7'	94.1°	68°58.1'	+08.6'	96.7°	68°49.8'	+11.4'	99.3°	68°38.8'	+14.2'	101.8°	68°25.2'	+16.9'	104.3°	68°09.2'	+19.6'	106.7°	6
7	69°09.5'	00.0'	88.7°	69°09.5'	+02.9'	91.3°	69°06.7'	+05.9'	94.0°	69°01.2'	+08.8'	96.6°	68°53.0'	+11.6'	99.1°	68°42.2'	+14.4'	101.7°	68°28.8'	+17.2'	104.2°	7
8	69°09.5'	-02.8'	85.9°	69°12.4'	+00.2'	88.5°	69°12.6'	+03.1'	91.2°	69°10.0'	+06.1'	93.8°	69°04.7'	+09.0'	96.4°	68°56.6'	+11.9'	99.0°	68°45.9'	+14.7'	101.5°	8
9	69°06.7'	-05.5'	83.1°	69°12.6'	-02.6'	85.7°	69°15.7'	+00.4'	88.3°	69°16.0'	+03.3'	91.0°	69°13.6'	+06.3'	93.6°	69°08.5'	+09.2'	96.2°	69°00.6'	+12.1'	98.8°	9
10	69°01.2'	-08.2'	80.3°	69°10.0'	-05.3'	82.9°	69°16.0'	-02.4'	85.5°	69°19.4'	+00.5'	88.2°	69°19.9'	+03.5'	90.8°	69°17.7'	+06.5'	93.5°	69°12.7'	+09.4'	96.1°	10
11	68°53.0'	-10.8'	77.5°	69°04.7'	-08.0'	80.1°	69°13.6'	-05.2'	82.7°	69°19.9'	-02.2'	85.3°	69°23.4'	+00.7'	88.0°	69°24.1'	+03.7'	90.6°	69°22.1'	+06.7'	93.3°	11
12	68°42.2'	-13.4'	74.8°	68°56.6'	-10.7'	77.3°	69°08.5'	-07.9'	79.9°	69°17.7'	-05.0'	82.5°	69°24.1'	-02.1'	85.1°	69°27.8'	+00.9'	87.8°	69°28.7'	+03.9'	90.5°	12
13	68°28.8'	-15.9'	72.2°	68°45.9'	-13.3'	74.6°	69°00.6'	-10.5'	77.1°	69°12.7'	-07.7'	79.7°	69°22.1'	-04.8'	82.3°	69°28.7'	-01.9'	84.9°	69°32.6'	+01.1'	87.6°	13
14	68°12.9'	-18.3'	69.5°	68°32.7'	-15.8'	71.9°	68°50.1'	-13.1'	74.4°	69°05.0'	-10.4'	76.9°	69°17.3'	-07.6'	79.5°	69°26.9'	-04.7'	82.1°	69°33.7'	-01.7'	84.8°	14
15	67°54.6'	-20.6'	67.0°	68°16.9'	-18.2'	69.3°	68°36.9'	-15.7'	71.7°	68°54.6'	-13.0'	74.1°	69°09.7'	-10.3'	76.7°	69°22.2'	-07.4'	79.3°	69°32.0'	-04.5'	81.9°	15
16	67°33.9'	-22.8'	64.5°	67°58.7'	-20.5'	66.7°	68°21.3'	-18.1'	69.1°	68°41.6'	-15.5'	71.4°	68°59.4'	-12.9'	73.9°	69°14.8'	-10.1'	76.4°	69°27.5'	-07.3'	79.0°	16
17	67°11.1'	-24.9'	62.1°	67°38.2'	-22.7'	64.3°	68°03.2'	-20.4'	66.5°	68°26.0'	-18.0'	68.8°	68°46.6'	-15.4'	71.2°	69°04.7'	-12.8'	73.7°	69°20.2'	-10.0'	76.2°	17
18	66°46.2'	-26.9'	59.8°	67°15.5'	-24.8'	61.8°	67°42.8'	-22.6'	64.0°	68°08.1'	-20.3'	66.2°	68°31.1'	-17.9'	68.5°	68°51.9'	-15.3'	71.0°	69°10.3'	-12.6'	73.4°	18
19	66°19.3'	-28.8'	57.5°	66°50.6'	-26.8'	59.5°	67°20.2'	-24.8'	61.6°	67°47.7'	-22.6'	63.7°	68°13.3'	-20.2'	66.0°	68°36.6'	-17.8'	68.3°	68°57.6'	-15.2'	70.7°	19
20	65°50.5'	-30.5'	55.4°	66°23.8'	-28.7'	57.3°	66°55.4'	-26.8'	59.2°	67°25.2'	-24.7'	61.3°	67°53.0'	-22.5'	63.4°	68°18.8'	-20.2'	65.7°	68°42.4'	-17.7'	68.0°	20
21	65°20.0'	-32.2'	53.3°	65°55.1'	-30.5'	55.1°	66°28.6'	-28.6'	57.0°	67°00.5'	-26.7'	58.9°	67°30.5'	-24.6'	61.0°	67						

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

22° 338° LHA

Latitude SAME as Declination

22° 338° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	66°58.0'	+17.6'	106.8°	66°39.5'	+20.0'	109.0°	66°18.9'	+22.3'	111.2°	65°56.2'	+24.6'	113.3°	65°31.6'	+26.7'	115.3°	65°05.0'	+28.7'	117.2°	64°36.7'	+30.7'	119.1°	0
1	67°15.5'	+15.3'	104.3°	66°59.5'	+17.8'	106.6°	66°41.2'	+20.2'	108.8°	66°20.8'	+22.6'	111.0°	65°58.3'	+24.8'	113.1°	65°33.8'	+26.9'	115.1°	65°07.3'	+29.0'	117.1°	1
2	67°30.8'	+12.9'	101.8°	67°17.3'	+15.5'	104.2°	67°01.5'	+18.0'	106.4°	66°43.4'	+20.4'	108.7°	66°23.1'	+22.8'	110.8°	66°00.7'	+25.0'	112.9°	65°36.3'	+27.2'	115.0°	2
3	67°43.6'	+10.4'	99.2°	67°32.8'	+13.1'	101.6°	67°19.5'	+15.7'	104.0°	67°03.8'	+18.2'	106.3°	66°45.8'	+20.7'	108.5°	66°25.7'	+23.0'	110.7°	66°03.5'	+25.3'	112.8°	3
4	67°54.0'	+07.9'	96.6°	67°45.8'	+10.6'	99.1°	67°35.1'	+13.3'	101.5°	67°22.0'	+15.9'	103.8°	67°06.5'	+18.4'	106.1°	66°48.7'	+20.9'	108.4°	66°28.7'	+23.2'	110.6°	4
5	68°01.9'	+05.3'	94.0°	67°56.4'	+08.1'	96.5°	67°48.4'	+10.8'	98.9°	67°37.9'	+13.5'	101.3°	67°24.9'	+16.1'	103.7°	67°09.6'	+18.7'	106.0°	66°52.0'	+21.1'	108.2°	5
6	68°07.2'	+02.7'	91.3°	68°04.5'	+05.5'	93.8°	67°59.3'	+08.3'	96.3°	67°51.4'	+11.1'	98.7°	67°41.1'	+13.7'	101.1°	67°28.3'	+16.4'	103.5°	67°13.1'	+18.9'	105.8°	6
7	68°10.0'	+00.1'	88.6°	68°10.1'	+02.9'	91.1°	68°07.6'	+05.7'	93.6°	68°02.5'	+08.5'	96.1°	67°54.8'	+11.3'	98.6°	67°44.6'	+14.0'	101.0°	67°32.0'	+16.6'	103.4°	7
8	68°10.1'	-02.5'	86.0°	68°13.0'	+00.3'	88.5°	68°13.3'	+03.1'	91.0°	68°11.0'	+06.0'	93.5°	68°06.1'	+08.7'	95.9°	67°58.6'	+11.5'	98.4°	67°48.6'	+14.2'	100.8°	8
9	68°07.6'	-05.1'	83.3°	68°13.3'	-02.3'	85.8°	68°16.5'	+00.5'	88.3°	68°17.0'	+03.3'	90.8°	68°14.8'	+06.2'	93.3°	68°10.1'	+09.0'	95.8°	68°02.8'	+11.7'	98.2°	9
10	68°02.5'	-07.7'	80.6°	68°11.0'	-04.9'	83.1°	68°17.0'	-02.1'	85.6°	68°20.3'	+00.7'	88.1°	68°21.0'	+03.5'	90.6°	68°19.1'	+06.4'	93.1°	68°14.5'	+09.2'	95.6°	10
11	67°54.8'	-10.2'	78.0°	68°06.1'	-07.5'	80.4°	68°14.8'	-04.7'	82.9°	68°21.0'	-01.9'	85.4°	68°24.5'	+00.9'	87.9°	68°25.4'	+03.7'	90.4°	68°23.7'	+06.6'	92.9°	11
12	67°44.6'	-12.6'	75.3°	67°58.6'	-10.0'	77.7°	68°10.1'	-07.3'	80.2°	68°19.1'	-04.6'	82.6°	68°25.4'	-01.7'	85.2°	68°29.2'	+01.1'	87.7°	68°30.3'	+03.9'	90.2°	12
13	67°32.0'	-15.0'	72.8°	67°48.6'	-12.5'	75.1°	68°02.8'	-09.9'	77.5°	68°14.5'	-07.2'	80.0°	68°23.7'	-04.4'	82.4°	68°30.3'	-01.6'	85.0°	68°34.2'	+01.3'	87.5°	13
14	67°16.9'	-17.4'	70.3°	67°36.1'	-14.9'	72.5°	67°52.9'	-12.3'	74.9°	68°07.4'	-09.7'	77.3°	68°19.3'	-07.0'	79.7°	68°28.7'	-04.2'	82.2°	68°35.5'	-01.4'	84.8°	14
15	66°59.6'	-19.6'	67.8°	67°21.2'	-17.2'	70.0°	67°40.6'	-14.8'	72.3°	67°57.7'	-12.2'	74.6°	68°12.3'	-09.6'	77.1°	68°24.5'	-06.8'	79.5°	68°34.1'	-04.0'	82.0°	15
16	66°40.0'	-21.7'	65.4°	67°04.0'	-19.5'	67.5°	67°25.8'	-17.1'	69.8°	67°45.4'	-14.6'	72.0°	68°02.8'	-12.1'	74.4°	68°17.7'	-09.4'	76.8°	68°30.1'	-06.7'	79.3°	16
17	66°18.3'	-23.8'	63.1°	66°44.5'	-21.6'	65.1°	67°08.7'	-19.4'	67.3°	67°30.8'	-17.0'	69.5°	67°50.7'	-14.5'	71.8°	68°08.3'	-11.9'	74.2°	68°23.4'	-09.3'	76.6°	17
18	65°54.5'	-25.7'	60.8°	66°22.9'	-23.7'	62.8°	66°49.3'	-21.5'	64.9°	67°13.8'	-19.3'	67.0°	67°36.2'	-16.9'	69.2°	67°56.3'	-14.4'	71.5°	68°14.1'	-11.8'	73.9°	18
19	65°28.8'	-27.6'	58.6°	65°59.2'	-25.6'	60.5°	66°27.8'	-23.6'	62.5°	66°54.6'	-21.4'	64.6°	67°19.3'	-19.2'	66.7°	67°41.9'	-16.8'	69.0°	68°02.3'	-14.3'	71.3°	19
20	65°01.2'	-29.3'	56.5°	65°33.5'	-27.5'	58.3°	66°04.2'	-25.6'	60.2°	66°33.1'	-23.5'	62.2°	67°00.1'	-21.3'	64.3°	67°25.1'	-19.1'	66.5°	67°48.0'	-16.7'	68.7°	20
21	64°31.9'	-30.9'	54.4°	65°06.1'	-29.2'	56.2°	65°38.7'	-27.4'	58.0°	66°09.6'	-25.5'	59.9°	66°38.8'	-23.4'	61.9°	67°06.1'	-21.3'	64.0°	67°31.4'	-19.0'	66.2°	21
22	64°00.9'	-32.5'	52.4°	64°36.8'	-30.9'	54.1°	65°11.3'	-29.2'	55.9°	65°44.1'	-27.4'	57.7°	66°15.4'	-25.4'	59.6°	66°44.8'	-23.4'	61.6°	67°12.4'	-21.2'	63.7°	22
23	63°28.5'	-33.9'	50.5°	64°05.9'	-32.4'	52.1°	64°42.1'	-30.8'	53.8°	65°16.8'	-29.1'	55.5°	65°49.9'	-27.3'	57.4°	66°21.4'	-25.4'	59.3°	66°51.2'	-23.3'	61.3°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	7			8			9			10			11			12			13			

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°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	66°00.8'	+16.9'	106.0°	65°43.2'	+19.3'	108.2°	65°23.5'	+21.5'	110.2°	65°01.7'	+23.7'	112.2°	64°38.1'	+25.8'	114.2°	64°12.6'	+27.8'	116.1°	63°45.3'	+29.7'	117.9°	0
1	66°17.7'	+14.7'	103.6°	66°02.5'	+17.1'	105.8°	65°45.0'	+19.5'	108.0°	65°25.5'	+21.8'	110.1°	65°03.9'	+24.0'	112.1°	64°40.4'	+26.1'	114.0°	64°15.0'	+28.1'	115.9°	1
2	66°32.4'	+12.4'	101.2°	66°19.6'	+14.9'	103.5°	66°04.5'	+17.4'	105.7°	65°47.2'	+19.7'	107.8°	65°27.8'	+22.0'	109.9°	65°06.4'	+24.2'	111.9°	64°43.1'	+26.3'	113.9°	2
3	66°44.8'	+10.0'	98.8°	66°34.5'	+12.6'	101.0°	66°21.9'	+15.1'	103.3°	66°07.0'	+17.6'	105.5°	65°49.8'	+20.0'	107.6°	65°30.6'	+22.2'	109.7°	65°09.4'	+24.4'	111.8°	3
4	66°54.9'	+07.6'	96.2°	66°47.1'	+10.3'	98.6°	66°37.0'	+12.8'	100.9°	66°24.5'	+15.4'	103.1°	66°09.8'	+17.8'	105.3°	65°52.9'	+20.2'	107.5°	65°33.8'	+22.5'	109.6°	4
5	67°02.5'	+05.2'	93.7°	66°57.4'	+07.9'	96.1°	66°49.8'	+10.5'	98.4°	66°39.9'	+13.1'	100.7°	66°27.6'	+15.6'	102.9°	66°13.1'	+18.1'	105.2°	65°56.3'	+20.4'	107.3°	5
6	67°07.7'	+02.7'	91.2°	67°05.3'	+05.4'	93.5°	67°00.3'	+08.1'	95.9°	66°53.0'	+10.7'	98.2°	66°43.2'	+13.3'	100.5°	66°31.1'	+15.8'	102.8°	66°16.7'	+18.3'	105.0°	6
7	67°10.4'	+00.2'	88.6°	67°10.7'	+02.9'	91.0°	67°08.4'	+05.6'	93.3°	67°03.7'	+08.3'	95.7°	66°56.5'	+11.0'	98.0°	66°47.0'	+13.5'	100.3°	66°35.0'	+16.1'	102.6°	7
8	67°10.7'	-02.2'	86.0°	67°13.6'	+00.5'	88.4°	67°14.1'	+03.2'	90.8°	67°12.0'	+05.9'	93.1°	67°07.5'	+08.5'	95.5°	67°00.5'	+11.2'	97.9°	66°51.1'	+13.8'	100.2°	8
9	67°08.4'	-04.7'	83.4°	67°14.1'	-02.0'	85.8°	67°17.2'	+00.7'	88.2°	67°17.9'	+03.4'	90.6°	67°16.0'	+06.1'	93.0°	67°11.7'	+08.8'	95.3°	67°04.9'	+11.4'	97.7°	9
10	67°03.7'	-07.2'	80.9°	67°12.0'	-04.5'	83.2°	67°17.9'	-01.8'	85.6°	67°21.2'	+00.9'	88.0°	67°22.1'	+03.6'	90.4°	67°20.5'	+06.3'	92.8°	67°16.3'	+09.0'	95.2°	10
11	66°56.5'	-09.6'	78.3°	67°07.5'	-07.0'	80.6°	67°16.0'	-04.3'	83.0°	67°22.1'	-01.6'	85.4°	67°25.7'	+01.1'	87.8°	67°26.8'	+03.8'	90.2°	67°25.3'	+06.5'	92.6°	11
12	66°47.0'	-11.9'	75.8°	67°00.5'	-09.4'	78.1°	67°11.7'	-06.8'	80.4°	67°20.5'	-04.1'	82.8°	67°26.8'	-01.5'	85.2°	67°30.6'	+01.3'	87.6°	67°31.8'	+04.0'	90.0°	12
13	66°35.0'	-14.2'	73.3°	66°51.1'	-11.8'	75.6°	67°04.9'	-09.2'	77.9°	67°16.3'	-06.6'	80.2°	67°25.3'	-04.0'	82.6°	67°31.8'	-01.3'	85.0°	67°35.8'	+01.5'	87.4°	13
14	66°20.8'	-16.5'	70.9°	66°39.3'	-14.1'	73.1°	66°55.7'	-11.6'	75.3°	67°09.7'	-09.1'	77.6°	67°21.3'	-06.5'	80.0°	67°30.6'	-03.8'	82.3°	67°37.3'	-01.1'	84.8°	14
15	66°04.3'	-18.6'	68.5°	66°25.2'	-16.3'	70.6°	66°44.0'	-13.9'	72.8°	67°00.6'	-11.5'	75.1°	67°14.9'	-08.9'	77.4°	67°26.8'	-06.3'	79.7°	67°36.2'	-03.6'	82.1°	15
16	65°45.7'	-20.7'	66.2°	66°08.9'	-18.5'	68.3°	66°30.1'	-16.2'	70.4°	66°49.2'	-13.8'	72.6°	67°06.0'	-11.3'	74.8°	67°20.5'	-08.8'	77.2°	67°32.6'	-06.1'	79.5°	16
17	65°25.0'	-22.7'	63.9°	65°50.4'	-20.6'	65.9°	66°13.9'	-18.4'	68.0°	66°35.3'	-16.1'	70.1°	66°54.7'	-13.7'	72.3°	67°11.7'	-11.2'	74.6°	67°26.5'	-08.6'	76.9°	17
18	65°02.3'	-24.6'	61.7°	65°29.8'	-22.6'	63.6°	65°55.5'	-20.5'	65.6°	66°19.3'	-18.3'	67.7°	66°41.0'	-15.9'	69.9°	67°00.6'	-13.5'	72.1°	67°17.9'	-11.0'	74.3°	18
19	64°37.7'	-26.4'	59.6°	65°07.2'	-24.5'	61.4°	65°35.0'	-22.5'	63.4°	66°01.0'	-20.4'	65.4°	66°25.0'	-18.2'	67.4°	66°47.0'	-15.8'	69.6°	67°06.9'	-13.4'	71.8°	19
20	64°11.3'	-28.1'	57.5°	64°42.7'	-26.3'	59.3°	65°12.6'	-24.4'	61.1°	65°40.7'	-22.4'	63.1°	66°06.9'	-20.3'	65.1°	66°31.2'	-18.0'	67.2°	66°53.5'	-15.7'	69.3°	20
21	63°43.1'	-29.7'	55.5°	64°16.4'	-28.0'	57.2°	64°48.2'	-26.2'	59.0°	65°18.3'	-24.3'	60.8°	65°46.6'	-22.3'	62.8°	66°13						

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

24° 336° LHA

Latitude SAME as Declination

24° 336° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	65°03.5'	+16.3'	105.3°	64°46.6'	+18.6'	107.4°	64°27.7'	+20.8'	109.4°	64°06.9'	+22.9'	111.3°	63°44.1'	+25.0'	113.2°	63°19.6'	+27.0'	115.0°	62°53.4'	+28.8'	116.8°	0
1	65°19.8'	+14.2'	103.0°	65°05.2'	+16.5'	105.1°	64°48.5'	+18.8'	107.2°	64°29.8'	+21.0'	109.2°	64°09.1'	+23.2'	111.1°	63°46.6'	+25.2'	113.0°	63°22.2'	+27.2'	114.9°	1
2	65°33.9'	+12.0'	100.7°	65°21.7'	+14.4'	102.8°	65°07.3'	+16.8'	104.9°	64°50.8'	+19.1'	107.0°	64°32.3'	+21.3'	109.0°	64°11.8'	+23.4'	111.0°	63°49.4'	+25.5'	112.9°	2
3	65°45.9'	+09.7'	98.3°	65°36.1'	+12.2'	100.5°	65°24.1'	+14.6'	102.6°	65°09.9'	+17.0'	104.7°	64°53.6'	+19.3'	106.8°	64°35.2'	+21.5'	108.8°	64°14.9'	+23.7'	110.8°	3
4	65°55.6'	+07.4'	95.9°	65°48.3'	+10.0'	98.1°	65°38.7'	+12.4'	100.3°	65°26.9'	+14.9'	102.4°	65°12.9'	+17.2'	104.6°	64°56.8'	+19.6'	106.6°	64°38.6'	+21.8'	108.7°	4
5	66°03.1'	+05.1'	93.4°	65°58.3'	+07.7'	95.7°	65°51.2'	+10.2'	97.9°	65°41.8'	+12.7'	100.1°	65°30.1'	+15.1'	102.3°	65°16.3'	+17.5'	104.4°	65°00.3'	+19.8'	106.5°	5
6	66°08.2'	+02.7'	91.0°	66°05.9'	+05.3'	93.2°	66°01.4'	+07.9'	95.5°	65°54.5'	+10.4'	97.7°	65°45.3'	+12.9'	99.9°	65°33.8'	+15.4'	102.1°	65°20.1'	+17.7'	104.2°	6
7	66°10.9'	+00.4'	88.5°	66°11.3'	+03.0'	90.8°	66°09.3'	+05.5'	93.0°	66°04.9'	+08.1'	95.3°	65°58.2'	+10.7'	97.5°	65°49.2'	+13.2'	99.7°	65°37.9'	+15.6'	101.9°	7
8	66°11.3'	-02.0'	86.0°	66°14.2'	+00.6'	88.3°	66°14.8'	+03.2'	90.6°	66°13.0'	+05.8'	92.8°	66°08.8'	+08.4'	95.1°	66°02.3'	+10.9'	97.4°	65°53.5'	+13.4'	99.6°	8
9	66°09.3'	-04.4'	83.6°	66°14.8'	-01.8'	85.8°	66°18.0'	+00.8'	88.1°	66°18.8'	+03.4'	90.4°	66°17.2'	+06.0'	92.7°	66°13.2'	+08.6'	94.9°	66°06.9'	+11.1'	97.2°	9
10	66°04.9'	-06.7'	81.1°	66°13.0'	-04.2'	83.3°	66°18.8'	-01.6'	85.6°	66°22.2'	+01.0'	87.9°	66°23.2'	+03.6'	90.2°	66°21.8'	+06.2'	92.5°	66°18.1'	+08.8'	94.7°	10
11	65°58.2'	-09.0'	78.7°	66°08.8'	-06.5'	80.9°	66°17.2'	-04.0'	83.1°	66°23.2'	-01.4'	85.4°	66°26.8'	+01.2'	87.7°	66°28.1'	+03.8'	90.0°	66°26.9'	+06.5'	92.3°	11
12	65°49.2'	-11.3'	76.2°	66°02.3'	-08.8'	78.4°	66°13.2'	-06.3'	80.6°	66°21.8'	-03.8'	82.9°	66°28.1'	-01.2'	85.2°	66°31.9'	+01.4'	87.5°	66°33.4'	+04.1'	89.8°	12
13	65°37.9'	-13.5'	73.8°	65°53.5'	-11.1'	76.0°	66°06.9'	-08.6'	78.2°	66°18.1'	-06.1'	80.4°	66°26.9'	-03.6'	82.7°	66°33.4'	-01.0'	85.0°	66°37.4'	+01.7'	87.3°	13
14	65°24.4'	-15.6'	71.5°	65°42.4'	-13.3'	73.6°	65°58.3'	-10.9'	75.7°	66°11.9'	-08.5'	77.9°	66°23.3'	-06.0'	80.2°	66°32.4'	-03.4'	82.4°	66°39.1'	-00.8'	84.7°	14
15	65°08.8'	-17.7'	69.2°	65°29.1'	-15.5'	71.2°	65°47.3'	-13.2'	73.3°	66°03.5'	-10.8'	75.5°	66°17.4'	-08.3'	77.7°	66°29.0'	-05.8'	79.9°	66°38.3'	-03.2'	82.2°	15
16	64°51.0'	-19.7'	66.9°	65°13.6'	-17.6'	68.9°	65°34.2'	-15.3'	71.0°	65°52.7'	-13.0'	73.1°	66°09.1'	-10.6'	75.2°	66°23.2'	-08.1'	77.5°	66°35.1'	-05.6'	79.7°	16
17	64°31.3'	-21.7'	64.7°	64°56.0'	-19.6'	66.6°	65°18.8'	-17.4'	68.6°	65°39.7'	-15.2'	70.7°	65°58.5'	-12.9'	72.8°	66°15.1'	-10.5'	75.0°	66°29.5'	-08.0'	77.2°	17
18	64°09.6'	-23.5'	62.6°	64°36.4'	-21.6'	64.4°	65°01.4'	-19.5'	66.4°	65°24.5'	-17.3'	68.4°	65°45.6'	-15.1'	70.4°	66°04.7'	-12.7'	72.5°	66°21.6'	-10.3'	74.7°	18
19	63°46.1'	-25.3'	60.5°	64°14.8'	-23.4'	62.3°	64°41.9'	-21.4'	64.1°	65°07.2'	-19.4'	66.1°	65°30.5'	-17.2'	68.1°	65°51.9'	-14.9'	70.1°	66°11.3'	-12.6'	72.3°	19
20	63°20.8'	-27.0'	58.4°	63°51.4'	-25.2'	60.2°	64°20.5'	-23.3'	62.0°	64°47.8'	-21.3'	63.8°	65°13.3'	-19.3'	65.8°	65°37.0'	-17.1'	67.8°	65°58.7'	-14.8'	69.9°	20
21	62°53.8'	-28.6'	56.5°	63°26.2'	-26.9'	58.1°	63°57.1'	-25.1'	59.9°	64°26.5'	-23.2'	61.7°	64°54.1'	-21.2'	63.5°	65°19.9'	-19.2'	65.5°	65°43.8'	-17.0'	67.5°	21
22	62°25.2'	-30.1'	54.5°	62°59.3'	-28.5'	56.1°	63°32.0'	-26.8'	57.4°	64°03.2'	-25.0'	59.5°	64°32.8'	-23.1'	61.3°	65°00.8'	-21.1'	63.2°	65°26.9'	-19.1'	65.2°	22
23	61°55.1'	-31.6'	52.7°	62°30.8'	-30.1'	54.2°	63°05.2'	-28.4'	55.8°	63°38.2'	-26.7'	57.5°	64°09.7'	-25.0'	59.2°	64°39.6'	-23.1'	61.0°	65°07.8'	-21.1'	62.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	7			8			9			10			11			12			13			

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°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	64°06.0'	+15.7'	104.6°	63°49.8'	+18.0'	106.6°	63°31.7'	+20.1'	108.5°	63°11.6'	+22.2'	110.4°	62°49.8'	+24.2'	112.3°	62°26.2'	+26.1'	114.0°	62°01.0'	+28.0'	115.8°	0
1	64°21.7'	+13.7'	102.4°	64°07.7'	+16.0'	104.4°	63°51.8'	+18.2'	106.4°	63°33.9'	+20.4'	108.4°	63°14.0'	+22.5'	110.2°	62°52.4'	+24.5'	112.1°	62°29.0'	+26.4'	113.9°	1
2	64°35.4'	+11.6'	100.2°	64°23.7'	+13.9'	102.2°	64°10.0'	+16.2'	104.2°	63°54.2'	+18.5'	106.2°	63°36.5'	+20.6'	108.2°	63°16.8'	+22.7'	110.1°	62°55.4'	+24.7'	111.9°	2
3	64°47.0'	+09.4'	97.9°	64°37.7'	+11.8'	100.0°	64°26.2'	+14.2'	102.0°	64°12.7'	+16.5'	104.1°	63°57.1'	+18.7'	106.0°	63°39.5'	+20.9'	108.0°	63°20.1'	+23.0'	109.9°	3
4	64°56.4'	+07.2'	95.5°	64°49.5'	+09.7'	97.7°	64°40.4'	+12.1'	99.8°	64°29.1'	+14.4'	101.8°	64°15.8'	+16.7'	103.9°	64°00.4'	+19.0'	105.9°	63°43.0'	+21.1'	107.8°	4
5	65°03.6'	+05.0'	93.2°	64°59.1'	+07.5'	95.3°	64°52.5'	+09.9'	97.5°	64°43.6'	+12.3'	99.6°	64°32.5'	+14.7'	101.6°	64°19.4'	+17.0'	103.7°	64°04.2'	+19.2'	105.7°	5
6	65°08.6'	+02.8'	90.8°	65°06.6'	+05.2'	93.0°	65°02.4'	+07.7'	95.1°	64°55.9'	+10.2'	97.3°	64°47.2'	+12.6'	99.4°	64°36.4'	+14.9'	101.5°	64°23.4'	+17.2'	103.5°	6
7	65°11.4'	+00.5'	88.5°	65°11.8'	+03.0'	90.6°	65°10.1'	+05.5'	92.8°	65°06.0'	+08.0'	94.9°	64°59.8'	+10.4'	97.1°	64°51.3'	+12.8'	99.2°	64°40.6'	+15.2'	101.3°	7
8	65°11.8'	-01.8'	86.1°	65°14.8'	+00.7'	88.2°	65°15.5'	+03.2'	90.4°	65°14.0'	+05.7'	92.6°	65°10.2'	+08.2'	94.7°	65°04.1'	+10.7'	96.9°	64°55.8'	+13.1'	99.0°	8
9	65°10.1'	-04.0'	83.7°	65°15.5'	-01.6'	85.8°	65°18.8'	+00.9'	88.0°	65°19.7'	+03.4'	90.2°	65°18.4'	+06.0'	92.4°	65°14.8'	+08.4'	94.5°	65°08.9'	+10.9'	96.7°	9
10	65°06.0'	-06.3'	81.3°	65°14.0'	-03.8'	83.5°	65°19.7'	-01.3'	85.6°	65°23.1'	+01.2'	87.8°	65°24.3'	+03.7'	90.0°	65°23.2'	+06.2'	92.2°	65°19.8'	+08.7'	94.3°	10
11	64°59.8'	-08.5'	79.0°	65°10.2'	-06.1'	81.1°	65°18.4'	-03.6'	83.2°	65°24.3'	-01.1'	85.4°	65°28.0'	+01.4'	87.6°	65°29.4'	+03.9'	89.8°	65°28.5'	+06.4'	92.0°	11
12	64°51.3'	-10.7'	76.6°	65°04.1'	-08.3'	78.7°	65°14.8'	-05.9'	80.8°	65°23.2'	-03.4'	83.0°	65°29.4'	-00.9'	85.2°	65°33.3'	+01.6'	87.4°	65°34.9'	+04.1'	89.6°	12
13	64°40.6'	-12.8'	74.3°	64°55.8'	-10.5'	76.4°	65°08.9'	-08.1'	78.5°	65°19.8'	-05.7'	80.6°	65°28.5'	-03.2'	82.8°	65°34.9'	-00.7'	84.9°	65°39.0'	+01.8'	87.1°	13
14	64°27.8'	-14.9'	72.0°	64°45.3'	-12.6'	74.1°	65°00.8'	-10.3'	76.1°	65°14.1'	-07.9'	78.2°	65°25.3'	-05.5'	80.4°	65°34.2'	-03.0'	82.5°	65°40.9'	-00.5'	84.7°	14
15	64°13.0'	-16.9'	69.8°	64°32.7'	-14.7'	71.8°	64°50.5'	-12.4'	73.8°	65°06.2'	-10.1'	75.9°	65°19.8'	-07.7'	78.0°	65°31.2'	-05.3'	80.1°	65°40.4'	-02.8'	82.3°	15
16	63°56.1'	-18.8'	67.6°	64°18.0'	-16.7'	69.5°	64°38.1'	-14.5'	71.5°	64°56.1'	-12.3'	73.5°	65°12.1'	-09.9'	75.6°	65°25.9'	-07.5'	77.7°	65°37.6'	-05.1'	79.9°	16
17	63°37.3'	-20.7'	65.5°	64°01.3'	-18.7'	67.3°	64°23.5'	-16.6'	69.2°	64°43.8'	-14.4'	71.2°	65°02.1'	-12.1'	73.3°	65°18.4'	-09.8'	75.3°	65°32.5'	-07.4'	77.5°	17
18	63°16.6'	-22.5'	63.4°	63°42.6'	-20.6'	65.2°	64°07.0'	-18.5'	67.0°	64°29.4'	-16.4'	69.0°	64°50.0'	-14.2'	70.9°	65°08.6'	-12.0'	73.0°	65°25.1'	-09.6'	75.1°	18
19	62°54.1'	-24.3'	61.3°	63°22.1'	-22.4'	63.1°	63°48.4'	-20.4'	64.9°	64°13.0'	-18.4'	66.7°	64°35.8'	-16.3'	68.7°	64°56.6'	-14.1'	70.7°	65°15.5'	-11.8'	72.7°	19
20	62°29.8'	-25.9'	59.3°	62°59.7'	-24.1'	61.0°	63°28.0'	-22.3'	62.7°	63°54.6'	-20.3'	64.6°	64°19.5'	-18.3'	66.4°	64°42.5'	-16.2'	68.4°	65°03.7'	-14.0'	70.4°	20
21	62°03.9'	-27.5'	57.4°	62°35.5'	-25.8'	59.0°	63°05.7'	-24.0'	60.7°	63°34.3'	-22.2'	62.4°	64°01.2'	-20.2'	64.2°	64°26.4'	-1					

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

26° 334° LHA

Latitude SAME as Declination

26° 334° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	63°08.3'	+15.2'	104.0°	62°52.7'	+17.4'	105.9°	62°35.4'	+19.5'	107.8°	62°16.1'	+21.5'	109.6°	61°55.1'	+23.5'	111.4°	61°32.4'	+25.4'	113.1°	61°08.1'	+27.2'	114.8°	0
1	63°23.5'	+13.2'	101.9°	63°10.1'	+15.5'	103.8°	62°54.8'	+17.6'	105.7°	62°37.6'	+19.7'	107.6°	62°18.6'	+21.8'	109.4°	61°57.8'	+23.7'	111.2°	61°35.3'	+25.6'	112.9°	1
2	63°36.7'	+11.2'	99.7°	63°25.6'	+13.5'	101.7°	63°12.5'	+15.7'	103.6°	62°57.4'	+17.9'	105.5°	62°40.4'	+20.0'	107.4°	62°21.6'	+22.0'	109.2°	62°00.9'	+24.0'	111.0°	2
3	63°47.9'	+09.2'	97.5°	63°39.1'	+11.5'	99.5°	63°28.2'	+13.7'	101.5°	63°15.3'	+16.0'	103.4°	63°00.4'	+18.1'	105.3°	62°43.6'	+20.3'	107.2°	62°24.9'	+22.3'	109.0°	3
4	63°57.1'	+07.1'	95.2°	63°50.6'	+09.4'	97.3°	63°41.9'	+11.7'	99.3°	63°31.2'	+14.0'	101.3°	63°18.5'	+16.2'	103.2°	63°03.9'	+18.4'	105.1°	62°47.2'	+20.5'	107.0°	4
5	64°04.1'	+04.9'	93.0°	64°00.0'	+07.3'	95.0°	63°53.7'	+09.7'	97.0°	63°45.3'	+12.0'	99.1°	63°34.8'	+14.3'	101.1°	63°22.3'	+16.5'	103.0°	63°07.8'	+18.7'	104.9°	5
6	64°09.1'	+02.8'	90.7°	64°07.3'	+05.2'	92.7°	64°03.3'	+07.6'	94.8°	63°57.2'	+09.9'	96.8°	63°49.0'	+12.2'	98.9°	63°38.8'	+14.5'	100.9°	63°26.5'	+16.8'	102.8°	6
7	64°11.8'	+00.6'	88.4°	64°12.4'	+03.0'	90.5°	64°10.9'	+05.4'	92.5°	64°07.2'	+07.8'	94.6°	64°01.3'	+10.2'	96.6°	63°53.3'	+12.5'	98.7°	63°43.2'	+14.8'	100.7°	7
8	64°12.4'	-01.6'	86.1°	64°15.4'	+00.8'	88.2°	64°16.3'	+03.3'	90.2°	64°15.0'	+05.7'	92.3°	64°11.5'	+08.1'	94.4°	64°05.8'	+10.4'	96.4°	63°58.0'	+12.8'	98.5°	8
9	64°10.9'	-03.7'	83.8°	64°16.3'	-01.3'	85.9°	64°19.5'	+01.1'	87.9°	64°20.6'	+03.5'	90.0°	64°19.5'	+05.9'	92.1°	64°16.2'	+08.3'	94.2°	64°10.8'	+10.7'	96.2°	9
10	64°07.2'	-05.9'	81.5°	64°15.0'	-03.5'	83.6°	64°20.6'	-01.1'	85.6°	64°24.1'	+01.3'	87.7°	64°25.4'	+03.7'	89.8°	64°24.5'	+06.2'	91.9°	64°21.5'	+08.6'	94.0°	10
11	64°01.3'	-08.0'	79.2°	64°11.5'	-05.6'	81.3°	64°19.5'	-03.3'	83.3°	64°25.4'	-00.9'	85.4°	64°29.1'	+01.5'	87.5°	64°30.7'	+04.0'	89.6°	64°30.0'	+06.4'	91.7°	11
12	63°53.3'	-10.1'	77.0°	64°05.8'	-07.8'	79.0°	64°16.2'	-05.4'	81.0°	64°24.5'	-03.1'	83.1°	64°30.7'	-00.7'	85.2°	64°34.7'	+01.8'	87.3°	64°36.4'	+04.2'	89.4°	12
13	63°43.2'	-12.1'	74.7°	63°58.0'	-09.9'	76.7°	64°10.8'	-07.6'	78.7°	64°21.5'	-05.2'	80.8°	64°30.0'	-02.8'	82.8°	64°36.4'	-00.4'	84.9°	64°40.7'	+02.0'	87.0°	13
14	63°31.1'	-14.1'	72.5°	63°48.2'	-11.9'	74.5°	64°03.2'	-09.7'	76.4°	64°16.3'	-07.4'	78.5°	64°27.2'	-05.0'	80.5°	64°36.0'	-02.6'	82.6°	64°42.7'	-00.2'	84.7°	14
15	63°17.0'	-16.1'	70.4°	63°36.2'	-13.9'	72.3°	63°53.5'	-11.8'	74.2°	64°08.9'	-09.5'	76.2°	64°22.2'	-07.2'	78.2°	64°33.4'	-04.8'	80.3°	64°42.5'	-02.4'	82.3°	15
16	63°00.9'	-18.0'	68.2°	63°22.3'	-15.9'	70.1°	63°41.8'	-13.8'	72.0°	63°59.4'	-11.6'	73.9°	64°15.0'	-09.3'	75.9°	64°28.6'	-07.0'	77.9°	64°40.0'	-04.6'	80.0°	16
17	62°43.0'	-19.8'	66.1°	63°06.4'	-17.8'	67.9°	63°28.0'	-15.7'	69.8°	63°47.8'	-13.6'	71.7°	64°05.7'	-11.4'	73.6°	64°21.6'	-09.1'	75.6°	64°35.4'	-06.8'	77.7°	17
18	62°23.2'	-21.6'	64.1°	62°48.6'	-19.6'	65.8°	63°12.3'	-17.7'	67.6°	63°34.2'	-15.6'	69.5°	63°54.3'	-13.5'	71.4°	64°12.4'	-11.2'	73.4°	64°28.6'	-09.0'	75.4°	18
19	62°01.6'	-23.2'	62.1°	62°28.9'	-21.4'	63.8°	62°54.6'	-19.5'	65.5°	63°18.6'	-17.5'	67.3°	63°40.8'	-15.4'	69.2°	64°01.2'	-13.3'	71.1°	64°19.6'	-11.1'	73.1°	19
20	61°38.4'	-24.9'	60.1°	62°07.5'	-23.1'	61.8°	62°35.1'	-21.3'	63.5°	63°01.1'	-19.4'	65.2°	63°25.4'	-17.4'	67.0°	63°47.9'	-15.3'	68.9°	64°08.5'	-13.2'	70.8°	20
21	61°13.5'	-26.4'	58.2°	61°44.4'	-24.8'	59.8°	62°13.8'	-23.0'	61.4°	62°41.7'	-21.2'	63.1°	63°08.0'	-19.3'	64.9°	63°32.6'	-17.3'	66.7°	63°55.4'	-15.2'	68.6°	21
22	60°47.1'	-27.9'	56.4°	61°19.6'	-26.3'	57.9°	61°50.8'	-24.7'	59.5°	62°20.5'	-22.9'	61.1°	62°48.7'	-21.1'	62.8°	63°15.3'	-19.1'	64.6°	63°40.2'	-17.1'	66.4°	22
23	60°19.1'	-29.3'	54.6°	60°53.3'	-27.8'	56.0°	61°26.1'	-26.2'	57.6°	61°57.6'	-24.6'	59.1°	62°27.7'	-22.8'	60.8°	62°56.2'	-21.0'	62.5°	63°23.1'	-19.0'	64.3°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	7			8			9			10			11			12			13			

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°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	62°10.4'	+14.7'	103.5°	61°55.5'	+16.8'	105.3°	61°38.8'	+18.9'	107.1°	61°20.3'	+20.9'	108.8°	61°00.1'	+22.8'	110.5°	60°38.3'	+24.7'	112.2°	60°14.8'	+26.5'	113.8°	0
1	62°25.1'	+12.8'	101.4°	62°12.4'	+15.0'	103.2°	61°57.7'	+17.1'	105.1°	61°41.2'	+19.2'	106.9°	61°22.9'	+21.1'	108.6°	61°02.9'	+23.1'	110.3°	60°41.3'	+24.9'	112.0°	1
2	62°38.0'	+10.9'	99.2°	62°27.4'	+13.1'	101.1°	62°14.8'	+15.3'	103.0°	62°00.4'	+17.4'	104.8°	61°44.1'	+19.4'	106.6°	61°26.0'	+21.4'	108.4°	61°06.2'	+23.3'	110.1°	2
3	62°48.9'	+08.9'	97.1°	62°40.4'	+11.2'	99.0°	62°30.1'	+13.4'	100.9°	62°17.7'	+15.5'	102.8°	62°03.5'	+17.6'	104.6°	61°47.4'	+19.7'	106.4°	61°29.5'	+21.7'	108.2°	3
4	62°57.8'	+06.9'	94.9°	62°51.6'	+09.2'	96.9°	62°43.4'	+11.4'	98.8°	62°33.2'	+13.6'	100.7°	62°21.1'	+15.8'	102.6°	62°07.1'	+17.9'	104.4°	61°51.2'	+20.0'	106.2°	4
5	63°04.7'	+04.8'	92.7°	63°00.8'	+07.1'	94.7°	62°54.8'	+09.4'	96.7°	62°46.9'	+11.7'	98.6°	62°36.9'	+13.9'	100.5°	62°25.0'	+16.1'	102.4°	62°11.2'	+18.2'	104.2°	5
6	63°09.5'	+02.8'	90.5°	63°07.9'	+05.1'	92.5°	63°04.3'	+07.4'	94.5°	62°58.5'	+09.7'	96.4°	62°50.8'	+11.9'	98.4°	62°41.1'	+14.2'	100.3°	62°29.4'	+16.3'	102.2°	6
7	63°12.3'	+00.7'	88.3°	63°13.0'	+03.0'	90.3°	63°11.7'	+05.4'	92.3°	63°08.2'	+07.7'	94.3°	63°02.8'	+10.0'	96.2°	62°55.2'	+12.2'	98.2°	62°45.7'	+14.4'	100.1°	7
8	63°13.0'	-01.4'	86.1°	63°16.1'	+01.0'	88.1°	63°17.0'	+03.3'	90.1°	63°15.9'	+05.6'	92.1°	63°12.7'	+07.9'	94.0°	63°07.5'	+10.2'	96.0°	63°00.2'	+12.5'	98.0°	8
9	63°11.7'	-03.4'	83.9°	63°17.0'	-01.1'	85.9°	63°20.3'	+01.2'	87.8°	63°21.5'	+03.5'	89.8°	63°20.6'	+05.9'	91.8°	63°17.7'	+08.2'	93.8°	63°12.7'	+10.5'	95.8°	9
10	63°08.2'	-05.5'	81.7°	63°15.9'	-03.2'	83.6°	63°21.5'	-00.9'	85.6°	63°25.1'	+01.5'	87.6°	63°26.5'	+03.8'	89.6°	63°25.9'	+06.1'	91.6°	63°23.1'	+08.5'	93.6°	10
11	63°02.8'	-07.5'	79.5°	63°12.7'	-05.3'	81.4°	63°20.6'	-03.0'	83.4°	63°26.5'	-00.6'	85.4°	63°30.3'	+01.7'	87.4°	63°32.0'	+04.0'	89.4°	63°31.6'	+06.4'	91.4°	11
12	62°55.2'	-09.5'	77.3°	63°07.5'	-07.3'	79.2°	63°17.7'	-05.0'	81.2°	63°25.9'	-02.7'	83.1°	63°32.0'	-00.4'	85.1°	63°36.0'	+01.9'	87.1°	63°38.0'	+04.3'	89.2°	12
13	62°45.7'	-11.5'	75.1°	63°00.2'	-09.3'	77.0°	63°12.7'	-07.1'	79.0°	63°23.1'	-04.8'	80.9°	63°31.6'	-02.5'	82.9°	63°38.0'	-00.2'	84.9°	63°42.3'	+02.2'	86.9°	13
14	62°34.2'	-13.4'	73.0°	62°50.9'	-11.3'	74.9°	63°05.6'	-09.1'	76.8°	63°18.3'	-06.9'	78.7°	63°29.1'	-04.6'	80.7°	63°37.8'	-02.3'	82.6°	63°44.5'	+00.1'	84.7°	14
15	62°20.8'	-15.3'	70.9°	62°39.6'	-13.2'	72.7°	62°56.5'	-11.1'	74.6°	63°11.5'	-08.9'	76.5°	63°24.5'	-06.7'	78.4°	63°35.5'	-04.4'	80.4°	63°44.5'	-02.1'	82.4°	15
16	62°05.5'	-17.1'	68.8°	62°26.3'	-15.1'	70.6°	62°45.4'	-13.1'	72.4°	63°02.5'	-10.9'	74.3°	63°17.8'	-08.7'	76.2°	63°31.1'	-06.5'	78.2°	63°42.4'	-04.2'	80.1°	16
17	61°48.4'	-18.9'	66.8°	62°11.2'	-17.0'	68.5°	62°32.3'	-15.0'	70.3°	62°51.6'	-12.9'	72.1°	63°09.1'	-10.7'	74.0°	63°24.7'	-08.5'	75.9°	63°38.3'	-06.3'	77.9°	17
18	61°29.5'	-20.6'	64.8°	61°54.2'	-18.8'	66.5°	62°17.3'	-16.8'	68.2°	62°38.8'	-14.8'	70.0°	62°58.4'	-12.7'	71.8°	63°16.1'	-10.6'	73.7°	63°32.0'	-08.3'	75.6°	18
19	61°08.8'	-22.3'	62.8°	61°35.5'	-20.5'	64.5°	62°00.5'	-18.6'	66.2°	62°24.0'	-16.7'	67.9°	62°45.7'	-14.6'	69.7°	63°05.6'	-12.5'	71.5°	63°23.6'	-10.4'	73.4°	19
20	60°46.5'	-23.9'	60.9°	61°15.0'	-22.2'	62.5°	61°41.9'	-20.3'	64.1°	62°07.3'	-18.5'	65.8°	62°31.0'	-16.5'	67.6°	62°53.0'	-14.5'	69.4°	63°13.3'	-12.4'	71.2°	20
21	60°22.6'	-25.4'	59.0°	60°52.8'	-23.8'	60.6°	61°21.6'	-22.0'	62.2°	61°48.8'	-20.2'	63.8°	62°14.5'	-18.3'	65.5°	62°38.6'	-16.4'					

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

28° 332° LHA

Latitude SAME as Declination

28° 332° LHA

Table with 13 columns for declination (7-13) and 13 rows for latitude (0-23). Each cell contains three values: Hc°, d', and Z°. The table is bordered and includes a Dec° column on the far left and far right.

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

Table with 13 columns for declination (7-13) and 13 rows for latitude (0-23). Each cell contains three values: Hc°, d', and Z°. The table is bordered and includes a Dec° column on the far left and far right.

29° 331° LHA

Latitude SAME as Declination

29° 331° LHA

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

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

30° 330° LHA

Latitude SAME as Declination

30° 330° LHA

Table with 12 columns (Dec, 7, 8, 9, 10, 11, 12, 13, Dec) and 24 rows (0-23) containing coordinate data for 30° latitude. Each cell contains Hc, d, and Z values.

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

Table with 12 columns (Dec, 7, 8, 9, 10, 11, 12, 13, Dec) and 24 rows (0-23) containing coordinate data for 31° latitude. Each cell contains Hc, d, and Z values.

31° 329° LHA

Latitude SAME as Declination

31° 329° LHA

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

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

36° 324° LHA

Latitude SAME as Declination

36° 324° LHA

Table with columns for Dec°, Hc°, d', Z° and rows 0-23. It contains astronomical data for 36° latitude.

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

Table with columns for Dec°, Hc°, d', Z° and rows 0-23. It contains astronomical data for 37° latitude.

37° 323° LHA

Latitude SAME as Declination

37° 323° LHA

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

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

44° 316° LHA

Latitude SAME as Declination

44° 316° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	45°33.6'	+09.9'	97.2°	45°25.5'	+11.4'	98.2°	45°16.5'	+12.8'	99.2°	45°06.3'	+14.3'	100.2°	44°55.2'	+15.7'	101.2°	44°43.1'	+17.1'	102.2°	44°30.0'	+18.5'	103.1°	0
1	45°43.5'	+08.9'	95.8°	45°36.9'	+10.4'	96.8°	45°29.3'	+11.8'	97.8°	45°20.6'	+13.3'	98.8°	45°10.9'	+14.7'	99.8°	45°00.2'	+16.1'	100.8°	44°48.4'	+17.5'	101.8°	1
2	45°52.4'	+07.8'	94.4°	45°47.3'	+09.3'	95.4°	45°41.1'	+10.8'	96.4°	45°33.9'	+12.2'	97.4°	45°25.6'	+13.7'	98.4°	45°16.3'	+15.1'	99.4°	45°05.9'	+16.5'	100.4°	2
3	46°00.2'	+06.7'	92.9°	45°56.6'	+08.2'	94.0°	45°51.9'	+09.7'	95.0°	45°46.1'	+11.2'	96.0°	45°39.3'	+12.7'	97.0°	45°31.4'	+14.1'	98.1°	45°22.5'	+15.6'	99.1°	3
4	46°06.9'	+05.7'	91.5°	46°04.8'	+07.2'	92.5°	46°01.6'	+08.7'	93.6°	45°57.3'	+10.2'	94.6°	45°52.0'	+11.6'	95.6°	45°45.5'	+13.1'	96.7°	45°38.0'	+14.6'	97.7°	4
5	46°12.6'	+04.6'	90.1°	46°12.0'	+06.1'	91.1°	46°10.3'	+07.6'	92.2°	46°07.5'	+09.1'	93.2°	46°03.6'	+10.6'	94.2°	45°58.6'	+12.1'	95.3°	45°52.6'	+13.5'	96.3°	5
6	46°17.2'	+03.5'	88.6°	46°18.1'	+05.0'	89.7°	46°17.9'	+06.5'	90.7°	46°16.6'	+08.0'	91.8°	46°14.2'	+09.5'	92.8°	46°10.7'	+11.0'	93.9°	46°06.1'	+12.5'	94.9°	6
7	46°20.7'	+02.4'	87.2°	46°23.1'	+03.9'	88.2°	46°24.4'	+05.4'	89.3°	46°24.6'	+06.9'	90.3°	46°23.7'	+08.5'	91.4°	46°21.7'	+10.0'	92.4°	46°18.6'	+11.4'	93.5°	7
8	46°23.1'	+01.3'	85.7°	46°27.0'	+02.8'	86.8°	46°29.8'	+04.3'	87.8°	46°31.5'	+05.9'	88.9°	46°32.2'	+07.4'	89.9°	46°31.7'	+08.9'	91.0°	46°30.1'	+10.4'	92.1°	8
9	46°24.4'	+00.2'	84.3°	46°29.8'	+01.7'	85.3°	46°34.2'	+03.2'	86.4°	46°37.4'	+04.8'	87.4°	46°39.5'	+06.3'	88.5°	46°40.5'	+07.8'	89.6°	46°40.5'	+09.3'	90.6°	9
10	46°24.6'	-00.9'	82.8°	46°31.5'	+00.6'	83.9°	46°37.4'	+02.1'	84.9°	46°42.2'	+03.6'	86.0°	46°45.8'	+05.2'	87.0°	46°48.3'	+06.7'	88.1°	46°49.8'	+08.2'	89.2°	10
11	46°23.7'	-02.0'	81.4°	46°32.2'	-00.5'	82.4°	46°39.5'	+01.0'	83.5°	46°45.8'	+02.5'	84.5°	46°51.0'	+04.1'	85.6°	46°55.0'	+05.6'	86.7°	46°58.0'	+07.1'	87.7°	11
12	46°21.7'	-03.1'	79.9°	46°31.7'	-01.6'	81.0°	46°40.5'	-00.1'	82.0°	46°48.3'	+01.4'	83.1°	46°55.0'	+02.9'	84.1°	47°00.6'	+04.5'	85.2°	47°05.1'	+06.0'	86.3°	12
13	46°18.6'	-04.2'	78.5°	46°30.1'	-02.7'	79.5°	46°40.5'	-01.2'	80.6°	46°49.8'	+00.3'	81.6°	46°58.0'	+01.8'	82.7°	47°05.1'	+03.3'	83.7°	47°11.0'	+04.9'	84.8°	13
14	46°14.4'	-05.3'	77.0°	46°27.4'	-03.8'	78.1°	46°39.3'	-02.3'	79.1°	46°50.1'	-00.8'	80.1°	46°59.8'	+00.7'	81.2°	47°08.4'	+02.2'	82.3°	47°15.9'	+03.7'	83.3°	14
15	46°09.2'	-06.3'	75.6°	46°23.6'	-04.9'	76.6°	46°36.9'	-03.4'	77.6°	46°49.2'	-01.9'	78.7°	47°00.5'	-00.4'	79.7°	47°10.6'	+01.1'	80.8°	47°19.7'	+02.6'	81.9°	15
16	46°02.8'	-07.4'	74.2°	46°18.7'	-06.0'	75.2°	46°33.5'	-04.5'	76.2°	46°47.3'	-03.0'	77.2°	47°00.0'	-01.5'	78.3°	47°11.7'	00.0'	79.3°	47°22.3'	+01.5'	80.4°	16
17	45°55.4'	-08.5'	72.7°	46°12.7'	-07.1'	73.7°	46°29.0'	-05.6'	74.7°	46°44.3'	-04.1'	75.8°	46°58.5'	-02.7'	76.8°	47°11.7'	-01.2'	77.9°	47°23.7'	+00.3'	78.9°	17
18	45°46.9'	-09.5'	71.3°	46°05.7'	-08.1'	72.3°	46°23.4'	-06.7'	73.3°	46°40.1'	-05.3'	74.3°	46°55.8'	-03.8'	75.3°	47°10.5'	-02.3'	76.4°	47°24.1'	-00.8'	77.4°	18
19	45°37.4'	-10.6'	69.9°	45°57.5'	-09.2'	70.9°	46°16.7'	-07.8'	71.9°	46°34.9'	-06.3'	72.9°	46°52.0'	-04.9'	73.9°	47°08.2'	-03.4'	74.9°	47°23.3'	-01.9'	76.0°	19
20	45°26.8'	-11.6'	68.5°	45°48.3'	-10.2'	69.5°	46°08.9'	-08.8'	70.4°	46°28.5'	-07.4'	71.4°	46°47.2'	-06.0'	72.4°	47°04.8'	-04.5'	73.4°	47°21.3'	-03.1'	74.5°	20
21	45°15.2'	-12.6'	67.1°	45°38.1'	-11.3'	68.0°	46°00.1'	-09.9'	69.0°	46°21.1'	-08.5'	70.0°	46°41.1'	-07.1'	71.0°	47°00.2'	-05.7'	72.0°	47°18.3'	-04.2'	73.0°	21
22	45°02.6'	-13.6'	65.7°	45°26.8'	-12.3'	66.6°	45°50.2'	-11.0'	67.6°	46°12.6'	-09.6'	68.5°	46°34.0'	-08.2'	69.5°	46°54.5'	-06.8'	70.5°	47°14.0'	-05.3'	71.5°	22
23	44°49.0'	-14.6'	64.3°	45°14.5'	-13.3'	65.3°	45°39.2'	-12.0'	66.2°	46°03.0'	-10.6'	67.1°	46°25.9'	-09.3'	68.1°	46°47.8'	-07.9'	69.1°	47°08.7'	-06.5'	70.1°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	7			8			9			10			11			12			13			

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°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	44°34.5'	+09.8'	96.9°	44°26.7'	+11.2'	97.9°	44°17.9'	+12.6'	98.9°	44°08.2'	+14.0'	99.9°	43°57.4'	+15.4'	100.8°	43°45.7'	+16.8'	101.7°	43°33.0'	+18.2'	102.7°	0
1	44°44.2'	+08.7'	95.6°	44°37.9'	+10.2'	96.5°	44°30.6'	+11.6'	97.5°	44°22.2'	+13.1'	98.5°	44°12.8'	+14.5'	99.5°	44°02.5'	+15.9'	100.4°	43°51.2'	+17.3'	101.4°	1
2	44°53.0'	+07.7'	94.2°	44°48.1'	+09.2'	95.2°	44°42.2'	+10.6'	96.1°	44°35.3'	+12.1'	97.1°	44°27.3'	+13.5'	98.1°	44°18.4'	+14.9'	99.1°	44°08.4'	+16.3'	100.0°	2
3	45°00.7'	+06.7'	92.8°	44°57.3'	+08.2'	93.8°	44°52.8'	+09.6'	94.8°	44°47.3'	+11.1'	95.7°	44°40.8'	+12.5'	96.7°	44°33.3'	+13.9'	97.7°	44°24.7'	+15.4'	98.7°	3
4	45°07.4'	+05.7'	91.4°	45°05.5'	+07.1'	92.4°	45°02.5'	+08.6'	93.4°	44°58.4'	+10.1'	94.4°	44°53.3'	+11.5'	95.4°	44°47.2'	+13.0'	96.3°	44°40.1'	+14.4'	97.3°	4
5	45°13.1'	+04.6'	89.9°	45°12.6'	+06.1'	91.0°	45°11.1'	+07.6'	92.0°	45°08.5'	+09.0'	93.0°	45°04.9'	+10.5'	94.0°	45°00.2'	+12.0'	95.0°	44°54.5'	+13.4'	96.0°	5
6	45°17.7'	+03.6'	88.5°	45°18.7'	+05.0'	89.5°	45°18.6'	+06.5'	90.5°	45°17.5'	+08.0'	91.6°	45°15.4'	+09.5'	92.6°	45°12.1'	+10.9'	93.6°	45°07.9'	+12.4'	94.6°	6
7	45°21.2'	+02.5'	87.1°	45°23.7'	+04.0'	88.1°	45°25.1'	+05.5'	89.1°	45°25.5'	+07.0'	90.2°	45°24.8'	+08.4'	91.2°	45°23.1'	+09.9'	92.2°	45°20.3'	+11.4'	93.2°	7
8	45°23.7'	+01.4'	85.7°	45°27.7'	+02.9'	86.7°	45°30.6'	+04.4'	87.7°	45°32.5'	+05.9'	88.7°	45°33.3'	+07.4'	89.8°	45°33.0'	+08.9'	90.8°	45°31.6'	+10.3'	91.8°	8
9	45°25.1'	+00.4'	84.3°	45°30.6'	+01.9'	85.3°	45°35.0'	+03.3'	86.3°	45°38.4'	+04.8'	87.3°	45°40.7'	+06.3'	88.3°	45°41.9'	+07.8'	89.4°	45°42.0'	+09.3'	90.4°	9
10	45°25.5'	-00.7'	82.8°	45°32.5'	+00.8'	83.8°	45°38.4'	+02.3'	84.9°	45°43.2'	+03.8'	85.9°	45°47.0'	+05.3'	86.9°	45°49.7'	+06.8'	87.9°	45°51.3'	+08.2'	89.0°	10
11	45°24.8'	-01.8'	81.4°	45°33.3'	-00.3'	82.4°	45°40.7'	+01.2'	83.4°	45°47.0'	+02.7'	84.5°	45°52.2'	+04.2'	85.5°	45°56.4'	+05.7'	86.5°	45°59.5'	+07.2'	87.5°	11
12	45°23.1'	-02.8'	80.0°	45°33.0'	-01.3'	81.0°	45°41.9'	+00.1'	82.0°	45°49.7'	+01.6'	83.0°	45°56.4'	+03.1'	84.0°	46°02.1'	+04.6'	85.1°	46°06.7'	+06.1'	86.1°	12
13	45°20.3'	-03.9'	78.6°	45°31.6'	-02.4'	79.6°	45°42.0'	-00.9'	80.6°	45°51.3'	+00.5'	81.6°	45°59.5'	+02.0'	82.6°	46°06.7'	+03.5'	83.6°	46°12.8'	+05.0'	84.7°	13
14	45°16.4'	-04.9'	77.2°	45°29.2'	-03.5'	78.1°	45°41.1'	-02.0'	79.1°	45°51.8'	-00.5'	80.2°	46°01.6'	+00.9'	81.2°	46°10.3'	+02.4'	82.2°	46°17.9'	+03.9'	83.2°	14
15	45°11.5'	-06.0'	75.7°	45°25.8'	-04.5'	76.7°	45°39.0'	-03.1'	77.7°	45°51.3'	-01.6'	78.7°	46°02.5'	-00.1'	79.7°	46°12.7'	+01.3'	80.8°	46°21.8'	+02.8'	81.8°	15
16	45°05.5'	-07.0'	74.3°	45°21.2'	-05.6'	75.3°	45°36.0'	-04.1'	76.3°	45°49.7'	-02.7'	77.3°	46°02.4'	-01.2'	78.3°	46°14.0'	+00.3'	79.3°	46°24.6'	+01.7'	80.3°	16
17	44°58.5'	-08.0'	72.9°	45°15.7'	-06.6'	73.9°	45°31.8'	-05.2'	74.9°	45°47.0'	-03.8'	75.8°	46°01.2'	-02.3'	76.9°	46°14.3'	-00.8'	77.9°	46°26.4'	+00.6'	78.9°	17
18	44°50.5'	-09.1'	71.5°	45°09.0'	-07.7'	72.5°	45°26.6'	-06.3'	73.4°	45°43.2'	-04.8'	74.4°	45°58.8'	-03.4'	75.4°	46°13.4'	-01.9'	76.4°	46°27.0'	-00.5'	77.4°	18
19	44°41.4'	-10.1'	70.1°	45°01.4'	-08.7'	71.1°	45°20.4'	-07.3'	72.0°	45°38.4'	-05.9'	73.0°	45°55.5'	-04.5'	74.0°	46°11.5'	-03.0'	75.0°	46°26.6'	-01.6'	76.0°	19
20	44°31.4'	-11.1'	68.7°	44°52.7'	-09.7'	69.7°	45°13.1'	-08.3'	70.6°	45°32.5'	-07.0'	71.6°	45°51.0'	-05.5'	72.5°	46°08.5'	-04.1'	73.5°	46°25.0'	-02.7'	74.5°	20
21	44°20.3'	-12.0'	67.4°	44°43.0'	-10.7'	68.3°	45°04.7'	-09.4'	69.2°	45°25.5'	-08.0'	70.2°	45°45.4'	-06.6'	71.1°	46°04.4'	-05.2'	72.1°	46°22.3'	-03.8'	73.1°	21
22	44°08.3'	-13.0'	66.0°	44°32.2'	-1																	

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

46° 314° LHA

Latitude SAME as Declination

46° 314° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	43°35.3'	+09.6'	96.7°	43°27.8'	+11.0'	97.7°	43°19.4'	+12.4'	98.6°	43°09.9'	+13.8'	99.5°	42°59.5'	+15.2'	100.4°	42°48.2'	+16.6'	101.4°	42°35.9'	+17.9'	102.3°	0
1	43°44.9'	+08.6'	95.3°	43°38.9'	+10.1'	96.3°	43°31.8'	+11.5'	97.2°	43°23.7'	+12.9'	98.2°	43°14.7'	+14.3'	99.1°	43°04.7'	+15.6'	100.0°	42°53.8'	+17.0'	101.0°	1
2	43°53.6'	+07.6'	94.0°	43°48.9'	+09.1'	94.9°	43°43.3'	+10.5'	95.9°	43°36.6'	+11.9'	96.8°	43°29.0'	+13.3'	97.8°	43°20.4'	+14.7'	98.7°	43°10.8'	+16.1'	99.6°	2
3	44°01.2'	+06.6'	92.6°	43°58.0'	+08.1'	93.6°	43°53.8'	+09.5'	94.5°	43°48.5'	+11.0'	95.5°	43°42.3'	+12.4'	96.4°	43°35.1'	+13.8'	97.4°	43°26.9'	+15.2'	98.3°	3
4	44°07.9'	+05.6'	91.2°	44°06.1'	+07.1'	92.2°	44°03.3'	+08.5'	93.2°	43°59.5'	+10.0'	94.1°	43°54.7'	+11.4'	95.1°	43°48.9'	+12.8'	96.0°	43°42.1'	+14.2'	97.0°	4
5	44°13.5'	+04.6'	89.8°	44°13.2'	+06.1'	90.8°	44°11.8'	+07.5'	91.8°	44°09.5'	+09.0'	92.7°	44°06.1'	+10.4'	93.7°	44°01.7'	+11.9'	94.7°	43°56.3'	+13.3'	95.6°	5
6	44°18.1'	+03.6'	88.4°	44°19.3'	+05.1'	89.4°	44°19.4'	+06.5'	90.4°	44°18.4'	+08.0'	91.4°	44°16.5'	+09.4'	92.3°	44°13.6'	+10.9'	93.3°	44°09.6'	+12.3'	94.3°	6
7	44°21.7'	+02.6'	87.0°	44°24.3'	+04.0'	88.0°	44°25.9'	+05.5'	89.0°	44°26.4'	+07.0'	90.0°	44°25.9'	+08.4'	91.0°	44°24.4'	+09.9'	91.9°	44°21.9'	+11.3'	92.9°	7
8	44°24.3'	+01.6'	85.6°	44°28.4'	+03.0'	86.6°	44°31.4'	+04.5'	87.6°	44°33.4'	+06.0'	88.6°	44°34.4'	+07.4'	89.6°	44°34.3'	+08.9'	90.6°	44°33.2'	+10.3'	91.5°	8
9	44°25.9'	+00.5'	84.2°	44°31.4'	+02.0'	85.2°	44°35.9'	+03.5'	86.2°	44°39.4'	+04.9'	87.2°	44°41.8'	+06.4'	88.2°	44°43.2'	+07.9'	89.2°	44°43.5'	+09.3'	90.2°	9
10	44°26.4'	-00.5'	82.8°	44°33.4'	+01.0'	83.8°	44°39.4'	+02.4'	84.8°	44°44.3'	+03.9'	85.8°	44°48.2'	+05.4'	86.8°	44°51.0'	+06.8'	87.8°	44°52.8'	+08.3'	88.8°	10
11	44°25.9'	-01.5'	81.4°	44°34.4'	-00.1'	82.4°	44°41.8'	+01.4'	83.4°	44°48.2'	+02.9'	84.4°	44°53.5'	+04.3'	85.4°	44°57.9'	+05.8'	86.4°	45°01.1'	+07.3'	87.4°	11
12	44°24.4'	-02.5'	80.0°	44°34.3'	-01.1'	81.0°	44°43.2'	+00.4'	82.0°	44°51.0'	+01.8'	83.0°	44°57.9'	+03.3'	84.0°	45°03.7'	+04.8'	85.0°	45°08.4'	+06.2'	86.0°	12
13	44°21.9'	-03.6'	78.6°	44°33.2'	-02.1'	79.6°	44°43.5'	-00.7'	80.6°	44°52.8'	+00.8'	81.6°	45°01.1'	+02.2'	82.5°	45°08.4'	+03.7'	83.5°	45°14.6'	+05.2'	84.5°	13
14	44°18.3'	-04.6'	77.2°	44°31.1'	-03.2'	78.2°	44°42.9'	-01.7'	79.2°	44°53.6'	-00.3'	80.1°	45°03.4'	+01.2'	81.1°	45°12.1'	+02.7'	82.1°	45°19.8'	+04.1'	83.1°	14
15	44°13.7'	-05.6'	75.9°	44°27.9'	-04.2'	76.8°	44°41.1'	-02.8'	77.8°	44°53.4'	-01.3'	78.7°	45°04.6'	+00.1'	79.7°	45°14.8'	+01.6'	80.7°	45°23.9'	+03.1'	81.7°	15
16	44°08.2'	-06.6'	74.5°	44°23.7'	-05.2'	75.4°	44°38.4'	-03.8'	76.4°	44°52.0'	-02.4'	77.3°	45°04.7'	-00.9'	78.3°	45°16.4'	+00.5'	79.3°	45°27.0'	+02.0'	80.3°	16
17	44°01.6'	-07.6'	73.1°	44°18.6'	-06.2'	74.0°	44°34.6'	-04.8'	75.0°	44°49.7'	-03.4'	75.9°	45°03.8'	-02.0'	76.9°	45°16.9'	-00.5'	77.9°	45°29.0'	+00.9'	78.9°	17
18	43°54.0'	-08.6'	71.7°	44°12.3'	-07.2'	72.6°	44°29.8'	-05.8'	73.6°	44°46.3'	-04.4'	74.5°	45°01.8'	-03.0'	75.5°	45°16.4'	-01.6'	76.4°	45°30.0'	-00.1'	77.4°	18
19	43°45.4'	-09.6'	70.3°	44°05.1'	-08.2'	71.2°	44°24.0'	-06.8'	72.2°	44°41.9'	-05.5'	73.1°	44°58.8'	-04.0'	74.1°	45°14.8'	-02.6'	75.0°	45°29.8'	-01.2'	76.0°	19
20	43°35.8'	-10.5'	69.0°	43°56.9'	-09.2'	69.9°	44°17.1'	-07.8'	70.8°	44°36.4'	-06.5'	71.7°	44°54.8'	-05.1'	72.7°	45°12.2'	-03.7'	73.6°	45°28.6'	-02.3'	74.6°	20
21	43°25.3'	-11.5'	67.6°	43°47.7'	-10.2'	68.5°	44°09.3'	-08.8'	69.4°	44°29.9'	-07.5'	70.3°	44°49.7'	-06.1'	71.2°	45°08.5'	-04.7'	72.2°	45°26.4'	-03.3'	73.2°	21
22	43°13.8'	-12.4'	66.3°	43°37.5'	-11.1'	67.1°	44°00.4'	-09.8'	68.0°	44°22.4'	-08.5'	68.9°	44°43.6'	-07.1'	69.8°	45°03.8'	-05.8'	70.8°	45°23.1'	-04.4'	71.7°	22
23	43°01.4'	-13.4'	64.9°	43°26.4'	-12.1'	65.8°	43°50.6'	-10.8'	66.6°	44°14.0'	-09.5'	67.5°	44°36.4'	-08.2'	68.4°	44°58.0'	-06.8'	69.4°	45°18.7'	-05.4'	70.3°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	7			8			9			10			11			12			13			

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°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	42°36.2'	+09.5'	96.5°	42°28.9'	+10.9'	97.4°	42°20.7'	+12.2'	98.3°	42°11.6'	+13.6'	99.2°	42°01.6'	+15.0'	100.1°	41°50.6'	+16.3'	101.0°	41°38.7'	+17.6'	101.8°	0
1	42°45.6'	+08.5'	95.1°	42°39.8'	+09.9'	96.1°	42°33.0'	+11.3'	97.0°	42°25.2'	+12.7'	97.9°	42°16.5'	+14.1'	98.8°	42°06.9'	+15.4'	99.7°	41°56.4'	+16.8'	100.6°	1
2	42°54.2'	+07.6'	93.8°	42°49.7'	+09.0'	94.7°	42°44.3'	+10.4'	95.6°	42°37.9'	+11.8'	96.6°	42°30.6'	+13.2'	97.5°	42°22.3'	+14.5'	98.4°	42°13.1'	+15.9'	99.3°	2
3	43°01.7'	+06.6'	92.4°	42°58.7'	+08.0'	93.4°	42°54.7'	+09.4'	94.3°	42°49.7'	+10.8'	95.2°	42°43.8'	+12.2'	96.1°	42°36.9'	+13.6'	97.1°	42°29.0'	+15.0'	98.0°	3
4	43°08.3'	+05.6'	91.1°	43°06.7'	+07.1'	92.0°	43°04.1'	+08.5'	92.9°	43°00.5'	+09.9'	93.9°	42°56.0'	+11.3'	94.8°	42°50.5'	+12.7'	95.7°	42°44.0'	+14.1'	96.7°	4
5	43°14.0'	+04.6'	89.7°	43°13.8'	+06.1'	90.6°	43°12.6'	+07.5'	91.6°	43°10.4'	+08.9'	92.5°	43°07.3'	+10.4'	93.5°	43°03.2'	+11.8'	94.4°	42°58.1'	+13.2'	95.3°	5
6	43°18.6'	+03.6'	88.3°	43°19.8'	+05.1'	89.3°	43°20.1'	+06.5'	90.2°	43°19.4'	+08.0'	91.2°	43°17.7'	+09.4'	92.1°	43°15.0'	+10.8'	93.1°	43°11.3'	+12.2'	94.0°	6
7	43°22.3'	+02.7'	87.0°	43°24.9'	+04.1'	87.9°	43°26.6'	+05.6'	88.9°	43°27.3'	+07.0'	89.8°	43°27.0'	+08.4'	90.8°	43°25.8'	+09.8'	91.7°	43°23.5'	+11.3'	92.6°	7
8	43°24.9'	+01.7'	85.6°	43°29.1'	+03.1'	86.5°	43°32.2'	+04.6'	87.5°	43°34.3'	+06.0'	88.4°	43°35.5'	+07.4'	89.4°	43°35.6'	+08.9'	90.3°	43°34.8'	+10.3'	91.3°	8
9	43°26.6'	+00.7'	84.2°	43°32.2'	+02.1'	85.2°	43°36.8'	+03.6'	86.1°	43°40.3'	+05.0'	87.1°	43°42.9'	+06.5'	88.0°	43°44.5'	+07.9'	89.0°	43°45.1'	+09.3'	89.9°	9
10	43°27.3'	-00.3'	82.8°	43°34.3'	+01.1'	83.8°	43°40.3'	+02.6'	84.7°	43°45.4'	+04.0'	85.7°	43°49.4'	+05.5'	86.6°	43°52.4'	+06.9'	87.6°	43°54.4'	+08.3'	88.6°	10
11	43°27.0'	-01.3'	81.5°	43°35.5'	+00.1'	82.4°	43°42.9'	+01.6'	83.3°	43°49.4'	+03.0'	84.3°	43°54.8'	+04.5'	85.3°	43°59.3'	+05.9'	86.2°	44°02.7'	+07.3'	87.2°	11
12	43°25.8'	-02.3'	80.1°	43°35.6'	-00.9'	81.0°	43°44.5'	+00.6'	82.0°	43°52.4'	+02.0'	82.9°	43°59.3'	+03.5'	83.9°	44°05.2'	+04.9'	84.8°	44°10.1'	+06.3'	85.8°	12
13	43°23.5'	-03.3'	78.7°	43°34.8'	-01.8'	79.6°	43°45.1'	-00.4'	80.6°	43°54.4'	+01.0'	81.5°	44°02.7'	+02.4'	82.5°	44°10.1'	+03.9'	83.4°	44°16.4'	+05.3'	84.4°	13
14	43°20.2'	-04.2'	77.3°	43°32.9'	-02.8'	78.3°	43°44.6'	-01.4'	79.2°	43°55.4'	00.0'	80.1°	44°05.2'	+01.4'	81.1°	44°14.0'	+02.9'	82.1°	44°21.8'	+04.3'	83.0°	14
15	43°16.0'	-05.2'	76.0°	43°30.1'	-03.8'	76.9°	43°43.2'	-02.4'	77.8°	43°55.4'	-01.0'	78.8°	44°06.6'	+00.4'	79.7°	44°16.9'	+01.9'	80.7°	44°26.1'	+03.3'	81.6°	15
16	43°10.8'	-06.2'	74.6°	43°26.2'	-04.8'	75.5°	43°40.8'	-03.4'	76.4°	43°54.4'	-02.0'	77.4°	44°07.0'	-00.6'	78.3°	44°18.7'	+00.8'	79.3°	44°29.4'	+02.3'	80.2°	16
17	43°04.6'	-07.2'	73.2°	43°21.4'	-05.8'	74.1°	43°37.4'	-04.4'	75.1°	43°52.4'	-03.0'	76.0°	44°06.4'	-01.6'	76.9°	44°19.5'	-00.2'	77.9°	44°31.7'	+01.2'	78.8°	17
18	42°57.4'	-08.1'	71.9°	43°15.6'	-06.8'	72.8°	43°32.9'	-05.4'	73.7°	43°49.3'	-04.0'	74.6°	44°04.8'	-02.6'	75.5°	44°19.3'	-01.2'	76.5°	44°32.9'	+00.2'	77.4°	18
19	42°49.3'	-09.1'	70.5°	43°08.8'	-07.7'	71.4°	43°27.5'	-06.4'	72.3°	43°45.3'	-05.0'	73.2°	44°02.2'	-03.6'	74.1°	44°18.1'	-02.2'	75.1°	44°33.1'	-00.8'	76.0°	19
20	42°40.2'	-10.0'	69.2°	43°01.1'	-08.7'	70.0°	43°21.1'	-07.4'	70.9°	43°40.3'	-06.0'	71.8°	43°58.5'	-04.6'	72.7°	44°15.9'	-03.3'	73.7°	44°32.3'	-01.9'	74.6°	20
21	42°30.2'	-10.9'	67.8°	42°52.4'	-09.7'	68.7°	43°13.8'	-08.3'	69.6°	43°34.3'	-07.0'	70.5°	43°53.9'	-05.6'	71.4°	44°12.6'	-04.3'	72.3°	44°30.4'	-02.9'	73.2°	21
22																						

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

48° 312° LHA

Latitude SAME as Declination

48° 312° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	41°37.0'	+09.3'	96.3°	41°30.0'	+10.7'	97.1°	41°22.1'	+12.1'	98.0°	41°13.3'	+13.4'	98.9°	41°03.5'	+14.8'	99.7°	40°52.9'	+16.1'	100.6°	40°41.5'	+17.4'	101.5°	0
1	41°46.3'	+08.4'	94.9°	41°40.7'	+09.8'	95.8°	41°34.1'	+11.2'	96.7°	41°26.7'	+12.5'	97.6°	41°18.3'	+13.9'	98.5°	41°09.0'	+15.2'	99.3°	40°58.9'	+16.6'	100.2°	1
2	41°54.7'	+07.5'	93.6°	41°50.5'	+08.9'	94.5°	41°45.3'	+10.3'	95.4°	41°39.2'	+11.6'	96.3°	41°32.2'	+13.0'	97.2°	41°24.2'	+14.4'	98.0°	41°15.4'	+15.7'	98.9°	2
3	42°02.2'	+06.6'	92.3°	41°59.4'	+08.0'	93.2°	41°55.6'	+09.3'	94.1°	41°50.8'	+10.7'	95.0°	41°45.2'	+12.1'	95.9°	41°38.6'	+13.5'	96.7°	41°31.1'	+14.8'	97.6°	3
4	42°08.8'	+05.6'	90.9°	42°07.3'	+07.0'	91.8°	42°04.9'	+08.4'	92.7°	42°01.6'	+09.8'	93.6°	41°57.3'	+11.2'	94.5°	41°52.1'	+12.6'	95.4°	41°45.9'	+14.0'	96.3°	4
5	42°14.4'	+04.7'	89.6°	42°14.4'	+06.1'	90.5°	42°13.4'	+07.5'	91.4°	42°11.4'	+08.9'	92.3°	42°08.5'	+10.3'	93.2°	42°04.7'	+11.7'	94.1°	41°59.9'	+13.1'	95.0°	5
6	42°19.1'	+03.7'	88.2°	42°20.4'	+05.1'	89.2°	42°20.8'	+06.6'	90.1°	42°20.3'	+08.0'	91.0°	42°18.8'	+09.4'	91.9°	42°16.3'	+10.8'	92.8°	42°12.9'	+12.1'	93.7°	6
7	42°22.8'	+02.8'	86.9°	42°25.6'	+04.2'	87.8°	42°27.4'	+05.6'	88.7°	42°28.3'	+07.0'	89.6°	42°28.2'	+08.4'	90.6°	42°27.1'	+09.8'	91.5°	42°25.1'	+11.2'	92.4°	7
8	42°25.6'	+01.8'	85.5°	42°29.8'	+03.2'	86.5°	42°33.0'	+04.6'	87.4°	42°35.3'	+06.1'	88.3°	42°36.6'	+07.5'	89.2°	42°36.9'	+08.9'	90.1°	42°36.3'	+10.3'	91.0°	8
9	42°27.4'	+00.9'	84.2°	42°33.0'	+02.3'	85.1°	42°37.6'	+03.7'	86.0°	42°41.3'	+05.1'	86.9°	42°44.1'	+06.5'	87.9°	42°45.8'	+07.9'	88.8°	42°46.6'	+09.4'	89.7°	9
10	42°28.3'	-00.1'	82.8°	42°35.3'	+01.3'	83.7°	42°41.3'	+02.7'	84.7°	42°46.4'	+04.1'	85.6°	42°50.6'	+05.6'	86.5°	42°53.8'	+07.0'	87.4°	42°56.0'	+08.4'	88.4°	10
11	42°28.2'	-01.1'	81.5°	42°36.6'	+00.3'	82.4°	42°44.1'	+01.8'	83.3°	42°50.6'	+03.2'	84.2°	42°56.1'	+04.6'	85.1°	43°00.7'	+06.0'	86.1°	43°04.4'	+07.4'	87.0°	11
12	42°27.1'	-02.0'	80.1°	42°36.9'	-00.6'	81.0°	42°45.8'	+00.8'	81.9°	42°53.8'	+02.2'	82.9°	43°00.7'	+03.6'	83.8°	43°06.8'	+05.0'	84.7°	43°11.8'	+06.5'	85.6°	12
13	42°25.1'	-03.0'	78.8°	42°36.3'	-01.6'	79.7°	42°46.6'	-00.2'	80.6°	42°56.0'	+01.2'	81.5°	43°04.4'	+02.6'	82.4°	43°11.8'	+04.1'	83.3°	43°18.3'	+05.5'	84.3°	13
14	42°22.1'	-03.9'	77.4°	42°34.7'	-02.5'	78.3°	42°46.4'	-01.1'	79.2°	42°57.2'	+00.3'	80.1°	43°07.0'	+01.7'	81.0°	43°15.9'	+03.1'	82.0°	43°23.8'	+04.5'	82.9°	14
15	42°18.2'	-04.9'	76.1°	42°32.2'	-03.5'	77.0°	42°45.3'	-02.1'	77.9°	42°57.4'	-00.7'	78.8°	43°08.7'	+00.7'	79.7°	43°18.9'	+02.1'	80.6°	43°28.3'	+03.5'	81.5°	15
16	42°13.3'	-05.8'	74.7°	42°28.7'	-04.5'	75.6°	42°43.2'	-03.1'	76.5°	42°56.7'	-01.7'	77.4°	43°09.4'	-00.3'	78.3°	43°21.0'	+01.1'	79.2°	43°31.8'	+02.5'	80.2°	16
17	42°07.5'	-06.7'	73.4°	42°24.2'	-05.4'	74.2°	42°40.1'	-04.0'	75.1°	42°55.0'	-02.7'	76.0°	43°09.1'	-01.3'	76.9°	43°22.2'	+00.1'	77.9°	43°34.3'	+01.5'	78.8°	17
18	42°00.8'	-07.7'	72.0°	42°18.8'	-06.3'	72.9°	42°36.1'	-05.0'	73.8°	42°52.4'	-03.6'	74.7°	43°07.8'	-02.3'	75.6°	43°22.3'	-00.9'	76.5°	43°35.8'	+00.5'	77.4°	18
19	41°53.1'	-08.6'	70.7°	42°12.5'	-07.3'	71.6°	42°31.1'	-05.9'	72.4°	42°48.7'	-04.6'	73.3°	43°05.5'	-03.2'	74.2°	43°21.4'	-01.9'	75.1°	43°36.4'	-00.5'	76.0°	19
20	41°44.5'	-09.5'	69.4°	42°05.2'	-08.2'	70.2°	42°25.1'	-06.9'	71.1°	42°44.1'	-05.6'	71.9°	43°02.3'	-04.2'	72.8°	43°19.6'	-02.8'	73.7°	43°35.9'	-01.5'	74.6°	20
21	41°35.0'	-10.4'	68.1°	41°57.0'	-09.1'	68.9°	42°18.2'	-07.8'	69.7°	42°38.6'	-06.5'	70.6°	42°58.1'	-05.2'	71.5°	43°16.7'	-03.8'	72.4°	43°34.4'	-02.5'	73.3°	21
22	41°24.6'	-11.3'	66.7°	41°47.9'	-10.0'	67.6°	42°10.4'	-08.8'	68.4°	42°32.1'	-07.5'	69.2°	42°52.9'	-06.1'	70.1°	43°12.9'	-04.8'	71.0°	43°32.0'	-03.4'	71.9°	22
23	41°13.3'	-12.2'	65.4°	41°37.8'	-10.9'	66.2°	42°01.6'	-09.7'	67.1°	42°24.6'	-08.4'	67.9°	42°46.8'	-07.1'	68.7°	43°08.1'	-05.8'	69.6°	43°28.5'	-04.4'	70.5°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	7			8			9			10			11			12			13			

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°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	40°37.8'	+09.2'	96.0°	40°31.0'	+10.6'	96.9°	40°23.4'	+11.9'	97.7°	40°14.9'	+13.2'	98.6°	40°05.5'	+14.5'	99.4°	39°55.2'	+15.9'	100.2°	39°44.1'	+17.2'	101.1°	0
1	40°47.0'	+08.3'	94.7°	40°41.6'	+09.7'	95.6°	40°35.3'	+11.0'	96.5°	40°28.1'	+12.4'	97.3°	40°20.0'	+13.7'	98.1°	40°11.1'	+15.0'	99.0°	40°01.3'	+16.3'	99.8°	1
2	40°55.3'	+07.4'	93.4°	40°51.2'	+08.8'	94.3°	40°46.3'	+10.2'	95.2°	40°40.5'	+11.5'	96.0°	40°33.7'	+12.9'	96.9°	40°26.1'	+14.2'	97.7°	40°17.6'	+15.5'	98.6°	2
3	41°02.7'	+06.5'	92.1°	41°00.0'	+07.9'	93.0°	40°56.5'	+09.3'	93.9°	40°52.0'	+10.6'	94.7°	40°46.6'	+12.0'	95.6°	40°40.3'	+13.3'	96.4°	40°33.1'	+14.7'	97.3°	3
4	41°09.2'	+05.6'	90.8°	41°07.9'	+07.0'	91.7°	41°05.7'	+08.4'	92.5°	41°02.6'	+09.8'	93.4°	40°58.6'	+11.1'	94.3°	40°53.6'	+12.5'	95.1°	40°47.8'	+13.8'	96.0°	4
5	41°14.8'	+04.7'	89.5°	41°14.9'	+06.1'	90.4°	41°14.1'	+07.5'	91.2°	41°12.4'	+08.9'	92.1°	41°09.7'	+10.2'	93.0°	41°06.1'	+11.6'	93.9°	41°01.6'	+13.0'	94.7°	5
6	41°19.6'	+03.8'	88.2°	41°21.0'	+05.2'	89.0°	41°21.6'	+06.6'	89.9°	41°21.2'	+08.0'	90.8°	41°19.9'	+09.3'	91.7°	41°17.7'	+10.7'	92.5°	41°14.6'	+12.1'	93.4°	6
7	41°23.3'	+02.9'	86.8°	41°26.2'	+04.3'	87.7°	41°28.1'	+05.7'	88.6°	41°29.2'	+07.0'	89.5°	41°29.3'	+08.4'	90.4°	41°28.4'	+09.8'	91.2°	41°26.7'	+11.2'	92.1°	7
8	41°26.2'	+01.9'	85.5°	41°30.5'	+03.3'	86.4°	41°33.8'	+04.7'	87.3°	41°36.2'	+06.1'	88.1°	41°37.7'	+07.5'	89.0°	41°38.2'	+08.9'	89.9°	41°37.9'	+10.3'	90.8°	8
9	41°28.1'	+01.0'	84.2°	41°33.8'	+02.4'	85.0°	41°38.5'	+03.8'	85.9°	41°42.3'	+05.2'	86.8°	41°45.2'	+06.6'	87.7°	41°47.1'	+08.0'	88.6°	41°48.1'	+09.4'	89.5°	9
10	41°29.2'	+00.1'	82.8°	41°36.2'	+01.5'	83.7°	41°42.3'	+02.9'	84.6°	41°47.5'	+04.3'	85.5°	41°51.8'	+05.7'	86.4°	41°55.1'	+07.1'	87.3°	41°57.5'	+08.5'	88.2°	10
11	41°29.3'	-00.8'	81.5°	41°37.7'	+00.6'	82.4°	41°45.2'	+01.9'	83.2°	41°51.8'	+03.3'	84.1°	41°57.5'	+04.7'	85.0°	42°02.2'	+06.1'	85.9°	42°06.0'	+07.5'	86.8°	11
12	41°28.4'	-01.8'	80.2°	41°38.2'	-00.4'	81.0°	41°47.1'	+01.0'	81.9°	41°55.1'	+02.4'	82.8°	42°02.2'	+03.8'	83.7°	42°08.3'	+05.2'	84.6°	42°13.5'	+06.6'	85.5°	12
13	41°26.7'	-02.7'	78.8°	41°37.9'	-01.3'	79.7°	41°48.1'	+00.1'	80.6°	41°57.5'	+01.5'	81.5°	42°06.0'	+02.8'	82.3°	42°13.5'	+04.2'	83.2°	42°20.1'	+05.6'	84.1°	13
14	41°24.0'	-03.6'	77.5°	41°36.5'	-02.2'	78.4°	41°48.2'	-00.9'	79.2°	41°59.0'	+00.5'	80.1°	42°08.8'	+01.9'	81.0°	42°17.8'	+03.3'	81.9°	42°25.7'	+04.7'	82.8°	14
15	41°20.4'	-04.5'	76.2°	41°34.3'	-03.2'	77.0°	41°47.3'	-01.8'	77.9°	41°59.5'	-00.4'	78.8°	42°10.7'	+01.0'	79.6°	42°21.0'	+02.3'	80.5°	42°30.4'	+03.7'	81.4°	15
16	41°15.9'	-05.4'	74.8°	41°31.1'	-04.1'	75.7°	41°45.5'	-02.7'	76.5°	41°59.1'	-01.4'	77.4°	42°11.7'	+00.0'	78.3°	42°23.4'	+01.4'	79.2°	42°34.2'	+02.8'	80.1°	16
17	41°10.4'	-06.3'	73.5°	41°27.0'	-05.0'	74.3°	41°42.8'	-03.7'	75.2°	41°57.7'	-02.3'	76.1°	42°11.7'	-00.9'	77.0°	42°24.8'	+00.4'	77.8°	42°37.0'	+01.8'	78.7°	17
18	41°04.1'	-07.2'	72.2°	41°22.0'	-05.9'	73.0°	41°39.1'	-04.6'	73.9°	41°55.4'	-03.3'	74.7°	42°10.7'	-01.9'	75.6°	42°25.2'	-00.5'	76.5°	42°38.8'	+00.9'	77.4°	18
19	40°56.9'	-08.1'	70.9°	41°16.1'	-06.8'	71.7°	41°34.5'	-05.5'	72.5°	41°52.1'	-04.2'	73.4°	42°08.8'	-02.8'	74.3°	42°24.7'	-01.5'	75.1°	42°39.6'	-00.1'	76.0°	19
20	40°48.7'	-09.0'	69.6°	41°09.3'	-07.7'	70.4°	41°29.0'	-06.4'	71.2°	41°47.9'	-05.1'	72.0°	42°06.0'	-03.8'	72.9°	42°23.2'	-02.4'	73.8°	42°39.5'	-01.1'	74.7°	20
21	40°39.7'	-09.9'	68.3°	41°01.5'	-08.6'	69.1°	41°22.6'	-07.3'	69.9°	41°42.8'	-06.0'	70.7°	42°02.2'	-04.7'	71.6°	42°20.8'	-03.4'	72.4°	42°38.5'	-02.0'	73.3°	21
22	40°																					

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

50° 310° LHA

Latitude SAME as Declination

50° 310° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	39°38.6'	+09.1'	95.8°	39°32.0'	+10.4'	96.7°	39°24.6'	+11.7'	97.5°	39°16.4'	+13.1'	98.3°	39°07.3'	+14.4'	99.1°	38°57.4'	+15.6'	99.9°	38°46.7'	+16.9'	100.7°	0
1	39°47.6'	+08.2'	94.6°	39°42.4'	+09.6'	95.4°	39°36.4'	+10.9'	96.2°	39°29.5'	+12.2'	97.0°	39°21.7'	+13.5'	97.8°	39°13.1'	+14.8'	98.7°	39°03.6'	+16.1'	99.5°	1
2	39°55.8'	+07.4'	93.3°	39°52.0'	+08.7'	94.1°	39°47.3'	+10.1'	94.9°	39°41.7'	+11.4'	95.8°	39°35.2'	+12.7'	96.6°	39°27.9'	+14.0'	97.4°	39°19.8'	+15.3'	98.2°	2
3	40°03.2'	+06.5'	92.0°	40°00.7'	+07.8'	92.8°	39°57.3'	+09.2'	93.6°	39°53.1'	+10.5'	94.5°	39°48.0'	+11.9'	95.3°	39°42.0'	+13.2'	96.1°	39°35.1'	+14.5'	97.0°	3
4	40°09.7'	+05.6'	90.7°	40°08.5'	+07.0'	91.5°	40°06.5'	+08.3'	92.4°	40°03.6'	+09.7'	93.2°	39°59.8'	+11.0'	94.0°	39°55.2'	+12.4'	94.9°	39°49.7'	+13.7'	95.7°	4
5	40°15.3'	+04.7'	89.4°	40°15.5'	+06.1'	90.2°	40°14.9'	+07.5'	91.1°	40°13.3'	+08.8'	91.9°	40°10.9'	+10.2'	92.7°	40°07.6'	+11.5'	93.6°	40°03.4'	+12.9'	94.4°	5
6	40°20.0'	+03.8'	88.1°	40°21.6'	+05.2'	88.9°	40°22.3'	+06.6'	89.8°	40°22.1'	+08.0'	90.6°	40°21.1'	+09.3'	91.5°	40°19.1'	+10.7'	92.3°	40°16.2'	+12.0'	93.2°	6
7	40°23.9'	+03.0'	86.7°	40°26.8'	+04.3'	87.6°	40°28.9'	+05.7'	88.5°	40°30.1'	+07.1'	89.3°	40°30.4'	+08.4'	90.2°	40°29.7'	+09.8'	91.0°	40°28.2'	+11.2'	91.9°	7
8	40°26.8'	+02.1'	85.4°	40°31.2'	+03.4'	86.3°	40°34.6'	+04.8'	87.1°	40°37.2'	+06.2'	88.0°	40°38.8'	+07.6'	88.9°	40°39.6'	+08.9'	89.7°	40°39.4'	+10.3'	90.6°	8
9	40°28.9'	+01.2'	84.1°	40°34.6'	+02.5'	85.0°	40°39.4'	+03.9'	85.8°	40°43.3'	+05.3'	86.7°	40°46.4'	+06.7'	87.5°	40°48.5'	+08.0'	88.4°	40°49.7'	+09.4'	89.3°	9
10	40°30.1'	+00.3'	82.8°	40°37.2'	+01.6'	83.7°	40°43.3'	+03.0'	84.5°	40°48.6'	+04.4'	85.4°	40°53.0'	+05.8'	86.2°	40°56.5'	+07.1'	87.1°	40°59.1'	+08.5'	88.0°	10
11	40°30.4'	-00.6'	81.5°	40°38.8'	+00.7'	82.3°	40°46.4'	+02.1'	83.2°	40°53.0'	+03.5'	84.1°	40°58.8'	+04.9'	84.9°	41°03.7'	+06.2'	85.8°	41°07.6'	+07.6'	86.7°	11
12	40°29.7'	-01.5'	80.2°	40°39.6'	-00.2'	81.0°	40°48.5'	+01.2'	81.9°	40°56.5'	+02.6'	82.7°	41°03.7'	+04.0'	83.6°	41°09.9'	+05.3'	84.5°	41°15.2'	+06.7'	85.3°	12
13	40°28.2'	-02.4'	78.9°	40°39.4'	-01.0'	79.7°	40°49.7'	+00.3'	80.6°	40°59.1'	+01.7'	81.4°	41°07.6'	+03.0'	82.3°	41°15.2'	+04.4'	83.1°	41°21.9'	+05.8'	84.0°	13
14	40°25.8'	-03.3'	77.5°	40°38.4'	-01.9'	78.4°	40°50.0'	-00.6'	79.2°	41°00.8'	+00.8'	80.1°	41°10.7'	+02.1'	80.9°	41°19.7'	+03.5'	81.8°	41°27.7'	+04.9'	82.7°	14
15	40°22.6'	-04.2'	76.2°	40°36.4'	-02.8'	77.1°	40°49.4'	-01.5'	77.9°	41°01.5'	-00.1'	78.8°	41°12.8'	+01.2'	79.6°	41°23.2'	+02.6'	80.5°	41°32.6'	+04.0'	81.4°	15
16	40°18.4'	-05.1'	74.9°	40°33.6'	-03.7'	75.8°	40°47.9'	-02.4'	76.6°	41°01.4'	-01.1'	77.4°	41°14.0'	+00.3'	78.3°	41°25.7'	+01.7'	79.1°	41°36.6'	+03.0'	80.0°	16
17	40°13.3'	-05.9'	73.6°	40°29.8'	-04.6'	74.4°	40°45.5'	-03.3'	75.3°	41°00.3'	-02.0'	76.1°	41°14.3'	-00.6'	77.0°	41°27.4'	+00.7'	77.8°	41°39.6'	+02.1'	78.7°	17
18	40°07.4'	-06.8'	72.3°	40°25.2'	-05.5'	73.1°	40°42.2'	-04.2'	74.0°	40°58.4'	-02.9'	74.8°	41°13.7'	-01.5'	75.6°	41°28.1'	-00.2'	76.5°	41°41.7'	+01.2'	77.3°	18
19	40°00.6'	-07.7'	71.0°	40°19.7'	-06.4'	71.8°	40°38.0'	-05.1'	72.6°	40°55.5'	-03.8'	73.5°	41°12.2'	-02.5'	74.3°	41°28.0'	-01.1'	75.1°	41°42.9'	+00.2'	76.0°	19
20	39°52.9'	-08.5'	69.7°	40°13.3'	-07.3'	70.5°	40°32.9'	-06.0'	71.3°	40°51.7'	-04.7'	72.1°	41°09.7'	-03.4'	73.0°	41°26.8'	-02.0'	73.8°	41°43.1'	-00.7'	74.7°	20
21	39°44.4'	-09.4'	68.4°	40°06.0'	-08.1'	69.2°	40°26.9'	-06.9'	70.0°	40°47.0'	-05.6'	70.8°	41°06.3'	-04.3'	71.6°	41°24.8'	-03.0'	72.5°	41°42.5'	-01.6'	73.3°	21
22	39°35.0'	-10.2'	67.2°	39°57.9'	-09.0'	67.9°	40°20.1'	-07.7'	68.7°	40°41.5'	-06.5'	69.5°	41°02.1'	-05.2'	70.3°	41°21.9'	-03.9'	71.1°	41°40.8'	-02.6'	72.0°	22
23	39°24.7'	-11.1'	65.9°	39°48.9'	-09.8'	66.6°	40°12.3'	-08.6'	67.4°	40°35.0'	-07.4'	68.2°	40°56.9'	-06.1'	69.0°	41°18.0'	-04.8'	69.8°	41°38.3'	-03.5'	70.7°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	7			8			9			10			11			12			13			

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°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	38°39.3'	+09.0'	95.6°	38°33.0'	+10.3'	96.4°	38°25.9'	+11.6'	97.2°	38°17.9'	+12.9'	98.0°	38°09.2'	+14.2'	98.8°	37°59.6'	+15.4'	99.6°	37°49.2'	+16.7'	100.3°	0
1	38°48.3'	+08.1'	94.4°	38°43.3'	+09.5'	95.2°	38°37.4'	+10.8'	96.0°	38°30.8'	+12.1'	96.8°	38°23.3'	+13.4'	97.5°	38°15.0'	+14.7'	98.3°	38°05.9'	+16.0'	99.1°	1
2	38°56.4'	+07.3'	93.1°	38°52.7'	+08.6'	93.9°	38°48.2'	+10.0'	94.7°	38°42.9'	+11.3'	95.5°	38°36.7'	+12.6'	96.3°	38°29.7'	+13.9'	97.1°	38°21.9'	+15.2'	97.9°	2
3	39°03.7'	+06.5'	91.8°	39°01.4'	+07.8'	92.6°	38°58.2'	+09.1'	93.4°	38°54.2'	+10.5'	94.2°	38°49.3'	+11.8'	95.0°	38°43.6'	+13.1'	95.8°	38°37.1'	+14.4'	96.6°	3
4	39°10.1'	+05.6'	90.5°	39°09.1'	+07.0'	91.4°	39°07.3'	+08.3'	92.2°	39°04.6'	+09.6'	93.0°	39°01.1'	+11.0'	93.8°	38°56.7'	+12.3'	94.6°	38°51.5'	+13.6'	95.4°	4
5	39°15.7'	+04.8'	89.3°	39°16.1'	+06.1'	90.1°	39°15.6'	+07.5'	90.9°	39°14.2'	+08.8'	91.7°	39°12.0'	+10.1'	92.5°	39°09.0'	+11.5'	93.3°	39°05.1'	+12.8'	94.1°	5
6	39°20.5'	+03.9'	88.0°	39°22.2'	+05.3'	88.8°	39°23.1'	+06.6'	89.6°	39°23.0'	+08.0'	90.4°	39°22.2'	+09.3'	91.2°	39°20.4'	+10.6'	92.1°	39°17.8'	+12.0'	92.9°	6
7	39°24.4'	+03.1'	86.7°	39°27.5'	+04.4'	87.5°	39°29.7'	+05.8'	88.3°	39°31.0'	+07.1'	89.1°	39°31.5'	+08.5'	90.0°	39°31.1'	+09.8'	90.8°	39°29.8'	+11.1'	91.6°	7
8	39°27.5'	+02.2'	85.4°	39°31.9'	+03.5'	86.2°	39°35.4'	+04.9'	87.0°	39°38.1'	+06.2'	87.9°	39°39.9'	+07.6'	88.7°	39°40.9'	+08.9'	89.5°	39°40.9'	+10.3'	90.3°	8
9	39°29.7'	+01.3'	84.1°	39°35.4'	+02.7'	84.9°	39°40.3'	+04.0'	85.7°	39°44.4'	+05.4'	86.6°	39°47.5'	+06.7'	87.4°	39°49.8'	+08.1'	88.2°	39°51.2'	+09.4'	89.1°	9
10	39°31.0'	+00.5'	82.8°	39°38.1'	+01.8'	83.6°	39°44.4'	+03.2'	84.4°	39°49.7'	+04.5'	85.3°	39°54.3'	+05.9'	86.1°	39°57.9'	+07.2'	86.9°	40°00.7'	+08.6'	87.8°	10
11	39°31.5'	-00.4'	81.5°	39°39.9'	+00.9'	82.3°	39°47.5'	+02.3'	83.1°	39°54.3'	+03.6'	84.0°	40°00.1'	+05.0'	84.8°	40°05.1'	+06.4'	85.6°	40°09.3'	+07.7'	86.5°	11
12	39°31.1'	-01.3'	80.2°	39°40.9'	+00.1'	81.0°	39°49.8'	+01.4'	81.8°	39°57.9'	+02.8'	82.7°	40°05.1'	+04.1'	83.5°	40°11.5'	+05.5'	84.3°	40°17.0'	+06.8'	85.2°	12
13	39°29.8'	-02.1'	78.9°	39°40.9'	-00.8'	79.7°	39°51.2'	+00.5'	80.5°	40°00.7'	+01.9'	81.4°	40°09.3'	+03.2'	82.2°	40°17.0'	+04.6'	83.0°	40°23.8'	+06.0'	83.9°	13
14	39°27.7'	-03.0'	77.6°	39°40.1'	-01.7'	78.4°	39°51.8'	-00.3'	79.2°	40°02.6'	+01.0'	80.1°	40°12.5'	+02.4'	80.9°	40°21.6'	+03.7'	81.7°	40°29.8'	+05.1'	82.6°	14
15	39°24.7'	-03.8'	76.3°	39°38.5'	-02.5'	77.1°	39°51.5'	-01.2'	77.9°	40°03.6'	+00.1'	78.7°	40°14.9'	+01.5'	79.6°	40°25.3'	+02.8'	80.4°	40°34.8'	+04.2'	81.3°	15
16	39°20.9'	-04.7'	75.0°	39°36.0'	-03.4'	75.8°	39°50.3'	-02.1'	76.6°	40°03.7'	-00.7'	77.4°	40°16.3'	+00.6'	78.3°	40°28.1'	+01.9'	79.1°	40°39.0'	+03.3'	79.9°	16
17	39°16.2'	-05.5'	73.7°	39°32.6'	-04.3'	74.5°	39°48.2'	-02.9'	75.3°	40°03.0'	-01.6'	76.1°	40°16.9'	-00.3'	77.0°	40°30.0'	+01.0'	77.8°	40°42.3'	+02.4'	78.6°	17
18	39°10.6'	-06.4'	72.4°	39°28.3'	-05.1'	73.2°	39°45.2'	-03.8'	74.0°	40°01.3'	-02.5'	74.8°	40°16.6'	-01.2'	75.6°	40°31.1'	+00.1'	76.5°	40°44.7'	+01.5'	77.3°	18
19	39°04.2'	-07.2'	71.2°	39°23.2'	-06.0'	71.9°	39°41.4'	-04.7'	72.7°	39°58.8'	-03.4'	73.5°	40°15.4'	-02.1'	74.3°	40°31.2'	-00.7'	75.2°	40°46.2'	+00.6'	76.0°	19
20	38°57.0'	-08.1'	69.9°	39°17.3'	-06.8'	70.7°	39°36.7'	-05.5'	71.4°	39°55.5'	-04.3'	72.2°	40°13.4'	-03.0'	73.0°	40°30.5'	-01.6'	73.8°	40°46.8'	-00.3'	74.7°	20
21	38°48.9'	-08.9'	68.6°	39°10.4'	-07.6'	69.4°	39°31.2'	-06.4'	70.1°	39°51.2'	-05.1'	70.9°	40°10.4'	-03.8'	71.7°	40°28.8'	-02.5'	72.5°	40°46.4'	-01.2'	73.3°	21
22	38°40.																					

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

52° 308° LHA

Latitude SAME as Declination

52° 308° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	37°40.0'	+08.8'	95.4°	37°33.9'	+10.1'	96.2°	37°27.1'	+11.4'	97.0°	37°19.4'	+12.7'	97.7°	37°10.9'	+14.0'	98.5°	37°01.7'	+15.3'	99.2°	36°51.7'	+16.5'	100.0°	0
1	37°48.9'	+08.0'	94.2°	37°44.1'	+09.4'	95.0°	37°38.5'	+10.7'	95.7°	37°32.1'	+11.9'	96.5°	37°24.9'	+13.2'	97.3°	37°16.9'	+14.5'	98.0°	37°08.2'	+15.8'	98.8°	1
2	37°56.9'	+07.2'	92.9°	37°53.4'	+08.6'	93.7°	37°49.1'	+09.9'	94.5°	37°44.1'	+11.2'	95.3°	37°38.2'	+12.5'	96.0°	37°31.5'	+13.7'	96.8°	37°24.0'	+15.0'	97.6°	2
3	38°04.2'	+06.4'	91.7°	38°02.0'	+07.8'	92.5°	37°59.0'	+09.1'	93.2°	37°55.2'	+10.4'	94.0°	37°50.6'	+11.7'	94.8°	37°45.2'	+13.0'	95.6°	37°39.0'	+14.3'	96.3°	3
4	38°10.6'	+05.6'	90.4°	38°09.7'	+06.9'	91.2°	38°08.1'	+08.3'	92.0°	38°05.6'	+09.6'	92.8°	38°02.3'	+10.9'	93.5°	37°58.2'	+12.2'	94.3°	37°53.2'	+13.5'	95.1°	4
5	38°16.2'	+04.8'	89.1°	38°16.7'	+06.1'	89.9°	38°16.3'	+07.5'	90.7°	38°15.2'	+08.8'	91.5°	38°13.2'	+10.1'	92.3°	38°10.4'	+11.4'	93.1°	38°06.7'	+12.7'	93.9°	5
6	38°21.0'	+04.0'	87.9°	38°22.8'	+05.3'	88.7°	38°23.8'	+06.6'	89.5°	38°24.0'	+08.0'	90.2°	38°23.3'	+09.3'	91.0°	38°21.8'	+10.6'	91.8°	38°19.4'	+11.9'	92.6°	6
7	38°25.0'	+03.1'	86.6°	38°28.1'	+04.5'	87.4°	38°30.4'	+05.8'	88.2°	38°31.9'	+07.1'	89.0°	38°32.6'	+08.5'	89.8°	38°32.4'	+09.8'	90.6°	38°31.4'	+11.1'	91.4°	7
8	38°28.1'	+02.3'	85.3°	38°32.6'	+03.6'	86.1°	38°36.2'	+05.0'	86.9°	38°39.1'	+06.3'	87.7°	38°41.0'	+07.6'	88.5°	38°42.2'	+09.0'	89.3°	38°42.5'	+10.3'	90.1°	8
9	38°30.4'	+01.5'	84.0°	38°36.2'	+02.8'	84.8°	38°41.2'	+04.1'	85.6°	38°45.4'	+05.5'	86.4°	38°48.7'	+06.8'	87.2°	38°51.2'	+08.1'	88.0°	38°52.8'	+09.5'	88.8°	9
10	38°31.9'	+00.6'	82.8°	38°39.1'	+02.0'	83.6°	38°45.4'	+03.3'	84.4°	38°50.9'	+04.6'	85.2°	38°55.5'	+06.0'	86.0°	38°59.3'	+07.3'	86.8°	39°02.3'	+08.6'	87.6°	10
11	38°32.6'	-00.2'	81.5°	38°41.0'	+01.1'	82.3°	38°48.7'	+02.5'	83.1°	38°55.5'	+03.8'	83.9°	39°01.5'	+05.1'	84.7°	39°06.6'	+06.5'	85.5°	39°10.9'	+07.8'	86.3°	11
12	38°32.4'	-01.0'	80.2°	38°42.2'	+00.3'	81.0°	38°51.2'	+01.6'	81.8°	38°59.3'	+03.0'	82.6°	39°06.6'	+04.3'	83.4°	39°13.1'	+05.6'	84.2°	39°18.7'	+07.0'	85.0°	12
13	38°31.4'	-01.9'	78.9°	38°42.5'	-00.5'	79.7°	38°52.8'	+00.8'	80.5°	39°02.3'	+02.1'	81.3°	39°10.9'	+03.4'	82.1°	39°18.7'	+04.8'	82.9°	39°25.7'	+06.1'	83.7°	13
14	38°29.5'	-02.7'	77.7°	38°41.9'	-01.4'	78.4°	38°53.6'	-00.1'	79.2°	39°04.4'	+01.3'	80.0°	39°14.4'	+02.6'	80.8°	39°23.5'	+03.9'	81.6°	39°31.8'	+05.3'	82.4°	14
15	38°26.8'	-03.5'	76.4°	38°40.6'	-02.2'	77.2°	38°53.5'	-00.9'	77.9°	39°05.6'	+00.4'	78.7°	39°16.9'	+01.7'	79.5°	39°27.4'	+03.1'	80.3°	39°37.1'	+04.4'	81.2°	15
16	38°23.3'	-04.3'	75.1°	38°38.3'	-03.0'	75.9°	38°52.6'	-01.8'	76.7°	39°06.0'	-00.4'	77.4°	39°18.7'	+00.9'	78.2°	39°30.5'	+02.2'	79.0°	39°41.5'	+03.5'	79.9°	16
17	38°19.0'	-05.2'	73.8°	38°35.3'	-03.9'	74.6°	38°50.8'	-02.6'	75.4°	39°05.6'	-01.3'	76.2°	39°19.6'	+00.0'	77.0°	39°32.7'	+01.3'	77.8°	39°45.0'	+02.7'	78.6°	17
18	38°13.8'	-06.0'	72.6°	38°31.4'	-04.7'	73.3°	38°48.3'	-03.4'	74.1°	39°04.3'	-02.1'	74.9°	39°19.6'	-00.8'	75.7°	39°34.0'	+00.5'	76.5°	39°47.7'	+01.8'	77.3°	18
19	38°07.8'	-06.8'	71.3°	38°26.7'	-05.5'	72.0°	38°44.8'	-04.3'	72.8°	39°02.2'	-03.0'	73.6°	39°18.7'	-01.7'	74.4°	39°34.5'	-00.4'	75.2°	39°49.5'	+00.9'	76.0°	19
20	38°01.0'	-07.6'	70.0°	38°21.2'	-06.4'	70.8°	38°40.6'	-05.1'	71.5°	38°59.2'	-03.8'	72.3°	39°17.0'	-02.6'	73.1°	39°34.1'	-01.3'	73.9°	39°50.4'	+00.0'	74.7°	20
21	37°53.5'	-08.4'	68.8°	38°14.8'	-07.2'	69.5°	38°35.4'	-05.9'	70.3°	38°55.3'	-04.7'	71.0°	39°14.5'	-03.4'	71.8°	39°32.9'	-02.1'	72.6°	39°50.4'	-00.8'	73.4°	21
22	37°45.1'	-09.2'	67.5°	38°07.6'	-08.0'	68.2°	38°29.5'	-06.8'	69.0°	38°50.7'	-05.5'	69.7°	39°11.1'	-04.3'	70.5°	39°30.7'	-03.0'	71.3°	39°49.6'	-01.7'	72.1°	22
23	37°35.9'	-10.0'	66.3°	37°59.7'	-08.8'	67.0°	38°22.8'	-07.6'	67.7°	38°45.2'	-06.3'	68.5°	39°06.8'	-05.1'	69.2°	39°27.7'	-03.8'	70.0°	39°47.9'	-02.6'	70.8°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	7			8			9			10			11			12			13			

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°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	36°40.7'	+08.7'	95.2°	36°34.9'	+10.0'	96.0°	36°28.2'	+11.3'	96.7°	36°20.8'	+12.6'	97.5°	36°12.6'	+13.8'	98.2°	36°03.7'	+15.1'	98.9°	35°54.1'	+16.3'	99.6°	0
1	36°49.5'	+08.0'	94.0°	36°44.9'	+09.3'	94.8°	36°39.5'	+10.5'	95.5°	36°33.4'	+11.8'	96.2°	36°26.5'	+13.1'	97.0°	36°18.8'	+14.4'	97.7°	36°10.4'	+15.6'	98.4°	1
2	36°57.4'	+07.2'	92.8°	36°54.1'	+08.5'	93.5°	36°50.1'	+09.8'	94.3°	36°45.2'	+11.1'	95.0°	36°39.6'	+12.3'	95.8°	36°33.2'	+13.6'	96.5°	36°26.0'	+14.9'	97.2°	2
3	37°04.6'	+06.4'	91.5°	37°02.6'	+07.7'	92.3°	36°59.8'	+09.0'	93.0°	36°56.3'	+10.3'	93.8°	36°51.9'	+11.6'	94.5°	36°46.8'	+12.9'	95.3°	36°40.9'	+14.1'	96.0°	3
4	37°11.0'	+05.6'	90.3°	37°10.3'	+06.9'	91.0°	37°08.9'	+08.2'	91.8°	37°06.6'	+09.5'	92.6°	37°03.5'	+10.8'	93.3°	36°59.6'	+12.1'	94.1°	36°55.0'	+13.4'	94.8°	4
5	37°16.7'	+04.8'	89.0°	37°17.3'	+06.1'	89.8°	37°17.1'	+07.5'	90.6°	37°16.1'	+08.8'	91.3°	37°14.3'	+10.1'	92.1°	37°11.8'	+11.4'	92.8°	37°08.4'	+12.6'	93.6°	5
6	37°21.5'	+04.0'	87.8°	37°23.4'	+05.4'	88.5°	37°24.5'	+06.7'	89.3°	37°24.9'	+08.0'	90.1°	37°24.4'	+09.3'	90.8°	37°23.1'	+10.6'	91.6°	37°21.0'	+11.9'	92.4°	6
7	37°25.5'	+03.2'	86.5°	37°28.8'	+04.6'	87.3°	37°31.2'	+05.9'	88.1°	37°32.8'	+07.2'	88.8°	37°33.7'	+08.5'	89.6°	37°33.7'	+09.8'	90.4°	37°32.9'	+11.1'	91.1°	7
8	37°28.8'	+02.4'	85.3°	37°33.3'	+03.8'	86.0°	37°37.1'	+05.1'	86.8°	37°40.0'	+06.4'	87.6°	37°42.2'	+07.7'	88.3°	37°43.5'	+09.0'	89.1°	37°44.0'	+10.3'	89.9°	8
9	37°31.2'	+01.6'	84.0°	37°37.1'	+02.9'	84.8°	37°42.1'	+04.3'	85.5°	37°46.4'	+05.6'	86.3°	37°49.9'	+06.9'	87.1°	37°52.5'	+08.2'	87.9°	37°54.3'	+09.5'	88.6°	9
10	37°32.8'	+00.8'	82.7°	37°40.0'	+02.1'	83.5°	37°46.4'	+03.5'	84.3°	37°52.0'	+04.8'	85.1°	37°56.8'	+06.1'	85.8°	38°00.7'	+07.4'	86.6°	38°03.9'	+08.7'	87.4°	10
11	37°33.7'	+00.0'	81.5°	37°42.2'	+01.3'	82.2°	37°49.9'	+02.6'	83.0°	37°56.8'	+04.0'	83.8°	38°02.8'	+05.3'	84.6°	38°08.1'	+06.6'	85.3°	38°12.6'	+07.9'	86.1°	11
12	37°33.7'	-00.8'	80.2°	37°43.5'	+00.5'	81.0°	37°52.5'	+01.8'	81.8°	38°00.7'	+03.1'	82.5°	38°08.1'	+04.5'	83.3°	38°14.7'	+05.8'	84.1°	38°20.5'	+07.1'	84.9°	12
13	37°32.9'	-01.6'	79.0°	37°44.0'	-00.3'	79.7°	37°54.3'	+01.0'	80.5°	38°03.9'	+02.3'	81.3°	38°12.6'	+03.6'	82.0°	38°20.5'	+05.0'	82.8°	38°27.6'	+06.3'	83.6°	13
14	37°31.3'	-02.4'	77.7°	37°43.7'	-01.1'	78.5°	37°55.3'	+00.2'	79.2°	38°06.2'	+01.5'	80.0°	38°16.2'	+02.8'	80.8°	38°25.4'	+04.1'	81.5°	38°33.9'	+05.4'	82.3°	14
15	37°28.9'	-03.2'	76.4°	37°42.6'	-01.9'	77.2°	37°55.5'	-00.6'	77.9°	38°07.7'	+00.7'	78.7°	38°19.0'	+02.0'	79.5°	38°29.6'	+03.3'	80.3°	38°39.3'	+04.6'	81.1°	15
16	37°25.8'	-04.0'	75.2°	37°40.7'	-02.7'	75.9°	37°54.9'	-01.4'	76.7°	38°08.4'	-00.1'	77.4°	38°21.0'	+01.2'	78.2°	38°32.9'	+02.5'	79.0°	38°43.9'	+03.8'	79.8°	16
17	37°21.8'	-04.8'	73.9°	37°38.0'	-03.5'	74.7°	37°53.5'	-02.2'	75.4°	38°08.2'	-01.0'	76.2°	38°22.2'	+00.3'	76.9°	38°35.3'	+01.6'	77.7°	38°47.7'	+02.9'	78.5°	17
18	37°17.0'	-05.6'	72.7°	37°34.5'	-04.3'	73.4°	37°51.3'	-03.1'	74.1°	38°07.3'	-01.8'	74.9°	38°22.5'	-00.5'	75.7°	38°37.0'	+00.8'	76.4°	38°50.6'	+02.1'	77.2°	18
19	37°11.4'	-06.4'	71.4°	37°30.2'	-05.1'	72.1°	37°48.2'	-03.9'	72.9°	38°05.5'	-02.6'	73.6°	38°22.0'	-01.3'	74.4°	38°37.8'	00.0'	75.2°	38°52.8'	+01.3'	75.9°	19
20	37°05.1'	-07.1'	70.2°	37°25.0'	-05.9'	70.9°	37°44.3'	-04.7'	71.6°	38°02.9'	-03.4'	72.4°	38°20.7'	-02.2'	73.1°	38°37.7'	-00.9'	73.9°	38°54.0'	+00.4'	74.6°	20
21	36°57.9'	-07.9'	68.9°	37°19.1'	-06.7'	69.6°	37°39.7'	-05.5'	70.4°	37°59.5'	-04.2'	71.1°	38°18.5'	-03.0'	71.8°	38°36.9'	-01.7'	72.6°	38°54.4'	-00.4'	73.4°	21
22	36°50.0																					

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

54° 306° LHA

Latitude SAME as Declination

54° 306° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	35°41.4'	+08.6'	95.1°	35°35.8'	+09.9'	95.8°	35°29.3'	+11.2'	96.5°	35°22.2'	+12.4'	97.2°	35°14.3'	+13.7'	97.9°	35°05.7'	+14.9'	98.6°	34°56.4'	+16.1'	99.3°	0
1	35°50.1'	+07.9'	93.8°	35°45.7'	+09.2'	94.6°	35°40.5'	+10.4'	95.3°	35°34.6'	+11.7'	96.0°	35°28.0'	+13.0'	96.7°	35°20.6'	+14.2'	97.4°	35°12.5'	+15.4'	98.1°	1
2	35°57.9'	+07.1'	92.6°	35°54.8'	+08.4'	93.3°	35°51.0'	+09.7'	94.1°	35°46.3'	+11.0'	94.8°	35°41.0'	+12.2'	95.5°	35°34.8'	+13.5'	96.2°	35°28.0'	+14.7'	96.9°	2
3	36°05.1'	+06.4'	91.4°	36°03.3'	+07.7'	92.1°	36°00.7'	+09.0'	92.8°	35°57.3'	+10.2'	93.6°	35°53.2'	+11.5'	94.3°	35°48.3'	+12.8'	95.0°	35°42.7'	+14.0'	95.7°	3
4	36°11.5'	+05.6'	90.2°	36°10.9'	+06.9'	90.9°	36°09.6'	+08.2'	91.6°	36°07.5'	+09.5'	92.4°	36°04.7'	+10.8'	93.1°	36°01.1'	+12.0'	93.8°	35°56.7'	+13.3'	94.5°	4
5	36°17.1'	+04.9'	88.9°	36°17.9'	+06.2'	89.7°	36°17.8'	+07.5'	90.4°	36°17.0'	+08.7'	91.1°	36°15.5'	+10.0'	91.9°	36°13.1'	+11.3'	92.6°	36°10.0'	+12.6'	93.3°	5
6	36°22.0'	+04.1'	87.7°	36°24.0'	+05.4'	88.4°	36°25.3'	+06.7'	89.2°	36°25.8'	+08.0'	89.9°	36°25.5'	+09.3'	90.6°	36°24.4'	+10.6'	91.4°	36°22.6'	+11.8'	92.1°	6
7	36°26.1'	+03.3'	86.4°	36°29.4'	+04.6'	87.2°	36°32.0'	+05.9'	87.9°	36°33.8'	+07.2'	88.7°	36°34.8'	+08.5'	89.4°	36°35.0'	+09.8'	90.1°	36°34.5'	+11.1'	90.9°	7
8	36°29.4'	+02.6'	85.2°	36°34.1'	+03.9'	85.9°	36°37.9'	+05.2'	86.7°	36°41.0'	+06.5'	87.4°	36°43.3'	+07.7'	88.2°	36°44.8'	+09.0'	88.9°	36°45.6'	+10.3'	89.7°	8
9	36°32.0'	+01.8'	84.0°	36°37.9'	+03.1'	84.7°	36°43.1'	+04.4'	85.4°	36°47.4'	+05.7'	86.2°	36°51.0'	+07.0'	86.9°	36°53.9'	+08.3'	87.7°	36°55.9'	+09.6'	88.4°	9
10	36°33.8'	+01.0'	82.7°	36°41.0'	+02.3'	83.5°	36°47.4'	+03.6'	84.2°	36°53.1'	+04.9'	84.9°	36°58.0'	+06.2'	85.7°	37°02.1'	+07.5'	86.4°	37°05.5'	+08.8'	87.2°	10
11	36°34.8'	+00.2'	81.5°	36°43.3'	+01.5'	82.2°	36°51.0'	+02.8'	83.0°	36°58.0'	+04.1'	83.7°	37°04.2'	+05.4'	84.4°	37°09.6'	+06.7'	85.2°	37°14.3'	+08.0'	86.0°	11
12	36°35.0'	-00.5'	80.2°	36°44.8'	+00.7'	81.0°	36°53.9'	+02.0'	81.7°	37°02.1'	+03.3'	82.4°	37°09.6'	+04.6'	83.2°	37°16.3'	+05.9'	84.0°	37°22.3'	+07.2'	84.7°	12
13	36°34.5'	-01.3'	79.0°	36°45.6'	00.0'	79.7°	36°55.9'	+01.2'	80.5°	37°05.5'	+02.5'	81.2°	37°14.3'	+03.8'	81.9°	37°22.3'	+05.1'	82.7°	37°29.5'	+06.4'	83.5°	13
14	36°33.1'	-02.1'	77.7°	36°45.5'	-00.8'	78.5°	36°57.1'	+00.5'	79.2°	37°08.0'	+01.7'	79.9°	37°18.1'	+03.0'	80.7°	37°27.4'	+04.3'	81.4°	37°35.9'	+05.6'	82.2°	14
15	36°31.0'	-02.9'	76.5°	36°44.7'	-01.6'	77.2°	36°57.6'	-00.3'	77.9°	37°09.7'	+01.0'	78.7°	37°21.1'	+02.2'	79.4°	37°31.7'	+03.5'	80.2°	37°41.6'	+04.8'	81.0°	15
16	36°28.2'	-03.6'	75.3°	36°43.1'	-02.4'	76.0°	36°57.3'	-01.1'	76.7°	37°10.7'	+00.2'	77.4°	37°23.4'	+01.4'	78.2°	37°35.3'	+02.7'	78.9°	37°46.4'	+04.0'	79.7°	16
17	36°24.5'	-04.4'	74.0°	36°40.7'	-03.2'	74.7°	36°56.1'	-01.9'	75.4°	37°10.8'	-00.6'	76.2°	37°24.8'	+00.6'	76.9°	37°38.0'	+01.9'	77.7°	37°50.4'	+03.2'	78.4°	17
18	36°20.1'	-05.2'	72.8°	36°37.5'	-03.9'	73.5°	36°54.2'	-02.7'	74.2°	37°10.2'	-01.4'	74.9°	37°25.4'	-00.2'	75.7°	37°39.9'	+01.1'	76.4°	37°53.6'	+02.4'	77.2°	18
19	36°14.9'	-05.9'	71.5°	36°33.6'	-04.7'	72.2°	36°51.5'	-03.5'	72.9°	37°08.8'	-02.2'	73.7°	37°25.3'	-01.0'	74.4°	37°41.0'	+00.3'	75.1°	37°56.0'	+01.6'	75.9°	19
20	36°09.0'	-06.7'	70.3°	36°28.9'	-05.5'	71.0°	36°48.1'	-04.3'	71.7°	37°06.6'	-03.0'	72.4°	37°24.3'	-01.8'	73.1°	37°41.4'	-00.5'	73.9°	37°57.6'	+00.8'	74.6°	20
21	36°02.3'	-07.4'	69.1°	36°23.4'	-06.2'	69.8°	36°43.8'	-05.0'	70.5°	37°03.5'	-03.8'	71.2°	37°22.6'	-02.6'	71.9°	37°40.8'	-01.3'	72.6°	37°58.4'	00.0'	73.4°	21
22	35°54.9'	-08.2'	67.8°	36°17.2'	-07.0'	68.5°	36°38.8'	-05.8'	69.2°	36°38.8'	-04.6'	69.9°	37°20.0'	-02.4'	70.6°	37°39.5'	-02.1'	71.4°	37°58.4'	-00.9'	72.1°	22
23	35°46.7'	-08.9'	66.6°	36°10.2'	-07.8'	67.3°	36°33.0'	-06.6'	68.0°	36°55.2'	-05.4'	68.7°	37°16.6'	-04.2'	69.4°	37°37.4'	-02.9'	70.1°	37°57.5'	-01.7'	70.8°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	7			8			9			10			11			12			13			

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°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	34°42.1'	+08.5'	94.9°	34°36.6'	+09.8'	95.6°	34°30.5'	+11.0'	96.3°	34°23.6'	+12.3'	96.9°	34°16.0'	+13.5'	97.6°	34°07.7'	+14.7'	98.3°	33°58.7'	+15.9'	99.0°	0
1	34°50.6'	+07.8'	93.7°	34°46.4'	+09.1'	94.4°	34°41.5'	+10.3'	95.1°	34°35.8'	+11.6'	95.7°	34°29.5'	+12.8'	96.4°	34°22.4'	+14.1'	97.1°	34°14.6'	+15.3'	97.8°	1
2	34°58.5'	+07.1'	92.5°	34°55.5'	+08.4'	93.2°	34°51.8'	+09.6'	93.9°	34°47.4'	+10.9'	94.6°	34°42.3'	+12.1'	95.2°	34°36.5'	+13.4'	95.9°	34°29.9'	+14.6'	96.6°	2
3	35°05.6'	+06.4'	91.3°	35°03.9'	+07.6'	92.0°	35°01.5'	+08.9'	92.7°	34°58.3'	+10.2'	93.4°	34°54.4'	+11.4'	94.0°	34°49.8'	+12.7'	94.7°	34°44.5'	+13.9'	95.4°	3
4	35°11.9'	+05.6'	90.0°	35°11.5'	+06.9'	90.7°	35°10.4'	+08.2'	91.4°	35°08.5'	+09.5'	92.1°	35°05.9'	+10.7'	92.9°	35°02.5'	+12.0'	93.6°	34°58.4'	+13.2'	94.3°	4
5	35°17.6'	+04.9'	88.8°	35°18.4'	+06.2'	89.5°	35°18.6'	+07.5'	90.2°	35°18.0'	+08.7'	90.9°	35°16.6'	+10.0'	91.6°	35°14.5'	+11.3'	92.4°	35°11.7'	+12.5'	93.1°	5
6	35°22.5'	+04.2'	87.6°	35°24.6'	+05.4'	88.3°	35°26.0'	+06.7'	89.0°	35°26.7'	+08.0'	89.7°	35°26.6'	+09.3'	90.4°	35°25.8'	+10.5'	91.2°	35°24.2'	+11.8'	91.9°	6
7	35°26.7'	+03.4'	86.4°	35°30.1'	+04.7'	87.1°	35°32.8'	+06.0'	87.8°	35°34.7'	+07.3'	88.5°	35°35.9'	+08.5'	89.2°	35°36.3'	+09.8'	89.9°	35°36.0'	+11.1'	90.7°	7
8	35°30.1'	+02.7'	85.1°	35°34.8'	+04.0'	85.9°	35°38.7'	+05.2'	86.6°	35°42.0'	+06.5'	87.3°	35°44.4'	+07.8'	88.0°	35°46.1'	+09.1'	88.7°	35°47.1'	+10.4'	89.4°	8
9	35°32.8'	+01.9'	83.9°	35°38.7'	+03.2'	84.6°	35°44.0'	+04.5'	85.3°	35°48.5'	+05.8'	86.1°	35°52.2'	+07.1'	86.8°	35°55.2'	+08.3'	87.5°	35°57.5'	+09.6'	88.2°	9
10	35°34.7'	+01.2'	82.7°	35°42.0'	+02.5'	83.4°	35°48.5'	+03.7'	84.1°	35°54.3'	+05.0'	84.8°	35°59.3'	+06.3'	85.6°	36°03.6'	+07.6'	86.3°	36°07.1'	+08.9'	87.0°	10
11	35°35.9'	+00.4'	81.5°	35°44.4'	+01.7'	82.2°	35°52.2'	+03.0'	82.9°	35°59.3'	+04.3'	83.6°	36°05.6'	+05.6'	84.3°	36°11.1'	+06.8'	85.1°	36°15.9'	+08.1'	85.8°	11
12	35°36.3'	-00.3'	80.2°	35°46.1'	+01.0'	80.9°	35°55.2'	+02.2'	81.7°	36°03.6'	+03.5'	82.4°	36°11.1'	+04.8'	83.1°	36°18.0'	+06.1'	83.8°	36°24.1'	+07.4'	84.6°	12
13	35°36.0'	-01.1'	79.0°	35°47.1'	+00.2'	79.7°	35°57.5'	+01.5'	80.4°	36°07.1'	+02.7'	81.1°	36°15.9'	+04.0'	81.9°	36°24.1'	+05.3'	82.6°	36°31.4'	+06.6'	83.3°	13
14	35°34.9'	-01.8'	77.8°	35°47.3'	-00.6'	78.5°	35°58.9'	+00.7'	79.2°	36°09.8'	+02.0'	79.9°	36°20.0'	+03.3'	80.6°	36°29.4'	+04.5'	81.3°	36°38.0'	+05.8'	82.1°	14
15	35°33.1'	-02.6'	76.5°	35°46.7'	-01.3'	77.2°	35°59.6'	00.0'	77.9°	36°11.8'	+01.2'	78.7°	36°23.2'	+02.5'	79.4°	36°33.9'	+03.8'	80.1°	36°43.8'	+05.0'	80.8°	15
16	35°30.6'	-03.3'	75.3°	35°45.4'	-02.1'	76.0°	35°59.6'	-00.8'	76.7°	36°13.0'	+00.5'	77.4°	36°25.7'	+01.7'	78.1°	36°37.7'	+03.0'	78.9°	36°48.9'	+04.3'	79.6°	16
17	35°27.3'	-04.0'	74.1°	35°43.4'	-02.8'	74.8°	35°58.8'	-01.6'	75.5°	36°13.5'	-00.3'	76.2°	36°27.4'	+00.9'	76.9°	36°40.7'	+02.2'	77.6°	36°53.2'	+03.5'	78.4°	17
18	35°23.2'	-04.8'	72.9°	35°40.6'	-03.6'	73.5°	35°57.2'	-02.3'	74.2°	36°13.2'	-01.1'	74.9°	36°28.4'	+00.2'	75.7°	36°42.9'	+01.4'	76.4°	36°56.6'	+02.7'	77.1°	18
19	35°18.4'	-05.5'	71.6°	35°37.0'	-04.3'	72.3°	35°54.9'	-03.1'	73.0°	36°12.1'	-01.8'	73.7°	36°28.6'	-00.6'	74.4°	36°44.3'	+00.7'	75.1°	36°59.4'	+01.9'	75.9°	19
20	35°12.9'	-06.3'	70.4°	35°32.7'	-05.1'	71.1°	35°51.8'	-03.8'	71.8°	36°10.2'	-02.6'	72.5°	36°28.0'	-01.4'	73.2°	36°45.0'	-00.1'	73.9°	37°01.3'	+01.1'	74.6°	20
21	35°06.7'	-07.0'	69.2°	35°27.6'	-05.8'	69.9°	35°48.0'	-04.6'	70.5°	36°07.6'	-03.4'	71.2°	36°26.6'	-02.1'	71.9°	36°44.8'	-00.9'	72.6°	37°02.4'	+00.3'	73.3°	21
22	34°59.7'</																					

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

56° 304° LHA

Latitude SAME as Declination

56° 304° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	33°42.7'	+08.4'	94.7°	33°37.5'	+09.7'	95.4°	33°31.5'	+10.9'	96.0°	33°24.9'	+12.2'	96.7°	33°17.6'	+13.4'	97.3°	33°09.6'	+14.6'	98.0°	33°00.9'	+15.8'	98.6°	0
1	33°51.2'	+07.8'	93.5°	33°47.2'	+09.0'	94.2°	33°42.5'	+10.2'	94.8°	33°37.0'	+11.5'	95.5°	33°30.9'	+12.7'	96.2°	33°24.2'	+13.9'	96.8°	33°16.7'	+15.1'	97.5°	1
2	33°59.0'	+07.1'	92.3°	33°56.2'	+08.3'	93.0°	33°52.7'	+09.6'	93.7°	33°48.5'	+10.8'	94.3°	33°43.7'	+12.0'	95.0°	33°38.1'	+13.3'	95.7°	33°31.8'	+14.5'	96.3°	2
3	34°06.0'	+06.4'	91.1°	34°04.5'	+07.6'	91.8°	34°02.3'	+08.9'	92.5°	33°59.3'	+10.1'	93.1°	33°55.7'	+11.4'	93.8°	33°51.3'	+12.6'	94.5°	33°46.3'	+13.8'	95.2°	3
4	34°12.4'	+05.7'	89.9°	34°12.1'	+06.9'	90.6°	34°11.1'	+08.2'	91.3°	34°09.4'	+09.4'	92.0°	34°07.1'	+10.7'	92.6°	34°03.9'	+11.9'	93.3°	34°00.1'	+13.2'	94.0°	4
5	34°18.0'	+04.9'	88.7°	34°19.0'	+06.2'	89.4°	34°19.3'	+07.5'	90.1°	34°18.9'	+08.7'	90.8°	34°17.7'	+10.0'	91.4°	34°15.9'	+11.2'	92.1°	34°13.3'	+12.5'	92.8°	5
6	34°23.0'	+04.2'	87.5°	34°25.2'	+05.5'	88.2°	34°26.8'	+06.8'	88.9°	34°27.6'	+08.0'	89.6°	34°27.7'	+09.3'	90.2°	34°27.1'	+10.5'	90.9°	34°25.8'	+11.8'	91.6°	6
7	34°27.2'	+03.5'	86.3°	34°30.7'	+04.8'	87.0°	34°33.5'	+06.1'	87.7°	34°35.6'	+07.3'	88.4°	34°37.0'	+08.6'	89.0°	34°37.6'	+09.8'	89.7°	34°37.5'	+11.1'	90.4°	7
8	34°30.7'	+02.8'	85.1°	34°35.5'	+04.1'	85.8°	34°39.6'	+05.3'	86.5°	34°42.9'	+06.6'	87.1°	34°45.6'	+07.9'	87.8°	34°47.5'	+09.1'	88.5°	34°48.6'	+10.4'	89.2°	8
9	34°33.5'	+02.1'	83.9°	34°39.6'	+03.3'	84.6°	34°44.9'	+04.6'	85.2°	34°49.5'	+05.9'	85.9°	34°53.4'	+07.1'	86.6°	34°56.6'	+08.4'	87.3°	34°59.0'	+09.7'	88.0°	9
10	34°35.6'	+01.4'	82.7°	34°42.9'	+02.6'	83.3°	34°49.5'	+03.9'	84.0°	34°55.4'	+05.2'	84.7°	35°00.6'	+06.4'	85.4°	35°05.0'	+07.7'	86.1°	35°08.7'	+09.0'	86.8°	10
11	34°37.0'	+00.6'	81.4°	34°45.6'	+01.9'	82.1°	34°53.4'	+03.2'	82.8°	35°00.6'	+04.4'	83.5°	35°07.0'	+05.7'	84.2°	35°12.7'	+07.0'	84.9°	35°17.6'	+08.2'	85.6°	11
12	34°37.6'	-00.1'	80.2°	34°47.5'	+01.2'	80.9°	34°56.6'	+02.4'	81.6°	35°05.0'	+03.7'	82.3°	35°12.7'	+05.0'	83.0°	35°19.6'	+06.2'	83.7°	35°25.9'	+07.5'	84.4°	12
13	34°37.5'	-00.8'	79.0°	34°48.6'	+00.4'	79.7°	34°59.0'	+01.7'	80.4°	35°08.7'	+03.0'	81.1°	35°17.6'	+04.2'	81.8°	35°25.9'	+05.5'	82.5°	35°33.4'	+06.8'	83.2°	13
14	34°36.7'	-01.5'	77.8°	34°49.1'	-00.3'	78.5°	35°00.7'	+01.0'	79.2°	35°11.6'	+02.2'	79.8°	35°21.9'	+03.5'	80.5°	35°31.4'	+04.7'	81.2°	35°40.1'	+06.0'	82.0°	14
15	34°35.2'	-02.3'	76.6°	34°48.8'	-01.0'	77.3°	35°01.7'	+00.2'	77.9°	35°13.9'	+01.5'	78.6°	35°25.3'	+02.7'	79.3°	35°36.1'	+04.0'	80.0°	35°46.1'	+05.3'	80.7°	15
16	34°33.0'	-03.0'	75.4°	34°47.8'	-01.7'	76.0°	35°01.9'	-00.5'	76.7°	35°15.4'	+00.7'	77.4°	35°28.1'	+02.0'	78.1°	35°40.1'	+03.3'	78.8°	35°51.4'	+04.5'	79.5°	16
17	34°30.0'	-03.7'	74.2°	34°46.0'	-02.5'	74.8°	35°01.4'	-01.2'	75.5°	35°16.1'	+00.0'	76.2°	35°30.1'	+01.2'	76.9°	35°43.4'	+02.5'	77.6°	35°55.9'	+03.8'	78.3°	17
18	34°26.3'	-04.4'	72.9°	34°43.6'	-03.2'	73.6°	35°00.2'	-02.0'	74.3°	35°16.1'	-00.7'	75.0°	35°31.3'	+00.5'	75.6°	35°45.9'	+01.7'	76.3°	35°59.7'	+03.0'	77.0°	18
19	34°21.9'	-05.1'	71.7°	34°40.4'	-03.9'	72.4°	34°58.2'	-02.7'	73.1°	35°15.4'	-01.5'	73.7°	35°31.8'	-00.2'	74.4°	35°47.6'	+01.0'	75.1°	36°02.7'	+02.2'	75.8°	19
20	34°16.8'	-05.8'	70.5°	34°36.5'	-04.6'	71.2°	34°55.5'	-03.4'	71.8°	35°13.9'	-02.2'	72.5°	35°31.6'	-01.0'	73.2°	35°48.6'	+00.2'	73.9°	36°04.9'	+01.5'	74.6°	20
21	34°11.0'	-06.5'	69.3°	34°31.8'	-05.3'	70.0°	34°52.1'	-04.2'	70.6°	35°11.7'	-03.0'	71.3°	35°30.6'	-01.7'	72.0°	35°48.8'	-00.5'	72.6°	36°06.4'	+00.7'	73.3°	21
22	34°04.4'	-07.2'	68.1°	34°26.5'	-06.1'	68.8°	34°47.9'	-04.9'	69.4°	35°08.7'	-03.7'	70.1°	35°28.8'	-02.5'	70.7°	35°48.3'	-01.3'	71.4°	36°07.1'	-00.1'	72.1°	22
23	33°57.2'	-07.9'	66.9°	34°20.4'	-06.8'	67.6°	34°43.0'	-05.6'	68.2°	35°05.0'	-04.4'	68.8°	35°26.3'	-03.2'	69.5°	35°47.0'	-02.0'	70.2°	36°07.0'	-00.8'	70.9°	23
Dec°	7			8			9			10			11			12			13			Dec°

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°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	32°43.4'	+08.4'	94.5°	32°38.3'	+09.6'	95.2°	32°32.6'	+10.8'	95.8°	32°26.2'	+12.0'	96.4°	32°19.1'	+13.2'	97.1°	32°11.4'	+14.4'	97.7°	32°03.1'	+15.6'	98.3°	0
1	32°51.7'	+07.7'	93.3°	32°47.9'	+08.9'	94.0°	32°43.4'	+10.2'	94.6°	32°38.2'	+11.4'	95.3°	32°32.4'	+12.6'	95.9°	32°25.9'	+13.8'	96.5°	32°18.7'	+15.0'	97.2°	1
2	32°59.4'	+07.0'	92.2°	32°56.8'	+08.3'	92.8°	32°53.6'	+09.5'	93.5°	32°49.6'	+10.7'	94.1°	32°45.0'	+11.9'	94.7°	32°39.7'	+13.2'	95.4°	32°33.7'	+14.4'	96.0°	2
3	33°06.5'	+06.4'	91.0°	33°05.1'	+07.6'	91.6°	33°03.1'	+08.8'	92.3°	33°00.3'	+10.1'	92.9°	32°56.9'	+11.3'	93.6°	32°52.8'	+12.5'	94.2°	32°48.1'	+13.7'	94.9°	3
4	33°12.8'	+05.7'	89.8°	33°12.7'	+06.9'	90.4°	33°11.9'	+08.2'	91.1°	33°10.4'	+09.4'	91.8°	33°08.2'	+10.6'	92.4°	33°05.3'	+11.9'	93.1°	33°01.8'	+13.1'	93.7°	4
5	33°18.5'	+05.0'	88.6°	33°19.6'	+06.2'	89.3°	33°20.0'	+07.5'	89.9°	33°19.8'	+08.7'	90.6°	33°18.8'	+10.0'	91.2°	33°17.2'	+11.2'	91.9°	33°14.9'	+12.4'	92.5°	5
6	33°23.5'	+04.3'	87.4°	33°25.9'	+05.6'	88.1°	33°27.5'	+06.8'	88.7°	33°28.5'	+08.0'	89.4°	33°28.8'	+09.3'	90.1°	33°28.4'	+10.5'	90.7°	33°27.3'	+11.8'	91.4°	6
7	33°27.8'	+03.6'	86.2°	33°31.4'	+04.9'	86.9°	33°34.3'	+06.1'	87.5°	33°36.6'	+07.4'	88.2°	33°38.1'	+08.6'	88.9°	33°38.9'	+09.9'	89.5°	33°39.1'	+11.1'	90.2°	7
8	33°31.4'	+02.9'	85.0°	33°36.3'	+04.2'	85.7°	33°40.5'	+05.4'	86.3°	33°43.9'	+06.7'	87.0°	33°46.7'	+07.9'	87.7°	33°48.8'	+09.2'	88.3°	33°50.2'	+10.4'	89.0°	8
9	33°34.3'	+02.2'	83.8°	33°40.5'	+03.5'	84.5°	33°45.9'	+04.7'	85.1°	33°50.6'	+06.0'	85.8°	33°54.6'	+07.2'	86.5°	33°58.0'	+08.5'	87.2°	34°00.6'	+09.7'	87.8°	9
10	33°36.6'	+01.5'	82.6°	33°43.9'	+02.8'	83.3°	33°50.6'	+04.0'	83.9°	33°56.6'	+05.3'	84.6°	34°01.9'	+06.5'	85.3°	34°06.4'	+07.8'	86.0°	34°10.3'	+09.0'	86.6°	10
11	33°38.1'	+00.8'	81.4°	33°46.7'	+02.1'	82.1°	33°54.6'	+03.3'	82.7°	34°01.9'	+04.6'	83.4°	34°08.4'	+05.8'	84.1°	34°14.2'	+07.1'	84.8°	34°19.4'	+08.3'	85.4°	11
12	33°38.9'	+00.1'	80.2°	33°48.8'	+01.4'	80.9°	33°58.0'	+02.6'	81.5°	34°06.4'	+03.9'	82.2°	34°14.2'	+05.1'	82.9°	34°21.3'	+06.4'	83.6°	34°27.7'	+07.6'	84.2°	12
13	33°39.1'	-00.6'	79.0°	33°50.2'	+00.7'	79.7°	34°00.6'	+01.9'	80.3°	34°10.3'	+03.2'	81.0°	34°19.4'	+04.4'	81.7°	34°27.7'	+05.7'	82.4°	34°35.3'	+06.9'	83.0°	13
14	33°38.5'	-01.3'	77.8°	33°50.9'	00.0'	78.5°	34°02.5'	+01.2'	79.1°	34°13.5'	+02.5'	79.8°	34°23.8'	+03.7'	80.5°	34°33.4'	+04.9'	81.1°	34°42.2'	+06.2'	81.8°	14
15	33°37.3'	-01.9'	76.6°	33°50.8'	-00.7'	77.3°	34°03.7'	+00.5'	77.9°	34°15.9'	+01.7'	78.6°	34°27.5'	+03.0'	79.3°	34°38.3'	+04.2'	79.9°	34°48.4'	+05.5'	80.6°	15
16	33°35.3'	-02.6'	75.4°	33°50.1'	-01.4'	76.1°	34°04.2'	-00.2'	76.7°	34°17.7'	+01.0'	77.4°	34°30.5'	+02.3'	78.0°	34°42.5'	+03.5'	78.7°	34°53.9'	+04.8'	79.4°	16
17	33°32.7'	-03.3'	74.2°	33°48.7'	-02.1'	74.9°	34°04.0'	-00.9'	75.5°	34°18.7'	+00.3'	76.2°	34°32.7'	+01.5'	76.8°	34°46.0'	+02.8'	77.5°	34°58.7'	+04.0'	78.2°	17
18	33°29.4'	-04.0'	73.0°	33°46.6'	-02.8'	73.7°	34°03.1'	-01.6'	74.3°	34°19.0'	-00.4'	75.0°	34°34.3'	+00.8'	75.6°	34°48.8'	+02.1'	76.3°	35°02.7'	+03.3'	77.0°	18
19	33°25.3'	-04.7'	71.8°	33°43.7'	-03.5'	72.5°	34°01.5'	-02.3'	73.1°	34°18.6'	-01.1'	73.7°	34°35.1'	+00.1'	74.4°	34°50.9'	+01.3'	75.1°	35°06.0'	+02.6'	75.8°	19
20	33°20.6'	-05.4'	70.6°	33°40.2'	-04.2'	71.3°	33°59.2'	-03.0'	71.9°	34°17.5'	-01.8'	72.5°	34°35.2'	-00.6'	73.2°	34°52.2'	+00.6'	73.9°	35°08.6'	+01.8'	74.5°	20
21	33°15.2'	-06.1'	69.4°	33°36.0'	-04.9'	70.1°	33°56.2'	-03.7'	70.7°	34°15.7'	-02.5'	71.3°	34°34.6'	-01.3'	72.0°	34°52.8'	-00.1'	72.6°	35°10.4'	+01.1'	73.3°	21
22	33°09.2'	-06.8'	68.2°	33°31.1'	-05.6'	68.9°	33°52.4'	-04.4'	69.5°	34°13.1'	-03.3'	70.1°	34°33.2'	-02.1'	70.8°	34°52.7'	-00.9'	71.4°	35°11.5'	+00.3'	72.1°	22

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

58° 302° LHA

Latitude SAME as Declination

58° 302° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	31°44.0'	+08.3'	94.4°	31°39.1'	+09.5'	95.0°	31°33.6'	+10.7'	95.6°	31°27.5'	+11.9'	96.2°	31°20.7'	+13.1'	96.8°	31°13.3'	+14.3'	97.4°	31°05.2'	+15.5'	98.0°	0
1	31°52.3'	+07.6'	93.2°	31°48.6'	+08.9'	93.8°	31°44.3'	+10.1'	94.4°	31°39.4'	+11.3'	95.0°	31°33.8'	+12.5'	95.7°	31°27.5'	+13.7'	96.3°	31°20.7'	+14.9'	96.9°	1
2	32°00.0'	+07.0'	92.0°	31°57.5'	+08.2'	92.6°	31°54.4'	+09.4'	93.3°	31°50.7'	+10.7'	93.9°	31°46.3'	+11.9'	94.5°	31°41.2'	+13.1'	95.1°	31°35.5'	+14.3'	95.7°	2
3	32°06.9'	+06.3'	90.8°	32°05.7'	+07.6'	91.5°	32°03.8'	+08.8'	92.1°	32°01.3'	+10.0'	92.7°	31°58.1'	+11.2'	93.4°	31°54.3'	+12.4'	94.0°	31°49.8'	+13.6'	94.6°	3
4	32°13.3'	+05.7'	89.7°	32°13.3'	+06.9'	90.3°	32°12.6'	+08.2'	90.9°	32°11.3'	+09.4'	91.6°	32°09.4'	+10.6'	92.2°	32°06.7'	+11.8'	92.8°	32°03.5'	+13.0'	93.4°	4
5	32°19.0'	+05.0'	88.5°	32°20.2'	+06.3'	89.1°	32°20.8'	+07.5'	89.8°	32°20.7'	+08.7'	90.4°	32°20.0'	+10.0'	91.0°	32°18.5'	+11.2'	91.7°	32°16.5'	+12.4'	92.3°	5
6	32°24.0'	+04.4'	87.3°	32°26.5'	+05.6'	88.0°	32°28.3'	+06.8'	88.6°	32°29.4'	+08.1'	89.2°	32°29.9'	+09.3'	89.9°	32°29.7'	+10.5'	90.5°	32°28.9'	+11.8'	91.1°	6
7	32°28.4'	+03.7'	86.1°	32°32.1'	+04.9'	86.8°	32°35.1'	+06.2'	87.4°	32°37.5'	+07.4'	88.0°	32°39.2'	+08.6'	88.7°	32°40.3'	+09.9'	89.3°	32°40.6'	+11.1'	90.0°	7
8	32°32.1'	+03.0'	85.0°	32°37.0'	+04.3'	85.6°	32°41.3'	+05.5'	86.2°	32°44.9'	+06.8'	86.9°	32°47.9'	+08.0'	87.5°	32°50.1'	+09.2'	88.2°	32°51.7'	+10.5'	88.8°	8
9	32°35.1'	+02.4'	83.8°	32°41.3'	+03.6'	84.4°	32°46.8'	+04.8'	85.0°	32°51.7'	+06.1'	85.7°	32°55.9'	+07.3'	86.3°	32°59.4'	+08.6'	87.0°	33°02.2'	+09.8'	87.6°	9
10	32°37.5'	+01.7'	82.6°	32°44.9'	+02.9'	83.2°	32°51.7'	+04.2'	83.9°	32°57.8'	+05.4'	84.5°	33°03.2'	+06.6'	85.1°	33°07.9'	+07.9'	85.8°	33°12.0'	+09.1'	86.5°	10
11	32°39.2'	+01.0'	81.4°	32°47.9'	+02.3'	82.0°	32°55.9'	+03.5'	82.7°	33°03.2'	+04.7'	83.3°	33°09.8'	+06.0'	84.0°	33°15.8'	+07.2'	84.6°	33°21.1'	+08.4'	85.3°	11
12	32°40.3'	+00.4'	80.2°	32°50.1'	+01.6'	80.8°	32°59.4'	+02.8'	81.5°	33°07.9'	+04.1'	82.1°	33°15.8'	+05.3'	82.8°	33°23.0'	+06.5'	83.4°	33°29.5'	+07.8'	84.1°	12
13	32°40.6'	-00.3'	79.0°	32°51.7'	+00.9'	79.7°	33°02.2'	+02.1'	80.3°	33°12.0'	+03.4'	80.9°	33°21.1'	+04.6'	81.6°	33°29.5'	+05.8'	82.2°	33°37.3'	+07.1'	82.9°	13
14	32°40.3'	-01.0'	77.8°	32°52.6'	+00.2'	78.5°	33°04.3'	+01.5'	79.1°	33°15.3'	+02.7'	79.7°	33°25.7'	+03.9'	80.4°	33°35.4'	+05.2'	81.0°	33°44.4'	+06.4'	81.7°	14
15	32°39.3'	-01.6'	76.6°	32°52.9'	-00.4'	77.3°	33°05.8'	+00.8'	77.9°	33°18.0'	+02.0'	78.5°	33°29.6'	+03.2'	79.2°	33°40.5'	+04.5'	79.8°	33°50.8'	+05.7'	80.5°	15
16	32°37.7'	-02.3'	75.5°	32°52.4'	-01.1'	76.1°	33°06.6'	+00.1'	76.7°	33°20.0'	+01.3'	77.3°	33°32.8'	+02.5'	78.0°	33°45.0'	+03.8'	78.6°	33°56.5'	+05.0'	79.3°	16
17	32°35.4'	-03.0'	74.3°	32°51.3'	-01.8'	74.9°	33°06.7'	-00.6'	75.5°	33°21.3'	+00.6'	76.2°	33°35.4'	+01.8'	76.8°	33°48.8'	+03.1'	77.4°	34°01.5'	+04.3'	78.1°	17
18	32°32.4'	-03.7'	73.1°	32°49.5'	-02.5'	73.7°	33°06.1'	-01.3'	74.3°	33°22.0'	-00.1'	75.0°	33°37.2'	+01.1'	75.6°	33°51.8'	+02.4'	76.2°	34°05.8'	+03.6'	76.9°	18
19	32°28.7'	-04.3'	71.9°	32°47.1'	-03.1'	72.5°	33°04.8'	-02.0'	73.1°	33°21.9'	-00.8'	73.8°	33°38.4'	+00.4'	74.4°	33°54.2'	+01.7'	75.0°	34°09.3'	+02.9'	75.7°	19
20	32°24.4'	-05.0'	70.7°	32°43.9'	-03.8'	71.3°	33°02.9'	-02.6'	71.9°	33°21.1'	-01.4'	72.6°	33°38.8'	-00.2'	73.2°	33°55.8'	+01.0'	73.8°	34°12.2'	+02.2'	74.5°	20
21	32°19.4'	-05.6'	69.5°	32°40.1'	-04.5'	70.1°	33°00.2'	-03.3'	70.7°	33°19.7'	-02.1'	71.4°	33°38.6'	-00.9'	72.0°	33°56.8'	+00.3'	72.6°	34°14.4'	+01.5'	73.3°	21
22	32°13.8'	-06.3'	68.4°	32°35.7'	-05.1'	69.0°	32°56.9'	-04.0'	69.6°	33°17.6'	-02.8'	70.2°	33°37.6'	-01.6'	70.8°	33°57.0'	-00.5'	71.4°	34°15.8'	+00.7'	72.1°	22
23	32°07.5'	-06.9'	67.2°	32°30.5'	-05.8'	67.8°	32°52.9'	-04.7'	68.4°	33°14.7'	-03.5'	69.0°	33°36.0'	-02.3'	69.6°	33°56.6'	-01.2'	70.2°	34°16.6'	+00.0'	70.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	7			8			9			10			11			12			13			

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°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	30°44.6'	+08.2'	94.2°	30°39.9'	+09.4'	94.8°	30°34.6'	+10.6'	95.4°	30°28.7'	+11.8'	96.0°	30°22.2'	+13.0'	96.5°	30°15.0'	+14.2'	97.1°	30°07.3'	+15.3'	97.7°	0
1	30°52.8'	+07.6'	93.0°	30°49.3'	+08.8'	93.6°	30°45.2'	+10.0'	94.2°	30°40.5'	+11.2'	94.8°	30°35.1'	+12.4'	95.4°	30°29.2'	+13.6'	96.0°	30°22.6'	+14.7'	96.6°	1
2	31°00.4'	+07.0'	91.9°	30°58.1'	+08.2'	92.5°	30°55.2'	+09.4'	93.1°	30°51.7'	+10.6'	93.7°	30°47.5'	+11.8'	94.3°	30°42.8'	+13.0'	94.9°	30°37.4'	+14.2'	95.5°	2
3	31°07.4'	+06.3'	90.7°	31°06.3'	+07.6'	91.3°	31°04.6'	+08.8'	91.9°	31°02.3'	+10.0'	92.5°	30°59.3'	+11.2'	93.1°	30°55.7'	+12.4'	93.7°	30°51.5'	+13.6'	94.3°	3
4	31°13.7'	+05.7'	89.6°	31°13.9'	+06.9'	90.2°	31°13.4'	+08.1'	90.8°	31°12.3'	+09.4'	91.4°	31°10.5'	+10.6'	92.0°	31°08.1'	+11.8'	92.6°	31°05.1'	+13.0'	93.2°	4
5	31°19.4'	+05.1'	88.4°	31°20.8'	+06.3'	89.0°	31°21.5'	+07.5'	89.6°	31°21.6'	+08.7'	90.2°	31°21.1'	+09.9'	90.8°	31°19.9'	+11.2'	91.4°	31°18.1'	+12.4'	92.0°	5
6	31°24.5'	+04.4'	87.2°	31°27.1'	+05.7'	87.8°	31°29.0'	+06.9'	88.4°	31°30.4'	+08.1'	89.1°	31°31.0'	+09.3'	89.7°	31°31.0'	+10.5'	90.3°	31°30.4'	+11.7'	90.9°	6
7	31°29.0'	+03.8'	86.1°	31°32.8'	+05.0'	86.7°	31°35.9'	+06.3'	87.3°	31°38.5'	+07.5'	87.9°	31°40.3'	+08.7'	88.5°	31°41.6'	+09.9'	89.1°	31°42.2'	+11.1'	89.7°	7
8	31°32.8'	+03.2'	84.9°	31°37.8'	+04.4'	85.5°	31°42.2'	+05.6'	86.1°	31°45.9'	+06.8'	86.7°	31°49.0'	+08.1'	87.3°	31°51.5'	+09.3'	88.0°	31°53.3'	+10.5'	88.6°	8
9	31°35.9'	+02.5'	83.7°	31°42.2'	+03.7'	84.3°	31°47.8'	+05.0'	84.9°	31°52.8'	+06.2'	85.6°	31°57.1'	+07.4'	86.2°	32°00.8'	+08.6'	86.8°	32°03.8'	+09.9'	87.4°	9
10	31°38.5'	+01.9'	82.5°	31°45.9'	+03.1'	83.2°	31°52.8'	+04.3'	83.8°	31°59.0'	+05.5'	84.4°	32°04.5'	+06.8'	85.0°	32°09.4'	+08.0'	85.6°	32°13.6'	+09.2'	86.3°	10
11	31°40.3'	+01.2'	81.4°	31°49.0'	+02.5'	82.0°	31°57.1'	+03.7'	82.6°	32°04.5'	+04.9'	83.2°	32°11.3'	+06.1'	83.8°	32°17.4'	+07.3'	84.5°	32°22.8'	+08.6'	85.1°	11
12	31°41.6'	+00.6'	80.2°	31°51.5'	+01.8'	80.8°	32°00.8'	+03.0'	81.4°	32°09.4'	+04.2'	82.0°	32°17.4'	+05.5'	82.7°	32°24.7'	+06.7'	83.3°	32°31.4'	+07.9'	83.9°	12
13	31°42.2'	-00.1'	79.0°	31°53.3'	+01.1'	79.6°	32°03.8'	+02.4'	80.2°	32°13.6'	+03.6'	80.9°	32°22.8'	+04.8'	81.5°	32°31.4'	+06.0'	82.1°	32°39.3'	+07.2'	82.7°	13
14	31°42.1'	-00.7'	77.8°	31°54.4'	+00.5'	78.4°	32°06.1'	+01.7'	79.1°	32°17.2'	+02.9'	79.7°	32°27.6'	+04.1'	80.3°	32°37.4'	+05.4'	80.9°	32°46.5'	+06.6'	81.6°	14
15	31°41.4'	-01.4'	76.7°	31°54.9'	-00.2'	77.3°	32°07.8'	+01.0'	77.9°	32°20.1'	+02.3'	78.5°	32°31.8'	+03.5'	79.1°	32°42.8'	+04.7'	79.7°	32°53.1'	+05.9'	80.4°	15
16	31°40.0'	-02.0'	75.5°	31°54.8'	-00.8'	76.1°	32°08.9'	+00.4'	76.7°	32°22.4'	+01.6'	77.3°	32°35.2'	+02.8'	77.9°	32°47.5'	+04.0'	78.6°	32°59.0'	+05.2'	79.2°	16
17	31°38.0'	-02.6'	74.3°	31°54.0'	-01.5'	74.9°	32°09.3'	-00.3'	75.5°	32°24.0'	+00.9'	76.1°	32°38.0'	+02.1'	76.7°	32°51.5'	+03.3'	77.4°	33°04.3'	+04.6'	78.0°	17
18	31°35.4'	-03.3'	73.1°	31°52.5'	-02.1'	73.7°	32°09.0'	-00.9'	74.3°	32°24.9'	+00.3'	74.9°	32°40.2'	+01.5'	75.6°	32°54.8'	+02.7'	76.2°	33°08.8'	+03.9'	76.8°	18
19	31°32.1'	-03.9'	72.0°	31°50.4'	-02.8'	72.6°	32°08.1'	-01.6'	73.2°	32°25.2'	-00.4'	73.8°	32°41.6'	+00.8'	74.4°	32°57.5'	+02.0'	75.0°	33°12.7'	+03.2'	75.6°	19
20	31°28.2'	-04.6'	70.8°	31°47.6'	-03.4'	71.4°	32°06.5'	-02.2'	72.0°	32°24.8'	-01.1'	72.6°	32°42.4'	+00.1'	73.2°	32°59.5'	+01.3'	73.8°	33°15.9'	+02.5'	74.4°	20
21	31°23.6'	-05.2'	69.6°	31°44.2'	-04.1'	70.2°	32°04.3'	-02.9'	70.8°	32°23.7'	-01.7'	71.4°	32°42.6'	-00.6'	72.0°	33°00.8'	+00.6'	72.6°	33°18.4'	+01.8'	73.2°	21
22	31°18.4'</																					

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

60° 300° LHA			Latitude SAME as Declination						60° 300° LHA													
Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	29°45.2'	+08.1'	94.0°	29°40.7'	+09.3'	94.6°	29°35.6'	+10.5'	95.2°	29°29.9'	+11.7'	95.7°	29°23.6'	+12.9'	96.3°	29°16.8'	+14.0'	96.8°	29°09.3'	+15.2'	97.4°	0
1	29°53.4'	+07.5'	92.9°	29°50.0'	+08.7'	93.5°	29°46.1'	+09.9'	94.0°	29°41.6'	+11.1'	94.6°	29°36.5'	+12.3'	95.2°	29°30.8'	+13.5'	95.7°	29°24.5'	+14.6'	96.3°	1
2	30°00.9'	+06.9'	91.7°	29°58.8'	+08.1'	92.3°	29°56.0'	+09.3'	92.9°	29°52.7'	+10.5'	93.5°	29°48.8'	+11.7'	94.0°	29°44.3'	+12.9'	94.6°	29°39.2'	+14.1'	95.2°	2
3	30°07.8'	+06.3'	90.6°	30°06.9'	+07.5'	91.2°	30°05.4'	+08.7'	91.7°	30°03.2'	+09.9'	92.3°	30°00.5'	+11.1'	92.9°	29°57.2'	+12.3'	93.5°	29°53.2'	+13.5'	94.1°	3
4	30°14.2'	+05.7'	89.4°	30°14.5'	+06.9'	90.0°	30°14.1'	+08.1'	90.6°	30°13.2'	+09.3'	91.2°	30°11.6'	+10.5'	91.8°	30°09.5'	+11.7'	92.4°	30°06.7'	+12.9'	92.9°	4
5	30°19.9'	+05.1'	88.3°	30°21.4'	+06.3'	88.9°	30°22.3'	+07.5'	89.5°	30°22.5'	+08.7'	90.0°	30°22.2'	+09.9'	90.6°	30°21.2'	+11.1'	91.2°	30°19.6'	+12.3'	91.8°	5
6	30°25.0'	+04.5'	87.1°	30°27.7'	+05.7'	87.7°	30°29.8'	+06.9'	88.3°	30°31.3'	+08.1'	88.9°	30°32.1'	+09.3'	89.5°	30°32.4'	+10.5'	90.1°	30°32.0'	+11.7'	90.7°	6
7	30°29.6'	+03.9'	86.0°	30°33.5'	+05.1'	86.6°	30°36.7'	+06.3'	87.2°	30°39.4'	+07.5'	87.7°	30°41.5'	+08.7'	88.3°	30°42.9'	+09.9'	88.9°	30°43.7'	+11.1'	89.5°	7
8	30°33.5'	+03.3'	84.8°	30°38.6'	+04.5'	85.4°	30°43.1'	+05.7'	86.0°	30°46.9'	+06.9'	86.6°	30°50.2'	+08.1'	87.2°	30°52.8'	+09.3'	87.8°	30°54.8'	+10.5'	88.4°	8
9	30°36.7'	+02.7'	83.7°	30°43.1'	+03.9'	84.2°	30°48.8'	+05.1'	84.8°	30°53.9'	+06.3'	85.4°	30°58.3'	+07.5'	86.0°	31°02.2'	+08.7'	86.6°	31°05.4'	+09.9'	87.2°	9
10	30°39.4'	+02.1'	82.5°	30°46.9'	+03.3'	83.1°	30°53.9'	+04.5'	83.7°	31°00.2'	+05.7'	84.3°	31°05.8'	+06.9'	84.9°	31°10.9'	+08.1'	85.5°	31°15.3'	+09.3'	86.1°	10
11	30°41.5'	+01.4'	81.3°	30°50.2'	+02.6'	81.9°	30°58.3'	+03.8'	82.5°	31°05.8'	+05.0'	83.1°	31°12.7'	+06.3'	83.7°	31°19.0'	+07.5'	84.3°	31°24.6'	+08.7'	84.9°	11
12	30°42.9'	+00.8'	80.2°	30°52.8'	+02.0'	80.8°	31°02.2'	+03.2'	81.4°	31°10.9'	+04.4'	81.9°	31°19.0'	+05.6'	82.5°	31°26.4'	+06.8'	83.2°	31°33.3'	+08.0'	83.8°	12
13	30°43.7'	+00.2'	79.0°	30°54.8'	+01.4'	79.6°	31°05.4'	+02.6'	80.2°	31°15.3'	+03.8'	80.8°	31°24.6'	+05.0'	81.4°	31°33.3'	+06.2'	82.0°	31°41.3'	+07.4'	82.6°	13
14	30°43.9'	-00.4'	77.8°	30°56.2'	+00.8'	78.4°	31°08.0'	+01.9'	79.0°	31°19.1'	+03.1'	79.6°	31°29.6'	+04.4'	80.2°	31°39.5'	+05.6'	80.8°	31°48.7'	+06.8'	81.4°	14
15	30°43.4'	-01.1'	76.7°	30°57.0'	+00.1'	77.3°	31°09.9'	+01.3'	77.9°	31°22.2'	+02.5'	78.4°	31°33.9'	+03.7'	79.0°	31°45.0'	+04.9'	79.7°	31°55.5'	+06.1'	80.3°	15
16	30°42.4'	-01.7'	75.5°	30°57.1'	-00.5'	76.1°	31°11.2'	+00.7'	76.7°	31°24.7'	+01.9'	77.3°	31°37.6'	+03.1'	77.9°	31°49.9'	+04.3'	78.5°	32°01.6'	+05.5'	79.1°	16
17	30°40.7'	-02.3'	74.4°	30°56.6'	-01.1'	74.9°	31°11.9'	+00.0'	75.5°	31°26.6'	+01.2'	76.1°	31°40.7'	+02.4'	76.7°	31°54.2'	+03.6'	77.3°	32°07.1'	+04.8'	77.9°	17
18	30°38.4'	-02.9'	73.2°	30°55.5'	-01.8'	73.8°	31°12.0'	-00.6'	74.3°	31°27.8'	+00.6'	74.9°	31°43.1'	+01.8'	75.5°	31°57.8'	+03.0'	76.1°	32°11.9'	+04.2'	76.7°	18
19	30°35.5'	-03.5'	72.0°	30°53.7'	-02.4'	72.6°	31°11.4'	-01.2'	73.2°	31°28.4'	00.0'	73.8°	31°44.9'	+01.1'	74.4°	32°00.8'	+02.3'	75.0°	32°16.1'	+03.5'	75.6°	19
20	30°31.9'	-04.2'	70.9°	30°51.3'	-03.0'	71.4°	31°10.1'	-01.9'	72.0°	31°28.4'	-00.7'	72.6°	31°46.1'	+00.5'	73.2°	32°03.1'	+01.7'	73.8°	32°19.6'	+02.8'	74.4°	20
21	30°27.8'	-04.8'	69.7°	30°48.3'	-03.6'	70.3°	31°08.3'	-02.5'	70.8°	31°27.7'	-01.3'	71.4°	31°46.5'	-00.2'	72.0°	32°04.8'	+01.0'	72.6°	32°22.4'	+02.2'	73.2°	21
22	30°23.0'	-05.4'	68.6°	30°44.7'	-04.2'	69.1°	31°05.8'	-03.1'	69.7°	31°26.4'	-02.0'	70.2°	31°46.4'	-00.8'	70.8°	32°05.8'	+00.3'	71.4°	32°24.6'	+01.5'	72.0°	22
23	30°17.7'	-06.0'	67.4°	30°40.4'	-04.9'	68.0°	31°02.7'	-03.7'	68.5°	31°24.4'	-02.6'	69.1°	31°45.6'	-01.5'	69.6°	32°06.1'	-00.3'	70.2°	32°26.1'	+00.9'	70.8°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	7			8			9			10			11			12			13			

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°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	28°45.8'	+08.1'	93.9°	28°41.5'	+09.2'	94.4°	28°36.6'	+10.4'	95.0°	28°31.1'	+11.6'	95.5°	28°25.1'	+12.7'	96.0°	28°18.5'	+13.9'	96.6°	28°11.3'	+15.0'	97.1°	0
1	28°53.9'	+07.5'	92.7°	28°50.7'	+08.7'	93.3°	28°47.0'	+09.9'	93.8°	28°42.7'	+11.0'	94.4°	28°37.8'	+12.2'	94.9°	28°32.4'	+13.4'	95.5°	28°26.4'	+14.5'	96.0°	1
2	29°01.4'	+06.9'	91.6°	28°59.4'	+08.1'	92.2°	28°56.9'	+09.3'	92.7°	28°53.7'	+10.5'	93.3°	28°50.0'	+11.6'	93.8°	28°45.8'	+12.8'	94.4°	28°40.9'	+14.0'	94.9°	2
3	29°08.3'	+06.3'	90.5°	29°07.5'	+07.5'	91.0°	29°06.1'	+08.7'	91.6°	29°04.2'	+09.9'	92.1°	29°01.7'	+11.1'	92.7°	28°58.6'	+12.3'	93.2°	28°54.9'	+13.4'	93.8°	3
4	29°14.6'	+05.8'	89.3°	29°15.0'	+07.0'	89.9°	29°14.9'	+08.1'	90.4°	29°14.1'	+09.3'	91.0°	29°12.8'	+10.5'	91.6°	29°10.8'	+11.7'	92.1°	29°08.3'	+12.9'	92.7°	4
5	29°20.4'	+05.2'	88.2°	29°22.0'	+06.4'	88.7°	29°23.0'	+07.6'	89.3°	29°23.4'	+08.8'	89.9°	29°23.3'	+09.9'	90.4°	29°22.5'	+11.1'	91.0°	29°21.2'	+12.3'	91.6°	5
6	29°25.6'	+04.6'	87.0°	29°28.4'	+05.8'	87.6°	29°30.6'	+07.0'	88.2°	29°32.2'	+08.2'	88.7°	29°33.2'	+09.4'	89.3°	29°33.7'	+10.6'	89.9°	29°33.5'	+11.7'	90.4°	6
7	29°30.1'	+04.0'	85.9°	29°34.2'	+05.2'	86.5°	29°37.6'	+06.4'	87.0°	29°40.4'	+07.6'	87.6°	29°42.6'	+08.8'	88.2°	29°44.2'	+10.0'	88.7°	29°45.2'	+11.2'	89.3°	7
8	29°34.2'	+03.4'	84.7°	29°39.3'	+04.6'	85.3°	29°44.0'	+05.8'	85.9°	29°48.0'	+07.0'	86.5°	29°51.4'	+08.2'	87.0°	29°54.2'	+09.4'	87.6°	29°56.4'	+10.6'	88.2°	8
9	29°37.6'	+02.8'	83.6°	29°44.0'	+04.0'	84.2°	29°49.8'	+05.2'	84.7°	29°55.0'	+06.4'	85.3°	29°59.6'	+07.6'	85.9°	30°03.6'	+08.8'	86.5°	30°07.0'	+10.0'	87.0°	9
10	29°40.4'	+02.2'	82.4°	29°48.0'	+03.4'	83.0°	29°55.0'	+04.6'	83.6°	30°01.4'	+05.8'	84.2°	30°07.2'	+07.0'	84.7°	30°12.4'	+08.2'	85.3°	30°17.0'	+09.4'	85.9°	10
11	29°42.6'	+01.6'	81.3°	29°51.4'	+02.8'	81.9°	29°59.6'	+04.0'	82.4°	30°07.2'	+05.2'	83.0°	30°14.2'	+06.4'	83.6°	30°20.6'	+07.6'	84.2°	30°26.4'	+08.8'	84.8°	11
12	29°44.2'	+01.0'	80.1°	29°54.2'	+02.2'	80.7°	30°03.6'	+03.4'	81.3°	30°12.4'	+04.6'	81.9°	30°20.6'	+05.8'	82.4°	30°28.2'	+07.0'	83.0°	30°35.2'	+08.2'	83.6°	12
13	29°45.2'	+00.4'	79.0°	29°56.4'	+01.6'	79.6°	30°07.0'	+02.8'	80.1°	30°17.0'	+04.0'	80.7°	30°26.4'	+05.2'	81.3°	30°35.2'	+06.4'	81.9°	30°43.3'	+07.6'	82.5°	13
14	29°45.7'	-00.2'	77.8°	29°58.0'	+01.0'	78.4°	30°09.8'	+02.2'	79.0°	30°21.0'	+03.4'	79.5°	30°31.6'	+04.6'	80.1°	30°41.5'	+05.8'	80.7°	30°50.9'	+07.0'	81.3°	14
15	29°45.5'	-00.8'	76.7°	29°59.0'	+00.4'	77.3°	30°12.0'	+01.6'	77.8°	30°24.3'	+02.8'	78.4°	30°36.1'	+04.0'	79.0°	30°47.3'	+05.1'	79.6°	30°57.9'	+06.3'	80.1°	15
16	29°44.7'	-01.4'	75.5°	29°59.4'	-00.2'	76.1°	30°13.6'	+01.0'	76.7°	30°27.1'	+02.2'	77.2°	30°40.1'	+03.3'	77.8°	30°52.4'	+04.5'	78.4°	31°04.2'	+05.7'	79.0°	16
17	29°43.4'	-02.0'	74.4°	29°59.2'	-00.8'	74.9°	30°14.5'	+00.4'	75.5°	30°29.3'	+01.5'	76.1°	30°43.4'	+02.7'	76.6°	30°57.0'	+03.9'	77.2°	31°09.9'	+05.1'	77.8°	17
18	29°41.4'	-02.6'	73.2°	29°58.4'	-01.4'	73.8°	30°14.9'	-00.2'	74.3°	30°30.8'	+00.9'	74.9°	30°46.1'	+02.1'	75.5°	31°00.9'	+03.3'	76.1°	31°15.0'	+04.5'	76.7°	18
19	29°38.8'	-03.2'	72.1°	29°57.0'	-02.0'	72.6°	30°14.6'	-00.9'	73.2°	30°31.7'	+00.3'	73.8°	30°48.2'	+01.5'	74.3°	31°04.1'	+02.6'	74.9°	31°19.5'	+03.8'	75.5°	19
20	29°35.7'	-03.8'	70.9°	29°55.0'	-02.6'	71.5°	30°13.8'	-01.5'	72.0°	30°32.0'	-00.3'	72.6°	30°49.7'	+00.8'	73.2°	31°06.8'	+02.0'	73.7°	31°23.3'	+03.2'	74.3°	20
21	29°31.9'	-04.3'	69.8°	29°52.4'	-03.2'	70.3°	30°12.3'	-02.1'	70.9°	30°31.7'	-00.9'	71.4°	30°50.5'	+00.2'	72.0°	31°08.8'	+01.4'	72.6°	31°26.5'	+02.5'	73.1°	21
22	29°27.6'	-04.9'	68.6°	29°49.2'	-03.8'	69.2°	30°10.2'	-02.7'	69.7°	30°30.8'	-01.6'	70.3°	30°50.7'	-00.4'	70.8°	31°10.2'	+00.7'	71.4°	31°29.0'	+01.9'</		

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

62° 298° LHA

Latitude SAME as Declination

62° 298° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	27°46.4'	+08.0'	93.7°	27°42.2'	+09.2'	94.2°	27°37.5'	+10.3'	94.8°	27°32.3'	+11.5'	95.3°	27°26.5'	+12.6'	95.8°	27°20.2'	+13.8'	96.3°	27°13.3'	+14.9'	96.8°	0
1	27°54.4'	+07.4'	92.6°	27°51.4'	+08.6'	93.1°	27°47.9'	+09.8'	93.6°	27°43.8'	+11.0'	94.2°	27°39.1'	+12.1'	94.7°	27°34.0'	+13.3'	95.2°	27°28.2'	+14.4'	95.7°	1
2	28°01.8'	+06.9'	91.5°	28°00.0'	+08.1'	92.0°	27°57.7'	+09.2'	92.5°	27°54.7'	+10.4'	93.1°	27°51.3'	+11.6'	93.6°	27°47.2'	+12.7'	94.1°	27°42.7'	+13.9'	94.6°	2
3	28°08.7'	+06.3'	90.3°	28°08.1'	+07.5'	90.9°	28°06.9'	+08.7'	91.4°	28°05.1'	+09.9'	91.9°	28°02.8'	+11.0'	92.5°	28°00.0'	+12.2'	93.0°	27°56.5'	+13.4'	93.5°	3
4	28°15.1'	+05.8'	89.2°	28°15.6'	+07.0'	89.7°	28°15.6'	+08.2'	90.3°	28°15.0'	+09.3'	90.8°	28°13.9'	+10.5'	91.4°	28°12.2'	+11.7'	91.9°	28°09.9'	+12.8'	92.4°	4
5	28°20.9'	+05.2'	88.1°	28°22.6'	+06.4'	88.6°	28°23.8'	+07.6'	89.2°	28°24.4'	+08.8'	89.7°	28°24.4'	+10.0'	90.2°	28°23.8'	+11.1'	90.8°	28°22.7'	+12.3'	91.3°	5
6	28°26.1'	+04.7'	86.9°	28°29.0'	+05.8'	87.5°	28°31.3'	+07.0'	88.0°	28°33.1'	+08.2'	88.6°	28°34.3'	+09.4'	89.1°	28°35.0'	+10.6'	89.7°	28°35.0'	+11.7'	90.2°	6
7	28°30.8'	+04.1'	85.8°	28°34.9'	+05.3'	86.4°	28°38.4'	+06.5'	86.9°	28°41.3'	+07.7'	87.4°	28°43.7'	+08.8'	88.0°	28°45.5'	+10.0'	88.5°	28°46.8'	+11.2'	89.1°	7
8	28°34.9'	+03.5'	84.7°	28°40.1'	+04.7'	85.2°	28°44.8'	+05.9'	85.8°	28°49.0'	+07.1'	86.3°	28°52.6'	+08.3'	86.9°	28°55.6'	+09.5'	87.4°	28°58.0'	+10.6'	88.0°	8
9	28°38.4'	+03.0'	83.5°	28°44.8'	+04.1'	84.1°	28°50.8'	+05.3'	84.6°	28°56.1'	+06.5'	85.2°	29°00.8'	+07.7'	85.7°	29°05.0'	+08.9'	86.3°	29°08.6'	+10.1'	86.8°	9
10	28°41.3'	+02.4'	82.4°	28°49.0'	+03.6'	82.9°	28°56.1'	+04.8'	83.5°	29°02.6'	+05.9'	84.0°	29°08.5'	+07.1'	84.6°	29°13.9'	+08.3'	85.2°	29°18.7'	+09.5'	85.7°	10
11	28°43.7'	+01.8'	81.3°	28°52.6'	+03.0'	81.8°	29°00.8'	+04.2'	82.4°	29°08.5'	+05.4'	82.9°	29°15.7'	+06.5'	83.5°	29°22.2'	+07.7'	84.0°	29°28.2'	+08.9'	84.6°	11
12	28°45.5'	+01.2'	80.1°	28°55.6'	+02.4'	80.7°	29°05.0'	+03.6'	81.2°	29°13.9'	+04.8'	81.8°	29°22.2'	+06.0'	82.3°	29°29.9'	+07.1'	82.9°	29°37.1'	+08.3'	83.4°	12
13	28°46.8'	+00.7'	79.0°	28°58.0'	+01.8'	79.5°	29°08.6'	+03.0'	80.1°	29°18.7'	+04.2'	80.6°	29°28.2'	+05.4'	81.2°	29°37.1'	+06.6'	81.7°	29°45.4'	+07.7'	82.3°	13
14	28°47.5'	+00.1'	77.8°	28°59.8'	+01.3'	78.4°	29°11.6'	+02.4'	78.9°	29°22.9'	+03.6'	79.5°	29°33.5'	+04.8'	80.0°	29°43.6'	+06.0'	80.6°	29°53.1'	+07.1'	81.2°	14
15	28°47.5'	-00.5'	76.7°	29°01.1'	+00.7'	77.2°	29°14.0'	+01.8'	77.8°	29°26.5'	+03.0'	78.3°	29°38.3'	+04.2'	78.9°	29°49.6'	+05.4'	79.4°	30°00.3'	+06.6'	80.0°	15
16	28°47.1'	-01.1'	75.6°	29°01.7'	+00.1'	76.1°	29°15.9'	+01.3'	76.6°	29°29.5'	+02.4'	77.2°	29°42.5'	+03.6'	77.7°	29°55.0'	+04.8'	78.3°	30°06.8'	+06.0'	78.9°	16
17	28°46.0'	-01.6'	74.4°	29°01.8'	-00.5'	74.9°	29°17.2'	+00.7'	75.5°	29°31.9'	+01.8'	76.0°	29°46.1'	+03.0'	76.6°	29°59.7'	+04.2'	77.1°	30°12.8'	+05.3'	77.7°	17
18	28°44.4'	-02.2'	73.3°	29°01.4'	-01.1'	73.8°	29°17.8'	+00.1'	74.3°	29°33.7'	+01.2'	74.9°	29°49.1'	+02.4'	75.4°	30°03.9'	+03.6'	76.0°	30°18.1'	+04.7'	76.6°	18
19	28°42.2'	-02.8'	72.1°	29°00.3'	-01.6'	72.7°	29°17.9'	-00.5'	73.2°	29°35.0'	+00.6'	73.7°	29°51.5'	+01.8'	74.3°	30°07.5'	+03.0'	74.8°	30°22.9'	+04.1'	75.4°	19
20	28°39.4'	-03.4'	71.0°	28°58.6'	-02.2'	71.5°	29°17.4'	-01.1'	72.0°	29°35.6'	+00.1'	72.6°	29°53.3'	+01.2'	73.1°	30°10.4'	+02.4'	73.7°	30°27.0'	+03.5'	74.2°	20
21	28°36.0'	-03.9'	69.9°	28°56.4'	-02.8'	70.4°	29°16.3'	-01.7'	70.9°	29°35.7'	-00.5'	71.4°	29°54.5'	+00.6'	72.0°	30°12.8'	+01.7'	72.5°	30°30.5'	+02.9'	73.1°	21
22	28°32.1'	-04.5'	68.7°	28°53.6'	-03.4'	69.2°	29°14.6'	-02.3'	69.8°	29°35.1'	-01.1'	70.3°	29°55.1'	-00.0'	70.8°	30°14.5'	+01.1'	71.4°	30°33.4'	+02.3'	71.9°	22
23	28°27.6'	-05.1'	67.6°	28°50.2'	-04.0'	68.1°	29°12.4'	-02.8'	68.6°	29°34.0'	-01.7'	69.1°	29°55.1'	00.6'	69.7°	30°15.7'	+00.5'	70.2°	30°35.7'	+01.7'	70.8°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	7			8			9			10			11			12			13			Dec°

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°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	26°47.0'	+07.9'	93.6°	26°43.0'	+09.1'	94.1°	26°38.5'	+10.2'	94.6°	26°33.4'	+11.4'	95.1°	26°27.9'	+12.5'	95.6°	26°21.8'	+13.7'	96.0°	26°15.3'	+14.8'	96.5°	0
1	26°54.9'	+07.4'	92.4°	26°52.1'	+08.6'	92.9°	26°48.7'	+09.7'	93.5°	26°44.8'	+10.9'	94.0°	26°40.4'	+12.0'	94.5°	26°35.5'	+13.2'	95.0°	26°30.1'	+14.3'	95.5°	1
2	27°02.3'	+06.9'	91.3°	27°00.6'	+08.0'	91.8°	26°58.4'	+09.2'	92.3°	26°55.7'	+10.4'	92.9°	26°52.5'	+11.5'	93.4°	26°48.7'	+12.7'	93.9°	26°44.4'	+13.8'	94.4°	2
3	27°09.2'	+06.4'	90.2°	27°08.7'	+07.5'	90.7°	27°07.7'	+08.7'	91.2°	27°06.1'	+09.8'	91.8°	27°04.0'	+11.0'	92.3°	27°01.4'	+12.2'	92.8°	26°58.2'	+13.3'	93.3°	3
4	27°15.5'	+05.8'	89.1°	27°16.2'	+07.0'	89.6°	27°16.3'	+08.2'	90.1°	27°15.9'	+09.3'	90.6°	27°15.0'	+10.5'	91.2°	27°13.5'	+11.6'	91.7°	27°11.5'	+12.8'	92.2°	4
5	27°21.3'	+05.3'	88.0°	27°23.2'	+06.5'	88.5°	27°24.5'	+07.6'	89.0°	27°25.3'	+08.8'	89.5°	27°25.5'	+10.0'	90.0°	27°25.2'	+11.1'	90.6°	27°24.3'	+12.3'	91.1°	5
6	27°26.6'	+04.7'	86.9°	27°29.6'	+05.9'	87.4°	27°32.1'	+07.1'	87.9°	27°34.1'	+08.3'	88.4°	27°35.4'	+09.4'	88.9°	27°36.3'	+10.6'	89.5°	27°36.6'	+11.8'	90.0°	6
7	27°31.4'	+04.2'	85.7°	27°35.6'	+05.4'	86.2°	27°39.2'	+06.5'	86.8°	27°42.3'	+07.7'	87.3°	27°44.9'	+08.9'	87.8°	27°46.9'	+10.1'	88.3°	27°48.3'	+11.2'	88.9°	7
8	27°35.6'	+03.7'	84.6°	27°40.9'	+04.8'	85.1°	27°45.8'	+06.0'	85.6°	27°50.0'	+07.2'	86.2°	27°53.8'	+08.3'	86.7°	27°56.9'	+09.5'	87.2°	27°59.6'	+10.7'	87.8°	8
9	27°39.2'	+03.1'	83.5°	27°45.8'	+04.3'	84.0°	27°51.8'	+05.5'	84.5°	27°57.2'	+06.6'	85.1°	28°02.1'	+07.8'	85.6°	28°06.4'	+09.0'	86.1°	28°10.2'	+10.1'	86.6°	9
10	27°42.3'	+02.6'	82.3°	27°50.0'	+03.7'	82.9°	27°57.2'	+04.9'	83.4°	28°03.8'	+06.1'	83.9°	28°09.9'	+07.2'	84.5°	28°15.4'	+08.4'	85.0°	28°20.4'	+09.6'	85.5°	10
11	27°44.9'	+02.0'	81.2°	27°53.8'	+03.2'	81.7°	28°02.1'	+04.3'	82.3°	28°09.9'	+05.5'	82.8°	28°17.1'	+06.7'	83.3°	28°23.8'	+07.9'	83.9°	28°30.0'	+09.0'	84.4°	11
12	27°46.9'	+01.5'	80.1°	27°56.9'	+02.6'	80.6°	28°06.4'	+03.8'	81.1°	28°15.4'	+05.0'	81.7°	28°23.8'	+06.1'	82.2°	28°31.7'	+07.3'	82.7°	28°39.0'	+08.5'	83.3°	12
13	27°48.3'	+00.9'	79.0°	27°59.6'	+02.1'	79.5°	28°10.2'	+03.2'	80.0°	28°20.4'	+04.4'	80.5°	28°30.0'	+05.6'	81.1°	28°39.0'	+06.7'	81.6°	28°47.5'	+07.9'	82.2°	13
14	27°49.2'	+00.4'	77.8°	28°01.6'	+01.5'	78.3°	28°13.5'	+02.7'	78.9°	28°24.8'	+03.8'	79.4°	28°35.5'	+05.0'	79.9°	28°45.7'	+06.2'	80.5°	28°55.4'	+07.3'	81.0°	14
15	27°49.6'	-00.2'	76.7°	28°03.1'	+00.9'	77.2°	28°16.1'	+02.1'	77.7°	28°28.6'	+03.3'	78.3°	28°40.5'	+04.4'	78.8°	28°51.9'	+05.6'	79.3°	29°02.7'	+06.8'	79.9°	15
16	27°49.4'	-00.8'	75.6°	28°04.1'	+00.4'	76.1°	28°18.2'	+01.5'	76.6°	28°31.9'	+02.7'	77.1°	28°45.0'	+03.9'	77.7°	28°57.5'	+05.0'	78.2°	29°09.5'	+06.2'	78.7°	16
17	27°48.6'	-01.3'	74.4°	28°04.5'	-00.2'	75.0°	28°19.8'	+01.0'	75.5°	28°34.6'	+02.1'	76.0°	28°48.8'	+03.3'	76.5°	29°02.5'	+04.4'	77.1°	29°15.7'	+05.6'	77.6°	17
18	27°47.3'	-01.9'	73.3°	28°04.3'	-00.7'	73.8°	28°20.8'	+00.4'	74.3°	28°36.7'	+01.6'	74.9°	28°52.1'	+02.7'	75.4°	29°07.0'	+03.9'	75.9°	29°21.3'	+05.0'	76.5°	18
19	27°45.5'	-02.4'	72.2°	28°03.6'	-01.3'	72.7°	28°21.2'	-00.2'	73.2°	28°38.3'	+01.0'	73.7°	28°54.8'	+02.1'	74.2°	29°10.8'	+03.3'	74.8°	29°26.3'	+04.4'	75.3°	19
20	27°43.1'	-03.0'	71.0°	28°02.3'	-01.8'	71.6°	28°21.0'	-00.7'	72.1°	28°39.2'	+00.4'	72.6°	28°57.0'	+01.6'	73.1°	29°14.1'	+02.7'	73.6°	29°30.8'	+03.8'	74.2°	20
21	27°40.1'	-03.5'	69.9°	28°00.4'	-02.4'	70.4°	28°20.3'	-01.3'	70.9°	28°39.7'	-00.2'	71.4°	28°58.5'	+01.0'	72.0°	29°16.8'	+02.1'	72.5°	29°34.6'	+03.3'	73.0°	21
22	27°36																					

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

64° 296° LHA

Latitude SAME as Declination

64° 296° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	25°47.5'	+07.9'	93.4°	25°43.7'	+09.0'	93.9°	25°39.4'	+10.2'	94.4°	25°34.6'	+11.3'	94.8°	25°29.3'	+12.4'	95.3°	25°23.5'	+13.6'	95.8°	25°17.2'	+14.7'	96.3°	0
1	25°55.4'	+07.4'	92.3°	25°52.7'	+08.5'	92.8°	25°49.6'	+09.7'	93.3°	25°45.9'	+10.8'	93.8°	25°41.7'	+12.0'	94.2°	25°37.0'	+13.1'	94.7°	25°31.8'	+14.2'	95.2°	1
2	26°02.8'	+06.9'	91.2°	26°01.2'	+08.0'	91.7°	25°59.2'	+09.2'	92.2°	25°56.7'	+10.3'	92.7°	25°53.7'	+11.5'	93.1°	25°50.1'	+12.6'	93.6°	25°46.1'	+13.7'	94.1°	2
3	26°09.6'	+06.4'	90.1°	26°09.3'	+07.5'	90.6°	26°08.4'	+08.7'	91.1°	26°07.0'	+09.8'	91.6°	26°05.1'	+11.0'	92.1°	26°02.7'	+12.1'	92.5°	25°59.8'	+13.3'	93.0°	3
4	26°16.0'	+05.8'	89.0°	26°16.8'	+07.0'	89.5°	26°17.1'	+08.2'	90.0°	26°16.9'	+09.3'	90.5°	26°16.1'	+10.5'	91.0°	26°14.9'	+11.6'	91.4°	26°13.1'	+12.8'	91.9°	4
5	26°21.8'	+05.3'	87.9°	26°23.8'	+06.5'	88.4°	26°25.2'	+07.7'	88.9°	26°26.2'	+08.8'	89.4°	26°26.6'	+10.0'	89.9°	26°26.5'	+11.1'	90.4°	26°25.8'	+12.3'	90.9°	5
6	26°27.2'	+04.8'	86.8°	26°30.3'	+06.0'	87.3°	26°32.9'	+07.1'	87.8°	26°35.0'	+08.3'	88.3°	26°36.6'	+09.5'	88.8°	26°37.6'	+10.6'	89.3°	26°38.1'	+11.8'	89.8°	6
7	26°32.0'	+04.3'	85.6°	26°36.3'	+05.5'	86.1°	26°40.0'	+06.6'	86.6°	26°43.3'	+07.8'	87.1°	26°46.0'	+08.9'	87.7°	26°48.2'	+10.1'	88.2°	26°49.9'	+11.3'	88.7°	7
8	26°36.3'	+03.8'	84.5°	26°41.7'	+04.9'	85.0°	26°46.7'	+06.1'	85.5°	26°51.1'	+07.3'	86.0°	26°55.0'	+08.4'	86.5°	26°58.3'	+09.6'	87.0°	27°01.1'	+10.7'	87.6°	8
9	26°40.0'	+03.2'	83.4°	26°46.7'	+04.4'	83.9°	26°52.8'	+05.6'	84.4°	26°58.3'	+06.7'	84.9°	27°03.4'	+07.9'	85.4°	27°07.9'	+09.1'	85.9°	27°11.9'	+10.2'	86.5°	9
10	26°43.3'	+02.7'	82.3°	26°51.1'	+03.9'	82.8°	26°58.3'	+05.0'	83.3°	27°05.1'	+06.2'	83.8°	27°11.3'	+07.4'	84.3°	27°17.0'	+08.5'	84.8°	27°22.1'	+09.7'	85.3°	10
11	26°46.0'	+02.2'	81.2°	26°55.0'	+03.4'	81.7°	27°03.4'	+04.5'	82.2°	27°11.3'	+05.7'	82.7°	27°18.7'	+06.8'	83.2°	27°25.5'	+08.0'	83.7°	27°31.8'	+09.2'	84.2°	11
12	26°48.2'	+01.7'	80.1°	26°58.3'	+02.8'	80.6°	27°07.9'	+04.0'	81.1°	27°17.0'	+05.1'	81.6°	27°25.5'	+06.3'	82.1°	27°33.5'	+07.5'	82.6°	27°41.0'	+08.6'	83.1°	12
13	26°49.9'	+01.1'	78.9°	27°01.1'	+02.3'	79.4°	27°11.9'	+03.4'	79.9°	27°22.1'	+04.6'	80.4°	27°31.8'	+05.8'	81.0°	27°41.0'	+06.9'	81.5°	27°49.6'	+08.1'	82.0°	13
14	26°51.0'	+00.6'	77.8°	27°03.4'	+01.8'	78.3°	27°15.3'	+02.9'	78.8°	27°26.7'	+04.1'	79.3°	27°37.6'	+05.2'	79.8°	27°47.9'	+06.4'	80.4°	27°57.7'	+07.5'	80.9°	14
15	26°51.6'	+00.1'	76.7°	27°05.2'	+01.2'	77.2°	27°18.2'	+02.4'	77.7°	27°30.8'	+03.5'	78.2°	27°42.8'	+04.7'	78.7°	27°54.2'	+05.8'	79.2°	28°05.2'	+07.0'	79.8°	15
16	26°51.7'	-00.5'	75.6°	27°06.4'	+00.7'	76.1°	27°20.6'	+01.8'	76.6°	27°34.3'	+03.0'	77.1°	27°47.4'	+04.1'	77.6°	28°00.1'	+05.3'	78.1°	28°12.2'	+06.4'	78.6°	16
17	26°51.3'	-01.0'	74.5°	27°07.1'	+00.1'	74.9°	27°22.4'	+01.3'	75.4°	27°37.2'	+02.4'	75.9°	27°51.6'	+03.6'	76.5°	28°05.3'	+04.7'	77.0°	28°18.6'	+05.9'	77.5°	17
18	26°50.3'	-01.5'	73.3°	27°07.2'	-00.4'	73.8°	27°23.7'	+00.7'	74.3°	27°39.7'	+01.9'	74.8°	27°55.1'	+03.0'	75.3°	28°10.1'	+04.2'	75.8°	28°24.5'	+05.3'	76.4°	18
19	26°48.8'	-02.0'	72.2°	27°06.8'	-00.9'	72.7°	27°24.4'	+00.2'	73.2°	27°41.5'	+01.3'	73.7°	27°58.1'	+02.5'	74.2°	28°14.2'	+03.6'	74.7°	28°29.8'	+04.7'	75.2°	19
20	26°46.7'	-02.6'	71.1°	27°05.9'	-01.5'	71.6°	27°24.6'	-00.3'	72.1°	27°42.9'	+00.8'	72.6°	28°00.6'	+01.9'	73.1°	28°17.8'	+03.0'	73.6°	28°34.5'	+04.2'	74.1°	20
21	26°44.2'	-03.1'	70.0°	27°04.5'	-02.0'	70.5°	27°24.3'	-00.9'	70.9°	27°43.7'	+00.2'	71.4°	28°02.5'	+01.3'	71.9°	28°20.9'	+02.5'	72.4°	28°38.7'	+03.6'	73.0°	21
22	26°41.1'	-03.6'	68.9°	27°02.5'	-02.5'	69.3°	27°23.4'	-01.4'	69.8°	27°43.9'	-00.3'	70.3°	28°03.9'	+00.8'	70.8°	28°23.3'	+01.9'	71.3°	28°42.3'	+03.0'	71.8°	22
23	26°37.4'	-04.1'	67.7°	27°00.0'	-03.1'	68.2°	27°22.0'	-02.0'	68.7°	27°43.6'	-00.9'	69.2°	28°04.6'	+00.2'	69.7°	28°25.2'	+01.3'	70.2°	28°45.3'	+02.5'	70.7°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	7			8			9			10			11			12			13			

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°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	24°48.1'	+07.8'	93.3°	24°44.4'	+09.0'	93.7°	24°40.3'	+10.1'	94.2°	24°35.7'	+11.2'	94.6°	24°30.6'	+12.4'	95.1°	24°25.1'	+13.5'	95.5°	24°19.0'	+14.6'	96.0°	0
1	24°55.9'	+07.3'	92.2°	24°53.4'	+08.5'	92.6°	24°50.4'	+09.6'	93.1°	24°46.9'	+10.8'	93.5°	24°43.0'	+11.9'	94.0°	24°38.5'	+13.0'	94.5°	24°33.6'	+14.1'	94.9°	1
2	25°03.2'	+06.9'	91.1°	25°01.9'	+08.0'	91.5°	25°00.0'	+09.1'	92.0°	24°57.7'	+10.3'	92.5°	24°54.8'	+11.4'	92.9°	24°51.5'	+12.6'	93.4°	24°47.8'	+13.7'	93.9°	2
3	25°10.1'	+06.4'	90.0°	25°09.9'	+07.5'	90.4°	25°09.2'	+08.7'	90.9°	25°08.0'	+09.8'	91.4°	25°06.3'	+10.9'	91.8°	25°04.1'	+12.1'	92.3°	25°01.4'	+13.2'	92.8°	3
4	25°16.4'	+05.9'	88.9°	25°17.4'	+07.0'	89.3°	25°17.8'	+08.2'	89.8°	25°17.8'	+09.3'	90.3°	25°17.2'	+10.5'	90.8°	25°16.2'	+11.6'	91.2°	25°14.6'	+12.7'	91.7°	4
5	25°22.3'	+05.4'	87.8°	25°24.4'	+06.5'	88.2°	25°26.0'	+07.7'	88.7°	25°27.1'	+08.8'	89.2°	25°27.7'	+10.0'	89.7°	25°27.8'	+11.1'	90.1°	25°27.4'	+12.3'	90.6°	5
6	25°27.7'	+04.9'	86.7°	25°30.9'	+06.0'	87.1°	25°33.7'	+07.2'	87.6°	25°35.9'	+08.3'	88.1°	25°37.7'	+09.5'	88.6°	25°38.9'	+10.6'	89.1°	25°39.7'	+11.8'	89.5°	6
7	25°32.6'	+04.4'	85.6°	25°37.0'	+05.5'	86.0°	25°40.9'	+06.7'	86.5°	25°44.3'	+07.9'	87.0°	25°47.2'	+09.0'	87.5°	25°49.6'	+10.2'	88.0°	25°51.4'	+11.3'	88.4°	7
8	25°37.0'	+03.9'	84.5°	25°42.5'	+05.0'	84.9°	25°47.6'	+06.2'	85.4°	25°52.1'	+07.4'	85.9°	25°56.2'	+08.5'	86.4°	25°59.7'	+09.7'	86.9°	26°02.7'	+10.8'	87.4°	8
9	25°40.9'	+03.4'	83.3°	25°47.6'	+04.5'	83.8°	25°53.8'	+05.7'	84.3°	25°59.5'	+06.9'	84.8°	26°04.7'	+08.0'	85.3°	26°09.4'	+09.2'	85.8°	26°13.5'	+10.3'	86.3°	9
10	25°44.3'	+02.9'	82.2°	25°52.1'	+04.0'	82.7°	25°59.5'	+05.2'	83.2°	26°06.3'	+06.3'	83.7°	26°12.7'	+07.5'	84.2°	26°18.5'	+08.6'	84.7°	26°23.8'	+09.8'	85.2°	10
11	25°47.2'	+02.4'	81.1°	25°56.2'	+03.5'	81.6°	26°04.7'	+04.7'	82.1°	26°12.7'	+05.8'	82.6°	26°20.2'	+07.0'	83.1°	26°27.2'	+08.1'	83.6°	26°33.6'	+09.3'	84.1°	11
12	25°49.6'	+01.9'	80.0°	25°59.7'	+03.0'	80.5°	26°09.4'	+04.2'	81.0°	26°18.5'	+05.3'	81.5°	26°27.2'	+06.5'	82.0°	26°35.3'	+07.6'	82.5°	26°42.9'	+08.8'	83.0°	12
13	25°51.4'	+01.4'	78.9°	26°02.7'	+02.5'	79.4°	26°13.5'	+03.7'	79.9°	26°23.8'	+04.8'	80.4°	26°33.6'	+06.0'	80.8°	26°42.9'	+07.1'	81.3°	26°51.7'	+08.3'	81.8°	13
14	25°52.8'	+00.9'	77.8°	26°05.2'	+02.0'	78.3°	26°17.2'	+03.1'	78.8°	26°28.6'	+04.3'	79.2°	26°39.6'	+05.4'	79.7°	26°50.0'	+06.6'	80.2°	27°00.0'	+07.7'	80.7°	14
15	25°53.7'	+00.4'	76.7°	26°07.3'	+01.5'	77.2°	26°20.3'	+02.6'	77.6°	26°32.9'	+03.8'	78.1°	26°45.0'	+04.9'	78.6°	26°56.6'	+06.1'	79.1°	27°07.7'	+07.2'	79.6°	15
16	25°54.0'	-00.2'	75.6°	26°08.7'	+01.0'	76.0°	26°23.0'	+02.1'	76.5°	26°36.7'	+03.2'	77.0°	26°49.9'	+04.4'	77.5°	27°02.7'	+05.5'	78.0°	27°14.9'	+06.7'	78.5°	16
17	25°53.9'	-00.7'	74.5°	26°09.7'	+00.5'	74.9°	26°25.1'	+01.6'	75.4°	26°39.9'	+02.7'	75.9°	26°54.3'	+03.9'	76.4°	27°08.2'	+05.0'	76.9°	27°21.5'	+06.1'	77.4°	17
18	25°53.2'	-01.2'	73.4°	26°10.2'	-00.1'	73.8°	26°26.7'	+01.1'	74.3°	26°42.6'	+02.2'	74.8°	26°58.2'	+03.3'	75.3°	27°13.2'	+04.5'	75.8°	27°27.7'	+05.6'	76.3°	18
19	25°52.1'	-01.7'	72.2°	26°10.1'	-00.6'	72.7°	26°27.7'	+00.5'	73.2°	26°44.8'	+01.7'	73.7°	27°01.5'	+02.8'	74.1°	27°17.6'	+03.9'	74.6°	27°33.3'	+05.0'	75.1°	19
20	25°50.4'	-02.2'	71.1°	26°09.6'	-01.1'	71.6°	26°28.3'	+00.0'	72.1°	26°46.5'	+01.1'	72.5°	27°04.3'	+02.3'	73.0°	27°21.5'	+03.4'	73.5°	27°38.3'	+04.5'	74.0°	20
21	25°48.2'	-02.7'	70.0°	26°08.5'	-01.6'	70.5°	26°28.3'	-00.5'	70.9°	26°47.6'	+00.6'	71.4°	27°06.5'	+01.7'	71.9°	27°24.9'	+02.8'	72.4°	27°42.8'	+04.0'	72.9°	21
22	25°45.5'</																					

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

66° 294° LHA

Latitude SAME as Declination

66° 294° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	23°48.6'	+07.8'	93.1°	23°45.1'	+08.9'	93.5°	23°41.2'	+10.0'	94.0°	23°36.8'	+11.1'	94.4°	23°31.9'	+12.3'	94.9°	23°26.6'	+13.4'	95.3°	23°20.9'	+14.5'	95.7°	0
1	23°56.4'	+07.3'	92.0°	23°54.0'	+08.4'	92.5°	23°51.2'	+09.6'	92.9°	23°47.9'	+10.7'	93.3°	23°44.2'	+11.8'	93.8°	23°40.0'	+12.9'	94.2°	23°35.4'	+14.1'	94.7°	1
2	24°03.7'	+06.8'	90.9°	24°02.5'	+08.0'	91.4°	24°00.8'	+09.1'	91.8°	23°58.6'	+10.3'	92.3°	23°56.0'	+11.4'	92.7°	23°52.9'	+12.5'	93.2°	23°49.4'	+13.6'	93.6°	2
3	24°10.5'	+06.4'	89.8°	24°10.4'	+07.5'	90.3°	24°09.9'	+08.7'	90.7°	24°08.9'	+09.8'	91.2°	24°07.4'	+10.9'	91.6°	24°05.5'	+12.1'	92.1°	24°03.0'	+13.2'	92.5°	3
4	24°16.9'	+05.9'	88.8°	24°18.0'	+07.1'	89.2°	24°18.6'	+08.2'	89.7°	24°18.7'	+09.3'	90.1°	24°18.3'	+10.5'	90.6°	24°17.5'	+11.6'	91.0°	24°16.2'	+12.7'	91.5°	4
5	24°22.8'	+05.4'	87.7°	24°25.0'	+06.6'	88.1°	24°26.8'	+07.7'	88.6°	24°28.0'	+08.9'	89.0°	24°28.8'	+10.0'	89.5°	24°29.1'	+11.1'	89.9°	24°28.9'	+12.3'	90.4°	5
6	24°28.3'	+05.0'	86.6°	24°31.6'	+06.1'	87.0°	24°34.5'	+07.3'	87.5°	24°36.9'	+08.4'	87.9°	24°38.8'	+09.5'	88.4°	24°40.2'	+10.7'	88.9°	24°41.2'	+11.8'	89.3°	6
7	24°33.2'	+04.5'	85.5°	24°37.7'	+05.6'	85.9°	24°41.7'	+06.8'	86.4°	24°45.3'	+07.9'	86.8°	24°48.3'	+09.1'	87.3°	24°50.9'	+10.2'	87.8°	24°53.0'	+11.3'	88.2°	7
8	24°37.7'	+04.0'	84.4°	24°43.4'	+05.2'	84.8°	24°48.5'	+06.3'	85.3°	24°53.2'	+07.4'	85.8°	24°57.4'	+08.6'	86.2°	25°01.1'	+09.7'	86.7°	25°04.3'	+10.9'	87.2°	8
9	24°41.7'	+03.5'	83.3°	24°48.5'	+04.7'	83.7°	24°54.8'	+05.8'	84.2°	25°00.7'	+07.0'	84.7°	25°06.0'	+08.1'	85.1°	25°10.8'	+09.2'	85.6°	25°15.2'	+10.4'	86.1°	9
10	24°45.3'	+03.1'	82.2°	24°53.2'	+04.2'	82.6°	25°00.7'	+05.3'	83.1°	25°07.6'	+06.5'	83.6°	25°14.1'	+07.6'	84.0°	25°20.1'	+08.8'	84.5°	25°25.6'	+09.9'	85.0°	10
11	24°48.3'	+02.6'	81.1°	24°57.4'	+03.7'	81.5°	25°06.0'	+04.9'	82.0°	25°14.1'	+06.0'	82.5°	25°21.7'	+07.1'	82.9°	25°28.9'	+08.3'	83.4°	25°35.5'	+09.4'	83.9°	11
12	24°50.9'	+02.1'	80.0°	25°01.1'	+03.2'	80.4°	25°10.8'	+04.4'	80.9°	25°20.1'	+05.5'	81.4°	25°28.9'	+06.6'	81.8°	25°37.1'	+07.8'	82.3°	25°44.9'	+08.9'	82.8°	12
13	24°53.0'	+01.6'	78.9°	25°04.3'	+02.7'	79.3°	25°15.2'	+03.9'	79.8°	25°25.6'	+05.0'	80.3°	25°35.5'	+06.1'	80.7°	25°44.9'	+07.3'	81.2°	25°53.8'	+08.4'	81.7°	13
14	24°54.6'	+01.1'	77.8°	25°07.1'	+02.2'	78.2°	25°19.1'	+03.4'	78.7°	25°30.6'	+04.5'	79.2°	25°41.6'	+05.6'	79.6°	25°52.2'	+06.8'	80.1°	26°02.3'	+07.9'	80.6°	14
15	24°55.7'	+00.6'	76.7°	25°09.3'	+01.8'	77.1°	25°22.5'	+02.9'	77.6°	25°35.1'	+04.0'	78.1°	25°47.3'	+05.1'	78.5°	25°59.0'	+06.3'	79.0°	26°10.2'	+07.4'	79.5°	15
16	24°56.4'	+00.1'	75.6°	25°11.1'	+01.3'	76.0°	25°25.3'	+02.4'	76.5°	25°39.1'	+03.5'	76.9°	25°52.4'	+04.6'	77.4°	26°05.3'	+05.8'	77.9°	26°17.6'	+06.9'	78.4°	16
17	24°56.5'	-00.3'	74.5°	25°12.3'	+00.8'	74.9°	25°27.7'	+01.9'	75.4°	25°42.6'	+03.0'	75.8°	25°57.1'	+04.1'	76.3°	26°11.0'	+05.3'	76.8°	26°24.5'	+06.4'	77.3°	17
18	24°56.2'	-00.8'	73.4°	25°13.1'	+00.3'	73.8°	25°29.6'	+01.4'	74.3°	25°45.6'	+02.5'	74.7°	26°01.2'	+03.6'	75.2°	26°16.3'	+04.7'	75.7°	26°30.9'	+05.9'	76.2°	18
19	24°55.3'	-01.3'	72.3°	25°13.4'	-00.2'	72.7°	25°31.0'	+00.9'	73.2°	25°48.1'	+02.0'	73.6°	26°04.8'	+03.1'	74.1°	26°21.0'	+04.2'	74.6°	26°36.8'	+05.4'	75.0°	19
20	24°54.0'	-01.8'	71.2°	25°13.2'	-00.7'	71.6°	25°31.9'	+00.4'	72.1°	25°50.1'	+01.5'	72.5°	26°07.9'	+02.6'	73.0°	26°25.3'	+03.7'	73.5°	26°42.1'	+04.8'	73.9°	20
21	24°52.2'	-02.3'	70.1°	25°12.5'	-01.2'	70.5°	25°32.3'	-00.1'	70.9°	25°51.6'	+01.0'	71.4°	26°10.5'	+02.1'	71.9°	26°29.0'	+03.2'	72.3°	26°46.9'	+04.3'	72.8°	21
22	24°49.9'	-02.8'	69.0°	25°11.3'	-01.7'	69.4°	25°32.2'	-00.6'	69.8°	25°52.6'	+00.5'	70.3°	26°12.6'	+01.6'	70.8°	26°32.2'	+02.7'	71.2°	26°51.3'	+03.8'	71.7°	22
23	24°47.2'	-03.3'	67.9°	25°09.6'	-02.2'	68.3°	25°31.5'	-01.1'	68.7°	25°53.1'	00.0'	69.2°	26°14.2'	+01.1'	69.6°	26°34.8'	+02.1'	70.1°	26°55.0'	+03.2'	70.6°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	7			8			9			10			11			12			13			

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°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	22°49.1'	+07.7'	93.0°	22°45.8'	+08.8'	93.4°	22°42.1'	+10.0'	93.8°	22°37.9'	+11.1'	94.2°	22°33.2'	+12.2'	94.6°	22°28.2'	+13.3'	95.0°	22°22.7'	+14.4'	95.5°	0
1	22°56.8'	+07.3'	91.9°	22°54.7'	+08.4'	92.3°	22°52.0'	+09.5'	92.7°	22°48.9'	+10.7'	93.2°	22°45.4'	+11.8'	93.6°	22°41.5'	+12.9'	94.0°	22°37.1'	+14.0'	94.4°	1
2	23°04.1'	+06.8'	90.8°	23°03.1'	+08.0'	91.2°	23°01.5'	+09.1'	91.7°	22°59.6'	+10.2'	92.1°	22°57.2'	+11.3'	92.5°	22°54.3'	+12.5'	92.9°	22°51.1'	+13.6'	93.3°	2
3	23°11.0'	+06.4'	89.7°	23°11.0'	+07.5'	90.2°	23°10.6'	+08.7'	90.6°	23°09.8'	+09.8'	91.0°	23°08.5'	+10.9'	91.4°	23°06.8'	+12.0'	91.9°	23°04.6'	+13.1'	92.3°	3
4	23°17.4'	+06.0'	88.6°	23°18.6'	+07.1'	89.1°	23°19.3'	+08.2'	89.5°	23°19.6'	+09.3'	89.9°	23°19.4'	+10.5'	90.4°	23°18.8'	+11.6'	90.8°	23°17.8'	+12.7'	91.2°	4
5	23°23.3'	+05.5'	87.6°	23°25.6'	+06.6'	88.0°	23°27.5'	+07.8'	88.4°	23°28.9'	+08.9'	88.9°	23°29.9'	+10.0'	89.3°	23°30.4'	+11.2'	89.7°	23°30.5'	+12.3'	90.2°	5
6	23°28.8'	+05.1'	86.5°	23°32.3'	+06.2'	86.9°	23°35.3'	+07.3'	87.3°	23°37.8'	+08.5'	87.8°	23°39.9'	+09.6'	88.2°	23°41.6'	+10.7'	88.7°	23°42.7'	+11.8'	89.1°	6
7	23°33.9'	+04.6'	85.4°	23°38.5'	+05.7'	85.8°	23°42.6'	+06.9'	86.3°	23°46.3'	+08.0'	86.7°	23°49.5'	+09.1'	87.1°	23°52.3'	+10.3'	87.6°	23°54.6'	+11.4'	88.0°	7
8	23°38.5'	+04.1'	84.3°	23°44.2'	+05.3'	84.7°	23°49.5'	+06.4'	85.2°	23°54.3'	+07.5'	85.6°	23°58.6'	+08.7'	86.1°	24°02.5'	+09.8'	86.5°	24°06.0'	+10.9'	87.0°	8
9	23°42.6'	+03.7'	83.2°	23°49.5'	+04.8'	83.6°	23°55.9'	+05.9'	84.1°	24°01.8'	+07.1'	84.5°	24°07.3'	+08.2'	85.0°	24°12.3'	+09.3'	85.4°	24°16.9'	+10.5'	85.9°	9
10	23°46.3'	+03.2'	82.1°	23°54.3'	+04.4'	82.6°	24°01.8'	+05.5'	83.0°	24°08.9'	+06.6'	83.4°	24°15.5'	+07.8'	83.9°	24°21.7'	+08.9'	84.3°	24°27.4'	+10.0'	84.8°	10
11	23°49.5'	+02.8'	81.0°	23°58.6'	+03.9'	81.5°	24°07.3'	+05.0'	81.9°	24°15.5'	+06.2'	82.4°	24°23.3'	+07.3'	82.8°	24°30.6'	+08.4'	83.3°	24°37.4'	+09.5'	83.7°	11
12	23°52.3'	+02.3'	79.9°	24°02.5'	+03.4'	80.4°	24°12.3'	+04.6'	80.8°	24°21.7'	+05.7'	81.3°	24°30.6'	+06.8'	81.7°	24°39.0'	+07.9'	82.2°	24°46.9'	+09.1'	82.6°	12
13	23°54.6'	+01.8'	78.8°	24°06.0'	+03.0'	79.3°	24°16.9'	+04.1'	79.7°	24°27.4'	+05.2'	80.2°	24°37.4'	+06.3'	80.6°	24°46.9'	+07.5'	81.1°	24°56.0'	+08.6'	81.5°	13
14	23°56.4'	+01.4'	77.8°	24°08.9'	+02.5'	78.2°	24°21.0'	+03.6'	78.6°	24°32.6'	+04.7'	79.1°	24°43.7'	+05.9'	79.5°	24°54.4'	+07.0'	80.0°	25°04.6'	+08.1'	80.4°	14
15	23°57.8'	+00.9'	76.7°	24°11.4'	+02.0'	77.1°	24°24.6'	+03.1'	77.5°	24°37.3'	+04.3'	78.0°	24°49.6'	+05.4'	78.4°	25°01.4'	+06.5'	78.9°	25°12.7'	+07.6'	79.3°	15
16	23°58.7'	+00.4'	75.6°	24°13.4'	+01.5'	76.0°	24°27.7'	+02.7'	76.4°	24°41.6'	+03.8'	76.9°	24°55.0'	+04.9'	77.3°	25°07.9'	+06.0'	77.8°	25°20.3'	+07.1'	78.2°	16
17	23°59.1'	00.0'	74.5°	24°15.0'	+01.1'	74.9°	24°30.4'	+02.2'	75.3°	24°45.3'	+03.3'	75.8°	24°59.9'	+04.4'	76.2°	25°13.9'	+05.5'	76.7°	25°27.5'	+06.7'	77.1°	17
18	23°59.1'	-00.5'	73.4°	24°16.1'	+00.6'	73.8°	24°32.6'	+01.7'	74.2°	24°48.6'	+02.8'	74.7°	25°04.3'	+03.9'	75.1°	25°19.4'	+05.0'	75.6°	25°34.1'	+06.2'	76.0°	18
19	23°58.6'	-01.0'	72.3°	24°16.7'	+00.1'	72.7°	24°34.3'	+01.2'	73.1°	24°51.5'	+02.3'	73.6°	25°08.2'	+03.4'	74.0°	25°24.5'	+04.5'	74.5°	25°40.3'	+05.7'	74.9°	19
20	23°57.7'	-01.4'	71.2°	24°16.8'	-00.3'	71.6°	24°35.5'	+00.8'	72.0°	24°53.8'	+01.8'	72.5°	25°11.6'	+02.9'	72.9°	25°29.0'	+04.0'	73.4°	25°46.0'	+05.2'	73.8°	20
21	23°56.2'	-01.9'	70.1°	24°16.5'	-00.8'	70.5°	24°36.3'	+00.3'	70.9°	24°55.6'	+01.4'	71.4°	25°14.6'	+02.5'	71.8°	25°33.1'	+03.6'	72.3°	25°51.1'	+04.7'	72.7°	21
22	23°54.3'</																					

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

68° 292° LHA

Latitude SAME as Declination

68° 292° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	21°49.7'	+07.7'	92.8°	21°46.5'	+08.8'	93.2°	21°42.9'	+09.9'	93.6°	21°38.9'	+11.0'	94.0°	21°34.5'	+12.1'	94.4°	21°29.7'	+13.2'	94.8°	21°24.5'	+14.3'	95.2°	0
1	21°57.3'	+07.3'	91.8°	21°55.3'	+08.4'	92.2°	21°52.8'	+09.5'	92.6°	21°49.9'	+10.6'	93.0°	21°46.6'	+11.7'	93.4°	21°42.9'	+12.8'	93.8°	21°38.8'	+13.9'	94.1°	1
2	22°04.6'	+06.8'	90.7°	22°03.7'	+08.0'	91.1°	22°02.3'	+09.1'	91.5°	22°00.5'	+10.2'	91.9°	21°58.3'	+11.3'	92.3°	21°55.7'	+12.4'	92.7°	21°52.7'	+13.5'	93.1°	2
3	22°11.4'	+06.4'	89.6°	22°11.6'	+07.5'	90.0°	22°11.4'	+08.7'	90.4°	22°10.7'	+09.8'	90.8°	22°09.6'	+10.9'	91.2°	22°08.1'	+12.0'	91.6°	22°06.2'	+13.1'	92.1°	3
4	22°17.8'	+06.0'	88.5°	22°19.1'	+07.1'	88.9°	22°20.0'	+08.2'	89.4°	22°20.5'	+09.4'	89.8°	22°20.5'	+10.5'	90.2°	22°20.1'	+11.6'	90.6°	22°19.3'	+12.7'	91.0°	4
5	22°23.8'	+05.6'	87.5°	22°26.3'	+06.7'	87.9°	22°28.3'	+07.8'	88.3°	22°29.9'	+08.9'	88.7°	22°31.0'	+10.1'	89.1°	22°31.7'	+11.2'	89.5°	22°32.0'	+12.3'	89.9°	5
6	22°29.4'	+05.1'	86.4°	22°33.0'	+06.3'	86.8°	22°36.1'	+07.4'	87.2°	22°38.8'	+08.5'	87.6°	22°41.1'	+09.6'	88.0°	22°42.9'	+10.7'	88.5°	22°44.3'	+11.9'	88.9°	6
7	22°34.5'	+04.7'	85.3°	22°39.2'	+05.8'	85.7°	22°43.5'	+07.0'	86.1°	22°47.3'	+08.1'	86.6°	22°50.7'	+09.2'	87.0°	22°53.6'	+10.3'	87.4°	22°56.1'	+11.4'	87.8°	7
8	22°39.2'	+04.3'	84.2°	22°45.0'	+05.4'	84.6°	22°50.4'	+06.5'	85.1°	22°55.4'	+07.6'	85.5°	22°59.9'	+08.8'	85.9°	23°04.0'	+09.9'	86.3°	23°07.6'	+11.0'	86.7°	8
9	22°43.5'	+03.8'	83.1°	22°50.4'	+05.0'	83.6°	22°56.9'	+06.1'	84.0°	23°03.0'	+07.2'	84.4°	23°08.6'	+08.3'	84.8°	23°13.8'	+09.4'	85.3°	23°18.6'	+10.6'	85.7°	9
10	22°47.3'	+03.4'	82.1°	22°55.4'	+04.5'	82.5°	23°03.0'	+05.6'	82.9°	23°10.2'	+06.8'	83.3°	23°17.0'	+07.9'	83.7°	23°23.3'	+09.0'	84.2°	23°29.2'	+10.1'	84.6°	10
11	22°50.7'	+02.9'	81.0°	22°59.9'	+04.1'	81.4°	23°08.6'	+05.2'	81.8°	23°17.0'	+06.3'	82.2°	23°24.9'	+07.4'	82.7°	23°32.3'	+08.6'	83.1°	23°39.3'	+09.7'	83.5°	11
12	22°53.6'	+02.5'	79.9°	23°04.0'	+03.6'	80.3°	23°13.8'	+04.7'	80.7°	23°23.3'	+05.9'	81.2°	23°32.3'	+07.0'	81.6°	23°40.8'	+08.1'	82.0°	23°49.0'	+09.2'	82.5°	12
13	22°56.1'	+02.1'	78.8°	23°07.6'	+03.2'	79.2°	23°18.6'	+04.3'	79.6°	23°29.2'	+05.4'	80.1°	23°39.3'	+06.5'	80.5°	23°49.0'	+07.7'	80.9°	23°58.2'	+08.8'	81.4°	13
14	22°58.2'	+01.6'	77.7°	23°10.8'	+02.7'	78.1°	23°22.9'	+03.8'	78.6°	23°34.6'	+05.0'	79.0°	23°45.8'	+06.1'	79.4°	23°56.6'	+07.2'	79.8°	24°07.0'	+08.3'	80.3°	14
15	22°59.8'	+01.2'	76.6°	23°13.5'	+02.3'	77.0°	23°26.7'	+03.4'	77.5°	23°39.5'	+04.5'	77.9°	23°51.9'	+05.6'	78.3°	24°03.8'	+06.7'	78.8°	24°15.3'	+07.9'	79.2°	15
16	23°01.0'	+00.7'	75.5°	23°15.8'	+01.8'	76.0°	23°30.1'	+02.9'	76.4°	23°44.0'	+04.0'	76.8°	23°57.5'	+05.2'	77.2°	24°10.5'	+06.3'	77.7°	24°23.1'	+07.4'	78.1°	16
17	23°01.7'	+00.3'	74.5°	23°17.6'	+01.4'	74.9°	23°33.1'	+02.5'	75.3°	23°48.1'	+03.6'	75.7°	24°02.7'	+04.7'	76.1°	24°16.8'	+05.8'	76.6°	24°30.5'	+06.9'	77.0°	17
18	23°02.0'	-00.2'	73.4°	23°19.0'	+00.9'	73.8°	23°35.5'	+02.0'	74.2°	23°51.7'	+03.1'	74.6°	24°07.4'	+04.2'	75.1°	24°22.6'	+05.3'	75.5°	24°37.4'	+06.4'	75.9°	18
19	23°01.9'	-00.6'	72.3°	23°19.9'	+00.5'	72.7°	23°37.6'	+01.6'	73.1°	23°54.8'	+02.7'	73.5°	24°11.6'	+03.8'	74.0°	24°27.9'	+04.9'	74.4°	24°43.9'	+06.0'	74.8°	19
20	23°01.3'	-01.0'	71.2°	23°20.4'	+00.0'	71.6°	23°39.1'	+01.1'	72.0°	23°57.4'	+02.2'	72.4°	24°15.3'	+03.3'	72.9°	24°32.8'	+04.4'	73.3°	24°49.8'	+05.5'	73.7°	20
21	23°00.2'	-01.5'	70.1°	23°20.4'	-00.4'	70.5°	23°40.2'	+00.7'	70.9°	23°59.6'	+01.7'	71.3°	24°18.6'	+02.8'	71.8°	24°37.2'	+03.9'	72.2°	24°55.3'	+05.0'	72.6°	21
22	22°58.7'	-01.9'	69.0°	23°20.0'	-00.9'	69.4°	23°40.9'	+00.2'	69.8°	24°01.4'	+01.3'	70.3°	24°21.4'	+02.3'	70.7°	24°41.1'	+03.4'	71.1°	25°00.3'	+04.5'	71.5°	22
23	22°56.8'	-02.4'	67.9°	23°19.1'	-01.3'	68.3°	23°41.1'	-00.3'	68.7°	24°02.6'	+00.8'	69.2°	24°23.8'	+01.9'	69.6°	24°44.5'	+02.9'	70.0°	25°04.8'	+04.0'	70.4°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	7			8			9			10			11			12			13			

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°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	20°50.2'	+07.6'	92.7°	20°47.2'	+08.7'	93.1°	20°43.8'	+09.8'	93.4°	20°40.0'	+10.9'	93.8°	20°35.8'	+12.0'	94.2°	20°31.2'	+13.1'	94.6°	20°26.2'	+14.2'	94.9°	0
1	20°57.8'	+07.2'	91.6°	20°55.9'	+08.3'	92.0°	20°53.6'	+09.5'	92.4°	20°50.9'	+10.6'	92.8°	20°47.8'	+11.7'	93.1°	20°44.3'	+12.8'	93.5°	20°40.5'	+13.8'	93.9°	1
2	21°05.0'	+06.8'	90.6°	21°04.2'	+07.9'	90.9°	21°03.1'	+09.1'	91.3°	21°01.5'	+10.2'	91.7°	20°59.5'	+11.3'	92.1°	20°57.1'	+12.4'	92.5°	20°54.3'	+13.5'	92.9°	2
3	21°11.9'	+06.4'	89.5°	21°12.2'	+07.5'	89.9°	21°12.1'	+08.7'	90.3°	21°11.6'	+09.8'	90.7°	21°10.8'	+10.9'	91.0°	21°09.5'	+12.0'	91.4°	21°07.8'	+13.1'	91.8°	3
4	21°18.3'	+06.0'	88.4°	21°19.7'	+07.1'	88.8°	21°20.8'	+08.3'	89.2°	21°21.4'	+09.4'	89.6°	21°21.6'	+10.5'	90.0°	21°21.4'	+11.6'	90.4°	21°20.9'	+12.7'	90.8°	4
5	21°24.3'	+05.6'	87.4°	21°26.9'	+06.7'	87.7°	21°29.0'	+07.9'	88.1°	21°30.8'	+09.0'	88.5°	21°32.1'	+10.1'	88.9°	21°33.0'	+11.2'	89.3°	21°33.5'	+12.3'	89.7°	5
6	21°29.9'	+05.2'	86.3°	21°33.6'	+06.3'	86.7°	21°36.9'	+07.4'	87.1°	21°39.8'	+08.6'	87.5°	21°42.2'	+09.7'	87.9°	21°44.2'	+10.8'	88.3°	21°45.8'	+11.9'	88.7°	6
7	21°35.2'	+04.8'	85.2°	21°40.0'	+05.9'	85.6°	21°44.4'	+07.0'	86.0°	21°48.3'	+08.2'	86.4°	21°51.9'	+09.3'	86.8°	21°55.0'	+10.4'	87.2°	21°57.7'	+11.5'	87.6°	7
8	21°40.0'	+04.4'	84.1°	21°45.9'	+05.5'	84.5°	21°51.4'	+06.6'	84.9°	21°56.5'	+07.7'	85.3°	22°01.1'	+08.9'	85.7°	22°05.4'	+10.0'	86.1°	22°09.2'	+11.1'	86.5°	8
9	21°44.4'	+04.0'	83.1°	21°51.4'	+05.1'	83.5°	21°58.0'	+06.2'	83.9°	22°04.2'	+07.3'	84.3°	22°10.0'	+08.4'	84.7°	22°15.4'	+09.5'	85.1°	22°20.3'	+10.7'	85.5°	9
10	21°48.3'	+03.6'	82.0°	21°56.5'	+04.7'	82.4°	22°04.2'	+05.8'	82.8°	22°11.5'	+06.9'	83.2°	22°18.4'	+08.0'	83.6°	22°24.9'	+09.1'	84.0°	22°31.0'	+10.2'	84.4°	10
11	21°51.9'	+03.1'	80.9°	22°01.1'	+04.2'	81.3°	22°10.0'	+05.4'	81.7°	22°18.4'	+06.5'	82.1°	22°26.4'	+07.6'	82.5°	22°34.0'	+08.7'	82.9°	22°41.2'	+09.8'	83.4°	11
12	21°55.0'	+02.7'	79.8°	22°05.4'	+03.8'	80.2°	22°15.4'	+04.9'	80.6°	22°24.9'	+06.0'	81.0°	22°34.0'	+07.2'	81.5°	22°42.7'	+08.3'	81.9°	22°51.0'	+09.4'	82.3°	12
13	21°57.7'	+02.3'	78.8°	22°09.2'	+03.4'	79.2°	22°20.3'	+04.5'	79.6°	22°31.0'	+05.6'	80.0°	22°41.2'	+06.7'	80.4°	22°51.0'	+07.8'	80.8°	23°00.4'	+08.9'	81.2°	13
14	22°00.0'	+01.9'	77.7°	22°12.6'	+03.0'	78.1°	22°24.8'	+04.1'	78.5°	22°36.6'	+05.2'	78.9°	22°47.9'	+06.3'	79.3°	22°58.8'	+07.4'	79.7°	23°09.3'	+08.5'	80.1°	14
15	22°01.9'	+01.4'	76.6°	22°15.6'	+02.5'	77.0°	22°28.9'	+03.6'	77.4°	22°41.8'	+04.8'	77.8°	22°54.2'	+05.9'	78.2°	23°06.2'	+07.0'	78.6°	23°17.9'	+08.1'	79.1°	15
16	22°03.3'	+01.0'	75.5°	22°18.1'	+02.1'	75.9°	22°32.5'	+03.2'	76.3°	22°46.5'	+04.3'	76.7°	23°00.1'	+05.4'	77.1°	23°13.2'	+06.5'	77.6°	23°25.9'	+07.6'	78.0°	16
17	22°04.4'	+00.6'	74.5°	22°20.3'	+01.7'	74.8°	22°35.7'	+02.8'	75.2°	22°50.8'	+03.9'	75.6°	23°05.5'	+05.0'	76.1°	23°19.7'	+06.1'	76.5°	23°33.5'	+07.2'	76.9°	17
18	22°05.0'	+00.2'	73.4°	22°21.9'	+01.3'	73.8°	22°38.5'	+02.3'	74.2°	22°54.7'	+03.4'	74.6°	23°10.5'	+04.5'	75.0°	23°25.8'	+05.6'	75.4°	23°40.7'	+06.7'	75.8°	18
19	22°05.1'	-00.2'	72.3°	22°23.2'	+00.8'	72.7°	22°40.9'	+01.9'	73.1°	22°58.1'	+03.0'	73.5°	23°15.0'	+04.1'	73.9°	23°31.4'	+05.2'	74.3°	23°47.4'	+06.3'	74.7°	19
20	22°04.9'	-00.7'	71.2°	22°24.0'	+00.4'	71.6°	22°42.8'	+01.5'	72.0°	23°01.1'	+02.5'	72.4°	23°19.1'	+03.6'	72.8°	23°36.6'	+04.7'	73.2°	23°53.7'	+05.8'	73.6°	20
21	22°04.2'	-01.1'	70.1°	22°24.4'	00.0'	70.5°	22°44.2'	+01.0'	70.9°	23°03.7'	+02.1'	71.3°	23°22.7'	+03.2'	71.7°	23°41.3'	+04.3'	72.1°	23°59.5'	+05.3'	72.6°	21
22	22°03.1'</																					

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

70° 290° LHA

Latitude SAME as Declination

70° 290° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	19°50.7'+07.6'	92.5°		19°47.8'+08.7'	92.9°		19°44.6'+09.8'	93.3°		19°41.0'+10.9'	93.6°		19°37.0'+12.0'	94.0°		19°32.7'+13.1'	94.3°		19°28.0'+14.1'	94.7°	0	
1	19°58.3'+07.2'	91.5°		19°56.5'+08.3'	91.8°		19°54.4'+09.4'	92.2°		19°51.9'+10.5'	92.6°		19°49.0'+11.6'	92.9°		19°45.8'+12.7'	93.3°		19°42.1'+13.8'	93.6°	1	
2	20°05.5'+06.8'	90.4°		20°04.8'+07.9'	90.8°		20°03.8'+09.0'	91.2°		20°02.4'+10.1'	91.5°		20°00.6'+11.2'	91.9°		19°58.5'+12.3'	92.3°		19°55.9'+13.4'	92.6°	2	
3	20°12.3'+06.5'	89.4°		20°12.8'+07.6'	89.7°		20°12.9'+08.7'	90.1°		20°12.6'+09.8'	90.5°		20°11.9'+10.9'	90.8°		20°10.8'+12.0'	91.2°		20°09.3'+13.1'	91.6°	3	
4	20°18.8'+06.1'	88.3°		20°20.3'+07.2'	88.7°		20°21.5'+08.3'	89.1°		20°22.3'+09.4'	89.4°		20°22.7'+10.5'	89.8°		20°22.8'+11.6'	90.2°		20°22.4'+12.7'	90.5°	4	
5	20°24.8'+05.7'	87.2°		20°27.5'+06.8'	87.6°		20°29.8'+07.9'	88.0°		20°31.7'+09.0'	88.4°		20°33.2'+10.1'	88.7°		20°34.4'+11.2'	89.1°		20°35.1'+12.3'	89.5°	5	
6	20°30.5'+05.3'	86.2°		20°34.3'+06.4'	86.6°		20°37.7'+07.5'	86.9°		20°40.7'+08.6'	87.3°		20°43.3'+09.7'	87.7°		20°45.6'+10.8'	88.1°		20°47.4'+11.9'	88.4°	6	
7	20°35.8'+04.9'	85.1°		20°40.7'+06.0'	85.5°		20°45.2'+07.1'	85.9°		20°49.4'+08.2'	86.3°		20°53.1'+09.3'	86.6°		20°56.4'+10.4'	87.0°		20°59.3'+11.5'	87.4°	7	
8	20°40.7'+04.5'	84.1°		20°46.7'+05.6'	84.4°		20°52.4'+06.7'	84.8°		20°57.6'+07.8'	85.2°		21°02.4'+08.9'	85.6°		21°06.8'+10.1'	86.0°		21°10.9'+11.2'	86.3°	8	
9	20°45.2'+04.1'	83.0°		20°52.4'+05.2'	83.4°		20°59.1'+06.3'	83.7°		21°05.4'+07.4'	84.1°		21°11.4'+08.5'	84.5°		21°16.9'+09.7'	84.9°		21°22.0'+10.8'	85.3°	9	
10	20°49.4'+03.7'	81.9°		20°57.6'+04.8'	82.3°		21°05.4'+05.9'	82.7°		21°12.9'+07.0'	83.1°		21°19.9'+08.1'	83.5°		21°26.5'+09.3'	83.8°		21°32.8'+10.4'	84.2°	10	
11	20°53.1'+03.3'	80.9°		21°02.4'+04.4'	81.2°		21°11.4'+05.5'	81.6°		21°19.9'+06.6'	82.0°		21°28.1'+07.7'	82.4°		21°35.8'+08.8'	82.8°		21°43.1'+10.0'	83.2°	11	
12	20°56.4'+02.9'	79.8°		21°06.8'+04.0'	80.2°		21°16.9'+05.1'	80.5°		21°26.5'+06.2'	80.9°		21°35.8'+07.3'	81.3°		21°44.6'+08.4'	81.7°		21°53.1'+09.5'	82.1°	12	
13	20°59.3'+02.5'	78.7°		21°10.9'+03.6'	79.1°		21°22.0'+04.7'	79.5°		21°32.8'+05.8'	79.9°		21°43.1'+06.9'	80.3°		21°53.1'+08.0'	80.7°		22°02.6'+09.1'	81.0°	13	
14	21°01.8'+02.1'	77.6°		21°14.5'+03.2'	78.0°		21°26.7'+04.3'	78.4°		21°38.6'+05.4'	78.8°		21°50.1'+06.5'	79.2°		22°01.1'+07.6'	79.6°		22°11.8'+08.7'	80.0°	14	
15	21°04.0'+01.7'	76.6°		21°17.7'+02.8'	77.0°		21°31.1'+03.9'	77.3°		21°44.0'+05.0'	77.7°		21°56.6'+06.1'	78.1°		22°08.7'+07.2'	78.5°		22°20.5'+08.3'	78.9°	15	
16	21°05.7'+01.3'	75.5°		21°20.5'+02.4'	75.9°		21°35.0'+03.5'	76.3°		21°49.0'+04.6'	76.7°		22°02.7'+05.7'	77.0°		22°15.9'+06.8'	77.4°		22°28.8'+07.9'	77.8°	16	
17	21°07.0'+00.9'	74.4°		21°22.9'+02.0'	74.8°		21°38.4'+03.1'	75.2°		21°53.6'+04.2'	75.6°		22°08.3'+05.2'	76.0°		22°22.7'+06.3'	76.4°		22°36.6'+07.4'	76.8°	17	
18	21°07.9'+00.5'	73.4°		21°24.9'+01.6'	73.7°		21°41.5'+02.7'	74.1°		21°57.7'+03.7'	74.5°		22°13.6'+04.8'	74.9°		22°29.0'+05.9'	75.3°		22°44.1'+07.0'	75.7°	18	
19	21°08.4'+00.1'	72.3°		21°26.5'+01.2'	72.7°		21°44.2'+02.2'	73.0°		22°01.5'+03.3'	73.4°		22°18.4'+04.4'	73.8°		22°34.9'+05.5'	74.2°		22°51.1'+06.6'	74.6°	19	
20	21°08.5'-00.3'	71.2°		21°27.7'+00.8'	71.6°		21°46.4'+01.8'	72.0°		22°04.8'+02.9'	72.3°		22°22.8'+04.0'	72.7°		22°40.4'+05.0'	73.1°		22°57.6'+06.1'	73.5°	20	
21	21°08.2'-00.7'	70.1°		21°28.4'+00.3'	70.5°		21°48.2'+01.4'	70.9°		22°07.7'+02.5'	71.3°		22°26.8'+03.5'	71.7°		22°45.5'+04.6'	72.1°		23°03.7'+05.7'	72.5°	21	
22	21°07.5'-01.1'	69.1°		21°28.8'-00.1'	69.4°		21°49.6'+01.0'	69.8°		22°10.2'+02.0'	70.2°		22°30.3'+03.1'	70.6°		22°50.1'+04.2'	71.0°		23°09.4'+05.2'	71.4°	22	
23	21°06.4'-01.5'	68.0°		21°28.7'-00.5'	68.4°		21°50.6'+00.6'	68.7°		22°12.2'+01.6'	69.1°		22°33.4'+02.7'	69.5°		22°54.2'+03.7'	69.9°		23°14.7'+04.8'	70.3°	23	
Dec°	7			8			9			10			11			12			13			Dec°

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°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	18°51.2'+07.6'	92.4°		18°48.5'+08.6'	92.7°		18°45.4'+09.7'	93.1°		18°42.0'+10.8'	93.4°		18°38.3'+11.9'	93.8°		18°34.2'+13.0'	94.1°		18°29.7'+14.1'	94.4°	0	
1	18°58.7'+07.2'	91.4°		18°57.1'+08.3'	91.7°		18°55.2'+09.4'	92.0°		18°52.9'+10.5'	92.4°		18°50.2'+11.6'	92.7°		18°47.2'+12.7'	93.1°		18°43.8'+13.7'	93.4°	1	
2	19°05.9'+06.8'	90.3°		19°05.4'+07.9'	90.7°		19°04.6'+09.0'	91.0°		19°03.3'+10.1'	91.3°		19°01.8'+11.2'	91.7°		18°59.8'+12.3'	92.0°		18°57.5'+13.4'	92.4°	2	
3	19°12.8'+06.5'	89.3°		19°13.4'+07.6'	89.6°		19°13.6'+08.7'	89.9°		19°13.5'+09.8'	90.3°		19°13.0'+10.9'	90.6°		19°12.1'+12.0'	91.0°		19°10.9'+13.0'	91.3°	3	
4	19°19.2'+06.1'	88.2°		19°20.9'+07.2'	88.5°		19°22.3'+08.3'	88.9°		19°23.2'+09.4'	89.3°		19°23.8'+10.5'	89.6°		19°24.1'+11.6'	90.0°		19°23.9'+12.7'	90.3°	4	
5	19°25.4'+05.7'	87.1°		19°28.2'+06.9'	87.5°		19°30.6'+08.0'	87.9°		19°32.7'+09.1'	88.2°		19°34.4'+10.1'	88.6°		19°35.7'+11.2'	88.9°		19°36.6'+12.3'	89.3°	5	
6	19°31.1'+05.4'	86.1°		19°35.0'+06.5'	86.4°		19°38.5'+07.6'	86.8°		19°41.7'+08.7'	87.2°		19°44.5'+09.8'	87.5°		19°46.9'+10.9'	87.9°		19°49.0'+12.0'	88.2°	6	
7	19°36.5'+05.0'	85.0°		19°41.5'+06.1'	85.4°		19°46.1'+07.2'	85.7°		19°50.4'+08.3'	86.1°		19°54.3'+09.4'	86.5°		19°57.8'+10.5'	86.8°		20°00.9'+11.6'	87.2°	7	
8	19°41.5'+04.6'	84.0°		19°47.6'+05.7'	84.3°		19°53.4'+06.8'	84.7°		19°58.7'+07.9'	85.1°		20°03.7'+09.0'	85.4°		20°08.3'+10.1'	85.8°		20°12.5'+11.2'	86.1°	8	
9	19°46.1'+04.3'	82.9°		19°53.4'+05.4'	83.3°		20°00.2'+06.5'	83.6°		20°06.7'+07.6'	84.0°		20°12.7'+08.7'	84.4°		20°18.4'+09.8'	84.7°		20°23.8'+10.9'	85.1°	9	
10	19°50.4'+03.9'	81.9°		19°58.7'+05.0'	82.2°		20°06.7'+06.1'	82.6°		20°14.2'+07.2'	82.9°		20°21.4'+08.3'	83.3°		20°28.2'+09.4'	83.7°		20°34.6'+10.5'	84.0°	10	
11	19°54.3'+03.5'	80.8°		20°03.7'+04.6'	81.2°		20°12.7'+05.7'	81.5°		20°21.4'+06.8'	81.9°		20°29.7'+07.9'	82.2°		20°37.6'+09.0'	82.6°		20°45.1'+10.1'	83.0°	11	
12	19°57.8'+03.1'	79.7°		20°08.3'+04.2'	80.1°		20°18.4'+05.3'	80.5°		20°28.2'+06.4'	80.8°		20°37.6'+07.5'	81.2°		20°46.6'+08.6'	81.6°		20°55.2'+09.7'	81.9°	12	
13	20°00.9'+02.8'	78.7°		20°12.5'+03.8'	79.0°		20°23.8'+04.9'	79.4°		20°34.6'+06.0'	79.8°		20°45.1'+07.1'	80.1°		20°55.2'+08.2'	80.5°		21°04.9'+09.3'	80.9°	13	
14	20°03.7'+02.4'	77.6°		20°16.4'+03.5'	78.0°		20°28.7'+04.5'	78.3°		20°40.7'+05.6'	78.7°		20°52.2'+06.7'	79.1°		21°03.4'+07.8'	79.4°		21°14.2'+08.9'	79.8°	14	
15	20°06.0'+02.0'	76.5°		20°19.8'+03.1'	76.9°		20°33.2'+04.2'	77.3°		20°46.3'+05.2'	77.6°		20°58.9'+06.3'	78.0°		21°11.2'+07.4'	78.4°		21°23.1'+08.5'	78.8°	15	
16	20°08.0'+01.6'	75.5°		20°22.9'+02.7'	75.8°		20°37.4'+03.8'	76.2°		20°51.5'+04.8'	76.6°		21°05.3'+05.9'	76.9°		21°18.6'+07.0'	77.3°		21°31.6'+08.1'	77.7°	16	
17	20°09.6'+01.2'	74.4°		20°25.6'+02.3'	74.8°		20°41.2'+03.4'	75.1°		20°56.4'+04.4'	75.5°		21°11.2'+05.5'	75.9°		21°25.7'+06.6'	76.3°		21°39.7'+07.7'	76.6°	17	
18	20°10.9'+00.8'	73.3°		20°27.9'+01.9'	73.7°		20°44.5'+03.0'	74.1°		21°00.8'+04.0'	74.4°		21°16.7'+05.1'	74.8°		21°32.3'+06.2'	75.2°		21°47.4'+07.3'	75.6°	18	
19	20°11.7'+00.4'	72.3°		20°29.8'+01.5'	72.6°		20°47.5'+02.6'	73.0°		21°04.9'+03.6'	73.4°		21°21.9'+04.7'	73.7°		21°38.5'+05.8'	74.1°		21°54.7'+06.9'	74.5°	19	
20	20°12.1'+00.1'	71.2°		20°31.3'+01.1'	71.6°		20°50.1'+02.2'	71.9°		21°08.5'+03.2'	72.3°		21°26.6'+04.3'	72.7°		21°44.3'+05.4'	73.0°		22°01.6'+06.4'	73.4°	20	
21	20°12.2'-00.3'	70.2°		20°32.4'+00.7'	70.5°		20°52.3'+01.8'	70.9°		21°11.7'+02.8'	71.2°		21°30.9'+03.9'	71.6°		21°49.6'+05.0'	72.0°		22°08.0'+06.0'	72.4°	21	
22	20°11.9'-00.7'	69.1°		20°33.1'+00.3'	69.4°		20°54.0'+01.4'	69.8°		21°14.6'+02.4'	70.1°		21°34.8'+03.5'	70.5°		21°54.6'+04.5'	70.9°		22°14.1'+05.6'	71.3°	22	
23	20°11.2'-01.1'	68.0°		20°33.5'-00.1'	68.4°		20°55.4'+01.0'	68.7°		21°17.0'+02.0'	69.1°		21°38.3'+03.1'	69.4°		21°59.1'+04.1'	6					

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

72° 288° LHA

Latitude SAME as Declination

72° 288° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	17°51.7'	+07.5'	92.3°	17°49.1'	+08.6'	92.6°	17°46.3'	+09.7'	92.9°	17°43.0'	+10.8'	93.2°	17°39.5'	+11.9'	93.5°	17°35.6'	+12.9'	93.9°	17°31.4'	+14.0'	94.2°	0
1	17°59.2'	+07.2'	91.2°	17°57.7'	+08.3'	91.5°	17°55.9'	+09.4'	91.9°	17°53.8'	+10.4'	92.2°	17°51.4'	+11.5'	92.5°	17°48.5'	+12.6'	92.8°	17°45.4'	+13.7'	93.2°	1
2	18°06.4'	+06.8'	90.2°	18°06.0'	+07.9'	90.5°	18°05.3'	+09.0'	90.8°	18°04.3'	+10.1'	91.2°	18°02.9'	+11.2'	91.5°	18°01.2'	+12.3'	91.8°	17°59.1'	+13.4'	92.1°	2
3	18°13.2'	+06.5'	89.1°	18°14.0'	+07.6'	89.5°	18°14.3'	+08.7'	89.8°	18°14.4'	+09.8'	90.1°	18°14.1'	+10.9'	90.5°	18°13.4'	+12.0'	90.8°	18°12.4'	+13.0'	91.1°	3
4	18°19.7'	+06.2'	88.1°	18°21.5'	+07.3'	88.4°	18°23.0'	+08.3'	88.8°	18°24.2'	+09.4'	89.1°	18°24.9'	+10.5'	89.4°	18°25.4'	+11.6'	89.7°	18°25.5'	+12.7'	90.1°	4
5	18°25.9'	+05.8'	87.0°	18°28.8'	+06.9'	87.4°	18°31.4'	+08.0'	87.7°	18°33.6'	+09.1'	88.0°	18°35.5'	+10.2'	88.4°	18°37.0'	+11.3'	88.7°	18°38.2'	+12.4'	89.1°	5
6	18°31.7'	+05.5'	86.0°	18°35.7'	+06.6'	86.3°	18°39.4'	+07.7'	86.7°	18°42.7'	+08.8'	87.0°	18°45.7'	+09.8'	87.3°	18°48.3'	+10.9'	87.7°	18°50.5'	+12.0'	88.0°	6
7	18°37.2'	+05.1'	84.9°	18°42.3'	+06.2'	85.3°	18°47.0'	+07.3'	85.6°	18°51.5'	+08.4'	86.0°	18°55.5'	+09.5'	86.3°	18°59.2'	+10.6'	86.6°	19°02.5'	+11.7'	87.0°	7
8	18°42.3'	+04.8'	83.9°	18°48.5'	+05.9'	84.2°	18°54.3'	+07.0'	84.6°	18°59.9'	+08.0'	84.9°	19°05.0'	+09.1'	85.3°	19°09.8'	+10.2'	85.6°	19°14.2'	+11.3'	85.9°	8
9	18°47.0'	+04.4'	82.8°	18°54.3'	+05.5'	83.2°	19°01.3'	+06.6'	83.5°	19°07.9'	+07.7'	83.9°	19°14.1'	+08.8'	84.2°	19°20.0'	+09.9'	84.6°	19°25.5'	+11.0'	84.9°	9
10	18°51.5'	+04.1'	81.8°	18°59.9'	+05.1'	82.1°	19°07.9'	+06.2'	82.5°	19°15.6'	+07.3'	82.8°	19°22.9'	+08.4'	83.2°	19°29.9'	+09.5'	83.5°	19°36.5'	+10.6'	83.9°	10
11	18°55.5'	+03.7'	80.7°	19°05.0'	+04.8'	81.1°	19°14.1'	+05.9'	81.4°	19°22.9'	+07.0'	81.8°	19°31.3'	+08.1'	82.1°	19°39.4'	+09.1'	82.5°	19°47.1'	+10.2'	82.8°	11
12	18°59.2'	+03.3'	79.7°	19°09.8'	+04.4'	80.0°	19°20.0'	+05.5'	80.4°	19°29.9'	+06.6'	80.7°	19°39.4'	+07.7'	81.1°	19°48.5'	+08.8'	81.4°	19°57.3'	+09.9'	81.8°	12
13	19°02.5'	+03.0'	78.6°	19°14.2'	+04.1'	79.0°	19°25.5'	+05.1'	79.3°	19°36.5'	+06.2'	79.6°	19°47.1'	+07.3'	80.0°	19°57.3'	+08.4'	80.4°	20°07.2'	+09.5'	80.7°	13
14	19°05.5'	+02.6'	77.6°	19°18.3'	+03.7'	77.9°	19°30.7'	+04.8'	78.2°	19°42.7'	+05.9'	78.6°	19°54.4'	+06.9'	78.9°	20°05.7'	+08.0'	79.3°	20°16.7'	+09.1'	79.7°	14
15	19°08.1'	+02.3'	76.5°	19°22.0'	+03.3'	76.8°	19°35.4'	+04.4'	77.2°	19°48.6'	+05.5'	77.5°	20°01.3'	+06.6'	77.9°	20°13.8'	+07.6'	78.2°	20°25.8'	+08.7'	78.6°	15
16	19°10.4'	+01.9'	75.4°	19°25.3'	+03.0'	75.8°	19°39.9'	+04.0'	76.1°	19°54.1'	+05.1'	76.5°	20°07.9'	+06.2'	76.8°	20°21.4'	+07.3'	77.2°	20°34.5'	+08.3'	77.6°	16
17	19°12.3'	+01.5'	74.4°	19°28.3'	+02.6'	74.7°	19°43.9'	+03.7'	75.1°	19°59.2'	+04.7'	75.4°	20°14.1'	+05.8'	75.8°	20°28.7'	+06.9'	76.1°	20°42.9'	+08.0'	76.5°	17
18	19°13.8'	+01.2'	73.3°	19°30.8'	+02.2'	73.7°	19°47.6'	+03.3'	74.0°	20°03.9'	+04.4'	74.4°	20°19.9'	+05.4'	74.7°	20°35.5'	+06.5'	75.1°	20°50.8'	+07.6'	75.4°	18
19	19°15.0'	+00.8'	72.3°	19°33.1'	+01.8'	72.6°	19°50.8'	+02.9'	72.9°	20°08.3'	+04.0'	73.3°	20°25.3'	+05.0'	73.6°	20°42.0'	+06.1'	74.0°	20°58.4'	+07.2'	74.4°	19
20	19°15.8'	+00.4'	71.2°	19°34.9'	+01.5'	71.5°	19°53.7'	+02.5'	71.9°	20°12.2'	+03.6'	72.2°	20°30.4'	+04.6'	72.6°	20°48.1'	+05.7'	72.9°	21°05.6'	+06.8'	73.3°	20
21	19°16.2'	+00.1'	70.1°	19°36.4'	+01.1'	70.5°	19°56.3'	+02.2'	70.8°	20°15.8'	+03.2'	71.2°	20°35.0'	+04.3'	71.5°	20°53.8'	+05.3'	71.9°	21°12.3'	+06.4'	72.2°	21
22	19°16.2'	-00.3'	69.1°	19°37.5'	+00.7'	69.4°	19°58.4'	+01.8'	69.8°	20°19.0'	+02.8'	70.1°	20°39.3'	+03.9'	70.5°	20°59.2'	+04.9'	70.8°	21°18.7'	+06.0'	71.2°	22
23	19°15.9'	-00.7'	68.0°	19°38.2'	+00.4'	68.4°	20°00.2'	+01.4'	68.7°	20°21.8'	+02.4'	69.0°	20°43.1'	+03.5'	69.4°	21°04.1'	+04.5'	69.7°	21°24.7'	+05.6'	70.1°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	7			8			9			10			11			12			13			Dec°

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°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	16°52.2'	+07.5'	92.1°	16°49.8'	+08.6'	92.4°	16°47.1'	+09.6'	92.7°	16°44.0'	+10.7'	93.0°	16°40.7'	+11.8'	93.3°	16°37.1'	+12.9'	93.6°	16°33.1'	+13.9'	93.9°	0
1	16°59.7'	+07.2'	91.1°	16°58.3'	+08.3'	91.4°	16°56.7'	+09.3'	91.7°	16°54.8'	+10.4'	92.0°	16°52.5'	+11.5'	92.3°	16°49.9'	+12.6'	92.6°	16°47.0'	+13.6'	92.9°	1
2	17°06.8'	+06.9'	90.1°	17°06.6'	+07.9'	90.4°	17°06.1'	+09.0'	90.7°	17°05.2'	+10.1'	91.0°	17°04.0'	+11.2'	91.3°	17°02.5'	+12.3'	91.6°	17°00.7'	+13.3'	91.9°	2
3	17°13.7'	+06.5'	89.0°	17°14.5'	+07.6'	89.3°	17°15.1'	+08.7'	89.6°	17°15.3'	+09.8'	89.9°	17°15.2'	+10.9'	90.3°	17°14.7'	+11.9'	90.6°	17°14.0'	+13.0'	90.9°	3
4	17°20.2'	+06.2'	88.0°	17°22.2'	+07.3'	88.3°	17°23.8'	+08.4'	88.6°	17°25.1'	+09.5'	88.9°	17°26.1'	+10.6'	89.2°	17°26.7'	+11.6'	89.5°	17°27.0'	+12.7'	89.9°	4
5	17°26.4'	+05.9'	86.9°	17°29.5'	+07.0'	87.2°	17°32.2'	+08.1'	87.6°	17°34.6'	+09.1'	87.9°	17°36.6'	+10.2'	88.2°	17°38.3'	+11.3'	88.5°	17°39.7'	+12.4'	88.8°	5
6	17°32.3'	+05.6'	85.9°	17°36.4'	+06.6'	86.2°	17°40.2'	+07.7'	86.5°	17°43.7'	+08.8'	86.8°	17°46.8'	+09.9'	87.2°	17°49.6'	+11.0'	87.5°	17°52.1'	+12.1'	87.8°	6
7	17°37.8'	+05.2'	84.8°	17°43.1'	+06.3'	85.2°	17°48.0'	+07.4'	85.5°	17°52.5'	+08.5'	85.8°	17°56.7'	+09.6'	86.1°	18°00.6'	+10.7'	86.5°	18°04.2'	+11.7'	86.8°	7
8	17°43.1'	+04.9'	83.8°	17°49.4'	+06.0'	84.1°	17°55.4'	+07.1'	84.4°	18°01.0'	+08.2'	84.8°	18°06.3'	+09.2'	85.1°	18°11.3'	+10.3'	85.4°	18°15.9'	+11.4'	85.7°	8
9	17°48.0'	+04.6'	82.8°	17°55.4'	+05.6'	83.1°	18°02.4'	+06.7'	83.4°	18°09.2'	+07.8'	83.7°	18°15.5'	+08.9'	84.0°	18°21.6'	+10.0'	84.4°	18°27.3'	+11.1'	84.7°	9
10	17°52.5'	+04.2'	81.7°	18°01.0'	+05.3'	82.0°	18°09.2'	+06.4'	82.4°	18°17.0'	+07.5'	82.7°	18°24.5'	+08.6'	83.0°	18°31.6'	+09.6'	83.3°	18°38.4'	+10.7'	83.7°	10
11	17°56.7'	+03.9'	80.7°	18°06.3'	+05.0'	81.0°	18°15.5'	+06.0'	81.3°	18°24.5'	+07.1'	81.6°	18°33.0'	+08.2'	82.0°	18°41.2'	+09.3'	82.3°	18°49.1'	+10.4'	82.6°	11
12	18°00.6'	+03.5'	79.6°	18°11.3'	+04.6'	79.9°	18°21.6'	+05.7'	80.3°	18°31.6'	+06.8'	80.6°	18°41.2'	+07.9'	80.9°	18°50.5'	+08.9'	81.3°	18°59.5'	+10.0'	81.6°	12
13	18°04.2'	+03.2'	78.6°	18°15.9'	+04.3'	78.9°	18°27.3'	+05.4'	79.2°	18°38.4'	+06.4'	79.5°	18°49.1'	+07.5'	79.9°	18°59.5'	+08.6'	80.2°	19°09.5'	+09.7'	80.5°	13
14	18°07.4'	+02.9'	77.5°	18°20.2'	+03.9'	77.8°	18°32.7'	+05.0'	78.2°	18°44.8'	+06.1'	78.5°	18°56.6'	+07.2'	78.8°	19°08.1'	+08.2'	79.2°	19°19.2'	+09.3'	79.5°	14
15	18°10.2'	+02.5'	76.5°	18°24.1'	+03.6'	76.8°	18°37.7'	+04.7'	77.1°	18°50.9'	+05.7'	77.4°	19°03.8'	+06.8'	77.8°	19°16.3'	+07.9'	78.1°	19°28.5'	+09.0'	78.5°	15
16	18°12.8'	+02.2'	75.4°	18°27.7'	+03.2'	75.7°	18°42.3'	+04.3'	76.1°	18°56.6'	+05.4'	76.4°	19°10.6'	+06.4'	76.7°	19°24.2'	+07.5'	77.1°	19°37.4'	+08.6'	77.4°	16
17	18°14.9'	+01.8'	74.4°	18°30.9'	+02.9'	74.7°	18°46.6'	+04.0'	75.0°	19°02.0'	+05.0'	75.3°	19°17.0'	+06.1'	75.7°	19°31.7'	+07.2'	76.0°	19°46.0'	+08.2'	76.4°	17
18	18°16.8'	+01.5'	73.3°	18°33.8'	+02.5'	73.6°	18°50.6'	+03.6'	73.9°	19°07.0'	+04.7'	74.3°	19°23.1'	+05.7'	74.6°	19°38.9'	+06.8'	75.0°	19°54.3'	+07.8'	75.3°	18
19	18°18.2'	+01.1'	72.2°	18°36.4'	+02.2'	72.6°	18°54.2'	+03.2'	72.9°	19°11.7'	+04.3'	73.2°	19°28.8'	+05.4'	73.6°	19°45.6'	+06.4'	73.9°	20°02.1'	+07.5'	74.2°	19
20	18°19.4'	+00.8'	71.2°	18°38.6'	+01.8'	71.5°	18°57.4'	+02.9'	71.8°	19°16.0'	+03.9'	72.2°	19°34.2'	+05.0'	72.5°	19°52.0'	+06.0'	72.8°	20°09.6'	+07.1'	73.2°	20
21	18°20.2'	+00.4'	70.1°	18°40.4'	+01.5'	70.5°	19°00.3'	+02.5'	70.8°	19°19.9'	+03.6'	71.1°	19°39.2'	+04.6'	71.4°	19°58.1'	+05.7'	71.8°	20°16.7'	+06.7'	72.1°	21
22	18°20																					

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

74° 286° LHA

Latitude SAME as Declination

74° 286° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	15°52.7'	+07.5'	92.0°	15°50.4'	+08.5'	92.3°	15°47.9'	+09.6'	92.6°	15°45.0'	+10.7'	92.9°	15°41.9'	+11.8'	93.1°	15°38.5'	+12.8'	93.4°	15°34.8'	+13.9'	93.7°	0
1	16°00.1'	+07.2'	91.0°	15°58.9'	+08.2'	91.3°	15°57.5'	+09.3'	91.5°	15°55.7'	+10.4'	91.8°	15°53.7'	+11.5'	92.1°	15°51.3'	+12.5'	92.4°	15°48.6'	+13.6'	92.7°	1
2	16°07.3'	+06.9'	89.9°	16°07.2'	+07.9'	90.2°	16°06.8'	+09.0'	90.5°	16°06.1'	+10.1'	90.8°	16°05.1'	+11.2'	91.1°	16°03.8'	+12.2'	91.4°	16°02.2'	+13.3'	91.7°	2
3	16°14.1'	+06.6'	88.9°	16°15.1'	+07.6'	89.2°	16°15.8'	+08.7'	89.5°	16°16.2'	+09.8'	89.8°	16°16.3'	+10.9'	90.1°	16°16.1'	+11.9'	90.4°	16°15.5'	+13.0'	90.7°	3
4	16°20.7'	+06.3'	87.9°	16°22.8'	+07.3'	88.2°	16°24.5'	+08.4'	88.5°	16°26.0'	+09.5'	88.7°	16°27.2'	+10.6'	89.0°	16°28.0'	+11.7'	89.3°	16°28.5'	+12.7'	89.6°	4
5	16°26.9'	+06.0'	86.8°	16°30.1'	+07.0'	87.1°	16°33.0'	+08.1'	87.4°	16°35.5'	+09.2'	87.7°	16°37.7'	+10.3'	88.0°	16°39.7'	+11.3'	88.3°	16°41.3'	+12.4'	88.6°	5
6	16°32.9'	+05.6'	85.8°	16°37.1'	+06.7'	86.1°	16°41.1'	+07.8'	86.4°	16°44.7'	+08.9'	86.7°	16°48.0'	+10.0'	87.0°	16°51.0'	+11.0'	87.3°	16°53.7'	+12.1'	87.6°	6
7	16°38.5'	+05.3'	84.8°	16°43.9'	+06.4'	85.1°	16°48.9'	+07.5'	85.4°	16°53.6'	+08.6'	85.7°	16°58.0'	+09.7'	86.0°	17°02.1'	+10.7'	86.3°	17°05.8'	+11.8'	86.6°	7
8	16°43.9'	+05.0'	83.7°	16°50.3'	+06.1'	84.0°	16°56.4'	+07.2'	84.3°	17°02.2'	+08.3'	84.6°	17°07.6'	+09.3'	84.9°	17°12.8'	+10.4'	85.2°	17°17.6'	+11.5'	85.5°	8
9	16°48.9'	+04.7'	82.7°	16°56.4'	+05.8'	83.0°	17°03.6'	+06.9'	83.3°	17°10.4'	+07.9'	83.6°	17°17.0'	+09.0'	83.9°	17°23.2'	+10.1'	84.2°	17°29.1'	+11.2'	84.5°	9
10	16°53.6'	+04.4'	81.6°	17°02.2'	+05.5'	81.9°	17°10.4'	+06.5'	82.2°	17°18.4'	+07.6'	82.5°	17°26.0'	+08.7'	82.9°	17°33.3'	+09.8'	83.2°	17°40.3'	+10.9'	83.5°	10
11	16°58.0'	+04.1'	80.6°	17°07.6'	+05.1'	80.9°	17°17.0'	+06.2'	81.2°	17°26.0'	+07.3'	81.5°	17°34.7'	+08.4'	81.8°	17°43.1'	+09.5'	82.1°	17°51.1'	+10.5'	82.5°	11
12	17°02.1'	+03.8'	79.5°	17°12.8'	+04.8'	79.8°	17°23.2'	+05.9'	80.2°	17°33.3'	+07.0'	80.5°	17°43.1'	+08.0'	80.8°	17°52.5'	+09.1'	81.1°	18°01.7'	+10.2'	81.4°	12
13	17°05.8'	+03.4'	78.5°	17°17.6'	+04.5'	78.8°	17°29.1'	+05.6'	79.1°	17°40.3'	+06.6'	79.4°	17°51.1'	+07.7'	79.7°	18°01.7'	+08.8'	80.1°	18°11.8'	+09.9'	80.4°	13
14	17°09.2'	+03.1'	77.5°	17°22.1'	+04.2'	77.8°	17°34.7'	+05.2'	78.1°	17°46.9'	+06.3'	78.4°	17°58.8'	+07.4'	78.7°	18°10.4'	+08.5'	79.0°	18°21.7'	+09.5'	79.3°	14
15	17°12.3'	+02.8'	76.4°	17°26.3'	+03.8'	76.7°	17°39.9'	+04.9'	77.0°	17°53.2'	+06.0'	77.3°	18°06.2'	+07.0'	77.7°	18°18.9'	+08.1'	78.0°	18°31.2'	+09.2'	78.3°	15
16	17°15.1'	+02.5'	75.4°	17°30.1'	+03.5'	75.7°	17°44.8'	+04.6'	76.0°	17°59.2'	+05.6'	76.3°	18°13.3'	+06.7'	76.6°	18°27.0'	+07.8'	76.9°	18°40.4'	+08.8'	77.3°	16
17	17°17.6'	+02.1'	74.3°	17°33.7'	+03.2'	74.6°	17°49.4'	+04.2'	74.9°	18°04.9'	+05.3'	75.2°	18°20.0'	+06.4'	75.6°	18°34.8'	+07.4'	75.9°	18°49.2'	+08.5'	76.2°	17
18	17°19.7'	+01.8'	73.3°	17°36.8'	+02.9'	73.6°	17°53.7'	+03.9'	73.9°	18°10.2'	+05.0'	74.2°	18°26.3'	+06.0'	74.5°	18°42.2'	+07.1'	74.8°	18°57.7'	+08.1'	75.2°	18
19	17°21.5'	+01.5'	72.2°	17°39.7'	+02.5'	72.5°	17°57.6'	+03.6'	72.8°	18°15.1'	+04.6'	73.1°	18°32.4'	+05.7'	73.5°	18°49.3'	+06.7'	73.8°	19°05.9'	+07.8'	74.1°	19
20	17°23.0'	+01.2'	71.2°	17°42.2'	+02.2'	71.5°	18°01.1'	+03.2'	71.8°	18°19.7'	+04.3'	72.1°	18°38.0'	+05.3'	72.4°	18°56.0'	+06.4'	72.7°	19°13.6'	+07.4'	73.1°	20
21	17°24.2'	+00.8'	70.1°	17°44.4'	+01.9'	70.4°	18°04.4'	+02.9'	70.7°	18°24.0'	+03.9'	71.0°	18°43.3'	+05.0'	71.4°	19°02.4'	+06.0'	71.7°	19°28.1'	+07.1'	72.0°	21
22	17°25.0'	+00.5'	69.1°	17°46.3'	+01.5'	69.4°	18°07.2'	+02.5'	69.7°	18°27.9'	+03.6'	70.0°	18°48.3'	+04.6'	70.3°	19°08.4'	+05.6'	70.6°	19°21.0'	+06.7'	71.0°	22
23	17°25.5'	+00.2'	68.0°	17°47.8'	+01.2'	68.3°	18°09.8'	+02.2'	68.6°	18°31.5'	+03.2'	68.9°	18°52.9'	+04.3'	69.3°	19°14.0'	+05.3'	69.6°	19°34.8'	+06.3'	69.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	7			8			9			10			11			12			13			

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°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	14°53.1'	+07.4'	91.9°	14°51.0'	+08.5'	92.1°	14°48.7'	+09.6'	92.4°	14°46.0'	+10.6'	92.7°	14°43.1'	+11.7'	92.9°	14°39.9'	+12.8'	93.2°	14°36.4'	+13.8'	93.4°	0
1	15°00.6'	+07.2'	90.8°	14°59.5'	+08.2'	91.1°	14°58.2'	+09.3'	91.4°	14°56.7'	+10.4'	91.6°	14°54.8'	+11.4'	91.9°	14°52.6'	+12.5'	92.2°	14°50.2'	+13.6'	92.4°	1
2	15°07.7'	+06.9'	89.8°	15°07.8'	+07.9'	90.1°	15°07.5'	+09.0'	90.4°	15°07.0'	+10.1'	90.6°	15°06.2'	+11.2'	90.9°	15°05.1'	+12.2'	91.2°	15°03.8'	+13.3'	91.4°	2
3	15°14.6'	+06.6'	88.8°	15°15.7'	+07.7'	89.1°	15°16.6'	+08.7'	89.3°	15°17.1'	+09.8'	89.6°	15°17.4'	+10.9'	89.9°	15°17.4'	+12.0'	90.2°	15°17.1'	+13.0'	90.4°	3
4	15°21.2'	+06.3'	87.8°	15°23.4'	+07.4'	88.0°	15°25.3'	+08.5'	88.3°	15°26.9'	+09.5'	88.6°	15°28.3'	+10.6'	88.9°	15°29.3'	+11.7'	89.1°	15°30.1'	+12.7'	89.4°	4
5	15°27.5'	+06.0'	86.7°	15°30.8'	+07.1'	87.0°	15°33.8'	+08.2'	87.3°	15°36.5'	+09.2'	87.6°	15°38.9'	+10.3'	87.8°	15°41.0'	+11.4'	88.1°	15°42.8'	+12.5'	88.4°	5
6	15°33.5'	+05.7'	85.7°	15°37.9'	+06.8'	86.0°	15°41.9'	+07.9'	86.2°	15°45.7'	+09.0'	86.5°	15°49.2'	+10.0'	86.8°	15°52.4'	+11.1'	87.1°	15°55.3'	+12.2'	87.4°	6
7	15°39.2'	+05.4'	84.7°	15°44.7'	+06.5'	84.9°	15°49.8'	+07.6'	85.2°	15°54.7'	+08.7'	85.5°	15°59.2'	+09.7'	85.8°	16°03.5'	+10.8'	86.1°	16°07.5'	+11.9'	86.4°	7
8	15°44.7'	+05.1'	83.6°	15°51.2'	+06.2'	83.9°	15°57.4'	+07.3'	84.2°	16°03.3'	+08.4'	84.5°	16°09.0'	+09.4'	84.8°	16°14.3'	+10.5'	85.1°	16°19.3'	+11.6'	85.3°	8
9	15°49.8'	+04.9'	82.6°	15°57.4'	+05.9'	82.9°	16°04.7'	+07.0'	83.2°	16°11.7'	+08.1'	83.4°	16°18.4'	+09.1'	83.7°	16°24.8'	+10.2'	84.0°	16°30.9'	+11.3'	84.3°	9
10	15°54.7'	+04.6'	81.6°	16°03.3'	+05.6'	81.8°	16°11.7'	+06.7'	82.1°	16°19.8'	+07.8'	82.4°	16°27.6'	+08.8'	82.7°	16°35.0'	+09.9'	83.0°	16°42.2'	+11.0'	83.3°	10
11	15°59.2'	+04.3'	80.5°	16°09.0'	+05.3'	80.8°	16°18.4'	+06.4'	81.1°	16°27.6'	+07.5'	81.4°	16°36.4'	+08.5'	81.7°	16°45.0'	+09.6'	82.0°	16°53.2'	+10.7'	82.3°	11
12	16°03.5'	+04.0'	79.5°	16°14.3'	+05.0'	79.8°	16°24.8'	+06.1'	80.0°	16°35.0'	+07.2'	80.3°	16°45.0'	+08.2'	80.6°	16°54.6'	+09.3'	80.9°	17°03.9'	+10.4'	81.2°	12
13	16°07.5'	+03.7'	78.4°	16°19.3'	+04.7'	78.7°	16°30.9'	+05.8'	79.0°	16°42.2'	+06.9'	79.3°	16°53.2'	+07.9'	79.6°	17°03.9'	+09.0'	79.9°	17°14.2'	+10.0'	80.2°	13
14	16°11.1'	+03.4'	77.4°	16°24.1'	+04.4'	77.7°	16°36.7'	+05.5'	78.0°	16°49.1'	+06.5'	78.3°	17°01.1'	+07.6'	78.6°	17°12.8'	+08.7'	78.9°	17°24.3'	+09.7'	79.2°	14
15	16°14.5'	+03.0'	76.4°	16°28.5'	+04.1'	76.6°	16°42.2'	+05.2'	76.9°	16°55.6'	+06.2'	77.2°	17°08.7'	+07.3'	77.5°	17°21.5'	+08.3'	77.8°	17°34.0'	+09.4'	78.1°	15
16	16°17.5'	+02.7'	75.3°	16°32.6'	+03.8'	75.6°	16°47.3'	+04.9'	75.9°	17°01.8'	+05.9'	76.2°	17°16.0'	+07.0'	76.5°	17°29.9'	+08.0'	76.8°	17°43.4'	+09.1'	77.1°	16
17	16°20.3'	+02.4'	74.3°	16°36.4'	+03.5'	74.6°	16°52.2'	+04.5'	74.9°	17°07.7'	+05.6'	75.1°	17°23.0'	+06.6'	75.4°	17°37.9'	+07.7'	75.8°	17°52.5'	+08.7'	76.1°	17
18	16°22.7'	+02.1'	73.2°	16°39.9'	+03.2'	73.5°	16°56.7'	+04.2'	73.8°	17°13.3'	+05.3'	74.1°	17°29.6'	+06.3'	74.4°	17°45.6'	+07.4'	74.7°	18°01.2'	+08.4'	75.0°	18
19	16°24.8'	+01.8'	72.2°	16°43.0'	+02.9'	72.5°	17°00.9'	+03.9'	72.8°	17°18.6'	+04.9'	73.1°	17°35.9'	+06.0'	73.4°	17°52.9'	+07.0'	73.7°	18°09.6'	+08.1'	74.0°	19
20	16°26.6'	+01.5'	71.2°	16°45.9'	+02.5'	71.4°	17°04.8'	+03.6'	71.7°	17°23.5'	+04.6'	72.0°	17°41.9'	+05.7'	72.3°	18°00.0'	+06.7'	72.6°	18°17.7'	+07.7'	72.9°	20
21	16°28.2'	+01.2'	70.1°	16°48.4'	+02.2'	70.4°	17°08.4'	+03.3'	70.7°	17°28.1'	+04.3'	71.0°	17°47.5'	+05.3'	71.3°	18°06.7'	+06.4'	71.6°	18°25.5'	+07.4'	71.9°	21
22	16°29.4'</																					

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

76° 284° LHA

Latitude SAME as Declination

76° 284° LHA

Table with 13 columns (7-13) and 24 rows (Dec 0-23). Each cell contains three values: Hc°, d', Z°. The table is symmetric around the center column (10).

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

Table with 13 columns (7-13) and 24 rows (Dec 0-23). Each cell contains three values: Hc°, d', Z°. The table is symmetric around the center column (10).

77° 283° LHA

Latitude SAME as Declination

77° 283° LHA

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

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

78° 282° LHA

Latitude SAME as Declination

78° 282° LHA

Table with columns for Dec, Hc, d, Z for values 7-13. Rows 0-23. Includes a bottom row for Dec and values 7-13.

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

Table with columns for Dec, Hc, d, Z for values 7-13. Rows 0-23. Includes a bottom row for Dec and values 7-13.

79° 281° LHA

Latitude SAME as Declination

79° 281° LHA

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

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

90° 270° LHA

Latitude CONTRARY or SAME as Declination

90° 270° LHA

Table with columns for Dec°, Hc°, d', Z° and rows for 0 to 23. It contains a grid of values for each combination of hour angle and declination.

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

Table with columns for Dec°, Hc°, d', Z° and rows for 0 to 23. It contains a grid of values for each combination of hour angle and declination, with some values underlined.

91° 269° LHA

Latitude SAME as DECLINATION

91° 269° LHA

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

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

88° 272° LHA

Latitude CONTRARY to Declination

88° 272° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	1°59.1'	-07.3'	90.2°	1°58.8'	-08.4'	90.3°	1°58.5'	-09.4'	90.3°	1°58.2'	-10.4'	90.3°	1°57.8'	-11.5'	90.4°	1°57.4'	-12.5'	90.4°	1°56.9'	-13.5'	90.5°	0
1	1°51.7'	-07.4'	91.2°	1°50.5'	-08.4'	91.3°	1°49.1'	-09.4'	91.3°	1°47.7'	-10.5'	91.3°	1°46.3'	-11.5'	91.4°	1°44.9'	-12.5'	91.4°	1°43.4'	-13.6'	91.4°	1
2	1°44.4'	-07.4'	92.2°	1°42.1'	-08.4'	92.3°	1°39.7'	-09.5'	92.3°	1°37.3'	-10.5'	92.3°	1°34.8'	-11.5'	92.3°	1°32.3'	-12.6'	92.4°	1°29.9'	-13.6'	92.4°	2
3	1°37.0'	-07.4'	93.2°	1°33.6'	-08.5'	93.3°	1°30.2'	-09.5'	93.3°	1°26.8'	-10.5'	93.3°	1°23.3'	-11.6'	93.3°	1°19.8'	-12.6'	93.4°	1°16.3'	-13.6'	93.4°	3
4	1°29.6'	-07.5'	94.2°	1°25.2'	-08.5'	94.2°	1°20.7'	-09.5'	94.3°	1°16.2'	-10.6'	94.3°	1°11.7'	-11.6'	94.3°	1°07.2'	-12.6'	94.3°	1°02.7'	-13.6'	94.3°	4
5	1°22.1'	-07.5'	95.2°	1°16.7'	-08.5'	95.2°	1°11.2'	-09.5'	95.3°	1°05.7'	-10.6'	95.3°	1°00.2'	-11.6'	95.3°	0°54.6'	-12.6'	95.3°	0°49.1'	-13.6'	95.3°	5
6	1°14.6'	-07.5'	96.2°	1°08.2'	-08.5'	96.2°	1°01.6'	-09.6'	96.2°	0°55.1'	-10.6'	96.3°	0°48.6'	-11.6'	96.3°	0°42.0'	-12.6'	96.3°	0°35.4'	-13.6'	96.3°	6
7	1°07.1'	-07.5'	97.2°	0°59.6'	-08.6'	97.2°	0°52.1'	-09.6'	97.2°	0°44.5'	-10.6'	97.2°	0°37.0'	-11.6'	97.3°	0°29.4'	-12.6'	97.3°	0°21.8'	-13.6'	97.3°	7
8	0°59.6'	-07.5'	98.2°	0°51.1'	-08.6'	98.2°	0°42.5'	-09.6'	98.2°	0°33.9'	-10.6'	98.2°	0°25.3'	-11.6'	98.2°	0°16.7'	-12.6'	98.2°	<u>0°08.1'</u>	-13.7'	98.2°	8
9	0°52.1'	-07.6'	99.2°	0°42.5'	-08.6'	99.2°	0°32.9'	-09.6'	99.2°	0°23.3'	-10.6'	99.2°	0°13.7'	-11.6'	99.2°	<u>0°04.1'</u>	-12.6'	99.2°	0°05.5'	+13.6'	80.8°	9
10	0°44.5'	-07.6'	100.2°	0°33.9'	-08.6'	100.2°	0°23.3'	-09.6'	100.2°	0°12.7'	-10.6'	100.2°	<u>0°02.1'</u>	-11.6'	100.2°	0°08.5'	+12.6'	79.8°	0°19.2'	+13.6'	79.8°	10
11	0°37.0'	-07.6'	101.2°	0°25.3'	-08.6'	101.2°	0°13.7'	-09.6'	101.2°	<u>0°02.1'</u>	-10.6'	101.2°	0°09.6'	+11.6'	78.8°	0°21.2'	+12.6'	78.8°	0°32.8'	+13.6'	78.8°	11
12	0°29.4'	-07.6'	102.2°	0°16.7'	-08.6'	102.2°	<u>0°04.1'</u>	-09.6'	102.2°	0°08.5'	+10.6'	77.8°	0°21.2'	+11.6'	77.8°	0°33.8'	+12.6'	77.8°	0°46.4'	+13.6'	77.9°	12
13	0°21.8'	-07.6'	103.1°	<u>0°08.1'</u>	-08.6'	103.1°	0°05.5'	+09.6'	76.8°	0°19.2'	+10.6'	76.9°	0°32.8'	+11.6'	76.9°	0°46.4'	+12.6'	76.9°	1°00.1'	+13.6'	76.9°	13
14	0°14.2'	-07.6'	104.1°	0°00.5'	+08.6'	75.9°	0°15.1'	+09.6'	75.9°	0°29.8'	+10.6'	75.9°	0°44.4'	+11.6'	75.9°	0°59.0'	+12.6'	75.9°	1°13.7'	+13.6'	75.9°	14
15	<u>0°06.6'</u>	-07.6'	105.1°	0°09.1'	+08.6'	74.9°	0°24.7'	+09.6'	74.9°	0°40.4'	+10.6'	74.9°	0°56.0'	+11.6'	74.9°	1°11.6'	+12.6'	74.9°	1°27.2'	+13.6'	74.9°	15
16	0°01.0'	+07.6'	73.9°	0°17.7'	+08.6'	73.9°	0°34.3'	+09.6'	73.9°	0°51.0'	+10.6'	73.9°	1°07.6'	+11.6'	73.9°	1°24.2'	+12.5'	73.9°	1°40.8'	+13.5'	74.0°	16
17	0°08.6'	+07.6'	72.9°	0°26.3'	+08.6'	72.9°	0°43.9'	+09.6'	72.9°	1°01.5'	+10.6'	72.9°	1°19.2'	+11.5'	72.9°	1°36.8'	+12.5'	73.0°	1°54.3'	+13.5'	73.0°	17
18	0°16.2'	+07.6'	71.9°	0°34.9'	+08.6'	71.9°	0°53.5'	+09.6'	71.9°	1°12.1'	+10.5'	71.9°	1°30.7'	+11.5'	72.0°	1°49.3'	+12.5'	72.0°	2°07.8'	+13.5'	72.0°	18
19	0°23.8'	+07.6'	70.9°	0°43.4'	+08.6'	70.9°	1°03.0'	+09.5'	70.9°	1°22.6'	+10.5'	70.9°	1°42.2'	+11.5'	71.0°	2°01.8'	+12.5'	71.0°	2°21.3'	+13.4'	71.0°	19
20	0°31.4'	+07.6'	69.9°	0°52.0'	+08.5'	69.9°	1°12.6'	+09.5'	69.9°	1°33.2'	+10.5'	70.0°	1°53.7'	+11.5'	70.0°	2°14.2'	+12.4'	70.0°	2°34.7'	+13.4'	70.1°	20
21	0°39.0'	+07.6'	68.9°	1°00.5'	+08.5'	68.9°	1°22.1'	+09.5'	69.0°	1°43.6'	+10.5'	69.0°	2°05.2'	+11.4'	69.0°	2°26.6'	+12.4'	69.0°	2°48.1'	+13.3'	69.1°	21
22	0°46.5'	+07.6'	67.9°	1°09.1'	+08.5'	67.9°	1°31.6'	+09.5'	68.0°	1°54.1'	+10.4'	68.0°	2°16.6'	+11.4'	68.0°	2°39.0'	+12.3'	68.1°	3°01.4'	+13.3'	68.1°	22
23	0°54.1'	+07.5'	66.9°	1°17.6'	+08.5'	67.0°	1°41.1'	+09.4'	67.0°	2°04.5'	+10.4'	67.0°	2°27.9'	+11.3'	67.0°	2°51.3'	+12.3'	67.1°	3°14.7'	+13.2'	67.1°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	7			8			9			10			11			12			13			

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°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	2°58.6'	-07.3'	90.4°	2°58.2'	-08.4'	90.4°	2°57.8'	-09.4'	90.5°	2°57.3'	-10.5'	90.5°	2°56.7'	-11.5'	90.6°	2°56.1'	-12.5'	90.6°	2°55.4'	-13.5'	90.7°	0
1	2°51.3'	-07.4'	91.4°	2°49.9'	-08.4'	91.4°	2°48.4'	-09.5'	91.5°	2°46.8'	-10.5'	91.5°	2°45.2'	-11.5'	91.6°	2°43.5'	-12.6'	91.6°	2°41.8'	-13.6'	91.7°	1
2	2°43.9'	-07.4'	92.4°	2°41.4'	-08.5'	92.4°	2°38.9'	-09.5'	92.4°	2°36.3'	-10.6'	92.5°	2°33.7'	-11.6'	92.5°	2°31.0'	-12.6'	92.6°	2°28.3'	-13.6'	92.6°	2
3	2°36.5'	-07.5'	93.3°	2°32.9'	-08.5'	93.4°	2°29.4'	-09.6'	93.4°	2°25.7'	-10.6'	93.5°	2°22.1'	-11.6'	93.5°	2°18.4'	-12.6'	93.6°	2°14.6'	-13.7'	93.6°	3
4	2°29.0'	-07.5'	94.3°	2°24.4'	-08.6'	94.4°	2°19.8'	-09.6'	94.4°	2°15.1'	-10.6'	94.5°	2°10.5'	-11.7'	94.5°	2°05.7'	-12.7'	94.5°	2°01.0'	-13.7'	94.6°	4
5	2°21.4'	-07.6'	95.3°	2°15.8'	-08.6'	95.4°	2°10.2'	-09.6'	95.4°	2°04.5'	-10.7'	95.4°	1°58.8'	-11.7'	95.5°	1°53.0'	-12.7'	95.5°	1°47.3'	-13.7'	95.5°	5
6	2°13.8'	-07.6'	96.3°	2°07.2'	-08.7'	96.4°	2°00.5'	-09.7'	96.4°	1°53.8'	-10.7'	96.4°	1°47.1'	-11.7'	96.5°	1°40.3'	-12.7'	96.5°	1°33.5'	-13.8'	96.5°	6
7	2°06.2'	-07.7'	97.3°	1°58.6'	-08.7'	97.4°	1°50.9'	-09.7'	97.4°	1°43.1'	-10.7'	97.4°	1°35.4'	-11.8'	97.4°	1°27.6'	-12.8'	97.5°	1°19.8'	-13.8'	97.5°	7
8	1°58.6'	-07.7'	98.3°	1°49.9'	-08.7'	98.3°	1°41.1'	-09.7'	98.4°	1°32.4'	-10.8'	98.4°	1°23.6'	-11.8'	98.4°	1°14.8'	-12.8'	98.4°	1°06.0'	-13.8'	98.5°	8
9	1°50.9'	-07.7'	99.3°	1°41.1'	-08.8'	99.3°	1°31.4'	-09.8'	99.4°	1°21.6'	-10.8'	99.4°	1°11.8'	-11.8'	99.4°	1°02.0'	-12.8'	99.4°	0°52.2'	-13.8'	99.4°	9
10	1°43.1'	-07.8'	100.3°	1°32.4'	-08.8'	100.3°	1°21.6'	-09.8'	100.3°	1°10.8'	-10.8'	100.4°	1°00.0'	-11.8'	100.4°	0°49.2'	-12.8'	100.4°	0°38.4'	-13.8'	100.4°	10
11	1°35.4'	-07.8'	101.3°	1°23.6'	-08.8'	101.3°	1°11.8'	-09.8'	101.3°	1°00.0'	-10.8'	101.4°	0°48.2'	-11.8'	101.4°	0°36.4'	-12.8'	101.4°	0°24.5'	-13.8'	101.4°	11
12	1°27.6'	-07.8'	102.3°	1°14.8'	-08.8'	102.3°	1°02.0'	-09.8'	102.3°	0°49.2'	-10.8'	102.3°	0°36.4'	-11.8'	102.3°	0°23.5'	-12.8'	102.4°	<u>0°10.7'</u>	-13.8'	102.4°	12
13	1°19.8'	-07.8'	103.3°	1°06.0'	-08.8'	103.3°	0°52.2'	-09.9'	103.3°	0°38.4'	-10.9'	103.3°	0°24.5'	-11.9'	103.3°	<u>0°10.7'</u>	-12.8'	103.3°	0°03.1'	+13.8'	76.7°	13
14	1°11.9'	-07.9'	104.3°	0°57.1'	-08.9'	104.3°	0°42.3'	-09.9'	104.3°	0°27.5'	-10.9'	104.3°	0°12.7'	-11.9'	104.3°	0°02.2'	+12.8'	75.7°	0°17.0'	+13.8'	75.7°	14
15	1°04.1'	-07.9'	105.3°	0°48.3'	-08.9'	105.3°	0°32.5'	-09.9'	105.3°	0°16.6'	-10.9'	105.3°	<u>0°00.8'</u>	-11.9'	105.3°	0°15.0'	+12.8'	74.7°	0°30.8'	+13.8'	74.7°	15
16	0°56.2'	-07.9'	106.2°	0°39.4'	-08.9'	106.3°	0°22.6'	-09.9'	106.3°	<u>0°05.8'</u>	-10.9'	106.3°	0°11.0'	+11.9'	73.7°	0°27.8'	+12.8'	73.7°	0°44.6'	+13.8'	73.7°	16
17	0°48.3'	-07.9'	107.2°	0°30.5'	-08.9'	107.2°	0°12.7'	-09.9'	107.3°	0°05.1'	+10.9'	72.7°	0°22.9'	+11.8'	72.7°	0°40.7'	+12.8'	72.8°	0°58.5'	+13.8'	72.8°	17
18	0°40.4'	-07.9'	108.2°	0°21.6'	-08.9'	108.2°	<u>0°02.8'</u>	-09.9'	108.2°	0°16.0'	+10.9'	71.8°	0°34.7'	+11.8'	71.8°	0°53.5'	+12.8'	71.8°	1°12.2'	+13.8'	71.8°	18
19	0°32.4'	-07.9'	109.2°	0°12.7'	-08.9'	109.2°	0°07.1'	+09.9'	70.8°	0°26.8'	+10.9'	70.8°	0°46.6'	+11.8'	70.8°	1°06.3'	+12.8'	70.8°	1°26.0'	+13.7'	70.8°	19
20	0°24.5'	-07.9'	110.2°	<u>0°03.8'</u>	-08.9'	110.2°	0°16.9'	+09.9'	69.8°	0°37.7'	+10.8'	69.8°	0°58.4'	+11.8'	69.8°	1°19.1'	+12.8'	69.8°	1°39.8'	+13.7'	69.9°	20
21	0°16.6'	-07.9'	111.2°	0°05.1'	+08.9'	68.8°	0°26.8'	+09.9'	68.8°	0°48.5'	+10.8'	68.8°	1°10.2'	+11.8'	68.8°	1°31.9'	+12.7'	68.8°	1°53.5'	+13.7'	68.9°	21
22	0°08.6'	-07.9'	112.2°	0°14.0'	+08.9'	67.8°	0°36.7'	+09.9'	67.8°	0°59.3'	+10.8'	67.8°	1°22.0'	+11.8'	67.8°	1°44.6'	+12.7'	67.9°	2°07.2'	+13.7'	67.9°	22
23	<u>0°00.7'</u>	-07.9'	113.2°	0																		

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

86° 274° LHA

Latitude CONTRARY to Declination

86° 274° LHA

Table with 13 columns (7-13) and 24 rows (Dec° 0-23). Each cell contains three values: Hc°, d', and Z°. The table is bounded by a thick border.

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

Table with 13 columns (7-13) and 24 rows (Dec° 0-23). Each cell contains three values: Hc°, d', and Z°. The table is bounded by a thick border.

95° 265° LHA

Latitude SAME as DECLINATION

95° 265° LHA

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

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

84° 276° LHA

Latitude CONTRARY to Declination

84° 276° LHA

Dec°	7			8			9			10			11			12			13			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'	-07.4'	90.7°	5°56.5'	-08.4'	90.8°	5°55.6'	-09.5'	90.9°	5°54.5'	-10.5'	91.0°	5°53.4'	-11.6'	91.1°	5°52.1'	-12.6'	91.3°	5°50.7'	-13.6'	91.4°	0
1	5°49.9'	-07.5'	91.7°	5°48.0'	-08.6'	91.8°	5°46.1'	-09.6'	91.9°	5°44.0'	-10.6'	92.0°	5°41.8'	-11.7'	92.1°	5°39.5'	-12.7'	92.2°	5°37.1'	-13.7'	92.3°	1
2	5°42.3'	-07.6'	92.7°	5°39.5'	-08.7'	92.8°	5°36.5'	-09.7'	92.9°	5°33.4'	-10.7'	93.0°	5°30.1'	-11.8'	93.1°	5°26.8'	-12.8'	93.2°	5°23.4'	-13.8'	93.3°	2
3	5°34.8'	-07.7'	93.7°	5°30.8'	-08.8'	93.8°	5°26.8'	-09.8'	93.9°	5°22.6'	-10.8'	94.0°	5°18.4'	-11.9'	94.1°	5°14.0'	-12.9'	94.2°	5°09.6'	-13.9'	94.3°	3
4	5°27.1'	-07.8'	94.7°	5°22.1'	-08.8'	94.8°	5°17.0'	-09.9'	94.9°	5°11.8'	-10.9'	95.0°	5°06.5'	-11.9'	95.1°	5°01.2'	-13.0'	95.2°	4°55.7'	-14.0'	95.3°	4
5	5°19.3'	-07.9'	95.7°	5°13.2'	-08.9'	95.8°	5°07.1'	-10.0'	95.9°	5°00.9'	-11.0'	96.0°	4°54.6'	-12.0'	96.1°	4°48.2'	-13.0'	96.2°	4°41.7'	-14.1'	96.2°	5
6	5°11.3'	-08.0'	96.7°	5°04.3'	-09.0'	96.8°	4°57.1'	-10.1'	96.9°	4°49.9'	-11.1'	97.0°	4°42.6'	-12.1'	97.1°	4°35.1'	-13.1'	97.1°	4°27.7'	-14.1'	97.2°	6
7	5°03.3'	-08.1'	97.7°	4°55.2'	-09.1'	97.8°	4°47.1'	-10.1'	97.9°	4°38.8'	-11.2'	98.0°	4°30.4'	-12.2'	98.0°	4°22.0'	-13.2'	98.1°	4°13.5'	-14.2'	98.2°	7
8	4°55.2'	-08.2'	98.7°	4°46.1'	-09.2'	98.8°	4°36.9'	-10.2'	98.9°	4°27.6'	-11.2'	98.9°	4°18.3'	-12.3'	99.0°	4°08.8'	-13.3'	99.1°	3°59.3'	-14.3'	99.2°	8
9	4°47.1'	-08.3'	99.7°	4°36.9'	-09.3'	99.8°	4°26.7'	-10.3'	99.9°	4°16.4'	-11.3'	99.9°	4°06.0'	-12.3'	100.0°	3°55.5'	-13.3'	100.1°	3°45.0'	-14.3'	100.1°	9
10	4°38.8'	-08.4'	100.7°	4°27.6'	-09.4'	100.8°	4°16.4'	-10.4'	100.8°	4°05.1'	-11.4'	100.9°	3°53.7'	-12.4'	101.0°	3°42.2'	-13.4'	101.0°	3°30.7'	-14.4'	101.1°	10
11	4°30.4'	-08.4'	101.7°	4°18.3'	-09.4'	101.8°	4°06.0'	-10.5'	101.8°	3°53.7'	-11.5'	101.9°	3°41.3'	-12.5'	102.0°	3°28.8'	-13.5'	102.0°	3°16.2'	-14.5'	102.1°	11
12	4°22.0'	-08.5'	102.7°	4°08.8'	-09.5'	102.7°	3°55.5'	-10.5'	102.8°	3°42.2'	-11.5'	102.9°	3°28.8'	-12.5'	102.9°	3°15.3'	-13.5'	103.0°	3°01.8'	-14.5'	103.1°	12
13	4°13.5'	-08.6'	103.7°	3°59.3'	-09.6'	103.7°	3°45.0'	-10.6'	103.8°	3°30.7'	-11.6'	103.9°	3°16.2'	-12.6'	103.9°	3°01.8'	-13.6'	104.0°	2°47.3'	-14.6'	104.0°	13
14	4°04.9'	-08.7'	104.7°	3°49.7'	-09.7'	104.7°	3°34.4'	-10.7'	104.8°	3°19.1'	-11.7'	104.8°	3°03.7'	-12.6'	104.9°	2°48.2'	-13.6'	105.0°	2°32.7'	-14.6'	105.0°	14
15	3°56.3'	-08.7'	105.7°	3°40.0'	-09.7'	105.7°	3°23.8'	-10.7'	105.8°	3°07.4'	-11.7'	105.8°	2°51.0'	-12.7'	105.9°	2°34.6'	-13.7'	105.9°	2°18.1'	-14.6'	106.0°	15
16	3°47.5'	-08.8'	106.6°	3°30.3'	-09.8'	106.7°	3°13.0'	-10.8'	106.8°	2°55.7'	-11.8'	106.8°	2°38.3'	-12.7'	106.9°	2°20.9'	-13.7'	106.9°	2°03.4'	-14.7'	106.9°	16
17	3°38.7'	-08.9'	107.6°	3°20.5'	-09.8'	107.7°	3°02.3'	-10.8'	107.7°	2°43.9'	-11.8'	107.8°	2°25.6'	-12.8'	107.8°	2°07.2'	-13.8'	107.9°	1°48.8'	-14.7'	107.9°	17
18	3°29.9'	-08.9'	108.6°	3°10.7'	-09.9'	108.7°	2°51.4'	-10.9'	108.7°	2°32.1'	-11.9'	108.8°	2°12.8'	-12.8'	108.8°	1°53.4'	-13.8'	108.9°	1°34.0'	-14.7'	108.9°	18
19	3°20.9'	-09.0'	109.6°	3°00.8'	-10.0'	109.7°	2°40.6'	-10.9'	109.7°	2°20.3'	-11.9'	109.8°	1°60.0'	-12.9'	109.8°	1°39.7'	-13.8'	109.8°	1°19.3'	-14.8'	109.8°	19
20	3°12.0'	-09.0'	110.6°	2°50.8'	-10.0'	110.7°	2°29.6'	-11.0'	110.7°	2°08.4'	-11.9'	110.7°	1°47.1'	-12.9'	110.8°	1°25.8'	-13.8'	110.8°	1°04.5'	-14.8'	110.8°	20
21	3°02.9'	-09.1'	111.6°	2°40.8'	-10.1'	111.6°	2°18.7'	-11.0'	111.7°	1°56.5'	-12.0'	111.7°	1°34.3'	-12.9'	111.7°	1°12.0'	-13.9'	111.8°	0°49.7'	-14.8'	111.8°	21
22	2°53.8'	-09.1'	112.6°	2°30.8'	-10.1'	112.6°	2°07.6'	-11.0'	112.7°	1°44.5'	-12.0'	112.7°	1°21.3'	-12.9'	112.7°	0°58.1'	-13.9'	112.7°	0°34.9'	-14.8'	112.8°	22
23	2°44.7'	-09.2'	113.6°	2°20.7'	-10.1'	113.6°	1°56.6'	-11.1'	113.7°	1°32.5'	-12.0'	113.7°	1°08.4'	-13.0'	113.7°	0°44.3'	-13.9'	113.7°	0°20.1'	-14.8'	113.7°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	7			8			9			10			11			12			13			

84° 276° LHA

Latitude CONTRARY to 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

83° 277° LHA

Latitude CONTRARY to Declination

83° 277° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	6°56.8'	-07.4'	90.9°	6°55.9'	-08.5'	91.0°	6°54.8'	-09.5'	91.1°	6°53.6'	-10.6'	91.2°	6°52.2'	-11.6'	91.3°	6°50.8'	-12.6'	91.5°	6°49.2'	-13.7'	91.6°	0
1	6°49.4'	-07.6'	91.9°	6°47.4'	-08.6'	92.0°	6°45.3'	-09.6'	92.1°	6°43.0'	-10.7'	92.2°	6°40.7'	-11.7'	92.3°	6°38.2'	-12.7'	92.4°	6°35.5'	-13.8'	92.6°	1
2	6°41.8'	-07.7'	92.9°	6°38.8'	-08.7'	93.0°	6°35.7'	-09.8'	93.1°	6°32.4'	-10.8'	93.2°	6°28.9'	-11.8'	93.3°	6°25.4'	-12.9'	93.4°	6°21.8'	-13.9'	93.5°	2
3	6°34.2'	-07.8'	93.9°	6°30.1'	-08.8'	94.0°	6°25.9'	-09.9'	94.1°	6°21.6'	-10.9'	94.2°	6°17.1'	-11.9'	94.3°	6°12.6'	-13.0'	94.4°	6°07.9'	-14.0'	94.5°	3
4	6°26.4'	-07.9'	94.9°	6°21.3'	-08.9'	95.0°	6°16.0'	-10.0'	95.1°	6°10.7'	-11.0'	95.2°	6°05.2'	-12.0'	95.3°	5°59.6'	-13.1'	95.4°	5°53.9'	-14.1'	95.5°	4
5	6°18.5'	-08.0'	95.8°	6°12.3'	-09.1'	96.0°	6°06.0'	-10.1'	96.1°	5°59.6'	-11.1'	96.2°	5°53.1'	-12.1'	96.3°	5°46.5'	-13.2'	96.4°	5°39.8'	-14.2'	96.5°	5
6	6°10.5'	-08.1'	96.8°	6°03.3'	-09.2'	97.0°	5°56.0'	-10.2'	97.1°	5°48.5'	-11.2'	97.2°	5°41.0'	-12.2'	97.3°	5°33.4'	-13.3'	97.4°	5°25.6'	-14.3'	97.5°	6
7	6°02.3'	-08.2'	97.8°	5°54.1'	-09.3'	97.9°	5°45.8'	-10.3'	98.0°	5°37.3'	-11.3'	98.1°	5°28.8'	-12.3'	98.2°	5°20.1'	-13.4'	98.3°	5°11.4'	-14.4'	98.4°	7
8	5°54.1'	-08.3'	98.8°	5°44.8'	-09.4'	98.9°	5°35.5'	-10.4'	99.0°	5°26.0'	-11.4'	99.1°	5°16.4'	-12.4'	99.2°	5°06.7'	-13.4'	99.3°	4°57.0'	-14.5'	99.4°	8
9	5°45.8'	-08.5'	99.8°	5°35.5'	-09.5'	99.9°	5°25.1'	-10.5'	100.0°	5°14.6'	-11.5'	100.1°	5°04.0'	-12.5'	100.2°	4°53.3'	-13.5'	100.3°	4°42.5'	-14.5'	100.4°	9
10	5°37.3'	-08.6'	100.8°	5°26.0'	-09.6'	100.9°	5°14.6'	-10.6'	101.0°	5°03.1'	-11.6'	101.1°	4°51.5'	-12.6'	101.2°	4°39.8'	-13.6'	101.3°	4°28.0'	-14.6'	101.3°	10
11	5°28.8'	-08.7'	101.8°	5°16.4'	-09.7'	101.9°	5°04.0'	-10.7'	102.0°	4°51.5'	-11.7'	102.1°	4°38.8'	-12.7'	102.2°	4°26.2'	-13.7'	102.2°	4°13.4'	-14.7'	102.3°	11
12	5°20.1'	-08.7'	102.8°	5°06.7'	-09.8'	102.9°	4°53.3'	-10.8'	103.0°	4°39.8'	-11.8'	103.1°	4°26.2'	-12.8'	103.2°	4°12.5'	-13.8'	103.2°	3°58.7'	-14.8'	103.3°	12
13	5°11.4'	-08.8'	103.8°	4°57.0'	-09.8'	103.9°	4°42.5'	-10.8'	104.0°	4°28.0'	-11.8'	104.1°	4°13.4'	-12.8'	104.1°	3°58.7'	-13.8'	104.2°	3°44.0'	-14.8'	104.3°	13
14	5°02.5'	-08.9'	104.8°	4°47.1'	-09.9'	104.9°	4°31.7'	-10.9'	105.0°	4°16.2'	-11.9'	105.0°	4°00.5'	-12.9'	105.1°	3°44.9'	-13.9'	105.2°	3°29.1'	-14.9'	105.2°	14
15	4°53.6'	-09.0'	105.8°	4°37.2'	-10.0'	105.9°	4°20.8'	-11.0'	106.0°	4°04.2'	-12.0'	106.0°	3°47.6'	-13.0'	106.1°	3°31.0'	-14.0'	106.2°	3°14.3'	-14.9'	106.2°	15
16	4°44.6'	-09.1'	106.8°	4°27.2'	-10.1'	106.9°	4°09.8'	-11.1'	106.9°	3°52.2'	-12.1'	107.0°	3°34.7'	-13.0'	107.1°	3°17.0'	-14.0'	107.1°	2°59.3'	-15.0'	107.2°	16
17	4°35.5'	-09.2'	107.8°	4°17.1'	-10.2'	107.9°	3°58.7'	-11.1'	107.9°	3°40.2'	-12.1'	108.0°	3°21.6'	-13.1'	108.0°	3°03.0'	-14.1'	108.1°	2°44.3'	-15.0'	108.1°	17
18	4°26.3'	-09.3'	108.8°	4°06.9'	-10.2'	108.8°	3°47.5'	-11.2'	108.9°	3°28.1'	-12.2'	109.0°	3°08.5'	-13.2'	109.0°	2°48.9'	-14.1'	109.1°	2°29.3'	-15.1'	109.1°	18
19	4°17.0'	-09.3'	109.8°	3°56.7'	-10.3'	109.8°	3°36.3'	-11.3'	109.9°	3°15.9'	-12.3'	109.9°	2°55.4'	-13.2'	110.0°	2°34.8'	-14.2'	110.0°	2°14.2'	-15.1'	110.1°	19
20	4°07.7'	-09.4'	110.8°	3°46.4'	-10.4'	110.8°	3°25.0'	-11.3'	110.9°	3°03.6'	-12.3'	110.9°	2°42.2'	-13.3'	111.0°	2°20.7'	-14.2'	111.0°	1°59.1'	-15.1'	111.1°	20
21	3°58.3'	-09.5'	111.7°	3°36.0'	-10.4'	111.8°	3°13.7'	-11.4'	111.9°	2°51.3'	-12.3'	111.9°	2°28.9'	-13.3'	112.0°	2°06.5'	-14.2'	112.0°	1°44.0'	-15.2'	112.0°	21
22	3°48.8'	-09.6'	112.7°	3°25.6'	-10.5'	112.8°	3°02.3'	-11.5'	112.8°	2°39.0'	-12.4'	112.9°	2°15.6'	-13.3'	1							

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

82° 278° LHA

Latitude CONTRARY to Declination

82° 278° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	7°56.3'	-07.5'	91.0°	7°55.3'	-08.5'	91.1°	7°54.1'	-09.5'	91.3°	7°52.7'	-10.6'	91.4°	7°51.1'	-11.6'	91.5°	7°49.4'	-12.7'	91.7°	7°47.6'	-13.7'	91.8°	0
1	7°48.9'	-07.6'	92.0°	7°46.8'	-08.6'	92.1°	7°44.5'	-09.7'	92.3°	7°42.1'	-10.7'	92.4°	7°39.5'	-11.8'	92.5°	7°36.8'	-12.8'	92.7°	7°33.9'	-13.8'	92.8°	1
2	7°41.3'	-07.7'	93.0°	7°38.2'	-08.8'	93.1°	7°34.8'	-09.8'	93.3°	7°31.3'	-10.9'	93.4°	7°27.7'	-11.9'	93.5°	7°24.0'	-12.9'	93.6°	7°20.1'	-13.9'	93.8°	2
3	7°33.6'	-07.9'	94.0°	7°29.4'	-08.9'	94.1°	7°25.0'	-10.0'	94.2°	7°20.5'	-11.0'	94.4°	7°15.8'	-12.0'	94.5°	7°11.1'	-13.0'	94.6°	7°06.2'	-14.1'	94.8°	3
4	7°25.7'	-08.0'	95.0°	7°20.5'	-09.0'	95.1°	7°15.0'	-10.1'	95.2°	7°09.5'	-11.1'	95.4°	7°03.8'	-12.1'	95.5°	6°58.0'	-13.2'	95.6°	6°52.1'	-14.2'	95.7°	4
5	7°17.7'	-08.1'	96.0°	7°11.4'	-09.2'	96.1°	7°05.0'	-10.2'	96.2°	6°58.4'	-11.2'	96.4°	6°51.7'	-12.3'	96.5°	6°44.8'	-13.3'	96.6°	6°37.9'	-14.3'	96.7°	5
6	7°09.6'	-08.3'	97.0°	7°02.2'	-09.3'	97.1°	6°54.8'	-10.3'	97.2°	6°47.1'	-11.4'	97.3°	6°39.4'	-12.4'	97.5°	6°31.6'	-13.4'	97.6°	6°23.6'	-14.4'	97.7°	6
7	7°01.3'	-08.4'	98.0°	6°52.9'	-09.4'	98.1°	6°44.4'	-10.5'	98.2°	6°35.8'	-11.5'	98.3°	6°27.0'	-12.5'	98.4°	6°18.2'	-13.5'	98.6°	6°09.2'	-14.5'	98.7°	7
8	6°52.9'	-08.5'	99.0°	6°43.5'	-09.5'	99.1°	6°34.0'	-10.6'	99.2°	6°24.3'	-11.6'	99.3°	6°14.5'	-12.6'	99.4°	6°04.6'	-13.6'	99.5°	5°54.6'	-14.6'	99.6°	8
9	6°44.4'	-08.6'	100.0°	6°34.0'	-09.7'	100.1°	6°23.4'	-10.7'	100.2°	6°12.7'	-11.7'	100.3°	6°01.9'	-12.7'	100.4°	5°51.0'	-13.7'	100.5°	5°40.0'	-14.7'	100.6°	9
10	6°35.8'	-08.8'	101.0°	6°24.3'	-09.8'	101.1°	6°12.7'	-10.8'	101.2°	6°01.0'	-11.8'	101.3°	5°49.2'	-12.8'	101.4°	5°37.3'	-13.8'	101.5°	5°25.3'	-14.8'	101.6°	10
11	6°27.0'	-08.9'	102.0°	6°14.5'	-09.9'	102.1°	6°01.9'	-10.9'	102.2°	5°49.2'	-11.9'	102.3°	5°36.4'	-12.9'	102.4°	5°23.5'	-13.9'	102.5°	5°10.5'	-14.9'	102.6°	11
12	6°18.2'	-09.0'	103.0°	6°04.6'	-10.0'	103.1°	5°51.0'	-11.0'	103.2°	5°37.3'	-12.0'	103.3°	5°23.5'	-13.0'	103.4°	5°09.6'	-14.0'	103.5°	4°55.6'	-15.0'	103.5°	12
13	6°09.2'	-09.1'	104.0°	5°54.6'	-10.1'	104.1°	5°40.0'	-11.1'	104.2°	5°25.3'	-12.1'	104.3°	5°10.5'	-13.1'	104.3°	4°55.6'	-14.1'	104.4°	4°40.6'	-15.1'	104.5°	13
14	6°00.1'	-09.2'	105.0°	5°44.5'	-10.2'	105.1°	5°28.9'	-11.2'	105.1°	5°13.2'	-12.2'	105.2°	4°57.4'	-13.2'	105.3°	4°41.5'	-14.2'	105.4°	4°25.5'	-15.1'	105.5°	14
15	5°50.9'	-09.3'	105.9°	5°34.3'	-10.3'	106.0°	5°17.7'	-11.3'	106.1°	5°01.0'	-12.3'	106.2°	4°44.2'	-13.3'	106.3°	4°27.3'	-14.2'	106.4°	4°10.4'	-15.2'	106.4°	15
16	5°41.6'	-09.4'	106.9°	5°24.0'	-10.4'	107.0°	5°06.4'	-11.4'	107.1°	4°48.7'	-12.4'	107.2°	4°30.9'	-13.3'	107.3°	4°13.1'	-14.3'	107.4°	3°55.1'	-15.3'	107.4°	16
17	5°32.2'	-09.5'	107.9°	5°13.6'	-10.5'	108.0°	4°55.0'	-11.5'	108.1°	4°36.3'	-12.4'	108.2°	4°17.6'	-13.4'	108.3°	3°58.8'	-14.4'	108.3°	3°39.9'	-15.3'	108.4°	17
18	5°22.6'	-09.6'	108.9°	5°03.1'	-10.6'	109.0°	4°43.6'	-11.6'	109.1°	4°23.9'	-12.5'	109.2°	4°04.2'	-13.5'	109.2°	3°44.4'	-14.5'	109.3°	3°24.5'	-15.4'	109.4°	18
19	5°13.0'	-09.7'	109.9°	4°52.6'	-10.7'	110.0°	4°32.0'	-11.6'	110.1°	4°11.4'	-12.6'	110.1°	3°50.7'	-13.6'	110.2°	3°29.9'	-14.5'	110.3°	3°09.1'	-15.5'	110.3°	19
20	5°03.3'	-09.8'	110.9°	4°41.9'	-10.8'	111.0°	4°20.4'	-11.7'	111.1°	3°58.8'	-12.7'	111.1°	3°37.1'	-13.6'	111.2°	3°15.4'	-14.6'	111.2°	2°53.6'	-15.5'	111.3°	20
21	4°53.6'	-09.9'	111.9°	4°31.1'	-10.8'	112.0°	4°08.7'	-11.8'	112.0°	3°46.1'	-12.7'	112.1°	3°23.5'	-13.7'	112.2°	3°00.8'	-14.6'	112.2°	2°38.1'	-15.6'	112.3°	21
22	4°43.7'	-10.0'	112.9°	4°20.3'	-10.9'	113.0°	3°56.9'	-11.9'	113.0°	3°33.4'	-12.8'	113.1°	3°09.8'	-13.7'	113.1°	2°46.2'	-14.7'	113.2°	2°22.6'	-15.6'	113.2°	22
23	4°33.7'	-10.0'	113.9°	4°09.4'	-11.0'	113.9°	3°45.0'	-11.9'	114.0°	3°20.6'	-12.9'	114.1°	2°56.1'	-13.8'	114.1°	2°31.6'	-14.7'	114.2°	2°07.0'	-15.6'	114.2°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	7			8			9			10			11			12			13			

82° 278° LHA

Latitude CONTRARY to 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

81° 279° LHA

Latitude CONTRARY to Declination

81° 279° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	8°55.9'	-07.5'	91.1°	8°54.7'	-08.5'	91.3°	8°53.3'	-09.6'	91.4°	8°51.7'	-10.6'	91.6°	8°50.0'	-11.7'	91.7°	8°48.1'	-12.7'	91.9°	8°46.0'	-13.7'	92.0°	0
1	8°48.4'	-07.6'	92.1°	8°46.2'	-08.7'	92.3°	8°43.7'	-09.7'	92.4°	8°41.1'	-10.8'	92.6°	8°38.3'	-11.8'	92.7°	8°35.4'	-12.9'	92.9°	8°32.3'	-13.9'	93.0°	1
2	8°40.8'	-07.8'	93.1°	8°37.5'	-08.8'	93.3°	8°34.0'	-09.9'	93.4°	8°30.3'	-10.9'	93.6°	8°26.5'	-12.0'	93.7°	8°22.6'	-13.0'	93.9°	8°18.4'	-14.0'	94.0°	2
3	8°33.0'	-08.0'	94.1°	8°28.6'	-09.0'	94.3°	8°24.1'	-10.0'	94.4°	8°19.4'	-11.1'	94.6°	8°14.6'	-12.1'	94.7°	8°09.6'	-13.1'	94.8°	8°04.4'	-14.2'	95.0°	3
4	8°25.1'	-08.1'	95.1°	8°19.6'	-09.1'	95.3°	8°14.1'	-10.2'	95.4°	8°08.3'	-11.2'	95.6°	8°02.4'	-12.3'	95.7°	7°56.4'	-13.3'	95.8°	7°50.2'	-14.3'	96.0°	4
5	8°17.0'	-08.3'	96.1°	8°10.5'	-09.3'	96.3°	8°03.9'	-10.3'	96.4°	7°57.1'	-11.4'	96.5°	7°50.2'	-12.4'	96.7°	7°43.1'	-13.4'	96.8°	7°35.9'	-14.4'	97.0°	5
6	8°08.7'	-08.4'	97.1°	8°01.2'	-09.4'	97.3°	7°53.5'	-10.5'	97.4°	7°45.7'	-11.5'	97.5°	7°37.8'	-12.5'	97.7°	7°29.7'	-13.5'	97.8°	7°21.5'	-14.6'	97.9°	6
7	8°00.3'	-08.5'	98.1°	7°51.8'	-09.6'	98.3°	7°43.1'	-10.6'	98.4°	7°34.2'	-11.6'	98.5°	7°25.3'	-12.7'	98.7°	7°16.2'	-13.7'	98.8°	7°06.9'	-14.7'	98.9°	7
8	7°51.8'	-08.7'	99.1°	7°42.2'	-09.7'	99.3°	7°32.5'	-10.7'	99.4°	7°22.6'	-11.8'	99.5°	7°12.6'	-12.8'	99.6°	7°02.5'	-13.8'	99.8°	6°52.3'	-14.8'	99.9°	8
9	7°43.1'	-08.8'	100.1°	7°32.5'	-09.9'	100.3°	7°21.7'	-10.9'	100.4°	7°10.8'	-11.9'	100.5°	6°59.8'	-12.9'	100.6°	6°48.7'	-13.9'	100.7°	6°37.5'	-14.9'	100.9°	9
10	7°34.2'	-09.0'	101.1°	7°22.6'	-10.0'	101.2°	7°10.8'	-11.0'	101.4°	6°58.9'	-12.0'	101.5°	6°46.9'	-13.0'	101.6°	6°34.8'	-14.0'	101.7°	6°22.5'	-15.0'	101.8°	10
11	7°25.3'	-09.1'	102.1°	7°12.6'	-10.1'	102.2°	6°59.8'	-11.1'	102.4°	6°46.9'	-12.1'	102.5°	6°33.9'	-13.1'	102.6°	6°20.8'	-14.1'	102.7°	6°07.5'	-15.1'	102.8°	11
12	7°16.2'	-09.2'	103.1°	7°02.5'	-10.2'	103.2°	6°48.7'	-11.2'	103.4°	6°34.8'	-12.3'	103.5°	6°20.8'	-13.2'	103.6°	6°06.6'	-14.2'	103.7°	5°52.4'	-15.2'	103.8°	12
13	7°06.9'	-09.4'	104.1°	6°52.3'	-10.4'	104.2°	6°37.5'	-11.4'	104.3°	6°22.5'	-12.4'	104.5°	6°07.5'	-13.4'	104.6°	5°52.4'	-14.3'	104.7°	5°37.1'	-15.3'	104.8°	13
14	6°57.6'	-09.5'	105.1°	6°41.9'	-10.5'	105.2°	6°26.1'	-11.5'	105.3°	6°10.2'	-12.5'	105.4°	5°54.2'	-13.5'	105.5°	5°38.0'	-14.4'	105.6°	5°21.8'	-15.4'	105.7°	14
15	6°48.1'	-09.6'	106.1°	6°31.4'	-10.6'	106.2°	6°14.6'	-11.6'	106.3°	5°57.7'	-12.6'	106.4°	5°40.7'	-13.6'	106.5°	5°23.6'	-14.5'	106.6°	5°06.4'	-15.5'	106.7°	15
16	6°38.5'	-09.7'	107.1°	6°20.8'	-10.7'	107.2°	6°03.0'	-11.7'	107.3°	5°45.1'	-12.7'	107.4°	5°27.1'	-13.7'	107.5°	5°09.1'	-14.6'	107.6°	4°50.9'	-15.6'	107.7°	16
17	6°28.8'	-09.8'	108.1°	6°10.1'	-10.8'	108.2°	5°51.3'	-11.8'	108.3°	5°32.5'	-12.8'	108.4°	5°13.5'	-13.7'	108.5°	4°54.4'	-14.7'	108.6°	4°35.3'	-15.7'	108.6°	17
18	6°19.0'	-09.9'	109.1°	5°59.3'	-10.9'	109.2°	5°39.5'	-11.9'	109.3°	5°19.7'	-12.9'	109.4°	4°59.7'	-13.8'	109.5°	4°39.7'	-14.8'	109.5°	4°19.6'	-15.7'	109.6°	18
19	6°09.0'	-10.1'	110.1°	5°48.4'	-11.0'	110.2°	5°27.6'	-12.0'	110.3°	5°06.8'	-13.0'	110.3°	4°45.9'	-13.9'	110.4°	4°24.9'	-14.9'	110.5°	4°03.9'	-15.8'	110.6°	19
20	5°58.9'	-10.2'	111.1°	5°37.3'	-11.1'	111.2°	5°15.6'	-12.1'	111.2°	4°53.9'	-13.0'	111.3°	4°32.0'	-14.0'	111.4°	4°10.1'	-14.9'	111.5°	3°48.1'	-15.9'	111.5°	20
21	5°48.8'	-10.3'	112.1°	5°26.2'	-11.2'	112.1°	5°03.6'	-12.2'	112.2°	4°40.8'	-13.1'	112.3°	4°18.0'	-14.1'	112.4°	3°55.1'	-15.0'	112.4°	3°32.2'	-15.9'	112.5°	21
22	5°38.5'	-10.4'	113.0°	5°15.0'	-11.3'	113.1°	4°51.4'	-12.3'	113.2°	4°27.7'	-13.2'	113.3°	4°03.9'	-14.1'	113.4°	3°40.1'	-15.1'	113.4°	3°16.3'	-16.0'	113.5°	22
23	5°28.1'	-10.5'	114.0°	5°03.7'	-11.4'	114.1°	4°39.1'	-12.3'	114.2°	4°14.5'	-13.3'	114.3°	3°49									

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

80° 280° LHA

Latitude CONTRARY to Declination

80° 280° LHA

Table with columns: Dec°, 7, 8, 9, 10, 11, 12, 13, Dec°. Each column contains three sub-columns: Hc°, d', Z°. Rows 0-23 show data for North Lat.

80° 280° LHA

Latitude CONTRARY to 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

79° 281° LHA

Latitude CONTRARY to Declination

79° 281° LHA

Table with columns: Dec°, 7, 8, 9, 10, 11, 12, 13, Dec°. Each column contains three sub-columns: Hc°, d', Z°. Rows 0-23 show data for North Lat.

79° 281° LHA

Latitude CONTRARY to DECLINATION

79° 281° LHA

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

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

78° 282° LHA			Latitude CONTRARY to Declination									78° 282° LHA										
Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	11°54.5'	-07.6'	91.5°	11°52.9'	-08.6'	91.7°	11°51.0'	-09.7'	91.9°	11°48.9'	-10.7'	92.1°	11°46.6'	-11.8'	92.3°	11°44.0'	-12.8'	92.5°	11°41.3'	-13.9'	92.7°	0
1	11°46.9'	-07.8'	92.5°	11°44.2'	-08.9'	92.7°	11°41.3'	-09.9'	92.9°	11°38.2'	-11.0'	93.1°	11°34.8'	-12.0'	93.3°	11°31.2'	-13.0'	93.5°	11°27.4'	-14.1'	93.7°	1
2	11°39.1'	-08.0'	93.5°	11°35.4'	-09.1'	93.7°	11°31.4'	-10.1'	93.9°	11°27.2'	-11.2'	94.1°	11°22.8'	-12.2'	94.3°	11°18.1'	-13.2'	94.5°	11°13.3'	-14.3'	94.7°	2
3	11°31.2'	-08.2'	94.5°	11°26.3'	-09.3'	94.7°	11°21.3'	-10.3'	94.9°	11°16.0'	-11.4'	95.1°	11°10.6'	-12.4'	95.3°	11°04.9'	-13.4'	95.5°	10°59.0'	-14.5'	95.7°	3
4	11°23.0'	-08.4'	95.5°	11°17.1'	-09.5'	95.7°	11°11.0'	-10.5'	95.9°	11°04.7'	-11.6'	96.1°	10°58.2'	-12.6'	96.3°	10°51.5'	-13.6'	96.5°	10°44.6'	-14.7'	96.7°	4
5	11°14.5'	-08.6'	96.5°	11°07.6'	-09.7'	96.7°	11°00.4'	-10.7'	96.9°	10°53.1'	-11.8'	97.1°	10°45.6'	-12.8'	97.3°	10°37.8'	-13.8'	97.5°	10°29.9'	-14.8'	97.7°	5
6	11°05.9'	-08.8'	97.6°	10°57.9'	-09.9'	97.7°	10°49.7'	-10.9'	97.9°	10°41.3'	-11.9'	98.1°	10°32.8'	-13.0'	98.3°	10°24.0'	-14.0'	98.5°	10°15.1'	-15.0'	98.7°	6
7	10°57.1'	-09.0'	98.6°	10°48.0'	-10.1'	98.7°	10°38.8'	-11.1'	98.9°	10°29.4'	-12.1'	99.1°	10°19.8'	-13.2'	99.3°	10°10.0'	-14.2'	99.5°	10°00.0'	-15.2'	99.7°	7
8	10°48.0'	-09.2'	99.6°	10°38.0'	-10.3'	99.8°	10°27.7'	-11.3'	99.9°	10°17.3'	-12.3'	100.1°	10°06.6'	-13.3'	100.3°	9°55.8'	-14.4'	100.5°	9°44.8'	-15.4'	100.6°	8
9	10°38.8'	-09.4'	100.6°	10°27.7'	-10.4'	100.8°	10°16.4'	-11.5'	100.9°	10°05.0'	-12.5'	101.1°	9°53.3'	-13.5'	101.3°	9°41.5'	-14.5'	101.5°	9°29.5'	-15.5'	101.6°	9
10	10°29.4'	-09.6'	101.6°	10°17.3'	-10.6'	101.8°	10°05.0'	-11.7'	101.9°	9°52.5'	-12.7'	102.1°	9°39.8'	-13.7'	102.3°	9°27.0'	-14.7'	102.4°	9°14.0'	-15.7'	102.6°	10
11	10°19.8'	-09.8'	102.6°	10°06.6'	-10.8'	102.8°	9°53.3'	-11.8'	102.9°	9°39.8'	-12.8'	103.1°	9°26.1'	-13.8'	103.3°	9°12.3'	-14.8'	103.4°	8°58.3'	-15.8'	103.6°	11
12	10°10.0'	-10.0'	103.6°	9°55.8'	-11.0'	103.8°	9°41.5'	-12.0'	103.9°	9°27.0'	-13.0'	104.1°	9°12.3'	-14.0'	104.2°	8°57.4'	-15.0'	104.4°	8°42.4'	-16.0'	104.6°	12
13	10°00.0'	-10.2'	104.6°	9°44.8'	-11.2'	104.8°	9°29.5'	-12.2'	104.9°	9°14.0'	-13.2'	105.1°	8°58.3'	-14.2'	105.2°	8°42.4'	-15.1'	105.4°	8°26.4'	-16.1'	105.5°	13
14	9°49.9'	-10.3'	105.6°	9°33.7'	-11.3'	105.7°	9°17.3'	-12.3'	105.9°	9°00.8'	-13.3'	106.1°	8°44.1'	-14.3'	106.2°	8°27.3'	-15.3'	106.4°	8°10.3'	-16.3'	106.5°	14
15	9°39.6'	-10.5'	106.6°	9°22.3'	-11.5'	106.7°	9°05.0'	-12.5'	106.9°	8°47.5'	-13.5'	107.0°	8°29.8'	-14.5'	107.2°	8°12.0'	-15.4'	107.3°	7°54.0'	-16.4'	107.5°	15
16	9°29.1'	-10.7'	107.6°	9°10.9'	-11.7'	107.7°	8°52.5'	-12.6'	107.9°	8°34.0'	-13.6'	108.0°	8°15.3'	-14.6'	108.2°	7°56.6'	-15.6'	108.3°	7°37.6'	-16.5'	108.4°	16
17	9°18.4'	-10.8'	108.6°	8°59.2'	-11.8'	108.7°	8°39.8'	-12.8'	108.9°	8°20.4'	-13.8'	109.0°	8°00.7'	-14.7'	109.2°	7°41.0'	-15.7'	109.3°	7°21.1'	-16.7'	109.4°	17
18	9°07.5'	-11.0'	109.6°	8°47.4'	-12.0'	109.7°	8°27.0'	-12.9'	109.9°	8°06.6'	-13.9'	110.0°	7°46.0'	-14.9'	110.1°	7°25.3'	-15.8'	110.3°	7°04.5'	-16.8'	110.4°	18
19	8°56.5'	-11.2'	110.6°	8°35.4'	-12.1'	110.7°	8°14.1'	-13.1'	110.9°	7°52.7'	-14.1'	111.0°	7°31.1'	-15.0'	111.1°	7°09.5'	-16.0'	111.2°	6°47.7'	-16.9'	111.3°	19
20	8°45.4'	-11.3'	111.6°	8°23.3'	-12.3'	111.7°	8°01.0'	-13.2'	111.8°	7°38.6'	-14.2'	112.0°	7°16.1'	-15.1'	112.1°	6°53.5'	-16.1'	112.2°	6°30.8'	-17.0'	112.3°	20
21	8°34.1'	-11.5'	112.6°	8°11.0'	-12.4'	112.7°	7°47.8'	-13.4'	112.8°	7°24.4'	-14.3'	112.9°	7°01.0'	-15.2'	113.1°	6°37.4'	-16.2'	113.2°	6°13.8'	-17.1'	113.3°	21
22	8°22.6'	-11.6'	113.6°	7°58.6'	-12.6'	113.7°	7°34.4'	-13.5'	113.8°	7°10.1'	-14.4'	113.9°	6°45.7'	-15.4'	114.0°	6°21.3'	-16.3'	114.1°	5°56.7'	-17.2'	114.2°	22
23	8°11.0'	-11.8'	114.5°	7°46.0'	-12.7'	114.7°	7°20.9'	-13.6'	114.8°	6°55.7'	-14.6'	114.9°	6°30.4'	-15.5'	115.0°	6°05.0'	-16.4'	115.1°	5°39.5'	-17.3'	115.2°	23

78° 282° LHA Latitude CONTRARY to 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

77° 283° LHA			Latitude CONTRARY to Declination									77° 283° LHA										
Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	12°54.0'	-07.6'	91.6°	12°52.3'	-08.7'	91.8°	12°50.2'	-09.7'	92.1°	12°47.9'	-10.8'	92.3°	12°45.4'	-11.9'	92.5°	12°42.7'	-12.9'	92.7°	12°39.7'	-13.9'	93.0°	0
1	12°46.4'	-07.9'	92.6°	12°43.6'	-08.9'	92.9°	12°40.5'	-10.0'	93.1°	12°37.1'	-11.0'	93.3°	12°33.6'	-12.1'	93.5°	12°29.8'	-13.1'	93.7°	12°25.7'	-14.2'	94.0°	1
2	12°38.6'	-08.1'	93.6°	12°34.7'	-09.1'	93.9°	12°30.5'	-10.2'	94.1°	12°26.1'	-11.2'	94.3°	12°21.5'	-12.3'	94.5°	12°16.6'	-13.3'	94.7°	12°11.6'	-14.4'	95.0°	2
3	12°30.5'	-08.3'	94.7°	12°25.5'	-09.4'	94.9°	12°20.3'	-10.4'	95.1°	12°14.9'	-11.5'	95.3°	12°09.2'	-12.5'	95.5°	12°03.3'	-13.6'	95.7°	11°57.2'	-14.6'	96.0°	3
4	12°22.2'	-08.5'	95.7°	12°16.2'	-09.6'	95.9°	12°09.9'	-10.6'	96.1°	12°03.4'	-11.7'	96.3°	11°56.7'	-12.7'	96.5°	11°49.8'	-13.8'	96.7°	11°42.6'	-14.8'	96.9°	4
5	12°13.7'	-08.8'	96.7°	12°06.6'	-09.8'	96.9°	11°59.3'	-10.9'	97.1°	11°51.7'	-11.9'	97.3°	11°44.0'	-12.9'	97.5°	11°36.0'	-14.0'	97.7°	11°27.8'	-15.0'	97.9°	5
6	12°04.9'	-09.0'	97.7°	11°56.8'	-10.0'	97.9°	11°48.4'	-11.1'	98.1°	11°39.8'	-12.1'	98.3°	11°31.0'	-13.1'	98.5°	11°22.0'	-14.2'	98.7°	11°12.8'	-15.2'	98.9°	6
7	11°55.9'	-09.2'	98.7°	11°46.8'	-10.2'	98.9°	11°37.3'	-11.3'	99.1°	11°27.7'	-12.3'	99.3°	11°17.9'	-13.3'	99.5°	11°07.9'	-14.4'	99.7°	10°57.6'	-15.4'	99.9°	7
8	11°46.8'	-09.4'	99.7°	11°36.5'	-10.4'	99.9°	11°26.1'	-11.5'	100.1°	11°15.4'	-12.5'	100.3°	11°04.6'	-13.5'	100.5°	10°53.5'	-14.5'	100.7°	10°42.3'	-15.6'	100.9°	8
9	11°37.3'	-09.6'	100.7°	11°26.1'	-10.6'	100.9°	11°14.6'	-11.7'	101.1°	11°02.9'	-12.7'	101.3°	10°51.0'	-13.7'	101.5°	10°39.0'	-14.7'	101.7°	10°26.7'	-15.7'	101.9°	9
10	11°27.7'	-09.8'	101.7°	11°15.4'	-10.9'	101.9°	11°02.9'	-11.9'	102.1°	10°50.2'	-12.9'	102.3°	10°37.3'	-13.9'	102.5°	10°24.2'	-14.9'	102.7°	10°11.0'	-15.9'	102.9°	10
11	11°17.9'	-10.0'	102.7°	11°04.6'	-11.0'	102.9°	10°51.0'	-12.1'	103.1°	10°37.3'	-13.1'	103.3°	10°23.4'	-14.1'	103.5°	10°09.3'	-15.1'	103.7°	9°55.1'	-16.1'	103.8°	11
12	11°07.9'	-10.2'	103.7°	10°53.5'	-11.2'	103.9°	10°39.0'	-12.3'	104.1°	10°24.2'	-13.3'	104.3°	10°09.3'	-14.3'	104.5°	9°54.2'	-15.3'	104.6°	9°39.0'	-16.2'	104.8°	12
13	10°57.6'	-10.4'	104.8°	10°42.3'	-11.4'	104.9°	10°26.7'	-12.4'	105.1°	10°11.0'	-13.4'	105.3°	9°55.1'	-14.4'	105.5°	9°39.0'	-15.4'	105.6°	9°22.7'	-16.4'	105.8°	13
14	10°47.2'	-10.6'	105.8°	10°30.8'	-11.6'	105.9°	10°14.3'	-12.6'	106.1°	9°57.5'	-13.6'	106.3°	9°40.6'	-14.6'	106.4°	9°23.6'	-15.6'	106.6°	9°06.3'	-16.6'	106.8°	14
15	10°36.6'	-10.8'	106.8°	10°19.2'	-11.8'	106.9°	10°01.7'	-12.8'	107.1°	9°43.9'	-13.8'	107.3°	9°26.0'	-14.8'	107.4°	9°08.0'	-15.7'	107.6°	8°49.8'	-16.7'	107.7°	15
16	10°25.8'	-11.0'	107.8°	10°07.4'	-12.0'	107.9°	9°48.9'	-13.0'	108.1°	9°30.1'	-14.0'	108.3°	9°11.3'	-14.9'	108.4°	8°52.2'	-15.9'	108.6°	8°33.1'	-16.9'	108.7°	16
17	10°14.8'	-11.2'	108.8°	9°55.4'	-12.2'	108.9°	9°35.9'	-13.1'	109.1°	9°16.2'	-14.1'	109.2°	8°56.3'	-15.1'	109.4°	8°36.3'	-16.0'	109.5°	8°16.2'	-17.0'	109.7°	17
18	10°03.6'	-11.4'	109.8°	9°43.3'	-12.3'	109.9°	9°22.7'	-13.3'	110.1°	9°02.1'	-14.3'	110.2°	8°41.3'	-15.2'	110.4°	8°20.3'	-16.2'	110.5°	7°59.2'	-17.1'	110.6°	18
19	9°52.3'	-11.5'	110.8°	9°30.9'	-12.5'	110.9°	9°09.4'	-13.5'	111.1°	8°47.8'	-14.4'	111.2°	8°26.0'	-15.4'	111.4°	8°04.1'	-16.3'	111.5°	7°42.1'	-17.3'	111.6°	19
20	9°40.7'	-11.7'	111.7°	9°18.4'	-12.7'	111.9°	8°56.0'	-13.6'	112.1°	8°33.4'	-14.6'	112.2°	8°10.7'	-15.5'	112.3°	7°47.8'	-16.5'	112.5°	7°24.8'	-17.4'	112.6°	20
21	9°29.0'	-11.9'	112.7°	9°05.8'	-12.8'	112.9°	8°42.4'	-13.8'	113.0°	8°18.8'	-14.7'	113.2°	7°55.1'	-15.7'	113.3°	7°31.3'	-16.6'	113.4°	7°07.4'	-17.5'	113.5°	21
22	9°17.2'	-12.0'	113.7°	8°52.9'	-13.0'	113.9°	8°28.6'	-13.9'	114.0°	8°04.1'	-14.9'	114.2°	7°39.5'	-15.8'	114.3°	7°14.8'	-16.7'	114.4°	6°49.9'	-17.6'	114.5°	22
23	9°05.1'	-12.2'	114.7°	8°40.0'	-13.1'	114.9°	8°14.7'	-14.1'	115.0°	7°49.2'	-15.0'	115.1°	7°23.7'	-15.9'	115.3°	6°58.0'	-16.8'	115.4°	6°32.3'	-17.7'	115.5°	23

77° 2

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

76° 284° LHA

Latitude CONTRARY to Declination

76° 284° LHA

Table with 13 columns (Dec°, 7, 8, 9, 10, 11, 12, 13, Dec°) and 24 rows of astronomical data.

76° 284° LHA

Latitude CONTRARY to 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

75° 285° LHA

Latitude CONTRARY to Declination

75° 285° LHA

Table with 13 columns (Dec°, 7, 8, 9, 10, 11, 12, 13, Dec°) and 24 rows of astronomical data.

75° 285° LHA

Latitude CONTRARY to DECLINATION

75° 285° LHA

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

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

74° 286° LHA

Latitude CONTRARY to Declination

74° 286° LHA

Table with columns for Dec°, and columns 7-13 containing Hc°, d', Z° values for declinations 0 to 23. It is a latitude contrary to declination table for 74° LHA.

74° 286° LHA

Latitude CONTRARY to 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

73° 287° LHA

Latitude CONTRARY to Declination

73° 287° LHA

Table with columns for Dec°, and columns 7-13 containing Hc°, d', Z° values for declinations 0 to 23. It is a latitude contrary to declination table for 73° LHA.

73° 287° LHA

Latitude CONTRARY to DECLINATION

73° 287° LHA

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

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

72° 288° LHA

Latitude CONTRARY to Declination

72° 288° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	17°51.6'	-07.8'	92.3°	17°49.1'	-08.9'	92.6°	17°46.3'	-10.0'	92.9°	17°43.0'	-11.1'	93.2°	17°39.5'	-12.2'	93.5°	17°35.6'	-13.2'	93.9°	17°31.4'	-14.3'	94.2°	0
1	17°43.8'	-08.2'	93.3°	17°40.2'	-09.3'	93.6°	17°36.2'	-10.3'	93.9°	17°31.9'	-11.4'	94.3°	17°27.3'	-12.5'	94.6°	17°22.4'	-13.6'	94.9°	17°17.1'	-14.6'	95.2°	1
2	17°35.6'	-08.5'	94.3°	17°30.9'	-09.6'	94.7°	17°25.9'	-10.7'	95.0°	17°20.5'	-11.7'	95.3°	17°14.8'	-12.8'	95.6°	17°08.8'	-13.9'	95.9°	17°02.5'	-14.9'	96.2°	2
3	17°27.2'	-08.8'	95.4°	17°21.4'	-09.9'	95.7°	17°15.2'	-11.0'	96.0°	17°08.8'	-12.0'	96.3°	17°02.0'	-13.1'	96.6°	16°55.0'	-14.2'	96.9°	16°47.6'	-15.2'	97.2°	3
4	17°18.3'	-09.1'	96.4°	17°11.5'	-10.2'	96.7°	17°04.3'	-11.3'	97.0°	16°56.8'	-12.3'	97.3°	16°48.9'	-13.4'	97.6°	16°40.8'	-14.5'	97.9°	16°32.4'	-15.5'	98.2°	4
5	17°09.2'	-09.5'	97.5°	17°01.2'	-10.5'	97.8°	16°53.0'	-11.6'	98.1°	16°44.4'	-12.7'	98.4°	16°35.5'	-13.7'	98.7°	16°26.3'	-14.7'	99.0°	16°16.8'	-15.8'	99.2°	5
6	16°59.7'	-09.8'	98.5°	16°50.7'	-10.8'	98.8°	16°41.4'	-11.9'	99.1°	16°31.8'	-12.9'	99.4°	16°21.8'	-14.0'	99.7°	16°11.6'	-15.0'	100.0°	16°01.1'	-16.1'	100.2°	6
7	16°50.0'	-10.1'	99.5°	16°39.9'	-11.1'	99.8°	16°29.5'	-12.2'	100.1°	16°18.8'	-13.2'	100.4°	16°07.8'	-14.3'	100.7°	15°56.6'	-15.3'	101.0°	15°45.0'	-16.3'	101.2°	7
8	16°39.9'	-10.4'	100.6°	16°28.7'	-11.4'	100.8°	16°17.3'	-12.5'	101.1°	16°05.6'	-13.5'	101.4°	15°53.5'	-14.6'	101.7°	15°41.2'	-15.6'	102.0°	15°28.6'	-16.6'	102.2°	8
9	16°29.5'	-10.7'	101.6°	16°17.3'	-11.7'	101.9°	16°04.8'	-12.8'	102.2°	15°52.0'	-13.8'	102.4°	15°39.0'	-14.8'	102.7°	15°25.6'	-15.9'	103.0°	15°12.0'	-16.9'	103.2°	9
10	16°18.8'	-11.0'	102.6°	16°05.6'	-12.0'	102.9°	15°52.0'	-13.1'	103.2°	15°38.2'	-14.1'	103.4°	15°24.1'	-15.1'	103.7°	15°09.8'	-16.1'	104.0°	14°55.2'	-17.1'	104.2°	10
11	16°07.8'	-11.3'	103.6°	15°53.5'	-12.3'	103.9°	15°39.0'	-13.3'	104.2°	15°24.1'	-14.4'	104.5°	15°09.0'	-15.4'	104.7°	14°53.7'	-16.4'	105.0°	14°38.0'	-17.4'	105.2°	11
12	15°56.6'	-11.6'	104.7°	15°41.2'	-12.6'	104.9°	15°25.6'	-13.6'	105.2°	15°09.8'	-14.6'	105.5°	14°53.7'	-15.6'	105.7°	14°37.3'	-16.6'	106.0°	14°20.7'	-17.6'	106.2°	12
13	15°45.0'	-11.8'	105.7°	15°28.6'	-12.9'	105.9°	15°12.0'	-13.9'	106.2°	14°55.2'	-14.9'	106.5°	14°38.0'	-15.9'	106.7°	14°20.7'	-16.9'	107.0°	14°03.0'	-17.9'	107.2°	13
14	15°33.1'	-12.1'	106.7°	15°15.8'	-13.1'	107.0°	14°58.2'	-14.1'	107.2°	14°40.3'	-15.1'	107.5°	14°22.1'	-16.1'	107.7°	14°03.8'	-17.1'	108.0°	13°45.2'	-18.1'	108.2°	14
15	15°21.0'	-12.4'	107.7°	15°02.6'	-13.4'	108.0°	14°44.0'	-14.4'	108.2°	14°25.1'	-15.4'	108.5°	14°06.0'	-16.4'	108.7°	13°46.7'	-17.4'	108.9°	13°27.1'	-18.3'	109.2°	15
16	15°08.6'	-12.7'	108.7°	14°49.2'	-13.7'	109.0°	14°29.6'	-14.7'	109.2°	14°09.7'	-15.6'	109.5°	13°49.6'	-16.6'	109.7°	13°29.3'	-17.6'	109.9°	13°08.7'	-18.5'	110.1°	16
17	14°55.9'	-12.9'	109.7°	14°35.6'	-13.9'	110.0°	14°14.9'	-14.9'	110.2°	13°54.1'	-15.9'	110.5°	13°33.0'	-16.9'	110.7°	13°11.7'	-17.8'	110.9°	12°50.2'	-18.8'	111.1°	17
18	14°43.0'	-13.2'	110.7°	14°21.6'	-14.2'	111.0°	14°00.0'	-15.2'	111.2°	13°38.2'	-16.1'	111.4°	13°16.2'	-17.1'	111.7°	12°53.9'	-18.0'	111.9°	12°31.4'	-19.0'	112.1°	18
19	14°29.8'	-13.5'	111.7°	14°07.5'	-14.4'	112.0°	13°44.9'	-15.4'	112.2°	13°22.1'	-16.4'	112.4°	12°59.1'	-17.3'	112.7°	12°35.9'	-18.2'	112.9°	12°12.5'	-19.2'	113.1°	19
20	14°16.4'	-13.7'	112.8°	13°53.0'	-14.7'	113.0°	13°29.5'	-15.6'	113.2°	13°05.7'	-16.6'	113.4°	12°41.8'	-17.5'	113.6°	12°17.6'	-18.4'	113.8°	11°53.3'	-19.4'	114.0°	20
21	14°02.6'	-14.0'	113.8°	13°38.4'	-14.9'	114.0°	13°13.9'	-15.9'	114.2°	12°49.2'	-16.8'	114.4°	12°24.3'	-17.7'	114.6°	11°59.2'	-18.6'	114.8°	11°33.9'	-19.6'	115.0°	21
22	13°48.7'	-14.2'	114.8°	13°23.4'	-15.1'	115.0°	12°58.0'	-16.1'	115.2°	12°32.4'	-17.0'	115.4°	12°06.5'	-17.9'	115.6°	11°40.5'	-18.8'	115.8°	11°14.3'	-19.8'	116.0°	22
23	13°34.5'	-14.4'	115.8°	13°08.3'	-15.4'	116.0°	12°41.9'	-16.3'	116.2°	12°15.4'	-17.2'	116.4°	11°48.6'	-18.1'	116.6°	11°21.7'	-19.0'	116.8°	10°54.6'	-19.9'	116.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	7			8			9			10			11			12			13			

72° 288° LHA

Latitude CONTRARY to DECLINATION

72° 288° LHA

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

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

71° 289° LHA

Latitude CONTRARY to Declination

71° 289° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	18°51.1'	-07.9'	92.4°	18°48.5'	-09.0'	92.7°	18°45.4'	-10.1'	93.1°	18°42.0'	-11.2'	93.4°	18°38.3'	-12.3'	93.8°	18°34.2'	-13.3'	94.1°	18°29.7'	-14.4'	94.4°	0
1	18°43.2'	-08.3'	93.4°	18°39.5'	-09.3'	93.8°	18°35.4'	-10.4'	94.1°	18°30.9'	-11.5'	94.5°	18°26.0'	-12.6'	94.8°	18°20.8'	-13.7'	95.1°	18°15.3'	-14.7'	95.5°	1
2	18°35.0'	-08.6'	94.5°	18°30.2'	-09.7'	94.8°	18°24.9'	-10.8'	95.2°	18°19.4'	-11.8'	95.5°	18°13.4'	-12.9'	95.8°	18°07.2'	-14.0'	96.1°	18°00.6'	-15.0'	96.5°	2
3	18°26.4'	-08.9'	95.5°	18°20.5'	-10.0'	95.9°	18°14.2'	-11.1'	96.2°	18°07.5'	-12.2'	96.5°	18°00.5'	-13.2'	96.8°	17°53.2'	-14.3'	97.2°	17°45.5'	-15.4'	97.5°	3
4	18°17.5'	-09.3'	96.6°	18°10.4'	-10.4'	96.9°	18°03.1'	-11.4'	97.2°	17°55.3'	-12.5'	97.6°	17°47.3'	-13.6'	97.9°	17°38.9'	-14.6'	98.2°	17°30.2'	-15.7'	98.5°	4
5	18°08.2'	-09.6'	97.6°	18°00.1'	-10.7'	97.9°	17°51.6'	-11.8'	98.3°	17°42.8'	-12.8'	98.6°	17°33.7'	-13.9'	98.9°	17°24.3'	-14.9'	99.2°	17°14.5'	-16.0'	99.5°	5
6	17°58.6'	-09.9'	98.7°	17°49.4'	-11.0'	99.0°	17°39.9'	-12.1'	99.3°	17°30.0'	-13.1'	99.6°	17°19.9'	-14.2'	99.9°	17°09.4'	-15.2'	100.2°	16°58.6'	-16.3'	100.5°	6
7	17°48.7'	-10.3'	99.7°	17°38.4'	-11.3'	100.0°	17°27.8'	-12.4'	100.3°	17°16.9'	-13.4'	100.6°	17°05.7'	-14.5'	100.9°	16°54.1'	-15.5'	101.2°	16°42.3'	-16.6'	101.5°	7
8	17°38.4'	-10.6'	100.7°	17°27.1'	-11.6'	101.0°	17°15.4'	-12.7'	101.3°	17°03.5'	-13.7'	101.6°	16°51.2'	-14.8'	101.9°	16°38.6'	-15.8'	102.2°	16°25.7'	-16.8'	102.5°	8
9	17°27.8'	-10.9'	101.8°	17°15.4'	-12.0'	102.1°	17°02.7'	-13.0'	102.4°	16°49.7'	-14.0'	102.7°	16°36.4'	-15.1'	103.0°	16°22.8'	-16.1'	103.2°	16°08.9'	-17.1'	103.5°	9
10	17°16.9'	-11.2'	102.8°	17°03.5'	-12.3'	103.1°	16°49.7'	-13.3'	103.4°	16°35.7'	-14.3'	103.7°	16°21.3'	-15.4'	104.0°	16°06.7'	-16.4'	104.3°	15°51.8'	-17.4'	104.5°	10
11	17°05.7'	-11.5'	103.8°	16°51.2'	-12.6'	104.1°	16°36.4'	-13.6'	104.4°	16°21.3'	-14.6'	104.7°	16°06.0'	-15.6'	105.0°	15°50.3'	-16.7'	105.3°	15°34.4'	-17.7'	105.5°	11
12	16°54.1'	-11.8'	104.8°	16°38.6'	-12.9'	105.1°	16°22.8'	-13.9'	105.4°	16°06.7'	-14.9'	105.7°	15°50.3'	-15.9'	106.0°	15°33.7'	-16.9'	106.3°	15°16.7'	-17.9'	106.5°	12
13	16°42.3'	-12.1'	105.9°	16°25.7'	-13.2'	106.2°	16°08.9'	-14.2'	106.4°	15°51.8'	-15.2'	106.7°	15°34.4'	-16.2'	107.0°	15°16.7'	-17.2'	107.2°	14°58.8'	-18.2'	107.5°	13
14	16°30.2'	-12.4'	106.9°	16°12.6'	-13.5'	107.2°	15°54.7'	-14.5'	107.4°	15°36.6'	-15.5'	107.7°	15°18.2'	-16.5'	108.0°	14°59.6'	-17.4'	108.2°	14°40.7'	-18.4'	108.5°	14
15	16°17.7'	-12.7'	107.9°	15°59.1'	-13.7'	108.2°	15°40.3'	-14.7'	108.5°	15°21.1'	-15.7'	108.8°	15°01.8'	-16.7'	109.0°	14°42.1'	-17.7'	109.2°	14°22.2'	-18.7'	109.5°	15
16	16°05.0'	-13.0'	108.9°	15°45.4'	-14.0'	109.2°	15°25.5'	-15.0'	109.5°	15°05.4'	-16.0'	109.7°	14°45.0'	-17.0'	110.0°	14°24.4'	-17.9'	110.2°	14°03.6'	-18.9'	110.5°	16
17	15°52.0'	-13.3'	109.9°	15°31.4'	-14.3'	110.2°	15°10.5'	-15.3'	110.5°	14°49.4'	-16.3'	110.7°	14°28.1'	-17.2'	111.0°	14°06.5'	-18.2'	111.2°	13°44.7'	-19.1'	111.4°	17
18	15°38.7'	-13.6'	111.0°	15°17.1'	-14.6'	111.2°	14°55.2'	-15.5'	111.5°	14°33.2'	-16.5'	111.7°	14°10.8'	-17.5'	112.0°	13°48.3'	-18.4'	112.2°	13°25.5'	-19.4'	112.4°	18
19	15°25.1'	-13.9'	112.0°	15°02.5'	-14.8'	112.2°	14°39.7'	-15.8'	112.5°	14°16.7'	-16.7'	112.7°	13°53.4'	-17.7'	112.9°	13°29.9'	-18.6'	113.2°	13°06.2'	-19.6'	113.4°	19
20	15°11.2'	-14.1'	113.0°	14°47.7'	-15.1'	113.2°	14°23.9'	-16.0'	113.5°	13°59.9'	-17.0'	113.7°	13°35.7'	-17.9'	113.9°	13°11.3'	-18.9'	114.1°	12°46.6'	-19.8'	114.3°	20
21	14°57.1'	-14.4'	114.0°																			

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

70° 290° LHA

Latitude CONTRARY to Declination

70° 290° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	19°50.6'	-08.0'	92.5°	19°47.8'	-09.1'	92.9°	19°44.6'	-10.2'	93.3°	19°41.0'	-11.2'	93.6°	19°37.0'	-12.3'	94.0°	19°32.7'	-13.4'	94.3°	19°28.0'	-14.5'	94.7°	0
1	19°42.7'	-08.3'	93.6°	19°38.8'	-09.4'	93.9°	19°34.5'	-10.5'	94.3°	19°29.8'	-11.6'	94.7°	19°24.7'	-12.7'	95.0°	19°19.3'	-13.8'	95.4°	19°13.5'	-14.8'	95.7°	1
2	19°34.3'	-08.7'	94.6°	19°29.3'	-09.8'	95.0°	19°23.9'	-10.9'	95.3°	19°18.2'	-12.0'	95.7°	19°12.0'	-13.0'	96.0°	19°05.5'	-14.1'	96.4°	18°58.7'	-15.2'	96.7°	2
3	19°25.7'	-09.1'	95.7°	19°19.6'	-10.1'	96.0°	19°13.1'	-11.2'	96.4°	19°06.2'	-12.3'	96.7°	18°59.0'	-13.4'	97.1°	18°51.4'	-14.4'	97.4°	18°43.5'	-15.5'	97.8°	3
4	19°16.6'	-09.4'	96.7°	19°09.4'	-10.5'	97.1°	19°01.8'	-11.6'	97.4°	18°53.9'	-12.6'	97.8°	18°45.6'	-13.7'	98.1°	18°37.0'	-14.8'	98.4°	18°28.0'	-15.8'	98.8°	4
5	19°07.2'	-09.8'	97.8°	18°58.9'	-10.8'	98.1°	18°50.3'	-11.9'	98.5°	18°41.3'	-13.0'	98.8°	18°31.9'	-14.0'	99.1°	18°22.2'	-15.1'	99.5°	18°12.2'	-16.1'	99.8°	5
6	18°57.5'	-10.1'	98.8°	18°48.1'	-11.2'	99.2°	18°38.3'	-12.3'	99.5°	18°28.3'	-13.3'	99.8°	18°17.9'	-14.4'	100.2°	18°07.1'	-15.4'	100.5°	17°56.0'	-16.5'	100.8°	6
7	18°47.4'	-10.5'	99.9°	18°36.9'	-11.5'	100.2°	18°26.1'	-12.6'	100.5°	18°15.0'	-13.6'	100.9°	18°03.5'	-14.7'	101.2°	17°51.7'	-15.7'	101.5°	17°39.6'	-16.8'	101.8°	7
8	18°36.9'	-10.8'	100.9°	18°25.4'	-11.9'	101.2°	18°13.5'	-12.9'	101.6°	18°01.3'	-14.0'	101.9°	17°48.8'	-15.0'	102.2°	17°35.9'	-16.0'	102.5°	17°22.8'	-17.1'	102.8°	8
9	18°26.1'	-11.1'	102.0°	18°13.5'	-12.2'	102.3°	18°00.6'	-13.2'	102.6°	17°47.3'	-14.3'	102.9°	17°33.8'	-15.3'	103.2°	17°19.9'	-16.3'	103.5°	17°05.7'	-17.4'	103.8°	9
10	18°15.0'	-11.5'	103.0°	18°01.3'	-12.5'	103.3°	17°47.3'	-13.6'	103.6°	17°33.1'	-14.6'	103.9°	17°18.5'	-15.6'	104.2°	17°03.6'	-16.6'	104.5°	16°48.3'	-17.7'	104.8°	10
11	18°03.5'	-11.8'	104.0°	17°48.8'	-12.8'	104.3°	17°33.8'	-13.9'	104.6°	17°18.5'	-14.9'	104.9°	17°02.8'	-15.9'	105.2°	16°46.9'	-16.9'	105.5°	16°30.7'	-17.9'	105.8°	11
12	17°51.7'	-12.1'	105.0°	17°35.9'	-13.2'	105.4°	17°19.9'	-14.2'	105.7°	17°03.6'	-15.2'	106.0°	16°46.9'	-16.2'	106.3°	16°30.0'	-17.2'	106.5°	16°12.8'	-18.2'	106.8°	12
13	17°39.6'	-12.4'	106.1°	17°22.8'	-13.5'	106.4°	17°05.7'	-14.5'	106.7°	16°48.3'	-15.5'	107.0°	16°30.7'	-16.5'	107.3°	16°12.8'	-17.5'	107.5°	15°54.5'	-18.5'	107.8°	13
14	17°27.1'	-12.8'	107.1°	17°09.3'	-13.8'	107.4°	16°51.2'	-14.8'	107.7°	16°32.8'	-15.8'	108.0°	16°14.2'	-16.8'	108.3°	15°55.3'	-17.8'	108.5°	15°36.1'	-18.8'	108.8°	14
15	17°14.4'	-13.1'	108.1°	16°55.5'	-14.1'	108.4°	16°36.4'	-15.1'	108.7°	16°17.1'	-16.1'	109.0°	15°57.4'	-17.1'	109.3°	15°37.5'	-18.0'	109.5°	15°17.3'	-19.0'	109.8°	15
16	17°01.3'	-13.4'	109.1°	16°41.5'	-14.4'	109.4°	16°21.4'	-15.4'	109.7°	16°01.0'	-16.4'	110.0°	15°40.3'	-17.3'	110.3°	15°19.4'	-18.3'	110.5°	14°58.3'	-19.3'	110.8°	16
17	16°47.9'	-13.7'	110.2°	16°27.1'	-14.7'	110.4°	16°06.0'	-15.7'	110.7°	15°44.6'	-16.6'	111.0°	15°23.0'	-17.6'	111.2°	15°01.1'	-18.6'	111.5°	14°39.0'	-19.5'	111.7°	17
18	16°34.2'	-14.0'	111.2°	16°12.4'	-15.0'	111.5°	15°50.3'	-15.9'	111.7°	15°28.0'	-16.9'	112.0°	15°05.4'	-17.9'	112.2°	14°42.6'	-18.8'	112.5°	14°19.5'	-19.7'	112.7°	18
19	16°20.3'	-14.3'	112.2°	15°57.5'	-15.2'	112.5°	15°34.4'	-16.2'	112.7°	15°11.1'	-17.2'	113.0°	14°47.6'	-18.1'	113.2°	14°23.8'	-19.0'	113.5°	13°59.8'	-20.0'	113.7°	19
20	16°06.0'	-14.5'	113.2°	15°42.2'	-15.5'	113.5°	15°18.2'	-16.5'	113.7°	14°54.0'	-17.4'	114.0°	14°29.5'	-18.3'	114.2°	14°04.7'	-19.3'	114.4°	13°39.8'	-20.2'	114.7°	20
21	15°51.5'	-14.8'	114.2°	15°26.7'	-15.8'	114.5°	15°01.8'	-16.7'	114.7°	14°36.5'	-17.7'	115.0°	14°11.1'	-18.6'	115.2°	13°45.5'	-19.5'	115.4°	13°19.6'	-20.4'	115.6°	21
22	15°36.6'	-15.1'	115.2°	15°10.9'	-16.0'	115.5°	14°45.0'	-17.0'	115.7°	14°18.9'	-17.9'	115.9°	13°52.5'	-18.8'	116.2°	13°26.0'	-19.7'	116.4°	12°59.2'	-20.6'	116.6°	22
23	15°21.5'	-15.4'	116.2°	14°54.9'	-16.3'	116.5°	14°28.1'	-17.2'	116.7°	14°01.0'	-18.1'	116.9°	13°33.7'	-19.1'	117.2°	13°06.2'	-20.0'	117.4°	12°38.5'	-20.8'	117.6°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	7			8			9			10			11			12			13			

70° 290° LHA

Latitude CONTRARY to DECLINATION

70° 290° LHA

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

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

69° 291° LHA

Latitude CONTRARY to Declination

69° 291° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	20°50.1'	-08.0'	92.7°	20°47.2'	-09.1'	93.1°	20°43.8'	-10.2'	93.4°	20°40.0'	-11.3'	93.8°	20°35.8'	-12.4'	94.2°	20°31.2'	-13.5'	94.6°	20°26.2'	-14.6'	94.9°	0
1	20°42.1'	-08.4'	93.7°	20°38.0'	-09.5'	94.1°	20°33.5'	-10.6'	94.5°	20°28.6'	-11.7'	94.9°	20°23.4'	-12.8'	95.2°	20°17.7'	-13.9'	95.6°	20°11.7'	-14.9'	96.0°	1
2	20°33.7'	-08.8'	94.8°	20°28.5'	-09.9'	95.2°	20°22.9'	-11.0'	95.5°	20°16.9'	-12.1'	95.9°	20°10.6'	-13.2'	96.3°	20°03.8'	-14.2'	96.6°	19°56.7'	-15.3'	97.0°	2
3	20°25.0'	-09.2'	95.9°	20°18.6'	-10.3'	96.2°	20°11.9'	-11.4'	96.6°	20°04.9'	-12.4'	97.0°	19°57.4'	-13.5'	97.3°	19°49.6'	-14.6'	97.7°	19°41.4'	-15.7'	98.0°	3
4	20°15.8'	-09.6'	96.9°	20°08.4'	-10.6'	97.3°	20°00.6'	-11.7'	97.6°	19°52.4'	-12.8'	98.0°	19°43.9'	-13.9'	98.3°	19°35.0'	-14.9'	98.7°	19°25.7'	-16.0'	99.1°	4
5	20°06.2'	-09.9'	98.0°	19°57.7'	-11.0'	98.3°	19°48.9'	-12.1'	98.7°	19°39.6'	-13.2'	99.0°	19°30.0'	-14.2'	99.4°	19°20.1'	-15.3'	99.7°	19°09.7'	-16.3'	100.1°	5
6	19°56.3'	-10.3'	99.0°	19°46.7'	-11.4'	99.4°	19°36.8'	-12.4'	99.7°	19°26.5'	-13.5'	100.1°	19°15.8'	-14.6'	100.4°	19°04.8'	-15.6'	100.8°	18°53.4'	-16.7'	101.1°	6
7	19°46.0'	-10.7'	100.1°	19°35.4'	-11.7'	100.4°	19°24.3'	-12.8'	100.8°	19°13.0'	-13.9'	101.1°	19°01.2'	-14.9'	101.4°	18°49.2'	-16.0'	101.8°	18°36.7'	-17.0'	102.1°	7
8	19°35.4'	-11.0'	101.1°	19°23.6'	-12.1'	101.4°	19°11.5'	-13.1'	101.8°	18°59.1'	-14.2'	102.1°	18°46.3'	-15.2'	102.5°	18°33.2'	-16.3'	102.8°	18°19.8'	-17.3'	103.1°	8
9	19°24.3'	-11.4'	102.1°	19°11.5'	-12.4'	102.5°	18°58.4'	-13.5'	102.8°	18°44.9'	-14.5'	103.2°	18°31.1'	-15.6'	103.5°	18°16.9'	-16.6'	103.8°	18°02.4'	-17.6'	104.1°	9
10	19°13.0'	-11.7'	103.2°	18°59.1'	-12.8'	103.5°	18°44.9'	-13.8'	103.9°	18°30.4'	-14.9'	104.2°	18°15.5'	-15.9'	104.5°	18°00.3'	-16.9'	104.8°	17°44.8'	-17.9'	105.1°	10
11	19°01.2'	-12.1'	104.2°	18°46.3'	-13.1'	104.6°	18°31.1'	-14.2'	104.9°	18°15.5'	-15.2'	105.2°	17°59.6'	-16.2'	105.5°	17°43.4'	-17.2'	105.8°	17°26.9'	-18.2'	106.1°	11
12	18°49.2'	-12.4'	105.3°	18°33.2'	-13.5'	105.6°	18°16.9'	-14.5'	105.9°	18°00.3'	-15.5'	106.2°	17°43.4'	-16.5'	106.5°	17°26.2'	-17.5'	106.8°	17°08.7'	-18.5'	107.1°	12
13	18°36.7'	-12.8'	106.3°	18°19.8'	-13.8'	106.6°	18°02.4'	-14.8'	106.9°	17°44.8'	-15.8'	107.2°	17°26.9'	-16.8'	107.5°	17°08.7'	-17.8'	107.8°	16°50.2'	-18.8'	108.1°	13
14	18°24.0'	-13.1'	107.3°	18°06.0'	-14.1'	107.6°	17°47.6'	-15.1'	107.9°	17°29.0'	-16.1'	108.2°	17°10.1'	-17.1'	108.5°	16°50.9'	-18.1'	108.8°	16°31.3'	-19.1'	109.1°	14
15	18°10.9'	-13.4'	108.3°	17°51.9'	-14.4'	108.7°	17°32.5'	-15.4'	109.0°	17°12.9'	-16.4'	109.3°	16°53.0'	-17.4'	109.5°	16°32.7'	-18.4'	109.8°	16°12.3'	-19.4'	110.1°	15
16	17°57.5'	-13.7'	109.4°	17°37.4'	-14.7'	109.7°	17°17.1'	-15.7'	110.0°	16°56.5'	-16.7'	110.3°	16°35.5'	-17.7'	110.5°	16°14.4'	-18.7'	110.8°	15°52.9'	-19.6'	111.1°	16
17	17°43.8'	-14.0'	110.4°	17°22.7'	-15.0'	110.7°	17°01.4'	-16.0'	111.0°	16°39.7'	-17.0'	111.3°	16°17.9'	-18.0'	111.5°	15°55.7'	-18.9'	111.8°	15°33.3'	-19.9'	112.1°	17
18	17°29.7'	-14.4'	111.4°	17°07.7'	-15.3'	111.7°	16°45.3'	-16.3'	112.0°	16°22.7'	-17.3'	112.3°	15°59.9'	-18.2'	112.5°	15°36.8'	-19.2'	112.8°	15°13.4'	-20.1'	113.0°	18
19	17°15.4'	-14.7'	112.4°	16°52.3'	-15.6'	112.7°	16°29.0'	-16.6'	113.0°	16°05.5'	-17.6'	113.3°	15°41.6'	-18.5'	113.5°	15°17.6'	-19.5'	113.8°	14°53.3'	-20.4'	114.0°	19
20	17°00.7'	-15.0'	113.4°	16°36.7'	-15.9'	113.7°	16°12.4'	-16.9'	114.0°	15°47.9'	-17.8'	114.3°	15°23.1'	-18.8'	114.5°	14°58.1'	-19.7'	114.8°	14°32.9'	-20.6'	115.0°	20
21	16°45.7'	-15.3'	114.5°	16°20.7'	-16.2'	114.7°	15															

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

68° 292° LHA

Latitude CONTRARY to Declination

68° 292° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	21°49.6'	-08.1'	92.8°	21°46.5'	-09.2'	93.2°	21°42.9'	-10.3'	93.6°	21°38.9'	-11.4'	94.0°	21°34.5'	-12.5'	94.4°	21°29.7'	-13.6'	94.8°	21°24.5'	-14.7'	95.2°	0
1	21°41.5'	-08.5'	93.9°	21°37.3'	-09.6'	94.3°	21°32.6'	-10.7'	94.7°	21°27.5'	-11.8'	95.1°	21°22.0'	-12.9'	95.5°	21°16.1'	-14.0'	95.8°	21°09.8'	-15.1'	96.2°	1
2	21°33.0'	-08.9'	95.0°	21°27.7'	-10.0'	95.3°	21°21.9'	-11.1'	95.7°	21°15.7'	-12.2'	96.1°	21°09.1'	-13.3'	96.5°	21°02.1'	-14.4'	96.9°	20°54.7'	-15.4'	97.3°	2
3	21°24.2'	-09.3'	96.0°	21°17.7'	-10.4'	96.4°	21°10.8'	-11.5'	96.8°	21°03.5'	-12.6'	97.2°	20°55.8'	-13.7'	97.6°	20°47.7'	-14.7'	97.9°	20°39.3'	-15.8'	98.3°	3
4	21°14.9'	-09.7'	97.1°	21°07.3'	-10.8'	97.5°	20°59.3'	-11.9'	97.8°	20°50.9'	-13.0'	98.2°	20°42.2'	-14.0'	98.6°	20°33.0'	-15.1'	99.0°	20°23.5'	-16.2'	99.3°	4
5	21°05.2'	-10.1'	98.1°	20°56.5'	-11.2'	98.5°	20°47.4'	-12.3'	98.9°	20°38.0'	-13.3'	99.3°	20°28.1'	-14.4'	99.6°	20°17.9'	-15.5'	100.0°	20°07.3'	-16.5'	100.4°	5
6	20°55.1'	-10.5'	99.2°	20°45.3'	-11.6'	99.6°	20°35.2'	-12.6'	99.9°	20°24.6'	-13.7'	100.3°	20°13.7'	-14.8'	100.7°	20°02.4'	-15.8'	101.0°	19°50.8'	-16.9'	101.4°	6
7	20°44.6'	-10.9'	100.2°	20°33.8'	-11.9'	100.6°	20°22.5'	-13.0'	101.0°	20°10.9'	-14.1'	101.3°	19°58.9'	-15.1'	101.7°	19°46.6'	-16.2'	102.1°	19°33.9'	-17.2'	102.4°	7
8	20°33.8'	-11.2'	101.3°	20°21.8'	-12.3'	101.7°	20°09.5'	-13.4'	102.0°	19°56.8'	-14.4'	102.4°	19°43.8'	-15.5'	102.7°	19°30.4'	-16.5'	103.1°	19°16.7'	-17.6'	103.4°	8
9	20°22.5'	-11.6'	102.3°	20°09.5'	-12.7'	102.7°	19°56.2'	-13.7'	103.1°	19°42.4'	-14.8'	103.4°	19°28.3'	-15.8'	103.8°	19°13.9'	-16.9'	104.1°	18°59.1'	-17.9'	104.4°	9
10	20°10.9'	-12.0'	103.4°	19°56.8'	-13.0'	103.7°	19°42.4'	-14.1'	104.1°	19°27.6'	-15.1'	104.4°	19°12.5'	-16.2'	104.8°	18°57.0'	-17.2'	105.1°	18°41.2'	-18.2'	105.4°	10
11	19°58.9'	-12.3'	104.4°	19°43.8'	-13.4'	104.8°	19°28.3'	-14.4'	105.1°	19°12.5'	-15.5'	105.5°	18°56.3'	-16.5'	105.8°	18°39.8'	-17.5'	106.1°	18°23.0'	-18.5'	106.4°	11
12	19°46.6'	-12.7'	105.5°	19°30.4'	-13.7'	105.8°	19°13.9'	-14.8'	106.2°	18°57.0'	-15.8'	106.5°	18°39.8'	-16.8'	106.8°	18°22.3'	-17.8'	107.1°	18°04.5'	-18.8'	107.4°	12
13	19°33.9'	-13.1'	106.5°	19°16.7'	-14.1'	106.8°	18°59.1'	-15.1'	107.2°	18°41.2'	-16.1'	107.5°	18°23.0'	-17.1'	107.8°	18°04.5'	-18.1'	108.1°	17°45.7'	-19.1'	108.4°	13
14	19°20.8'	-13.4'	107.5°	19°02.6'	-14.4'	107.9°	18°44.0'	-15.5'	108.2°	18°25.1'	-16.5'	108.5°	18°05.9'	-17.5'	108.8°	17°46.3'	-18.4'	109.1°	17°26.5'	-19.4'	109.4°	14
15	19°07.4'	-13.8'	108.6°	18°48.1'	-14.8'	108.9°	18°28.5'	-15.8'	109.2°	18°08.6'	-16.8'	109.5°	17°48.4'	-17.8'	109.8°	17°27.9'	-18.7'	110.1°	17°07.1'	-19.7'	110.4°	15
16	18°53.6'	-14.1'	109.6°	18°33.4'	-15.1'	109.9°	18°12.8'	-16.1'	110.2°	17°51.8'	-17.1'	110.5°	17°30.6'	-18.1'	110.8°	17°09.2'	-19.0'	111.1°	16°47.4'	-20.0'	111.4°	16
17	18°39.5'	-14.4'	110.6°	18°18.2'	-15.4'	110.9°	17°56.7'	-16.4'	111.3°	17°34.8'	-17.4'	111.5°	17°12.6'	-18.4'	111.8°	16°50.1'	-19.3'	112.1°	16°27.4'	-20.3'	112.4°	17
18	18°25.1'	-14.8'	111.7°	18°02.8'	-15.7'	112.0°	17°40.2'	-16.7'	112.3°	17°17.4'	-17.7'	112.6°	16°54.2'	-18.6'	112.8°	16°30.8'	-19.6'	113.1°	16°07.1'	-20.5'	113.4°	18
19	18°10.4'	-15.1'	112.7°	17°47.1'	-16.1'	113.0°	17°23.5'	-17.0'	113.3°	16°59.7'	-18.0'	113.6°	16°35.6'	-18.9'	113.8°	16°11.2'	-19.9'	114.1°	15°46.6'	-20.8'	114.4°	19
20	17°55.3'	-15.4'	113.7°	17°31.0'	-16.4'	114.0°	17°06.5'	-17.3'	114.3°	16°41.7'	-18.3'	114.5°	16°16.6'	-19.2'	114.8°	15°51.3'	-20.1'	115.1°	15°25.8'	-21.1'	115.3°	20
21	17°39.9'	-15.7'	114.7°	17°14.7'	-16.7'	115.0°	16°49.2'	-17.6'	115.3°	16°23.4'	-18.5'	115.5°	15°57.4'	-19.5'	115.8°	15°31.2'	-20.4'	116.1°	15°04.7'	-21.3'	116.3°	21
22	17°24.2'	-16.0'	115.7°	16°58.0'	-17.0'	116.0°	16°31.6'	-17.9'	116.3°	16°04.9'	-18.8'	116.5°	15°38.0'	-19.7'	116.8°	15°10.8'	-20.6'	117.0°	14°43.4'	-21.5'	117.3°	22
23	17°08.2'	-16.3'	116.7°	16°41.0'	-17.2'	117.0°	16°13.7'	-18.2'	117.3°	15°46.1'	-19.1'	117.5°	15°18.2'	-20.0'	117.8°	14°50.2'	-20.9'	118.0°	14°21.9'	-21.8'	118.2°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	7			8			9			10			11			12			13			

68° 292° LHA

Latitude CONTRARY to DECLINATION

68° 292° LHA

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

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

67° 293° LHA

Latitude CONTRARY to Declination

67° 293° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	22°49.1'	-08.1'	93.0°	22°45.8'	-09.3'	93.4°	22°42.1'	-10.4'	93.8°	22°37.9'	-11.5'	94.2°	22°33.2'	-12.6'	94.6°	22°28.2'	-13.7'	95.0°	22°22.7'	-14.8'	95.5°	0
1	22°40.9'	-08.6'	94.0°	22°36.5'	-09.7'	94.5°	22°31.7'	-10.8'	94.9°	22°26.4'	-11.9'	95.3°	22°20.6'	-13.0'	95.7°	22°14.5'	-14.1'	96.1°	22°07.9'	-15.2'	96.5°	1
2	22°32.4'	-09.0'	95.1°	22°26.8'	-10.1'	95.5°	22°20.9'	-11.2'	95.9°	22°14.4'	-12.3'	96.3°	22°07.6'	-13.4'	96.7°	22°00.4'	-14.5'	97.1°	21°52.7'	-15.6'	97.5°	2
3	22°23.4'	-09.4'	96.2°	22°16.7'	-10.5'	96.6°	22°09.6'	-11.6'	97.0°	22°02.1'	-12.7'	97.4°	21°54.2'	-13.8'	97.8°	21°45.9'	-14.9'	98.2°	21°37.1'	-16.0'	98.6°	3
4	22°14.0'	-09.8'	97.2°	22°06.2'	-10.9'	97.6°	21°58.0'	-12.0'	98.1°	21°49.4'	-13.1'	98.4°	21°40.4'	-14.2'	98.8°	21°31.0'	-15.3'	99.2°	21°21.1'	-16.4'	99.6°	4
5	22°04.1'	-10.3'	98.3°	21°55.3'	-11.4'	98.7°	21°46.0'	-12.4'	99.1°	21°36.3'	-13.5'	99.5°	21°26.3'	-14.6'	99.9°	21°15.7'	-15.7'	100.3°	21°04.8'	-16.7'	100.7°	5
6	21°53.9'	-10.7'	99.4°	21°43.9'	-11.8'	99.8°	21°33.5'	-12.8'	100.2°	21°22.7'	-13.9'	100.5°	21°11.6'	-15.0'	100.9°	20°60.0'	-16.0'	101.3°	20°48.0'	-17.1'	101.7°	6
7	21°43.2'	-11.1'	100.4°	21°32.2'	-12.1'	100.8°	21°20.7'	-13.2'	101.2°	21°08.8'	-14.3'	101.6°	20°56.6'	-15.4'	102.0°	20°44.0'	-16.4'	102.3°	20°30.9'	-17.5'	102.7°	7
8	21°32.2'	-11.5'	101.5°	21°20.0'	-12.5'	101.9°	21°07.5'	-13.6'	102.3°	20°54.5'	-14.7'	102.6°	20°41.2'	-15.7'	103.0°	20°27.5'	-16.8'	103.4°	20°13.5'	-17.8'	103.7°	8
9	21°20.7'	-11.9'	102.5°	21°07.5'	-12.9'	102.9°	20°53.9'	-14.0'	103.3°	20°39.9'	-15.0'	103.7°	20°25.5'	-16.1'	104.0°	20°10.8'	-17.1'	104.4°	19°55.7'	-18.2'	104.7°	9
10	21°08.8'	-12.2'	103.6°	20°54.5'	-13.3'	104.0°	20°39.9'	-14.4'	104.3°	20°24.8'	-15.4'	104.7°	20°09.4'	-16.4'	105.1°	19°53.6'	-17.5'	105.4°	19°37.5'	-18.5'	105.8°	10
11	20°56.6'	-12.6'	104.6°	20°41.2'	-13.7'	105.0°	20°25.5'	-14.7'	105.4°	20°09.4'	-15.8'	105.7°	19°53.0'	-16.8'	106.1°	19°36.2'	-17.8'	106.4°	19°19.0'	-18.8'	106.8°	11
12	20°44.0'	-13.0'	105.7°	20°27.5'	-14.1'	106.1°	20°10.8'	-15.1'	106.4°	19°53.6'	-16.1'	106.8°	19°36.2'	-17.1'	107.1°	19°18.4'	-18.1'	107.4°	19°00.2'	-19.1'	107.8°	12
13	20°30.9'	-13.4'	106.7°	20°13.5'	-14.4'	107.1°	19°55.7'	-15.4'	107.4°	19°37.5'	-16.5'	107.8°	19°19.0'	-17.5'	108.1°	19°00.2'	-18.5'	108.4°	18°41.1'	-19.5'	108.8°	13
14	20°17.6'	-13.7'	107.8°	19°59.1'	-14.8'	108.1°	19°40.2'	-15.8'	108.5°	19°21.1'	-16.8'	108.8°	19°01.6'	-17.8'	109.1°	18°41.7'	-18.8'	109.5°	18°21.6'	-19.8'	109.8°	14
15	20°03.8'	-14.1'	108.8°	19°44.3'	-15.1'	109.2°	19°24.4'	-16.1'	109.5°	19°04.3'	-17.1'	109.8°	18°43.8'	-18.1'	110.1°	18°22.9'	-19.1'	110.5°	18°01.8'	-20.1'	110.8°	15
16	19°49.7'	-14.5'	109.8°	19°29.2'	-15.5'	110.2°	19°08.3'	-16.5'	110.5°	18°47.1'	-17.5'	110.8°	18°25.6'	-18.4'	111.1°	18°03.8'	-19.4'	111.5°	17°41.7'	-20.4'	111.8°	16
17	19°35.2'	-14.8'	110.9°	19°13.7'	-15.8'	111.2°	18°51.8'	-16.8'	111.5°	18°29.7'	-17.8'	111.8°	18°07.2'	-18.8'	112.1°	17°44.4'	-19.7'	112.4°	17°21.4'	-20.7'	112.7°	17
18	19°20.4'	-15.2'	111.9°	18°57.9'	-16.1'	112.2°	18°35.0'	-17.1'	112.5°	18°11.9'	-18.1'	112.8°	17°48.4'	-19.1'	113.1°	17°24.7'	-20.0'	113.4°	17°00.7'	-20.9'	113.7°	18
19	19°05.3'	-15.5'	112.9°	18°41.7'	-16.5'	113.2°	18°17.9'	-17.4'	113.6°	17°53.8'	-18.4'	113.8°	17°29.4'	-19.4'	114.1°	17°04.7'	-20.3'	114.4°	16°39.8'	-21.2'	114.7°	19
20	18°49.8'	-15.8'	114.0°	18°25.2'	-16.8'	114.3°	18°00.5'	-17.8'	114.6°	17°35.4'	-18.7'	114.8°	17°10.0'	-19.6'	115.1°	16°44.4'	-20.6'	115.4°	16°18.5'	-21.5'	115.7°	20
21	18°33.9'	-16.2'	115.0°	18°08.4'	-17.1'	115.3°</																

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

66° 294° LHA

Latitude CONTRARY to Declination

66° 294° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	23°48.5'	-08.2'	93.1°	23°45.1'	-09.3'	93.5°	23°41.2'	-10.5'	94.0°	23°36.8'	-11.6'	94.4°	23°31.9'	-12.7'	94.9°	23°26.6'	-13.8'	95.3°	23°20.9'	-14.9'	95.7°	0
1	23°40.3'	-08.7'	94.2°	23°35.8'	-09.8'	94.6°	23°30.7'	-10.9'	95.1°	23°25.2'	-12.0'	95.5°	23°19.2'	-13.1'	95.9°	23°12.8'	-14.2'	96.3°	23°06.0'	-15.3'	96.8°	1
2	23°31.7'	-09.1'	95.3°	23°26.0'	-10.2'	95.7°	23°19.8'	-11.3'	96.1°	23°13.2'	-12.5'	96.6°	23°06.1'	-13.6'	97.0°	22°58.6'	-14.7'	97.4°	22°50.6'	-15.7'	97.8°	2
3	23°22.6'	-09.6'	96.3°	23°15.7'	-10.7'	96.8°	23°08.4'	-11.8'	97.2°	23°00.7'	-12.9'	97.6°	22°52.5'	-14.0'	98.0°	22°43.9'	-15.1'	98.5°	22°34.9'	-16.1'	98.9°	3
4	23°13.0'	-10.0'	97.4°	23°05.1'	-11.1'	97.8°	22°56.7'	-12.2'	98.3°	22°47.8'	-13.3'	98.7°	22°38.6'	-14.4'	99.1°	22°28.9'	-15.5'	99.5°	22°18.7'	-16.5'	99.9°	4
5	23°03.0'	-10.4'	98.5°	22°54.0'	-11.5'	98.9°	22°44.5'	-12.6'	99.3°	22°34.5'	-13.7'	99.7°	22°24.2'	-14.8'	100.1°	22°13.4'	-15.9'	100.6°	22°02.2'	-16.9'	100.9°	5
6	22°52.6'	-10.9'	99.6°	22°42.4'	-12.0'	100.0°	22°31.8'	-13.0'	100.4°	22°20.8'	-14.1'	100.8°	22°09.4'	-15.2'	101.2°	21°57.5'	-16.3'	101.6°	21°45.3'	-17.3'	102.0°	6
7	22°41.8'	-11.3'	100.6°	22°30.5'	-12.4'	101.0°	22°18.8'	-13.4'	101.4°	22°06.7'	-14.5'	101.8°	21°54.2'	-15.6'	102.2°	21°41.3'	-16.6'	102.6°	21°27.9'	-17.7'	103.0°	7
8	22°30.5'	-11.7'	101.7°	22°18.1'	-12.8'	102.1°	22°05.3'	-13.9'	102.5°	21°52.2'	-14.9'	102.9°	21°38.6'	-16.0'	103.3°	21°24.6'	-17.0'	103.7°	21°10.2'	-18.1'	104.0°	8
9	22°18.8'	-12.1'	102.8°	22°05.3'	-13.2'	103.2°	21°51.5'	-14.2'	103.5°	21°37.2'	-15.3'	103.9°	21°22.6'	-16.4'	104.3°	21°07.6'	-17.4'	104.7°	20°52.2'	-18.4'	105.1°	9
10	22°06.7'	-12.5'	103.8°	21°52.2'	-13.6'	104.2°	21°37.2'	-14.6'	104.6°	21°21.9'	-15.7'	105.0°	21°06.2'	-16.7'	105.3°	20°50.2'	-17.8'	105.7°	20°33.7'	-18.8'	106.1°	10
11	21°54.2'	-12.9'	104.9°	21°38.6'	-14.0'	105.3°	21°22.6'	-15.0'	105.6°	21°06.2'	-16.1'	106.0°	20°49.5'	-17.1'	106.4°	20°32.4'	-18.1'	106.7°	20°15.0'	-19.1'	107.1°	11
12	21°41.3'	-13.3'	105.9°	21°24.6'	-14.4'	106.3°	21°07.6'	-15.4'	106.7°	20°50.2'	-16.4'	107.0°	20°32.4'	-17.5'	107.4°	20°14.3'	-18.5'	107.8°	19°55.8'	-19.5'	108.1°	12
13	21°27.9'	-13.7'	107.0°	21°10.2'	-14.7'	107.3°	20°52.2'	-15.8'	107.7°	20°33.7'	-16.8'	108.1°	20°15.0'	-17.8'	108.4°	19°55.8'	-18.8'	108.8°	19°36.4'	-19.8'	109.1°	13
14	21°14.2'	-14.1'	108.0°	20°55.5'	-15.1'	108.4°	20°36.4'	-16.1'	108.7°	20°17.0'	-17.2'	109.1°	19°57.2'	-18.2'	109.4°	19°37.0'	-19.1'	109.8°	19°16.6'	-20.1'	110.1°	14
15	21°00.1'	-14.5'	109.1°	20°40.4'	-15.5'	109.4°	20°20.3'	-16.5'	109.8°	19°59.8'	-17.5'	110.1°	19°39.0'	-18.5'	110.4°	19°17.9'	-19.5'	110.8°	18°56.4'	-20.4'	111.1°	15
16	20°45.7'	-14.8'	110.1°	20°24.9'	-15.9'	110.4°	20°03.8'	-16.9'	110.8°	19°42.3'	-17.8'	111.1°	19°20.5'	-18.8'	111.5°	18°58.4'	-19.8'	111.8°	18°36.0'	-20.8'	112.1°	16
17	20°30.8'	-15.2'	111.1°	20°09.0'	-16.2'	111.5°	19°46.9'	-17.2'	111.8°	19°24.5'	-18.2'	112.1°	19°01.7'	-19.2'	112.5°	18°38.6'	-20.1'	112.8°	18°15.2'	-21.1'	113.1°	17
18	20°15.6'	-15.6'	112.2°	19°52.8'	-16.6'	112.5°	19°29.7'	-17.5'	112.8°	19°06.3'	-18.5'	113.2°	18°42.5'	-19.5'	113.5°	18°18.5'	-20.4'	113.8°	17°54.2'	-21.4'	114.1°	18
19	20°00.0'	-15.9'	113.2°	19°36.3'	-16.9'	113.5°	19°12.2'	-17.9'	113.8°	18°47.8'	-18.8'	114.2°	18°23.1'	-19.8'	114.5°	17°58.1'	-20.7'	114.8°	17°32.8'	-21.6'	115.1°	19
20	19°44.1'	-16.3'	114.2°	19°19.4'	-17.2'	114.5°	18°54.3'	-18.2'	114.9°	18°28.9'	-19.1'	115.2°	18°03.3'	-20.1'	115.5°	17°37.4'	-21.0'	115.7°	17°11.2'	-21.9'	116.0°	20
21	19°27.8'	-16.6'	115.2°	19°02.1'	-17.6'	115.6°	18°36.1'	-18.5'	115.9°	18°09.8'	-19.5'	116.2°	17°43.2'	-20.4'	116.4°	17°16.3'	-21.3'	116.7°	16°49.2'	-22.2'	117.0°	21
22	19°11.2'	-17.0'	116.3°	18°44.5'	-17.9'	116.6°	18°17.6'	-18.8'	116.9°	17°50.3'	-19.8'	117.2°	17°22.8'	-20.7'	117.4°	16°55.0'	-21.6'	117.7°	16°27.0'	-22.5'	118.0°	22
23	18°54.3'	-17.3'	117.3°	18°26.6'	-18.2'	117.6°	17°58.7'	-19.1'	117.9°	17°30.6'	-20.0'	118.1°	17°02.1'	-21.0'	118.4°	16°33.5'	-21.8'	118.7°	16°04.6'	-22.7'	118.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	7			8			9			10			11			12			13			Dec°

66° 294° LHA

Latitude CONTRARY to DECLINATION

66° 294° LHA

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

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

65° 295° LHA

Latitude CONTRARY to Declination

65° 295° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	24°48.0'	-08.3'	93.3°	24°44.4'	-09.4'	93.7°	24°40.3'	-10.6'	94.2°	24°35.7'	-11.7'	94.6°	24°30.6'	-12.8'	95.1°	24°25.1'	-13.9'	95.5°	24°19.0'	-15.0'	96.0°	0
1	24°39.7'	-08.8'	94.3°	24°35.0'	-09.9'	94.8°	24°29.7'	-11.0'	95.3°	24°24.0'	-12.1'	95.7°	24°17.8'	-13.3'	96.2°	24°11.1'	-14.4'	96.6°	24°04.0'	-15.5'	97.0°	1
2	24°31.0'	-09.2'	95.4°	24°25.1'	-10.4'	95.9°	24°18.7'	-11.5'	96.3°	24°11.9'	-12.6'	96.8°	24°04.5'	-13.7'	97.2°	23°56.8'	-14.8'	97.7°	23°48.5'	-15.9'	98.1°	2
3	24°21.8'	-09.7'	96.5°	24°14.7'	-10.8'	97.0°	24°07.2'	-11.9'	97.4°	23°59.3'	-13.0'	97.9°	23°50.8'	-14.1'	98.3°	23°42.0'	-15.2'	98.7°	23°32.6'	-16.3'	99.2°	3
4	24°12.1'	-10.2'	97.6°	24°03.9'	-11.3'	98.0°	23°55.3'	-12.4'	98.5°	23°46.2'	-13.5'	98.9°	23°36.7'	-14.6'	99.4°	23°26.7'	-15.7'	99.8°	23°16.3'	-16.7'	100.2°	4
5	24°01.9'	-10.6'	98.7°	23°52.7'	-11.7'	99.1°	23°42.9'	-12.8'	99.6°	23°32.7'	-13.9'	100.0°	23°22.1'	-15.0'	100.4°	23°11.1'	-16.1'	100.8°	22°59.6'	-17.1'	101.3°	5
6	23°51.3'	-11.1'	99.8°	23°40.9'	-12.2'	100.2°	23°30.1'	-13.2'	100.6°	23°18.8'	-14.3'	101.0°	23°07.1'	-15.4'	101.5°	22°55.0'	-16.5'	101.9°	22°42.4'	-17.6'	102.3°	6
7	23°40.3'	-11.5'	100.8°	23°28.8'	-12.6'	101.3°	23°16.9'	-13.7'	101.7°	23°04.5'	-14.8'	102.1°	22°51.7'	-15.8'	102.5°	22°38.5'	-16.9'	102.9°	22°24.9'	-17.9'	103.3°	7
8	23°28.8'	-11.9'	101.9°	23°16.2'	-13.0'	102.3°	23°03.2'	-14.1'	102.7°	22°49.7'	-15.2'	103.2°	22°35.9'	-16.2'	103.6°	22°21.6'	-17.3'	104.0°	22°06.9'	-18.3'	104.4°	8
9	23°16.9'	-12.4'	103.0°	23°03.2'	-13.4'	103.4°	22°49.1'	-14.5'	103.8°	22°34.6'	-15.6'	104.2°	22°19.6'	-16.6'	104.6°	22°04.3'	-17.7'	105.0°	21°48.6'	-18.7'	105.4°	9
10	23°04.5'	-12.8'	104.0°	22°49.7'	-13.9'	104.4°	22°34.6'	-14.9'	104.8°	22°19.0'	-16.0'	105.2°	22°03.0'	-17.0'	105.6°	21°46.6'	-18.1'	106.0°	21°29.9'	-19.1'	106.4°	10
11	22°51.7'	-13.2'	105.1°	22°35.9'	-14.3'	105.5°	22°19.6'	-15.3'	105.9°	22°03.0'	-16.4'	106.3°	21°46.0'	-17.4'	106.7°	21°28.6'	-18.4'	107.1°	21°10.8'	-19.4'	107.4°	11
12	22°38.5'	-13.6'	106.2°	22°21.6'	-14.7'	106.5°	22°04.3'	-15.7'	106.9°	21°46.6'	-16.8'	107.3°	21°28.6'	-17.8'	107.7°	21°10.1'	-18.8'	108.1°	20°51.4'	-19.8'	108.4°	12
13	22°24.9'	-14.0'	107.2°	22°06.9'	-15.1'	107.6°	21°48.6'	-16.1'	108.0°	21°29.9'	-17.1'	108.4°	21°10.8'	-18.2'	108.7°	20°51.4'	-19.2'	109.1°	20°31.5'	-20.2'	109.4°	13
14	22°10.8'	-14.4'	108.3°	21°51.8'	-15.5'	108.6°	21°32.5'	-16.5'	109.0°	21°12.7'	-17.5'	109.4°	20°52.6'	-18.5'	109.7°	20°32.2'	-19.5'	110.1°	20°11.4'	-20.5'	110.5°	14
15	21°56.4'	-14.8'	109.3°	21°36.4'	-15.9'	109.7°	21°16.0'	-16.9'	110.0°	20°55.2'	-17.9'	110.4°	20°34.1'	-18.9'	110.8°	20°12.7'	-19.9'	111.1°	19°50.9'	-20.8'	111.5°	15
16	21°41.6'	-15.2'	110.3°	21°20.5'	-16.2'	110.7°	20°59.1'	-17.2'	111.1°	20°37.4'	-18.2'	111.4°	20°15.3'	-19.2'	111.8°	19°52.8'	-20.2'	112.1°	19°30.1'	-21.1'	112.4°	16
17	21°26.3'	-15.6'	111.4°	21°04.3'	-16.6'	111.7°	20°41.9'	-17.6'	112.1°	20°19.1'	-18.6'	112.4°	19°56.0'	-19.6'	112.8°	19°32.6'	-20.5'	113.1°	19°08.9'	-21.5'	113.4°	17
18	21°10.7'	-16.0'	112.4°	20°47.7'	-17.0'	112.8°	20°24.3'	-18.0'	113.1°	20°00.5'	-18.9'	113.5°	19°36.5'	-19.9'	113.8°	19°12.1'	-20.8'	114.1°	18°47.5'	-21.8'	114.4°	18
19	20°54.7'	-16.4'	113.5°	20°30.7'	-17.3'	113.8°	20°06.3'	-18.3'	114.1°	19°41.6'	-19.3'	114.5°	19°16.6'	-20.2'	114.8°	18°51.3'	-21.2'	115.1°	18°25.7'	-22.1'	115.4°	19
20	20°38.4'	-16.7'	114.5°	20°13.3'	-17.7'	114.8°	19°48.0'	-18.6'	115.2°	19°22.3'	-19.6'	115.5°	18°56.4'	-20.5'	115.8°	18°30.1'	-21.5'	116.1°	18°03.6'	-22.4'	116.4°	20
21	2																					

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

64° 296° LHA

Latitude CONTRARY to Declination

64° 296° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	25°47.5'	-08.4'	93.4°	25°43.7'	-09.5'	93.9°	25°39.4'	-10.7'	94.4°	25°34.6'	-11.8'	94.8°	25°29.3'	-12.9'	95.3°	25°23.5'	-14.0'	95.8°	25°17.2'	-15.2'	96.3°	0
1	25°39.1'	-08.9'	94.5°	25°34.2'	-10.0'	95.0°	25°28.7'	-11.1'	95.5°	25°22.8'	-12.3'	95.9°	25°16.3'	-13.4'	96.4°	25°09.4'	-14.5'	96.9°	25°02.0'	-15.6'	97.3°	1
2	25°30.2'	-09.3'	95.6°	25°24.2'	-10.5'	96.1°	25°17.6'	-11.6'	96.5°	25°10.5'	-12.7'	97.0°	25°02.9'	-13.9'	97.5°	24°54.9'	-15.0'	97.9°	24°46.4'	-16.1'	98.4°	2
3	25°20.9'	-09.8'	96.7°	25°13.7'	-11.0'	97.2°	25°06.0'	-12.1'	97.6°	24°57.8'	-13.2'	98.1°	24°49.1'	-14.3'	98.5°	24°39.9'	-15.4'	99.0°	24°30.3'	-16.5'	99.5°	3
4	25°11.1'	-10.3'	97.8°	25°02.7'	-11.4'	98.2°	24°53.9'	-12.6'	98.7°	24°44.6'	-13.7'	99.2°	24°34.8'	-14.8'	99.6°	24°24.5'	-15.9'	100.1°	24°13.8'	-16.9'	100.5°	4
5	25°00.8'	-10.8'	98.9°	24°51.3'	-11.9'	99.3°	24°41.3'	-13.0'	99.8°	24°30.9'	-14.1'	100.2°	24°20.0'	-15.2'	100.7°	24°08.7'	-16.3'	101.1°	23°56.9'	-17.4'	101.6°	5
6	24°50.0'	-11.3'	100.0°	24°39.4'	-12.4'	100.4°	24°28.3'	-13.5'	100.9°	24°16.8'	-14.6'	101.3°	24°04.8'	-15.6'	101.7°	23°52.4'	-16.7'	102.2°	23°39.5'	-17.8'	102.6°	6
7	24°38.8'	-11.7'	101.0°	24°27.0'	-12.8'	101.5°	24°14.9'	-13.9'	101.9°	24°02.2'	-15.0'	102.4°	23°49.2'	-16.1'	102.8°	23°35.7'	-17.1'	103.2°	23°21.7'	-18.2'	103.6°	7
8	24°27.0'	-12.2'	102.1°	24°14.2'	-13.3'	102.6°	24°00.9'	-14.4'	103.0°	23°47.2'	-15.4'	103.4°	23°33.1'	-16.5'	103.9°	23°18.5'	-17.6'	104.3°	23°03.5'	-18.6'	104.7°	8
9	24°14.9'	-12.6'	103.2°	24°00.9'	-13.7'	103.6°	23°46.6'	-14.8'	104.1°	23°31.8'	-15.9'	104.5°	23°16.6'	-16.9'	104.9°	23°01.0'	-18.0'	105.3°	22°44.9'	-19.0'	105.7°	9
10	24°02.2'	-13.1'	104.3°	23°47.2'	-14.1'	104.7°	23°31.8'	-15.2'	105.1°	23°16.0'	-16.3'	105.5°	22°59.7'	-17.3'	105.9°	22°43.0'	-18.4'	106.3°	22°25.9'	-19.4'	106.7°	10
11	23°49.2'	-13.5'	105.3°	23°33.1'	-14.6'	105.8°	23°16.6'	-15.6'	106.2°	22°59.7'	-16.7'	106.6°	22°42.4'	-17.7'	107.0°	22°24.6'	-18.7'	107.4°	22°06.5'	-19.8'	107.8°	11
12	23°35.7'	-13.9'	106.4°	23°18.5'	-15.0'	106.8°	23°01.0'	-16.0'	107.2°	22°43.0'	-17.1'	107.6°	22°24.6'	-18.1'	108.0°	22°05.9'	-19.1'	108.4°	21°46.8'	-20.1'	108.8°	12
13	23°21.7'	-14.4'	107.5°	23°03.5'	-15.4'	107.9°	22°44.9'	-16.5'	108.3°	22°25.9'	-17.5'	108.7°	22°06.5'	-18.5'	109.0°	21°46.8'	-19.5'	109.4°	21°26.6'	-20.5'	109.8°	13
14	23°07.3'	-14.8'	108.5°	22°48.1'	-15.8'	108.9°	22°28.5'	-16.9'	109.3°	22°08.4'	-17.9'	109.7°	21°48.0'	-18.9'	110.1°	21°27.2'	-19.9'	110.4°	21°06.1'	-20.9'	110.8°	14
15	22°52.6'	-15.2'	109.6°	22°32.3'	-16.2'	110.0°	22°11.6'	-17.2'	110.3°	21°50.6'	-18.3'	110.7°	21°29.1'	-19.2'	111.1°	21°07.4'	-20.2'	111.5°	20°45.3'	-21.2'	111.8°	15
16	22°37.3'	-15.6'	110.6°	22°16.0'	-16.6'	111.0°	21°54.3'	-17.6'	111.4°	21°32.3'	-18.6'	111.7°	21°09.9'	-19.6'	112.1°	20°47.1'	-20.6'	112.5°	20°24.0'	-21.5'	112.8°	16
17	22°21.7'	-16.0'	111.7°	21°59.4'	-17.0'	112.0°	21°36.7'	-18.0'	112.4°	21°13.7'	-19.0'	112.8°	20°50.3'	-20.0'	113.1°	20°26.6'	-20.9'	113.5°	20°02.5'	-21.9'	113.8°	17
18	22°05.7'	-16.4'	112.7°	21°42.4'	-17.4'	113.1°	21°18.7'	-18.4'	113.4°	20°54.7'	-19.4'	113.8°	20°30.3'	-20.3'	114.1°	20°05.6'	-21.3'	114.5°	19°40.6'	-22.2'	114.8°	18
19	21°49.3'	-16.8'	113.7°	21°25.0'	-17.8'	114.1°	21°00.3'	-18.7'	114.5°	20°35.3'	-19.7'	114.8°	20°10.0'	-20.7'	115.1°	19°44.4'	-21.6'	115.5°	19°18.4'	-22.5'	115.8°	19
20	21°32.5'	-17.2'	114.8°	21°07.2'	-18.1'	115.1°	20°41.6'	-19.1'	115.5°	20°15.6'	-20.1'	115.8°	19°49.3'	-21.0'	116.1°	19°22.8'	-21.9'	116.5°	18°55.9'	-22.8'	116.8°	20
21	21°15.3'	-17.5'	115.8°	20°49.1'	-18.5'	116.1°	20°22.5'	-19.5'	116.5°	19°55.6'	-20.4'	116.8°	19°28.4'	-21.3'	117.1°	19°00.9'	-22.2'	117.4°	18°33.1'	-23.1'	117.7°	21
22	20°57.8'	-17.9'	116.8°	20°30.6'	-18.9'	117.2°	20°03.0'	-19.8'	117.5°	19°35.2'	-20.7'	117.8°	19°07.0'	-21.6'	118.1°	18°38.6'	-22.5'	118.4°	18°09.9'	-23.4'	118.7°	22
23	20°39.9'	-18.3'	117.8°	20°11.7'	-19.2'	118.2°	19°43.2'	-20.1'	118.5°	19°14.5'	-21.0'	118.8°	18°45.4'	-21.9'	119.1°	18°16.1'	-22.8'	119.4°	17°46.5'	-23.7'	119.7°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	7			8			9			10			11			12			13			Dec°

64° 296° LHA

Latitude CONTRARY to DECLINATION

64° 296° LHA

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

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

63° 297° LHA

Latitude CONTRARY to Declination

63° 297° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	26°46.9'	-08.4'	93.6°	26°43.0'	-09.6'	94.1°	26°38.5'	-10.8'	94.6°	26°33.4'	-11.9'	95.1°	26°27.9'	-13.0'	95.6°	26°21.8'	-14.2'	96.0°	26°15.3'	-15.3'	96.5°	0
1	26°38.5'	-09.0'	94.7°	26°33.4'	-10.1'	95.2°	26°27.7'	-11.3'	95.7°	26°21.5'	-12.4'	96.2°	26°14.9'	-13.5'	96.6°	26°07.7'	-14.7'	97.1°	25°60.0'	-15.8'	97.6°	1
2	26°29.5'	-09.5'	95.8°	26°23.3'	-10.6'	96.3°	26°16.5'	-11.8'	96.8°	26°09.1'	-12.9'	97.2°	26°01.3'	-14.0'	97.7°	25°53.0'	-15.1'	98.2°	25°44.2'	-16.2'	98.7°	2
3	26°20.1'	-10.0'	96.9°	26°12.6'	-11.1'	97.4°	26°04.7'	-12.2'	97.8°	25°56.3'	-13.4'	98.3°	25°47.3'	-14.5'	98.8°	25°37.9'	-15.6'	99.3°	25°28.0'	-16.7'	99.8°	3
4	26°10.1'	-10.5'	98.0°	26°01.5'	-11.6'	98.5°	25°52.5'	-12.7'	98.9°	25°42.9'	-13.9'	99.4°	25°32.8'	-15.0'	99.9°	25°22.3'	-16.1'	100.4°	25°11.3'	-17.2'	100.8°	4
5	25°59.6'	-11.0'	99.1°	25°49.9'	-12.1'	99.5°	25°39.7'	-13.2'	100.0°	25°29.0'	-14.3'	100.5°	25°17.9'	-15.4'	101.0°	25°06.2'	-16.5'	101.4°	24°54.1'	-17.6'	101.9°	5
6	25°48.6'	-11.5'	100.2°	25°37.8'	-12.6'	100.6°	25°26.5'	-13.7'	101.1°	25°14.7'	-14.8'	101.6°	25°02.4'	-15.9'	102.0°	24°49.7'	-17.0'	102.5°	24°36.5'	-18.0'	102.9°	6
7	25°37.2'	-11.9'	101.2°	25°25.2'	-13.1'	101.7°	25°12.8'	-14.2'	102.2°	24°59.9'	-15.2'	102.6°	24°46.6'	-16.3'	103.1°	24°32.8'	-17.4'	103.5°	24°18.5'	-18.5'	104.0°	7
8	25°25.2'	-12.4'	102.3°	25°12.2'	-13.5'	102.8°	24°58.7'	-14.6'	103.3°	24°44.7'	-15.7'	103.7°	24°30.2'	-16.8'	104.1°	24°15.4'	-17.8'	104.6°	24°00.0'	-18.9'	105.0°	8
9	25°12.8'	-12.9'	103.4°	24°58.7'	-14.0'	103.9°	24°44.1'	-15.1'	104.3°	24°29.0'	-16.1'	104.8°	24°13.5'	-17.2'	105.2°	23°57.5'	-18.3'	105.6°	23°41.1'	-19.3'	106.1°	9
10	24°59.9'	-13.4'	104.5°	24°44.7'	-14.4'	104.9°	24°29.0'	-15.5'	105.4°	24°12.8'	-16.6'	105.8°	23°56.3'	-17.6'	106.3°	23°39.3'	-18.7'	106.7°	23°21.8'	-19.7'	107.1°	10
11	24°46.6'	-13.8'	105.6°	24°30.2'	-14.9'	106.0°	24°13.5'	-16.0'	106.4°	23°56.3'	-17.0'	106.9°	23°38.6'	-18.0'	107.3°	23°20.6'	-19.1'	107.7°	23°02.1'	-20.1'	108.1°	11
12	24°32.8'	-14.3'	106.6°	24°15.4'	-15.3'	107.1°	23°57.5'	-16.4'	107.5°	23°39.3'	-17.4'	107.9°	23°20.6'	-18.5'	108.3°	23°01.5'	-19.5'	108.7°	22°42.0'	-20.5'	109.1°	12
13	24°18.5'	-14.7'	107.7°	24°00.0'	-15.8'	108.1°	23°41.1'	-16.8'	108.6°	23°21.8'	-17.8'	109.0°	23°02.1'	-18.9'	109.4°	22°42.0'	-19.9'	109.8°	22°21.6'	-20.9'	110.2°	13
14	24°03.8'	-15.2'	108.8°	23°44.3'	-16.2'	109.2°	23°24.3'	-17.2'	109.6°	23°04.0'	-18.2'	110.0°	22°43.3'	-19.3'	110.4°	22°22.2'	-20.2'	110.8°	22°00.7'	-21.2'	111.2°	14
15	23°48.6'	-15.6'	109.8°	23°28.1'	-16.6'	110.2°	23°07.1'	-17.6'	110.6°	22°45.8'	-18.6'	111.0°	22°24.0'	-19.6'	111.4°	22°01.9'	-20.6'	111.8°	21°39.5'	-21.6'	112.2°	15
16	23°33.0'	-16.0'	110.9°	23°11.5'	-17.0'	111.3°	22°49.5'	-18.0'	111.7°	22°27.1'	-19.0'	112.1°	22°04.4'	-20.0'	112.4°	21°41.3'	-21.0'	112.8°	21°17.9'	-22.0'	113.2°	16
17	23°17.0'	-16.4'	111.9°	22°54.4'	-17.4'	112.3°	22°31.4'	-18.4'	112.7°	22°08.1'	-19.4'	113.1°	21°44.4'	-20.4'	113.5°	21°20.3'	-21.3'	113.8°	20°55.9'	-22.3'	114.2°	17
18	23°00.6'	-16.8'	113.0°	22°37.0'	-17.8'	113.4°	22°13.0'	-18.8'	113.8°	21°48.7'	-19.8'	114.1°	21°24.0'	-20.7'	114.5°	20°59.0'	-21.7'	114.8°	20°33.6'	-22.6'	115.2°	18
19	22°43.8'	-17.2'	114.0°	22°19.2'	-18.2'	114.4°	21°54.2'	-19.2'	114.8°	21°28.9'	-20.2'	115.1°	21°03.2'	-21.1'	115.5°	20°37.3'	-22.0'	115.8°	20°11.0'	-23.0'	116.2°	19
20	22°26.5'	-17.6'	115.1°	22°00.9'	-18.6'	115.4°	21°35.0'	-19.6'	115.8°	21°08.7'	-20.6'	116.1°	20°42.1'	-21.4'	116.5°	20°15.2'	-22.4'	116.8°	19°48.0'	-23.3'	117.1°	20
2																						

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

62° 298° LHA

Latitude CONTRARY to Declination

62° 298° LHA

Table with 13 columns (Dec°, 7, 8, 9, 10, 11, 12, 13, Dec°) and 24 rows of astronomical data including Hc, d, and Z values.

62° 298° LHA

Latitude CONTRARY to DECLINATION

62° 298° LHA

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

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

61° 299° LHA

Latitude CONTRARY to Declination

61° 299° LHA

Table with 13 columns (Dec°, 7, 8, 9, 10, 11, 12, 13, Dec°) and 24 rows of astronomical data including Hc, d, and Z values.

61° 299° LHA

Latitude CONTRARY to DECLINATION

61° 299° LHA

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

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

60° 300° LHA

Latitude CONTRARY to Declination

60° 300° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	29°45.2'	-08.7'	94.0°	29°40.7'	-09.9'	94.6°	29°35.6'	-11.1'	95.2°	29°29.9'	-12.3'	95.7°	29°23.6'	-13.4'	96.3°	29°16.8'	-14.6'	96.8°	29°09.3'	-15.7'	97.4°	0
1	29°36.5'	-09.3'	95.2°	29°30.8'	-10.5'	95.7°	29°24.5'	-11.6'	96.3°	29°17.7'	-12.8'	96.8°	29°10.2'	-14.0'	97.4°	29°02.2'	-15.1'	98.0°	28°53.6'	-16.3'	98.5°	1
2	29°27.2'	-09.9'	96.3°	29°20.3'	-11.0'	96.9°	29°12.9'	-12.2'	97.4°	29°04.9'	-13.4'	98.0°	28°56.3'	-14.5'	98.5°	28°47.1'	-15.7'	99.1°	28°37.4'	-16.8'	99.6°	2
3	29°17.3'	-10.4'	97.4°	29°09.3'	-11.6'	98.0°	29°00.7'	-12.8'	98.5°	28°51.5'	-13.9'	99.1°	28°41.7'	-15.1'	99.6°	28°31.4'	-16.2'	100.2°	28°20.6'	-17.3'	100.7°	3
4	29°06.9'	-11.0'	98.6°	28°57.7'	-12.2'	99.1°	28°47.9'	-13.3'	99.7°	28°37.6'	-14.5'	100.2°	28°26.7'	-15.6'	100.7°	28°15.2'	-16.7'	101.3°	28°03.3'	-17.8'	101.8°	4
5	28°55.9'	-11.6'	99.7°	28°45.5'	-12.7'	100.2°	28°34.6'	-13.9'	100.8°	28°23.1'	-15.0'	101.3°	28°11.1'	-16.1'	101.8°	27°58.5'	-17.2'	102.3°	27°45.4'	-18.3'	102.9°	5
6	28°44.3'	-12.1'	100.8°	28°32.8'	-13.3'	101.3°	28°20.7'	-14.4'	101.9°	28°08.1'	-15.5'	102.4°	27°55.0'	-16.6'	102.9°	27°41.3'	-17.7'	103.4°	27°27.1'	-18.8'	103.9°	6
7	28°32.2'	-12.7'	101.9°	28°19.5'	-13.8'	102.4°	28°06.3'	-14.9'	103.0°	27°52.6'	-16.0'	103.5°	27°38.3'	-17.1'	104.0°	27°23.6'	-18.2'	104.5°	27°08.3'	-19.3'	105.0°	7
8	28°19.5'	-13.2'	103.0°	28°05.7'	-14.3'	103.6°	27°51.4'	-15.4'	104.1°	27°36.6'	-16.5'	104.6°	27°21.2'	-17.6'	105.1°	27°05.4'	-18.7'	105.6°	26°49.0'	-19.8'	106.1°	8
9	28°06.3'	-13.7'	104.1°	27°51.4'	-14.8'	104.7°	27°36.0'	-15.9'	105.2°	27°20.0'	-17.0'	105.7°	27°03.6'	-18.1'	106.2°	26°46.7'	-19.2'	106.6°	26°29.2'	-20.2'	107.1°	9
10	27°52.6'	-14.3'	105.2°	27°36.6'	-15.4'	105.7°	27°20.0'	-16.4'	106.2°	27°03.0'	-17.5'	106.7°	26°45.5'	-18.6'	107.2°	26°27.5'	-19.6'	107.7°	26°09.0'	-20.7'	108.2°	10
11	27°38.3'	-14.8'	106.3°	27°21.2'	-15.9'	106.8°	27°03.6'	-16.9'	107.3°	26°45.5'	-18.0'	107.8°	26°26.9'	-19.1'	108.3°	26°07.8'	-20.1'	108.8°	25°48.3'	-21.1'	109.2°	11
12	27°23.6'	-15.3'	107.4°	27°05.4'	-16.4'	107.9°	26°46.7'	-17.4'	108.4°	26°27.5'	-18.5'	108.9°	26°07.8'	-19.5'	109.3°	25°47.7'	-20.6'	109.8°	25°27.2'	-21.6'	110.3°	12
13	27°08.3'	-15.8'	108.5°	26°49.0'	-16.8'	109.0°	26°29.2'	-17.9'	109.5°	26°09.0'	-18.9'	109.9°	25°48.3'	-20.0'	110.4°	25°27.2'	-21.0'	110.8°	25°05.6'	-22.0'	111.3°	13
14	26°52.5'	-16.3'	109.6°	26°32.1'	-17.3'	110.1°	26°11.3'	-18.4'	110.5°	25°50.1'	-19.4'	111.0°	25°28.3'	-20.4'	111.4°	25°06.2'	-21.4'	111.9°	24°43.6'	-22.4'	112.3°	14
15	26°36.2'	-16.8'	110.7°	26°14.8'	-17.8'	111.1°	25°53.0'	-18.8'	111.6°	25°30.7'	-19.8'	112.0°	25°07.9'	-20.8'	112.5°	24°44.8'	-21.8'	112.9°	24°21.2'	-22.8'	113.3°	15
16	26°19.5'	-17.2'	111.8°	25°57.0'	-18.3'	112.2°	25°34.1'	-19.3'	112.7°	25°10.8'	-20.3'	113.1°	24°47.1'	-21.3'	113.5°	24°22.9'	-22.2'	113.9°	23°58.4'	-23.2'	114.3°	16
17	26°02.2'	-17.7'	112.8°	25°38.8'	-18.7'	113.3°	25°14.8'	-19.7'	113.7°	24°50.5'	-20.7'	114.1°	24°25.8'	-21.7'	114.5°	24°00.7'	-22.7'	115.0°	23°35.2'	-23.6'	115.4°	17
18	25°44.5'	-18.2'	113.9°	25°20.0'	-19.2'	114.3°	24°55.1'	-20.2'	114.7°	24°29.8'	-21.1'	115.2°	24°04.1'	-22.1'	115.6°	23°38.0'	-23.0'	116.0°	23°11.6'	-24.0'	116.4°	18
19	25°26.4'	-18.6'	114.9°	25°00.9'	-19.6'	115.4°	24°35.0'	-20.6'	115.8°	24°08.7'	-21.5'	116.2°	23°42.0'	-22.5'	116.6°	23°15.0'	-23.4'	117.0°	22°47.6'	-24.3'	117.4°	19
20	25°07.8'	-19.1'	116.0°	24°41.3'	-20.0'	116.4°	24°14.4'	-21.0'	116.8°	23°47.1'	-21.9'	117.2°	23°19.5'	-22.9'	117.6°	22°51.6'	-23.8'	118.0°	22°23.2'	-24.7'	118.3°	20
21	24°48.7'	-19.5'	117.0°	24°21.2'	-20.5'	117.4°	23°53.4'	-21.4'	117.8°	23°25.2'	-22.3'	118.2°	22°56.7'	-23.3'	118.6°	22°27.8'	-24.2'	119.0°	21°58.5'	-25.1'	119.3°	21
22	24°29.2'	-19.9'	118.1°	24°00.8'	-20.9'	118.5°	23°32.0'	-21.8'	118.9°	23°02.9'	-22.7'	119.2°	22°33.4'	-23.6'	119.6°	22°03.6'	-24.5'	120.0°	21°33.5'	-25.4'	120.3°	22
23	24°09.3'	-20.3'	119.1°	23°39.9'	-21.3'	119.5°	23°10.2'	-22.2'	119.9°	22°40.2'	-23.1'	120.2°	22°09.8'	-24.0'	120.6°	21°39.1'	-24.9'	120.9°	21°08.1'	-25.7'	121.3°	23

60° 300° LHA

Latitude CONTRARY to DECLINATION

60° 300° LHA

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

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

59° 301° LHA

Latitude CONTRARY to Declination

59° 301° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	30°44.6'	-08.8'	94.2°	30°39.9'	-10.0'	94.8°	30°34.6'	-11.2'	95.4°	30°28.7'	-12.4'	96.0°	30°22.2'	-13.6'	96.5°	30°15.0'	-14.7'	97.1°	30°07.3'	-15.9'	97.7°	0
1	30°35.8'	-09.4'	95.3°	30°29.9'	-10.6'	95.9°	30°23.4'	-11.8'	96.5°	30°16.3'	-13.0'	97.1°	30°08.6'	-14.1'	97.7°	30°00.3'	-15.3'	98.2°	29°51.4'	-16.4'	98.8°	1
2	30°26.3'	-10.0'	96.5°	30°19.3'	-11.2'	97.1°	30°11.6'	-12.4'	97.6°	30°03.4'	-13.5'	98.2°	29°54.5'	-14.7'	98.8°	29°45.0'	-15.9'	99.4°	29°35.0'	-17.0'	99.9°	2
3	30°16.4'	-10.6'	97.6°	30°08.1'	-11.8'	98.2°	29°59.3'	-13.0'	98.8°	29°49.8'	-14.1'	99.3°	29°39.8'	-15.3'	99.9°	29°29.2'	-16.4'	100.5°	29°18.0'	-17.5'	101.0°	3
4	30°05.8'	-11.2'	98.8°	29°56.3'	-12.4'	99.3°	29°46.3'	-13.5'	99.9°	29°35.7'	-14.7'	100.5°	29°24.5'	-15.8'	101.0°	29°12.8'	-16.9'	101.6°	29°00.4'	-18.1'	102.1°	4
5	29°54.6'	-11.8'	99.9°	29°44.0'	-12.9'	100.5°	29°32.8'	-14.1'	101.0°	29°21.0'	-15.2'	101.6°	29°08.7'	-16.4'	102.1°	28°55.8'	-17.5'	102.7°	28°42.4'	-18.6'	103.2°	5
6	29°42.8'	-12.4'	101.0°	29°31.0'	-13.5'	101.6°	29°18.7'	-14.6'	102.1°	29°05.8'	-15.8'	102.7°	28°52.3'	-16.9'	103.2°	28°38.3'	-18.0'	103.8°	28°23.8'	-19.1'	104.3°	6
7	29°30.4'	-12.9'	102.2°	29°17.5'	-14.1'	102.7°	29°04.1'	-15.2'	103.3°	28°50.0'	-16.3'	103.8°	28°35.5'	-17.4'	104.3°	28°20.4'	-18.5'	104.8°	28°04.7'	-19.6'	105.4°	7
8	29°17.5'	-13.5'	103.3°	29°03.5'	-14.6'	103.8°	28°48.9'	-15.7'	104.4°	28°33.7'	-16.8'	104.9°	28°18.0'	-17.9'	105.4°	28°01.8'	-19.0'	105.9°	27°45.1'	-20.1'	106.4°	8
9	29°04.1'	-14.0'	104.4°	28°48.9'	-15.1'	104.9°	28°33.1'	-16.3'	105.5°	28°16.9'	-17.3'	106.0°	28°00.1'	-18.4'	106.5°	27°42.8'	-19.5'	107.0°	27°25.0'	-20.6'	107.5°	9
10	28°50.0'	-14.6'	105.5°	28°33.7'	-15.7'	106.0°	28°16.9'	-16.8'	106.6°	27°59.5'	-17.9'	107.1°	27°41.7'	-18.9'	107.6°	27°23.3'	-20.0'	108.1°	27°04.5'	-21.0'	108.6°	10
11	28°35.5'	-15.1'	106.6°	28°18.0'	-16.2'	107.1°	28°00.1'	-17.3'	107.6°	27°41.7'	-18.4'	108.1°	27°22.8'	-19.4'	108.6°	27°03.3'	-20.5'	109.1°	26°43.4'	-21.5'	109.6°	11
12	28°20.4'	-15.6'	107.7°	28°01.8'	-16.7'	108.2°	27°42.8'	-17.8'	108.7°	27°23.3'	-18.8'	109.2°	27°03.3'	-19.9'	109.7°	26°42.9'	-20.9'	110.2°	26°22.0'	-21.9'	110.6°	12
13	28°04.7'	-16.2'	108.8°	27°45.1'	-17.2'	109.3°	27°25.0'	-18.3'	109.8°	27°04.5'	-19.3'	110.3°	26°43.4'	-20.4'	110.8°	26°22.0'	-21.4'	111.2°	26°00.0'	-22.4'	111.7°	13
14	27°48.6'	-16.7'	109.9°	27°27.9'	-17.7'	110.4°	27°06.8'	-18.8'	110.9°	26°45.2'	-19.8'	111.3°	26°23.1'	-20.8'	111.8°	26°00.6'	-21.8'	112.3°	25°37.6'	-22.8'	112.7°	14
15	27°31.9'	-17.2'	111.0°	27°10.2'	-18.2'	111.5°	26°48.0'	-19.2'	111.9°	26°25.4'	-20.3'	112.4°	26°02.3'	-21.3'	112.9°	25°38.7'	-22.3'	113.3°	25°14.8'	-23.2'	113.7°	15
16	27°14.7'	-17.7'	112.1°	26°52.0'	-18.7'	112.5°	26°28.7'	-19.7'	113.0°	26°05.1'	-20.7'	113.5°	25°41.0'	-21.7'	113.9°	25°16.5'	-22.7'	114.3°	24°51.6'	-23.7'	114.8°	16
17	26°57.1'	-18.1'	113.1°	26°33.3'	-19.2'	113.6°	26°09.0'	-20.2'	114.1°	25°44.4'	-21.2'	114.5°	25°19.3'	-22.1'	114.9°	24°53.8'	-23.1'	115.4°	24°27.9'	-24.1'	115.8°	17
18	26°38.9'	-18.6'	114.2°	26°14.1'	-19.6'	114.7°	25°48.9'	-20.6'	115.1°	25°23.2'	-21.6'	115.5°	24°57.2'	-22.6'	116.0°	24°30.7'	-23.5'	116.4°	24°03.9'	-24.4'	116.8°	18
19	26°20.3'	-19.1'	115.3°	25°54.5'	-20.1'	115.7°	25°28.3'	-21.1'	116.1°	25°01.6'	-22.0'	116.6°	24°34.6'	-23.0'	117.0°	24°07.2'	-23.9'	117.4°	23°39.4'	-24.8'	117.8°	19
20	26°01.2'	-19.5'	116.3°	25°34.4'	-20.5'	116.8°	25°07.2'	-21.5'	117.2°	24°39.6'	-22.4'	117.6°	24°11.6'	-23.4'	118.0°	23°43.3'	-24.3'	118.4°	23°14.6'	-25.2'	118.8°	20
21	25°41.7'	-20.0'	117.4°	25°13.9'	-21.0'	117.8°	24°45.7'	-21.9'	118.2°	24°17.2'	-22.8'	118.6°	23°48.3'	-23.8'	119.0°	23°19.0'	-24.7'	119.4°	22°49.4'	-25.6'	119.7°	21
22	25°21.7'	-20.4'	118.4°	24°52.9'	-21.4'	118.8°																

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

58° 302° LHA

Latitude CONTRARY to Declination

58° 302° LHA

Dec°	7			8			9			10			11			12			13			Dec°			
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°				
0	31°44.0'	-08.9'	94.4°	31°39.1'	-10.1'	95.0°	31°33.6'	-11.3'	95.6°	31°27.5'	-12.5'	96.2°	31°20.7'	-13.7'	96.8°	31°13.3'	-14.9'	97.4°	31°05.2'	-16.1'	98.0°	0			
1	31°35.0'	-09.5'	95.5°	31°29.0'	-10.7'	96.1°	31°22.3'	-11.9'	96.7°	31°14.9'	-13.1'	97.3°	31°07.0'	-14.3'	97.9°	30°58.4'	-15.5'	98.5°	30°49.2'	-16.6'	99.1°	1			
2	31°25.5'	-10.2'	96.7°	31°18.3'	-11.4'	97.3°	31°10.4'	-12.5'	97.9°	31°01.8'	-13.7'	98.5°	30°52.7'	-14.9'	99.1°	30°42.9'	-16.1'	99.7°	30°32.5'	-17.2'	100.2°	2			
3	31°15.4'	-10.8'	97.8°	31°06.9'	-12.0'	98.4°	30°57.8'	-13.1'	99.0°	30°48.1'	-14.3'	99.6°	30°37.8'	-15.5'	100.2°	30°26.8'	-16.6'	100.8°	30°15.3'	-17.8'	101.4°	3			
4	31°04.6'	-11.4'	99.0°	30°54.9'	-12.6'	99.6°	30°44.7'	-13.7'	100.2°	30°33.8'	-14.9'	100.7°	30°22.3'	-16.0'	101.3°	30°10.2'	-17.2'	101.9°	29°57.6'	-18.3'	102.5°	4			
5	30°53.2'	-12.0'	100.1°	30°42.4'	-13.2'	100.7°	30°30.9'	-14.3'	101.3°	30°18.9'	-15.5'	101.9°	30°06.2'	-16.6'	102.4°	29°53.0'	-17.7'	103.0°	29°39.3'	-18.8'	103.6°	5			
6	30°41.2'	-12.6'	101.3°	30°29.2'	-13.7'	101.8°	30°16.6'	-14.9'	102.4°	30°03.4'	-16.0'	103.0°	29°49.6'	-17.2'	103.5°	29°35.3'	-18.3'	104.1°	29°20.4'	-19.4'	104.6°	6			
7	30°28.6'	-13.2'	102.4°	30°15.5'	-14.3'	103.0°	30°01.7'	-15.5'	103.5°	29°47.4'	-16.6'	104.1°	29°32.5'	-17.7'	104.6°	29°17.0'	-18.8'	105.2°	29°01.0'	-19.9'	105.7°	7			
8	30°15.5'	-13.8'	103.5°	30°01.1'	-14.9'	104.1°	29°46.2'	-16.0'	104.7°	29°30.8'	-17.1'	105.2°	29°14.8'	-18.2'	105.7°	28°58.2'	-19.3'	106.3°	28°41.1'	-20.4'	106.8°	8			
9	30°01.7'	-14.3'	104.7°	29°46.2'	-15.5'	105.2°	29°30.2'	-16.6'	105.8°	29°13.7'	-17.7'	106.3°	28°56.5'	-18.8'	106.8°	28°38.9'	-19.8'	107.4°	28°20.7'	-20.9'	107.9°	9			
10	29°47.4'	-14.9'	105.8°	29°30.8'	-16.0'	106.3°	29°13.7'	-17.1'	106.9°	28°56.0'	-18.2'	107.4°	28°37.8'	-19.3'	107.9°	28°19.1'	-20.3'	108.4°	27°59.8'	-21.4'	108.9°	10			
11	29°32.5'	-15.4'	106.9°	29°14.8'	-16.6'	107.4°	28°56.5'	-17.6'	108.0°	28°37.8'	-18.7'	108.5°	28°18.5'	-19.8'	109.0°	27°58.7'	-20.8'	109.5°	27°38.5'	-21.9'	110.0°	11			
12	29°17.0'	-16.0'	108.0°	28°58.2'	-17.1'	108.5°	28°38.9'	-18.2'	109.1°	28°19.1'	-19.2'	109.6°	27°58.7'	-20.3'	110.1°	27°37.9'	-21.3'	110.6°	27°16.6'	-22.3'	111.0°	12			
13	29°01.0'	-16.5'	109.1°	28°41.1'	-17.6'	109.6°	28°20.7'	-18.7'	110.1°	27°59.8'	-19.7'	110.6°	27°38.5'	-20.8'	111.1°	27°16.6'	-21.8'	111.6°	26°54.3'	-22.8'	112.1°	13			
14	28°44.5'	-17.1'	110.2°	28°23.5'	-18.1'	110.7°	28°02.1'	-19.2'	111.2°	27°40.1'	-20.2'	111.7°	27°17.7'	-21.2'	112.2°	26°54.8'	-22.2'	112.7°	26°31.5'	-23.2'	113.1°	14			
15	28°27.4'	-17.6'	111.3°	28°05.4'	-18.6'	111.8°	27°42.9'	-19.7'	112.3°	27°19.9'	-20.7'	112.8°	26°56.5'	-21.7'	113.2°	26°32.6'	-22.7'	113.7°	26°08.2'	-23.7'	114.2°	15			
16	28°09.9'	-18.1'	112.4°	27°46.8'	-19.1'	112.9°	27°23.2'	-20.1'	113.4°	26°59.2'	-21.2'	113.8°	26°34.8'	-22.2'	114.3°	26°09.9'	-23.1'	114.7°	25°44.6'	-24.1'	115.2°	16			
17	27°51.8'	-18.6'	113.5°	27°27.7'	-19.6'	113.9°	27°03.1'	-20.6'	114.4°	26°38.1'	-21.6'	114.9°	26°12.6'	-22.6'	115.3°	25°46.7'	-23.6'	115.8°	25°20.5'	-24.5'	116.2°	17			
18	27°33.2'	-19.1'	114.5°	27°08.0'	-20.1'	115.0°	26°42.5'	-21.1'	115.5°	26°16.4'	-22.1'	115.9°	25°50.0'	-23.0'	116.4°	25°23.2'	-24.0'	116.8°	24°56.0'	-24.9'	117.2°	18			
19	27°14.1'	-19.6'	115.6°	26°47.9'	-20.6'	116.1°	26°21.4'	-21.5'	116.5°	25°54.4'	-22.5'	116.9°	25°27.0'	-23.5'	117.4°	24°59.2'	-24.4'	117.8°	24°31.0'	-25.3'	118.2°	19			
20	26°54.5'	-20.0'	116.7°	26°27.4'	-21.0'	117.1°	25°59.8'	-22.0'	117.5°	25°31.9'	-22.9'	118.0°	25°03.5'	-23.9'	118.4°	24°34.8'	-24.8'	118.8°	24°05.7'	-25.7'	119.2°	20			
21	26°34.5'	-20.5'	117.7°	26°06.4'	-21.5'	118.2°	25°37.8'	-22.4'	118.6°	25°09.0'	-23.3'	119.0°	24°39.7'	-24.3'	119.4°	24°10.0'	-25.2'	119.8°	23°40.0'	-26.1'	120.2°	21			
22	26°14.0'	-21.0'	118.8°	25°44.9'	-21.9'	119.2°	25°15.4'	-22.8'	119.6°	24°45.6'	-23.8'	120.0°	24°15.4'	-24.7'	120.4°	23°44.9'	-25.6'	120.8°	23°14.0'	-26.4'	121.2°	22			
23	25°53.0'	-21.4'	119.8°	25°23.0'	-22.3'	120.2°	24°52.6'	-23.3'	120.6°	24°21.8'	-24.2'	121.0°	23°50.7'	-25.0'	121.4°	23°19.3'	-25.9'	121.8°	22°47.6'	-26.8'	122.1°	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°
	7			8			9			10			11			12			13						

58° 302° LHA

Latitude CONTRARY to DECLINATION

58° 302° LHA

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

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

57° 303° LHA

Latitude CONTRARY to Declination

57° 303° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	32°43.3'	-09.0'	94.5°	32°38.3'	-10.2'	95.2°	32°32.6'	-11.5'	95.8°	32°26.2'	-12.7'	96.4°	32°19.1'	-13.9'	97.1°	32°11.4'	-15.0'	97.7°	32°03.1'	-16.2'	98.3°	0
1	32°34.3'	-09.7'	95.7°	32°28.1'	-10.9'	96.3°	32°21.1'	-12.1'	97.0°	32°13.5'	-13.3'	97.6°	32°05.3'	-14.5'	98.2°	31°56.4'	-15.7'	98.8°	31°46.9'	-16.8'	99.4°	1
2	32°24.6'	-10.3'	96.9°	32°17.2'	-11.5'	97.5°	32°09.0'	-12.7'	98.1°	32°00.2'	-13.9'	98.7°	31°50.8'	-15.1'	99.4°	31°40.7'	-16.3'	100.0°	31°30.0'	-17.4'	100.6°	2
3	32°14.4'	-11.0'	98.0°	32°05.7'	-12.2'	98.7°	31°56.3'	-13.3'	99.3°	31°46.3'	-14.5'	99.9°	31°35.7'	-15.7'	100.5°	31°24.5'	-16.9'	101.1°	31°12.6'	-18.0'	101.7°	3
4	32°03.4'	-11.6'	99.2°	31°53.5'	-12.8'	99.8°	31°43.0'	-14.0'	100.4°	31°31.8'	-15.1'	101.0°	31°20.0'	-16.3'	101.6°	31°07.6'	-17.4'	102.2°	30°54.6'	-18.6'	102.8°	4
5	31°51.8'	-12.2'	100.4°	31°40.7'	-13.4'	101.0°	31°29.0'	-14.6'	101.6°	31°16.7'	-15.7'	102.2°	31°03.7'	-16.9'	102.8°	30°50.2'	-18.0'	103.3°	30°36.1'	-19.1'	103.9°	5
6	31°39.6'	-12.8'	101.5°	31°27.3'	-14.0'	102.1°	31°14.4'	-15.2'	102.7°	31°01.0'	-16.3'	103.3°	30°46.9'	-17.4'	103.9°	30°32.2'	-18.6'	104.4°	30°16.9'	-19.7'	105.0°	6
7	31°26.8'	-13.4'	102.7°	31°13.3'	-14.6'	103.2°	30°59.3'	-15.7'	103.8°	30°44.6'	-16.9'	104.4°	30°29.4'	-18.0'	105.0°	30°13.6'	-19.1'	105.5°	29°57.3'	-20.2'	106.1°	7
8	31°13.3'	-14.0'	103.8°	30°58.7'	-15.2'	104.4°	30°43.5'	-16.3'	105.0°	30°27.8'	-17.4'	105.5°	30°11.4'	-18.6'	106.1°	29°54.5'	-19.7'	106.6°	29°37.1'	-20.7'	107.2°	8
9	30°59.3'	-14.6'	104.9°	30°43.5'	-15.8'	105.5°	30°27.2'	-16.9'	106.1°	30°10.3'	-18.0'	106.6°	29°52.9'	-19.1'	107.2°	29°34.9'	-20.2'	107.7°	29°16.3'	-21.2'	108.3°	9
10	30°44.6'	-15.2'	106.1°	30°27.8'	-16.3'	106.6°	30°10.3'	-17.5'	107.2°	29°52.3'	-18.5'	107.7°	29°33.8'	-19.6'	108.3°	29°14.7'	-20.7'	108.8°	28°55.1'	-21.8'	109.3°	10
11	30°29.4'	-15.8'	107.2°	30°11.4'	-16.9'	107.7°	29°52.9'	-18.0'	108.3°	29°33.8'	-19.1'	108.8°	29°14.1'	-20.2'	109.4°	28°54.0'	-21.2'	109.9°	28°33.3'	-22.2'	110.4°	11
12	30°13.6'	-16.4'	108.3°	29°54.5'	-17.5'	108.8°	29°34.9'	-18.5'	109.4°	29°14.7'	-19.6'	109.9°	28°54.0'	-20.7'	110.4°	28°32.8'	-21.7'	111.0°	28°11.1'	-22.7'	111.5°	12
13	29°57.3'	-16.9'	109.4°	29°37.1'	-18.0'	109.9°	29°16.3'	-19.1'	110.5°	28°55.1'	-20.1'	111.0°	28°33.3'	-21.2'	111.5°	28°11.1'	-22.2'	112.0°	27°48.3'	-23.2'	112.5°	13
14	29°40.3'	-17.5'	110.5°	29°19.1'	-18.5'	111.0°	28°57.2'	-19.6'	111.6°	28°34.9'	-20.6'	112.1°	28°12.2'	-21.7'	112.6°	27°48.9'	-22.7'	113.1°	27°25.1'	-23.7'	113.5°	14
15	29°22.9'	-18.0'	111.6°	29°00.5'	-19.1'	112.1°	28°37.7'	-20.1'	112.6°	28°14.3'	-21.1'	113.1°	27°50.5'	-22.1'	113.6°	27°26.2'	-23.1'	114.1°	27°01.5'	-24.1'	114.6°	15
16	29°04.9'	-18.5'	112.7°	28°41.5'	-19.6'	113.2°	28°17.6'	-20.6'	113.7°	27°53.2'	-21.6'	114.2°	27°28.4'	-22.6'	114.7°	27°03.1'	-23.6'	115.1°	26°37.4'	-24.5'	115.6°	16
17	28°46.3'	-19.1'	113.8°	28°21.9'	-20.1'	114.3°	27°57.0'	-21.1'	114.8°	27°31.6'	-22.1'	115.3°	27°05.8'	-23.1'	115.7°	26°39.5'	-24.0'	116.2°	26°12.8'	-25.0'	116.6°	17
18	28°27.3'	-19.6'	114.9°	28°01.8'	-20.6'	115.4°	27°35.9'	-21.6'	115.8°	27°09.5'	-22.5'	116.3°	26°42.7'	-23.5'	116.8°	26°15.5'	-24.5'	117.2°	25°47.9'	-25.4'	117.6°	18
19	28°07.7'	-20.1'	115.9°	27°41.2'	-21.1'	116.4°	27°14.3'	-22.0'	116.9°	26°47.0'	-23.0'	117.3°	26°19.2'	-23.9'	117.8°	25°51.0'	-24.9'	118.2°	25°22.5'	-25.8'	118.6°	19
20	27°47.7'	-20.6'	117.0°	27°20.2'	-21.5'	117.5°	26°52.3'	-22.5'	117.9°	26°24.0'	-23.4'	118.4°	25°55.3'	-24.4'	118.8°	25°26.1'	-25.3'	119.2°	24°56.7'	-26.2'		

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

56° 304° LHA		Latitude CONTRARY to Declination										56° 304° LHA										
Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	33°42.7'	-09.1'	94.7°	33°37.5'	-10.4'	95.4°	33°31.5'	-11.6'	96.0°	33°24.9'	-12.8'	96.7°	33°17.6'	-14.0'	97.3°	33°09.6'	-15.2'	98.0°	33°00.9'	-16.4'	98.6°	0
1	33°33.6'	-09.8'	95.9°	33°27.1'	-11.0'	96.5°	33°19.9'	-12.3'	97.2°	33°12.1'	-13.5'	97.8°	33°03.6'	-14.7'	98.5°	32°54.4'	-15.9'	99.1°	32°44.5'	-17.0'	99.8°	1
2	33°23.8'	-10.5'	97.1°	33°16.1'	-11.7'	97.7°	33°07.7'	-12.9'	98.4°	32°58.6'	-14.1'	99.0°	32°48.9'	-15.3'	99.7°	32°38.5'	-16.5'	100.3°	32°27.5'	-17.6'	100.9°	2
3	33°13.3'	-11.1'	98.2°	33°04.4'	-12.4'	98.9°	32°54.8'	-13.6'	99.5°	32°44.5'	-14.7'	100.2°	32°33.6'	-15.9'	100.8°	32°22.0'	-17.1'	101.4°	32°09.8'	-18.2'	102.0°	3
4	33°02.2'	-11.8'	99.4°	32°52.0'	-13.0'	100.1°	32°41.2'	-14.2'	100.7°	32°29.8'	-15.4'	101.3°	32°17.7'	-16.5'	101.9°	32°04.9'	-17.7'	102.6°	31°51.6'	-18.8'	103.2°	4
5	32°50.4'	-12.4'	100.6°	32°39.0'	-13.6'	101.2°	32°27.0'	-14.8'	101.8°	32°14.4'	-16.0'	102.5°	32°01.1'	-17.1'	103.1°	31°47.3'	-18.3'	103.7°	31°32.8'	-19.4'	104.3°	5
6	32°37.9'	-13.1'	101.8°	32°25.4'	-14.3'	102.4°	32°12.2'	-15.4'	103.0°	31°58.4'	-16.6'	103.6°	31°44.0'	-17.7'	104.2°	31°29.0'	-18.9'	104.8°	31°13.3'	-20.0'	105.4°	6
7	32°24.9'	-13.7'	102.9°	32°11.1'	-14.9'	103.5°	31°56.8'	-16.0'	104.1°	31°41.8'	-17.2'	104.7°	31°26.3'	-18.3'	105.3°	31°10.1'	-19.4'	105.9°	30°53.4'	-20.5'	106.5°	7
8	32°11.1'	-14.3'	104.1°	31°56.2'	-15.5'	104.7°	31°40.7'	-16.6'	105.3°	31°24.6'	-17.8'	105.9°	31°08.0'	-18.9'	106.4°	30°50.7'	-20.0'	107.0°	30°32.8'	-21.1'	107.6°	8
9	31°56.8'	-15.0'	105.2°	31°40.7'	-16.1'	105.8°	31°24.1'	-17.2'	106.4°	31°06.9'	-18.3'	107.0°	30°49.1'	-19.4'	107.5°	30°30.7'	-20.5'	108.1°	30°11.8'	-21.6'	108.7°	9
10	31°41.8'	-15.6'	106.3°	31°24.6'	-16.7'	106.9°	31°06.9'	-17.8'	107.5°	30°48.5'	-18.9'	108.1°	30°29.6'	-20.0'	108.6°	30°10.2'	-21.1'	109.2°	29°50.2'	-22.1'	109.7°	10
11	31°26.3'	-16.2'	107.5°	31°08.0'	-17.3'	108.1°	30°49.1'	-18.4'	108.6°	30°29.6'	-19.5'	109.2°	30°09.6'	-20.5'	109.7°	29°49.1'	-21.6'	110.3°	29°28.0'	-22.6'	110.8°	11
12	31°10.1'	-16.7'	108.6°	30°50.7'	-17.8'	109.2°	30°30.7'	-18.9'	109.7°	30°10.2'	-20.0'	110.3°	29°49.1'	-21.1'	110.8°	29°27.5'	-22.1'	111.4°	29°05.4'	-23.1'	111.9°	12
13	30°53.4'	-17.3'	109.7°	30°32.8'	-18.4'	110.3°	30°11.8'	-19.5'	110.8°	29°50.2'	-20.5'	111.4°	29°28.0'	-21.6'	111.9°	29°05.4'	-22.6'	112.4°	28°42.3'	-23.6'	112.9°	13
14	30°36.1'	-17.9'	110.8°	30°14.4'	-19.0'	111.4°	29°52.3'	-20.0'	111.9°	29°29.6'	-21.1'	112.5°	29°06.5'	-22.1'	113.0°	28°42.8'	-23.1'	113.5°	28°18.7'	-24.1'	114.0°	14
15	30°18.2'	-18.4'	111.9°	29°55.5'	-19.5'	112.5°	29°32.3'	-20.5'	113.0°	29°08.6'	-21.6'	113.5°	28°44.4'	-22.6'	114.0°	28°19.7'	-23.6'	114.5°	27°54.6'	-24.6'	115.0°	15
16	29°59.7'	-19.0'	113.0°	29°36.0'	-20.0'	113.6°	29°11.7'	-21.1'	114.1°	28°47.0'	-22.1'	114.6°	28°21.8'	-23.1'	115.1°	27°56.1'	-24.0'	115.6°	27°30.0'	-25.0'	116.0°	16
17	29°40.7'	-19.5'	114.1°	29°16.0'	-20.5'	114.7°	28°50.7'	-21.6'	115.2°	28°24.9'	-22.6'	115.7°	27°58.7'	-23.5'	116.1°	27°32.1'	-24.5'	116.6°	27°05.0'	-25.5'	117.1°	17
18	29°21.2'	-20.0'	115.2°	28°55.4'	-21.1'	115.7°	28°29.1'	-22.1'	116.2°	28°02.4'	-23.0'	116.7°	27°35.2'	-24.0'	117.2°	27°07.6'	-24.9'	117.6°	26°39.5'	-25.9'	118.1°	18
19	29°01.2'	-20.6'	116.3°	28°34.4'	-21.6'	116.8°	28°07.1'	-22.5'	117.3°	27°39.4'	-23.5'	117.8°	27°11.2'	-24.4'	118.2°	26°42.6'	-25.4'	118.7°	26°13.7'	-26.3'	119.1°	19
20	28°40.6'	-21.1'	117.4°	28°12.8'	-22.0'	117.9°	27°44.5'	-23.0'	118.3°	27°15.9'	-24.0'	118.8°	26°46.8'	-24.9'	119.2°	26°17.3'	-25.8'	119.7°	25°47.4'	-26.7'	120.1°	20
21	28°19.6'	-21.6'	118.4°	27°50.8'	-22.5'	118.9°	27°21.5'	-23.5'	119.4°	26°51.9'	-24.4'	119.8°	26°21.9'	-25.3'	120.3°	25°51.5'	-26.2'	120.7°	25°20.7'	-27.1'	121.1°	21
22	27°58.0'	-22.1'	119.5°	27°28.2'	-23.0'	120.0°	26°58.1'	-23.9'	120.4°	26°27.5'	-24.8'	120.8°	25°56.6'	-25.7'	121.3°	25°25.2'	-26.6'	121.7°	24°53.6'	-27.5'	122.1°	22
23	27°36.0'	-22.5'	120.6°	27°05.3'	-23.4'	121.0°	26°34.2'	-24.4'	121.4°	26°02.7'	-25.3'	121.9°	25°30.8'	-26.1'	122.3°	24°58.6'	-27.0'	122.7°	24°26.1'	-27.9'	123.0°	23
Dec°	7			8			9			10			11			12			13			Dec°

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

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

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

55° 305° LHA		Latitude CONTRARY to Declination										55° 305° LHA										
Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	34°42.0'	-09.2'	94.9°	34°36.6'	-10.5'	95.6°	34°30.5'	-11.7'	96.3°	34°23.6'	-13.0'	96.9°	34°16.0'	-14.2'	97.6°	34°07.7'	-15.4'	98.3°	33°58.7'	-16.6'	99.0°	0
1	34°32.8'	-10.0'	96.1°	34°26.1'	-11.2'	96.8°	34°18.7'	-12.4'	97.4°	34°10.6'	-13.6'	98.1°	34°01.8'	-14.9'	98.8°	33°52.3'	-16.1'	99.4°	33°42.1'	-17.2'	100.1°	1
2	34°22.8'	-10.6'	97.3°	34°14.9'	-11.9'	98.0°	34°06.3'	-13.1'	98.6°	33°57.0'	-14.3'	99.3°	33°46.9'	-15.5'	100.0°	33°36.2'	-16.7'	100.6°	33°24.8'	-17.9'	101.3°	2
3	34°12.2'	-11.3'	98.5°	34°03.1'	-12.6'	99.1°	33°53.2'	-13.8'	99.8°	33°42.6'	-15.0'	100.5°	33°31.4'	-16.2'	101.1°	33°19.5'	-17.3'	101.8°	33°07.0'	-18.5'	102.4°	3
4	34°00.9'	-12.0'	99.7°	33°50.5'	-13.2'	100.3°	33°39.4'	-14.4'	101.0°	33°27.7'	-15.6'	101.6°	33°15.3'	-16.8'	102.3°	33°02.2'	-18.0'	102.9°	32°48.5'	-19.1'	103.5°	4
5	33°48.9'	-12.7'	100.8°	33°37.3'	-13.9'	101.5°	33°25.0'	-15.1'	102.1°	33°12.1'	-16.3'	102.8°	32°58.5'	-17.4'	103.4°	32°44.2'	-18.6'	104.0°	32°29.4'	-19.7'	104.7°	5
6	33°36.2'	-13.3'	102.0°	33°23.4'	-14.5'	102.7°	33°09.9'	-15.7'	103.3°	32°55.8'	-16.9'	103.9°	32°41.1'	-18.0'	104.6°	32°25.7'	-19.2'	105.2°	32°09.7'	-20.3'	105.8°	6
7	33°22.9'	-14.0'	103.2°	33°08.9'	-15.2'	103.8°	32°54.2'	-16.3'	104.4°	32°38.9'	-17.5'	105.1°	32°23.0'	-18.6'	105.7°	32°06.5'	-19.8'	106.3°	31°49.4'	-20.9'	106.9°	7
8	33°08.9'	-14.6'	104.3°	32°53.7'	-15.8'	105.0°	32°37.9'	-17.0'	105.6°	32°21.4'	-18.1'	106.2°	32°04.4'	-19.2'	106.8°	31°46.7'	-20.3'	107.4°	31°28.5'	-21.4'	108.0°	8
9	32°54.2'	-15.3'	105.5°	32°37.9'	-16.4'	106.1°	32°20.9'	-17.6'	106.7°	32°03.3'	-18.7'	107.3°	31°45.2'	-19.8'	107.9°	31°26.4'	-20.9'	108.5°	31°07.1'	-22.0'	109.1°	9
10	32°38.9'	-15.9'	106.6°	32°21.4'	-17.0'	107.3°	32°03.3'	-18.2'	107.9°	31°44.6'	-19.3'	108.4°	31°25.4'	-20.4'	109.0°	31°05.5'	-21.4'	109.6°	30°45.1'	-22.5'	110.2°	10
11	32°23.0'	-16.5'	107.8°	32°04.4'	-17.6'	108.4°	31°45.2'	-18.8'	109.0°	31°25.4'	-19.8'	109.6°	31°05.0'	-20.9'	110.1°	30°44.1'	-22.0'	110.7°	30°22.6'	-23.0'	111.2°	11
12	32°06.5'	-17.1'	108.9°	31°46.7'	-18.2'	109.5°	31°26.4'	-19.3'	110.1°	31°05.5'	-20.4'	110.7°	30°44.1'	-21.5'	111.2°	30°22.1'	-22.5'	111.8°	29°59.6'	-23.5'	112.3°	12
13	31°49.4'	-17.7'	110.1°	31°28.5'	-18.8'	110.6°	31°07.1'	-19.9'	111.2°	30°45.1'	-21.0'	111.8°	30°22.6'	-22.0'	112.3°	29°59.6'	-23.0'	112.8°	29°36.0'	-24.0'	113.4°	13
14	31°31.6'	-18.3'	111.2°	31°09.7'	-19.4'	111.7°	30°47.2'	-20.4'	112.3°	30°24.2'	-21.5'	112.8°	30°00.6'	-22.5'	113.4°	29°36.5'	-23.5'	113.9°	29°12.0'	-24.5'	114.4°	14
15	31°13.3'	-18.9'	112.3°	30°50.3'	-19.9'	112.8°	30°26.7'	-21.0'	113.4°	30°02.7'	-22.0'	113.9°	29°38.1'	-23.0'	114.5°	29°13.0'	-24.0'	115.0°	28°47.4'	-25.0'	115.5°	15
16	30°54.5'	-19.4'	113.4°	30°30.4'	-20.5'	113.9°	30°05.8'	-21.5'	114.5°	29°40.6'	-22.5'	115.0°	29°15.0'	-23.5'	115.5°	28°49.0'	-24.5'	116.0°	28°22.4'	-25.5'	116.5°	16
17	30°35.0'	-20.0'	114.5°	30°09.9'	-21.0'	115.0°	29°44.2'	-22.0'	115.6°	29°18.1'	-23.0'	116.1°	28°51.5'	-24.0'	116.6°	28°24.5'	-25.0'	117.1°	27°56.9'	-25.9'	117.5°	17
18	30°15.0'	-20.5'	115.6°	29°48.8'	-21.6'	116.1°	29°22.2'	-22.5'	116.6°	28°55.1'	-23.5'	117.1°	28°27.5'	-24.5'	117.6°	27°59.5'	-25.4'	118.1°	27°31.0'	-26.4'	118.5°	18
19	29°54.5'	-21.1'	116.7°	29°27.3'	-22.1'	117.2°	28°59.6'	-23.0'	117.7°	28°31.5'	-24.0'	118.2°	28°03.0'	-25.0'	118.6°	27°34.0'	-25.9'	119.1°	27°04.6'	-26.8'	119.6°	19
20	29°33.4'	-21.6'	117.8°	29°05.2'	-22.6'	118.3°	28°36.6'	-23.5'	118.7°	28°07.5'	-24.5'	119.2°	27°38.0'	-25.4'	119.7°	27°08.1'	-26.3'	120.1°	26°37.8'	-27.2'	120.6°	20
21	29°11.8'	-22.1'	118.8°	28°42.7'	-23.1'	119.3°	28°13.1'	-24.0'	119.8°	27°43.1'	-24.9'	120.2°	27°12.6'	-25.8'	120.7°	26°41.8'	-26.7'	121.1°	26°10.6'	-27.6'	121.6°	21
22	28°49.7'	-22.6'	119.9°	28°19.6'	-23.5'	120.4°	27°49.1'	-24.5'	120.8°	27°18.1'	-25.4'	121.3°	26°46.8'	-26.3'	121.7°							

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

54° 306° LHA

Latitude CONTRARY to Declination

54° 306° LHA

Table with columns for Dec°, 7, 8, 9, 10, 11, 12, 13, Dec°. Each column contains three sub-columns for Hc°, d', Z°. Rows 0-23 show data for various declinations.

54° 306° LHA

Latitude CONTRARY to DECLINATION

54° 306° LHA

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

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

53° 307° LHA

Latitude CONTRARY to Declination

53° 307° LHA

Table with columns for Dec°, 7, 8, 9, 10, 11, 12, 13, Dec°. Each column contains three sub-columns for Hc°, d', Z°. Rows 0-23 show data for various declinations.

53° 307° LHA

Latitude CONTRARY to DECLINATION

53° 307° LHA

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

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

52° 308° LHA

Latitude CONTRARY to Declination

52° 308° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	37°40.0'	-09.6'	95.4°	37°33.9'	-10.9'	96.2°	37°27.1'	-12.2'	97.0°	37°19.4'	-13.5'	97.7°	37°10.9'	-14.7'	98.5°	37°01.7'	-16.0'	99.2°	36°51.7'	-17.2'	100.0°	0
1	37°30.3'	-10.4'	96.7°	37°23.0'	-11.7'	97.4°	37°14.8'	-13.0'	98.2°	37°05.9'	-14.2'	98.9°	36°56.2'	-15.5'	99.7°	36°45.7'	-16.7'	100.4°	36°34.5'	-17.9'	101.2°	1
2	37°19.9'	-11.2'	97.9°	37°11.3'	-12.5'	98.7°	37°01.9'	-13.7'	99.4°	36°51.7'	-15.0'	100.2°	36°40.7'	-16.2'	100.9°	36°29.0'	-17.4'	101.6°	36°16.5'	-18.6'	102.3°	2
3	37°08.8'	-11.9'	99.2°	36°58.9'	-13.2'	99.9°	36°48.2'	-14.5'	100.6°	36°36.7'	-15.7'	101.4°	36°24.5'	-16.9'	102.1°	36°11.6'	-18.1'	102.8°	35°57.9'	-19.3'	103.5°	3
4	36°56.8'	-12.7'	100.4°	36°45.7'	-14.0'	101.1°	36°33.7'	-15.2'	101.9°	36°21.0'	-16.4'	102.6°	36°07.6'	-17.6'	103.3°	35°53.4'	-18.8'	104.0°	35°38.6'	-20.0'	104.7°	4
5	36°44.1'	-13.4'	101.6°	36°31.7'	-14.7'	102.3°	36°18.5'	-15.9'	103.1°	36°04.6'	-17.1'	103.8°	35°50.0'	-18.3'	104.5°	35°34.6'	-19.5'	105.2°	35°18.6'	-20.6'	105.9°	5
6	36°30.7'	-14.2'	102.8°	36°17.0'	-15.4'	103.5°	36°02.6'	-16.6'	104.2°	35°47.5'	-17.8'	105.0°	35°31.7'	-19.0'	105.6°	35°15.1'	-20.1'	106.3°	34°57.9'	-21.3'	107.0°	6
7	36°16.5'	-14.9'	104.0°	36°01.6'	-16.1'	104.7°	35°46.0'	-17.3'	105.4°	35°29.7'	-18.5'	106.1°	35°12.7'	-19.6'	106.8°	34°55.0'	-20.8'	107.5°	34°36.6'	-21.9'	108.1°	7
8	36°01.6'	-15.6'	105.2°	35°45.5'	-16.8'	105.9°	35°28.7'	-18.0'	106.6°	35°11.2'	-19.1'	107.3°	34°53.0'	-20.3'	108.0°	34°34.2'	-21.4'	108.6°	34°14.7'	-22.5'	109.3°	8
9	35°46.0'	-16.3'	106.4°	35°28.7'	-17.5'	107.1°	35°10.7'	-18.7'	107.8°	34°52.0'	-19.8'	108.4°	34°32.7'	-20.9'	109.1°	34°12.8'	-22.0'	109.8°	33°52.2'	-23.1'	110.4°	9
10	35°29.7'	-17.0'	107.6°	35°11.2'	-18.2'	108.3°	34°52.0'	-19.3'	108.9°	34°32.2'	-20.4'	109.6°	34°11.8'	-21.6'	110.2°	33°50.7'	-22.6'	110.9°	33°29.0'	-23.7'	111.5°	10
11	35°12.7'	-17.7'	108.8°	34°53.0'	-18.8'	109.4°	34°32.7'	-20.0'	110.1°	34°11.8'	-21.1'	110.7°	33°50.2'	-22.2'	111.4°	33°28.1'	-23.2'	112.0°	33°05.3'	-24.3'	112.6°	11
12	34°55.0'	-18.3'	109.9°	34°34.2'	-19.5'	110.6°	34°12.8'	-20.6'	111.2°	33°50.7'	-21.7'	111.9°	33°28.1'	-22.8'	112.5°	33°04.8'	-23.8'	113.1°	32°41.0'	-24.9'	113.7°	12
13	34°36.6'	-19.0'	111.1°	34°14.7'	-20.1'	111.7°	33°52.2'	-21.2'	112.4°	33°29.0'	-22.3'	113.0°	33°05.3'	-23.3'	113.6°	32°41.0'	-24.4'	114.2°	32°16.2'	-25.4'	114.8°	13
14	34°17.6'	-19.6'	112.3°	33°54.6'	-20.7'	112.9°	33°31.0'	-21.8'	113.5°	33°06.8'	-22.9'	114.1°	32°42.0'	-23.9'	114.7°	32°16.7'	-24.9'	115.3°	31°50.8'	-25.9'	115.8°	14
15	33°58.0'	-20.3'	113.4°	33°33.9'	-21.3'	114.0°	33°09.2'	-22.4'	114.6°	32°43.9'	-23.4'	115.2°	32°18.1'	-24.5'	115.8°	31°51.7'	-25.5'	116.3°	31°24.8'	-26.4'	116.9°	15
16	33°37.7'	-20.9'	114.5°	33°12.5'	-21.9'	115.1°	32°46.8'	-23.0'	115.7°	32°20.5'	-24.0'	116.3°	31°53.6'	-25.0'	116.9°	31°26.3'	-26.0'	117.4°	30°58.4'	-27.0'	117.9°	16
17	33°16.8'	-21.5'	115.7°	32°50.6'	-22.5'	116.2°	32°23.8'	-23.5'	116.8°	31°56.5'	-24.5'	117.4°	31°28.6'	-25.5'	117.9°	31°00.3'	-26.5'	118.5°	30°31.4'	-27.4'	119.0°	17
18	32°55.4'	-22.1'	116.8°	32°28.1'	-23.1'	117.3°	32°00.2'	-24.1'	117.9°	31°31.9'	-25.1'	118.4°	31°03.1'	-26.0'	119.0°	30°33.8'	-27.0'	119.5°	30°04.0'	-27.9'	120.0°	18
19	32°33.3'	-22.7'	117.9°	32°05.0'	-23.7'	118.4°	31°36.1'	-24.6'	119.0°	31°06.8'	-25.6'	119.5°	30°37.0'	-26.5'	120.0°	30°06.8'	-27.5'	120.5°	29°36.1'	-28.4'	121.0°	19
20	32°10.6'	-23.2'	119.0°	31°41.3'	-24.2'	119.5°	31°11.5'	-25.2'	120.0°	30°41.2'	-26.1'	120.6°	30°10.5'	-27.0'	121.1°	29°39.3'	-27.9'	121.6°	29°07.7'	-28.8'	122.0°	20
21	31°47.4'	-23.8'	120.1°	31°17.1'	-24.7'	120.6°	30°46.4'	-25.7'	121.1°	30°15.1'	-26.6'	121.6°	29°43.0'	-27.5'	122.1°	29°11.4'	-28.4'	122.6°	28°38.9'	-29.3'	123.0°	21
22	31°23.7'	-24.3'	121.1°	30°52.4'	-25.2'	121.7°	30°20.7'	-26.2'	122.2°	29°48.5'	-27.1'	122.6°	29°16.0'	-28.0'	123.1°	28°43.0'	-28.8'	123.6°	28°09.6'	-29.7'	124.0°	22
23	30°59.4'	-24.8'	122.2°	30°27.2'	-25.7'	122.7°	29°54.5'	-26.7'	123.2°	29°21.5'	-27.5'	123.7°	28°48.0'	-28.4'	124.1°	28°14.1'	-29.3'	124.6°	27°39.9'	-30.1'	125.0°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	7			8			9			10			11			12			13			Dec°

52° 308° LHA

Latitude CONTRARY to DECLINATION

52° 308° LHA

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

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

51° 309° LHA

Latitude CONTRARY to Declination

51° 309° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	38°39.3'	-09.8'	95.6°	38°33.0'	-11.1'	96.4°	38°25.9'	-12.4'	97.2°	38°17.9'	-13.7'	98.0°	38°09.2'	-14.9'	98.8°	37°59.6'	-16.2'	99.6°	37°49.2'	-17.5'	100.3°	0
1	38°29.5'	-10.6'	96.9°	38°21.9'	-11.9'	97.7°	38°13.5'	-13.2'	98.5°	38°04.2'	-14.4'	99.2°	37°54.2'	-15.7'	100.0°	37°43.4'	-17.0'	100.8°	37°31.8'	-18.2'	101.5°	1
2	38°18.9'	-11.4'	98.2°	38°10.0'	-12.7'	98.9°	38°00.3'	-13.9'	99.7°	37°49.8'	-15.2'	100.5°	37°38.5'	-16.5'	101.2°	37°26.4'	-17.7'	102.0°	37°13.6'	-18.9'	102.7°	2
3	38°07.6'	-12.2'	99.4°	37°57.4'	-13.4'	100.2°	37°46.4'	-14.7'	100.9°	37°34.6'	-16.0'	101.7°	37°22.1'	-17.2'	102.4°	37°08.7'	-18.4'	103.2°	36°54.7'	-19.6'	103.9°	3
4	37°55.4'	-12.9'	100.6°	37°43.9'	-14.2'	101.4°	37°31.7'	-15.5'	102.2°	37°18.6'	-16.7'	102.9°	37°04.9'	-17.9'	103.6°	36°50.3'	-19.1'	104.4°	36°35.1'	-20.3'	105.1°	4
5	37°42.5'	-13.7'	101.9°	37°29.7'	-15.0'	102.6°	37°16.2'	-16.2'	103.4°	37°01.9'	-17.4'	104.1°	36°46.9'	-18.6'	104.8°	36°31.2'	-19.8'	105.6°	36°14.8'	-21.0'	106.3°	5
6	37°28.7'	-14.5'	103.1°	37°14.7'	-15.7'	103.9°	37°00.0'	-16.9'	104.6°	36°44.5'	-18.1'	105.3°	36°28.3'	-19.3'	106.0°	36°11.4'	-20.5'	106.7°	35°53.8'	-21.6'	107.4°	6
7	37°14.3'	-15.2'	104.3°	36°59.0'	-16.4'	105.1°	36°43.1'	-17.6'	105.8°	36°26.4'	-18.8'	106.5°	36°09.0'	-20.0'	107.2°	35°50.9'	-21.2'	107.9°	35°32.1'	-22.3'	108.6°	7
8	36°59.0'	-16.0'	105.5°	36°42.6'	-17.2'	106.3°	36°25.4'	-18.4'	107.0°	36°07.6'	-19.5'	107.7°	35°49.0'	-20.7'	108.4°	35°29.7'	-21.8'	109.0°	35°09.8'	-22.9'	109.7°	8
9	36°43.1'	-16.7'	106.8°	36°25.4'	-17.9'	107.5°	36°07.1'	-19.0'	108.2°	35°48.0'	-20.2'	108.8°	35°28.3'	-21.3'	109.5°	35°07.9'	-22.4'	110.2°	34°46.9'	-23.5'	110.8°	9
10	36°26.4'	-17.4'	107.9°	36°07.6'	-18.6'	108.6°	35°48.0'	-19.7'	109.3°	35°27.8'	-20.9'	110.0°	35°07.0'	-22.0'	110.7°	34°45.5'	-23.1'	111.3°	34°23.4'	-24.1'	112.0°	10
11	36°09.0'	-18.1'	109.1°	35°49.0'	-19.2'	109.8°	35°28.3'	-20.4'	110.5°	35°07.0'	-21.5'	111.2°	34°45.0'	-22.6'	111.8°	34°22.4'	-23.7'	112.4°	33°59.2'	-24.7'	113.1°	11
12	35°50.9'	-18.8'	110.3°	35°29.7'	-19.9'	111.0°	35°07.9'	-21.0'	111.6°	34°45.5'	-22.1'	112.3°	34°22.4'	-23.2'	112.9°	33°58.7'	-24.3'	113.6°	33°34.5'	-25.3'	114.2°	12
13	35°32.1'	-19.4'	111.5°	35°09.8'	-20.6'	112.1°	34°46.9'	-21.7'	112.8°	34°23.4'	-22.7'	113.4°	33°59.2'	-23.8'	114.0°	33°34.5'	-24.8'	114.7°	33°09.2'	-25.9'	115.2°	13
14	35°12.7'	-20.1'	112.6°	34°49.3'	-21.2'	113.3°	34°25.2'	-22.3'	113.9°	34°00.6'	-23.3'	114.5°	33°35.4'	-24.4'	115.1°	33°09.6'	-25.4'	115.7°	32°43.3'	-26.4'	116.3°	14
15	34°52.6'	-20.8'	113.8°	34°28.1'	-21.8'	114.4°	34°03.0'	-22.9'	115.0°	33°37.3'	-23.9'	115.6°	33°11.0'	-25.0'	116.2°	32°44.2'	-26.0'	116.8°	32°16.9'	-26.9'	117.4°	15
16	34°31.8'	-21.4'	114.9°	34°06.2'	-22.4'	115.6°	33°40.1'	-23.5'	116.2°	33°13.3'	-24.5'	116.7°	32°46.1'	-25.5'	117.3°	32°18.3'	-26.5'	117.9°	31°49.9'	-27.5'	118.4°	16
17	34°10.4'	-22.0'	116.1°	33°43.8'	-23.0'	116.7°	33°16.6'	-24.1'	117.3°	32°48.8'	-25.1'	117.8°	32°20.5'	-26.1'	118.4°	31°51.8'	-27.0'	118.9°	31°22.5'	-28.0'	119.5°	17
18	33°48.4'	-22.6'	117.2°	33°20.7'	-23.6'	117.8°	32°52.5'	-24.6'	118.4°	32°23.8'	-25.6'	118.9°	31°54.5'	-26.6'	119.5°	31°24.7'	-27.5'	120.0°	30°54.5'	-28.5'	120.5°	18
19	33°25.8'	-23.2'	118.3°	32°57.1'	-24.2'	118.9°	32°27.9'	-25.2'	119.4°	31°58.1'	-26.1'	120.0°	31°27.9'	-27.1'	120.5°	30°57.2'	-28.0'	121.0°	30°26.0'	-28.9'	121.5°	19
20	33°02.6'	-23.8'	119.4°	32°32.9'	-24.8'	120.0°	32°02.7'	-25.7'	120.5°	31°32.0'	-26.7'	121.0°	31°00.8'	-27.6'	121.6°	30°29.2'	-28.5'	122.1°	29°57.1'	-		

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

50° 310° LHA

Latitude CONTRARY to Declination

50° 310° LHA

Table with 13 columns (7-13) and 24 rows (0-23). Columns contain Hc, d, Z values. Rows contain Dec values. Includes a final row with column headers 7-13.

50° 310° LHA

Latitude CONTRARY to DECLINATION

50° 310° LHA

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

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

49° 311° LHA

Latitude CONTRARY to Declination

49° 311° LHA

Table with 13 columns (7-13) and 24 rows (0-23). Columns contain Hc, d, Z values. Rows contain Dec values. Includes a final row with column headers 7-13.

49° 311° LHA

Latitude CONTRARY to DECLINATION

49° 311° LHA

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

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

48° 312° LHA

Latitude CONTRARY to Declination

48° 312° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	41°36.9'	-10.2'	96.3°	41°30.0'	-11.6'	97.1°	41°22.1'	-12.9'	98.0°	41°13.3'	-14.3'	98.9°	41°03.5'	-15.6'	99.7°	40°52.9'	-16.9'	100.6°	40°41.5'	-18.2'	101.5°	0
1	41°26.7'	-11.1'	97.6°	41°18.4'	-12.5'	98.5°	41°09.1'	-13.8'	99.3°	40°59.0'	-15.1'	100.2°	40°47.9'	-16.4'	101.0°	40°36.0'	-17.7'	101.9°	40°23.3'	-19.0'	102.7°	1
2	41°15.6'	-12.0'	98.9°	41°05.9'	-13.3'	99.8°	40°55.3'	-14.7'	100.6°	40°43.8'	-16.0'	101.5°	40°31.5'	-17.3'	102.3°	40°18.3'	-18.5'	103.1°	40°04.2'	-19.8'	103.9°	2
3	41°03.6'	-12.9'	100.2°	40°52.6'	-14.2'	101.0°	40°40.6'	-15.5'	101.9°	40°27.9'	-16.8'	102.7°	40°14.2'	-18.1'	103.6°	39°59.7'	-19.3'	104.4°	39°44.4'	-20.6'	105.2°	3
4	40°50.7'	-13.7'	101.5°	40°38.4'	-15.1'	102.3°	40°25.1'	-16.3'	103.2°	40°11.1'	-17.6'	104.0°	39°56.1'	-18.9'	104.8°	39°40.4'	-20.1'	105.6°	39°23.9'	-21.3'	106.4°	4
5	40°37.0'	-14.6'	102.8°	40°23.3'	-15.9'	103.6°	40°08.8'	-17.2'	104.4°	39°53.4'	-18.4'	105.2°	39°37.3'	-19.7'	106.0°	39°20.3'	-20.9'	106.8°	39°02.5'	-22.1'	107.6°	5
6	40°22.4'	-15.4'	104.0°	40°07.4'	-16.7'	104.9°	39°51.6'	-18.0'	105.7°	39°35.0'	-19.2'	106.5°	39°17.6'	-20.4'	107.3°	38°59.4'	-21.6'	108.0°	38°40.5'	-22.8'	108.8°	6
7	40°07.0'	-16.2'	105.3°	39°50.7'	-17.5'	106.1°	39°33.7'	-18.7'	106.9°	39°15.8'	-20.0'	107.7°	38°57.2'	-21.2'	108.5°	38°37.8'	-22.3'	109.2°	38°17.7'	-23.5'	110.0°	7
8	39°50.7'	-17.1'	106.6°	39°33.2'	-18.3'	107.4°	39°14.9'	-19.5'	108.1°	38°55.9'	-20.7'	108.9°	38°36.0'	-21.9'	109.7°	38°15.5'	-23.0'	110.4°	37°54.2'	-24.2'	111.1°	8
9	39°33.7'	-17.8'	107.8°	39°14.9'	-19.1'	108.6°	38°55.4'	-20.3'	109.4°	38°35.2'	-21.0'	110.1°	38°14.2'	-22.6'	110.9°	37°52.4'	-23.7'	111.6°	37°30.0'	-24.8'	112.3°	9
10	39°15.8'	-18.6'	109.0°	38°55.9'	-19.8'	109.8°	38°35.2'	-21.0'	110.6°	38°13.7'	-22.2'	111.3°	37°51.6'	-23.3'	112.0°	37°28.7'	-24.4'	112.7°	37°05.2'	-25.5'	113.4°	10
11	38°57.2'	-19.4'	110.3°	38°36.0'	-20.6'	111.0°	38°14.2'	-21.7'	111.8°	37°51.6'	-22.9'	112.5°	37°28.3'	-24.0'	113.2°	37°04.3'	-25.1'	113.9°	36°39.7'	-26.1'	114.6°	11
12	38°37.8'	-20.1'	111.5°	38°15.5'	-21.3'	112.2°	37°52.4'	-22.4'	112.9°	37°28.7'	-23.5'	113.7°	37°04.3'	-24.6'	114.4°	36°39.2'	-25.7'	115.0°	36°13.5'	-26.8'	115.7°	12
13	38°17.7'	-20.9'	112.7°	37°54.2'	-22.0'	113.4°	37°30.0'	-23.1'	114.1°	37°05.2'	-24.2'	114.8°	36°39.7'	-25.3'	115.5°	36°13.5'	-26.3'	116.2°	35°46.8'	-27.4'	116.8°	13
14	37°56.8'	-21.6'	113.9°	37°32.2'	-22.7'	114.6°	37°06.9'	-23.8'	115.3°	36°41.0'	-24.9'	116.0°	36°14.4'	-25.9'	116.6°	35°47.2'	-26.9'	117.3°	35°19.4'	-27.9'	117.9°	14
15	37°35.2'	-22.3'	115.1°	37°09.5'	-23.4'	115.8°	36°43.1'	-24.4'	116.4°	36°16.1'	-25.5'	117.1°	35°48.5'	-26.5'	117.7°	35°20.3'	-27.5'	118.4°	34°51.5'	-28.5'	119.0°	15
16	37°13.0'	-23.0'	116.2°	36°46.1'	-24.0'	116.9°	36°18.7'	-25.1'	117.6°	35°50.6'	-26.1'	118.2°	35°22.0'	-27.1'	118.8°	34°52.7'	-28.1'	119.5°	34°23.0'	-29.1'	120.0°	16
17	36°50.0'	-23.6'	117.4°	36°22.1'	-24.7'	118.0°	35°53.6'	-25.7'	118.7°	35°24.5'	-26.7'	119.3°	34°54.9'	-27.7'	119.9°	34°24.6'	-28.7'	120.5°	33°53.9'	-29.6'	121.1°	17
18	36°26.4'	-24.3'	118.5°	35°57.4'	-25.3'	119.2°	35°27.9'	-26.3'	119.8°	34°57.8'	-27.3'	120.4°	34°27.2'	-28.3'	121.0°	33°56.0'	-29.2'	121.6°	33°24.3'	-30.1'	122.2°	18
19	36°02.1'	-24.9'	119.7°	35°32.1'	-25.9'	120.3°	35°01.6'	-26.9'	120.9°	34°30.5'	-27.9'	121.5°	33°58.9'	-28.8'	122.1°	33°26.8'	-29.7'	122.6°	32°54.2'	-30.6'	123.2°	19
20	35°37.2'	-25.5'	120.8°	35°06.2'	-26.5'	121.4°	34°34.7'	-27.5'	122.0°	34°02.7'	-28.4'	122.6°	33°30.1'	-29.3'	123.1°	32°57.1'	-30.2'	123.7°	32°23.6'	-31.1'	124.2°	20
21	35°11.7'	-26.1'	121.9°	34°39.7'	-27.1'	122.5°	34°07.2'	-28.0'	123.1°	33°34.2'	-28.9'	123.6°	33°00.8'	-29.8'	124.2°	32°26.9'	-30.7'	124.7°	31°52.5'	-31.6'	125.2°	21
22	34°45.6'	-26.7'	123.0°	34°12.6'	-27.7'	123.6°	33°39.2'	-28.6'	124.1°	33°05.3'	-29.5'	124.7°	32°30.9'	-30.3'	125.2°	31°56.1'	-31.2'	125.7°	31°20.9'	-32.0'	126.2°	22
23	34°18.8'	-27.3'	124.1°	33°45.0'	-28.2'	124.6°	33°10.6'	-29.1'	125.2°	32°35.8'	-30.0'	125.7°	32°00.6'	-30.8'	126.2°	31°24.9'	-31.7'	126.7°	30°48.9'	-32.5'	127.2°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	7			8			9			10			11			12			13			

48° 312° LHA

Latitude CONTRARY to DECLINATION

48° 312° LHA

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

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

47° 313° LHA

Latitude CONTRARY to Declination

47° 313° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	42°36.1'	-10.4'	96.5°	42°28.9'	-11.8'	97.4°	42°20.7'	-13.2'	98.3°	42°11.6'	-14.5'	99.2°	42°01.6'	-15.9'	100.1°	41°50.6'	-17.2'	101.0°	41°38.7'	-18.5'	101.8°	0
1	42°25.7'	-11.3'	97.8°	42°17.1'	-12.7'	98.7°	42°07.6'	-14.1'	99.6°	41°57.1'	-15.4'	100.5°	41°45.7'	-16.7'	101.4°	41°33.4'	-18.0'	102.3°	41°20.2'	-19.3'	103.1°	1
2	42°14.4'	-12.2'	99.1°	42°04.5'	-13.6'	100.0°	41°53.5'	-14.9'	100.9°	41°41.7'	-16.3'	101.8°	41°29.0'	-17.6'	102.7°	41°15.4'	-18.9'	103.5°	41°00.9'	-20.1'	104.4°	2
3	42°02.2'	-13.1'	100.5°	41°50.9'	-14.5'	101.4°	41°38.6'	-15.8'	102.2°	41°25.5'	-17.1'	103.1°	41°11.4'	-18.4'	103.9°	40°56.5'	-19.7'	104.8°	40°40.8'	-20.9'	105.6°	3
4	41°49.1'	-14.0'	101.8°	41°36.4'	-15.4'	102.7°	41°22.8'	-16.7'	103.5°	41°08.3'	-17.9'	104.4°	40°53.0'	-19.2'	105.2°	40°36.9'	-20.5'	106.0°	40°19.9'	-21.7'	106.9°	4
5	41°35.0'	-14.9'	103.1°	41°21.0'	-16.2'	103.9°	41°06.1'	-17.5'	104.8°	40°50.4'	-18.8'	105.6°	40°33.8'	-20.0'	106.5°	40°16.4'	-21.2'	107.3°	39°58.2'	-22.5'	108.1°	5
6	41°20.1'	-15.8'	104.4°	41°04.8'	-17.1'	105.2°	40°48.6'	-18.3'	106.1°	40°31.6'	-19.6'	106.9°	40°13.8'	-20.8'	107.7°	39°55.2'	-22.0'	108.5°	39°35.7'	-23.2'	109.3°	6
7	41°04.4'	-16.6'	105.7°	40°47.8'	-17.9'	106.5°	40°30.3'	-19.1'	107.3°	40°12.0'	-20.4'	108.1°	39°53.0'	-21.6'	108.9°	39°33.1'	-22.8'	109.7°	39°12.5'	-23.9'	110.5°	7
8	40°47.8'	-17.4'	106.9°	40°29.9'	-18.7'	107.7°	40°11.2'	-19.9'	108.6°	39°51.7'	-21.1'	109.4°	39°31.4'	-22.3'	110.1°	39°10.4'	-23.5'	110.9°	38°48.6'	-24.6'	111.7°	8
9	40°30.3'	-18.3'	108.2°	40°11.2'	-19.5'	109.0°	39°51.3'	-20.7'	109.8°	39°30.6'	-21.9'	110.6°	39°09.1'	-23.0'	111.3°	38°46.9'	-24.2'	112.1°	38°24.0'	-25.3'	112.8°	9
10	40°12.0'	-19.1'	109.4°	39°51.7'	-20.3'	110.2°	39°30.6'	-21.5'	111.0°	39°08.7'	-22.6'	111.8°	38°46.1'	-23.8'	112.5°	38°22.7'	-24.9'	113.3°	37°58.7'	-26.0'	114.0°	10
11	39°53.0'	-19.8'	110.7°	39°31.4'	-21.0'	111.5°	39°09.1'	-22.2'	112.2°	38°46.1'	-23.3'	113.0°	38°22.3'	-24.5'	113.7°	37°57.8'	-25.6'	114.4°	37°32.7'	-26.6'	115.1°	11
12	39°33.1'	-20.6'	111.9°	39°10.4'	-21.8'	112.7°	38°46.9'	-22.9'	113.4°	38°22.7'	-24.0'	114.1°	37°57.8'	-25.1'	114.9°	37°32.3'	-26.2'	115.6°	37°06.1'	-27.3'	116.2°	12
13	39°12.5'	-21.4'	113.1°	38°48.6'	-22.5'	113.9°	38°24.0'	-23.6'	114.6°	37°58.7'	-24.7'	115.3°	37°32.7'	-25.8'	116.0°	37°06.1'	-26.8'	116.7°	36°38.8'	-27.9'	117.4°	13
14	38°51.2'	-22.1'	114.3°	38°26.1'	-23.2'	115.1°	38°00.4'	-24.3'	115.8°	37°34.0'	-25.4'	116.5°	37°06.9'	-26.4'	117.1°	36°39.2'	-27.5'	117.8°	36°10.9'	-28.5'	118.5°	14
15	38°29.1'	-22.8'	115.5°	38°02.9'	-23.9'	116.2°	37°36.1'	-25.0'	116.9°	37°08.6'	-26.0'	117.6°	36°40.5'	-27.1'	118.3°	36°11.8'	-28.1'	118.9°	35°42.5'	-29.1'	119.5°	15
16	38°06.3'	-23.5'	116.7°	37°39.0'	-24.6'	117.4°	37°11.1'	-25.6'	118.1°	36°42.6'	-26.7'	118.7°	36°13.4'	-27.7'	119.4°	35°43.7'	-28.7'	120.0°	35°13.4'	-29.6'	120.6°	16
17	37°42.8'	-24.2'	117.9°	37°14.4'	-25.2'	118.5°	36°45.5'	-26.3'	119.2°	36°15.9'	-27.3'	119.8°	35°45.8'	-28.3'	120.5°	35°15.1'	-29.2'	121.1°	34°43.8'	-30.2'	121.7°	17
18	37°18.6'	-24.9'	119.0°	36°49.2'	-25.9'	119.7°	36°19.2'	-26.9'	120.3°	35°48.6'	-27.9'	120.9°	35°17.5'	-28.8'	121.6°	34°45.8'	-29.8'	122.1°	34°13.7'	-30.7'	122.7°	18
19	36°53.7'	-25.5'	120.2°	36°23.3'	-26.5'	120.8°	35°52.3'	-27.5'	121.4°	35°20.8'	-28.4'	122.0°	34°48.7'	-29.4'	122.6°	34°16.1'	-30.3'	123.2°	33°43.0'	-31.2'	123.8°	19
20	36°28.2'	-26.1'	121.3°	35°56.8'	-27.1'	121.9°	35°24.8'	-28.1'	122.5°	34°52.3'	-29.0'	123.1°	34°19.3'	-29.9'	123.7°	33°45.8'	-30.8'	124.2°	33°11.8'	-31.7'	124.8°	20

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

46° 314° LHA

Latitude CONTRARY to Declination

46° 314° LHA

Table with 24 rows and 11 columns. Columns 2-10 show Hc, d, Z values for declinations 7 to 13. Row 23 has underlined values. Bottom row shows column headers 7-13.

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

Table with 24 rows and 11 columns. Columns 2-10 show Hc, d, Z values for declinations 7 to 13. Row 23 has underlined values. Bottom row shows column headers 7-13.

45° 315° LHA

Latitude CONTRARY to DECLINATION

45° 315° LHA

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

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

42° 318° LHA

Latitude CONTRARY to Declination

42° 318° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	47°31.6'	-11.4'	97.7°	47°23.1'	-12.9'	98.8°	47°13.3'	-14.4'	99.9°	47°02.5'	-15.8'	100.9°	46°50.6'	-17.2'	102.0°	46°37.7'	-18.7'	103.0°	46°23.6'	-20.1'	104.0°	0
1	47°20.2'	-12.5'	99.2°	47°10.2'	-13.9'	100.2°	46°59.0'	-15.4'	101.3°	46°46.7'	-16.8'	102.3°	46°33.4'	-18.3'	103.4°	46°19.0'	-19.6'	104.4°	46°03.6'	-21.0'	105.4°	1
2	47°07.8'	-13.5'	100.6°	46°56.2'	-15.0'	101.7°	46°43.6'	-16.4'	102.7°	46°29.9'	-17.9'	103.7°	46°15.1'	-19.2'	104.7°	45°59.3'	-20.6'	105.7°	45°42.6'	-22.0'	106.7°	2
3	46°54.3'	-14.6'	102.0°	46°41.2'	-16.0'	103.1°	46°27.1'	-17.5'	104.1°	46°12.0'	-18.8'	105.1°	45°55.9'	-20.2'	106.1°	45°38.7'	-21.6'	107.1°	45°20.6'	-22.9'	108.1°	3
4	46°39.7'	-15.6'	103.4°	46°25.2'	-17.1'	104.5°	46°09.7'	-18.4'	105.5°	45°53.2'	-19.8'	106.5°	45°35.7'	-21.2'	107.5°	45°17.2'	-22.5'	108.4°	44°57.7'	-23.8'	109.4°	4
5	46°24.0'	-16.7'	104.8°	46°08.1'	-18.1'	105.9°	45°51.2'	-19.4'	106.9°	45°33.4'	-20.8'	107.8°	45°14.5'	-22.1'	108.8°	44°54.7'	-23.4'	109.7°	44°34.0'	-24.6'	110.7°	5
6	46°07.4'	-17.7'	106.2°	45°50.1'	-19.0'	107.2°	45°31.8'	-20.4'	108.2°	45°12.6'	-21.7'	109.2°	44°52.4'	-23.0'	110.1°	44°31.4'	-24.2'	111.0°	44°09.4'	-25.5'	111.9°	6
7	45°49.7'	-18.6'	107.6°	45°31.1'	-20.0'	108.6°	45°11.5'	-21.3'	109.5°	44°50.9'	-22.6'	110.5°	44°29.5'	-23.8'	111.4°	44°07.1'	-25.1'	112.3°	43°43.9'	-26.3'	113.2°	7
8	45°31.1'	-19.6'	109.0°	45°11.1'	-20.9'	109.9°	44°50.2'	-22.2'	110.9°	44°28.3'	-23.5'	111.8°	44°05.6'	-24.7'	112.7°	43°42.1'	-25.9'	113.6°	43°17.6'	-27.1'	114.4°	8
9	45°11.5'	-20.5'	110.3°	44°50.2'	-21.8'	111.3°	44°28.0'	-23.1'	112.2°	44°04.9'	-24.3'	113.1°	43°40.9'	-25.5'	114.0°	43°16.2'	-26.7'	114.8°	42°50.6'	-27.8'	115.7°	9
10	44°50.9'	-21.5'	111.6°	44°28.3'	-22.7'	112.6°	44°04.9'	-23.9'	113.5°	43°40.6'	-25.1'	114.3°	43°15.4'	-26.3'	115.2°	42°49.5'	-27.5'	116.0°	42°22.8'	-28.6'	116.9°	10
11	44°29.5'	-22.3'	113.0°	44°05.6'	-23.6'	113.9°	43°40.9'	-24.8'	114.7°	43°15.4'	-25.9'	115.6°	42°49.1'	-27.1'	116.4°	42°22.0'	-28.2'	117.3°	41°54.2'	-29.3'	118.1°	11
12	44°07.1'	-23.2'	114.3°	43°42.1'	-24.4'	115.1°	43°16.2'	-25.6'	116.0°	42°49.5'	-26.7'	116.8°	42°22.0'	-27.8'	117.6°	41°53.8'	-28.9'	118.4°	41°24.9'	-30.0'	119.2°	12
13	43°43.9'	-24.1'	115.5°	43°17.6'	-25.2'	116.4°	42°50.6'	-26.4'	117.2°	42°22.8'	-27.5'	118.0°	41°54.2'	-28.6'	118.8°	41°24.9'	-29.6'	119.6°	40°54.9'	-30.7'	120.4°	13
14	43°19.9'	-24.9'	116.8°	42°52.4'	-26.0'	117.6°	42°24.2'	-27.1'	118.4°	41°55.3'	-28.2'	119.2°	41°25.6'	-29.3'	120.0°	40°55.2'	-30.3'	120.8°	40°24.2'	-31.3'	121.5°	14
15	42°55.0'	-25.7'	118.0°	42°26.4'	-26.8'	118.9°	41°57.1'	-27.9'	119.7°	41°27.0'	-28.9'	120.4°	40°56.3'	-30.0'	121.2°	40°24.9'	-31.0'	121.9°	39°52.9'	-32.0'	122.6°	15
16	42°29.3'	-26.5'	119.3°	41°59.6'	-27.5'	120.1°	41°29.2'	-28.6'	120.8°	40°58.1'	-29.6'	121.6°	40°26.3'	-30.6'	122.3°	39°53.9'	-31.6'	123.0°	39°20.9'	-32.6'	123.7°	16
17	42°02.8'	-27.2'	120.5°	41°32.0'	-28.3'	121.3°	41°00.6'	-29.3'	122.0°	40°28.5'	-30.3'	122.7°	39°55.7'	-31.3'	123.4°	39°22.3'	-32.2'	124.1°	38°48.4'	-33.2'	124.8°	17
18	41°35.6'	-27.9'	121.7°	41°03.8'	-29.0'	122.4°	40°31.3'	-30.0'	123.2°	39°58.1'	-31.0'	123.9°	39°24.4'	-31.9'	124.6°	38°50.1'	-32.8'	125.2°	38°15.2'	-33.7'	125.9°	18
19	41°07.7'	-28.7'	122.9°	40°34.8'	-29.7'	123.6°	40°01.3'	-30.6'	124.3°	39°27.2'	-31.6'	125.0°	38°52.5'	-32.5'	125.6°	38°17.3'	-33.4'	126.3°	37°41.5'	-34.3'	126.9°	19
20	40°39.0'	-29.3'	124.0°	40°05.1'	-30.3'	124.7°	39°30.7'	-31.3'	125.4°	38°55.6'	-32.2'	126.1°	38°20.0'	-33.1'	126.7°	37°43.9'	-34.0'	127.3°	37°07.2'	-34.8'	127.9°	20
21	40°09.7'	-30.0'	125.2°	39°34.8'	-31.0'	125.9°	38°59.4'	-31.9'	126.5°	38°23.4'	-32.8'	127.2°	37°46.9'	-33.6'	127.8°	37°09.9'	-34.5'	128.4°	36°32.4'	-35.3'	129.0°	21
22	39°39.7'	-30.7'	126.3°	39°03.9'	-31.6'	127.0°	38°27.5'	-32.5'	127.6°	37°50.6'	-33.3'	128.2°	37°13.3'	-34.2'	128.8°	36°35.4'	-35.0'	129.4°	35°57.1'	-35.8'	130.0°	22
23	39°09.0'	-31.3'	127.4°	38°32.3'	-32.2'	128.1°	37°55.0'	-33.0'	128.7°	37°17.3'	-33.9'	129.3°	36°39.1'	-34.7'	129.8°	36°00.4'	-35.5'	130.4°	35°21.3'	-36.3'	131.0°	23
Dec°	7			8			9			10			11			12			13			Dec°

42° 318° LHA

Latitude CONTRARY to DECLINATION

42° 318° LHA

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

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

41° 319° LHA

Latitude CONTRARY to Declination

41° 319° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	48°30.6'	-11.6'	98.0°	48°21.8'	-13.1'	99.1°	48°11.7'	-14.6'	100.2°	48°00.5'	-16.1'	101.3°	47°48.2'	-17.6'	102.4°	47°34.8'	-19.0'	103.5°	47°20.3'	-20.4'	104.5°	0
1	48°19.0'	-12.7'	99.5°	48°08.6'	-14.2'	100.6°	47°57.1'	-15.7'	101.7°	47°44.4'	-17.2'	102.7°	47°30.6'	-18.6'	103.8°	47°15.8'	-20.0'	104.9°	46°59.9'	-21.4'	105.9°	1
2	48°06.3'	-13.8'	100.9°	47°54.4'	-15.3'	102.0°	47°41.4'	-16.8'	103.1°	47°27.2'	-18.2'	104.2°	47°12.0'	-19.6'	105.2°	46°55.8'	-21.0'	106.2°	46°38.5'	-22.4'	107.3°	2
3	47°52.5'	-14.9'	102.4°	47°39.1'	-16.4'	103.5°	47°24.6'	-17.8'	104.5°	47°09.0'	-19.2'	105.6°	46°52.4'	-20.6'	106.6°	46°34.7'	-22.0'	107.6°	46°16.1'	-23.3'	108.6°	3
4	47°37.5'	-16.0'	103.8°	47°22.7'	-17.4'	104.9°	47°06.7'	-18.8'	105.9°	46°49.8'	-20.2'	106.9°	46°31.8'	-21.6'	108.0°	46°12.8'	-22.9'	109.0°	45°52.8'	-24.2'	109.9°	4
5	47°21.5'	-17.1'	105.2°	47°05.2'	-18.5'	106.3°	46°47.9'	-19.8'	107.3°	46°29.5'	-21.2'	108.3°	46°10.2'	-22.5'	109.3°	45°49.9'	-23.8'	110.3°	45°28.6'	-25.1'	111.2°	5
6	47°04.5'	-18.1'	106.7°	46°46.8'	-19.5'	107.7°	46°28.0'	-20.8'	108.7°	46°08.3'	-22.2'	109.7°	45°47.7'	-23.4'	110.6°	45°26.0'	-24.7'	111.6°	45°03.5'	-26.0'	112.5°	6
7	46°46.4'	-19.1'	108.1°	46°27.3'	-20.4'	109.1°	46°07.2'	-21.8'	110.0°	45°46.2'	-23.1'	111.0°	45°24.2'	-24.3'	112.0°	45°01.3'	-25.6'	112.9°	44°37.5'	-26.8'	113.8°	7
8	46°27.3'	-20.1'	109.4°	46°06.8'	-21.4'	110.4°	45°45.4'	-22.7'	111.4°	45°23.1'	-24.0'	112.3°	44°59.9'	-25.2'	113.3°	44°35.7'	-26.4'	114.2°	44°10.7'	-27.6'	115.1°	8
9	46°07.2'	-21.0'	110.8°	45°45.4'	-22.3'	111.8°	45°22.7'	-23.6'	112.7°	44°59.1'	-24.8'	113.6°	44°34.6'	-26.1'	114.5°	44°09.3'	-27.2'	115.4°	43°43.1'	-28.4'	116.3°	9
10	45°46.2'	-22.0'	112.1°	45°23.1'	-23.2'	113.1°	44°59.1'	-24.5'	114.0°	44°34.3'	-25.7'	114.9°	44°08.6'	-26.9'	115.8°	43°42.1'	-28.0'	116.7°	43°14.8'	-29.1'	117.5°	10
11	45°24.2'	-22.9'	113.5°	44°59.9'	-24.1'	114.4°	44°34.6'	-25.3'	115.3°	44°08.6'	-26.5'	116.2°	43°41.7'	-27.7'	117.0°	43°14.1'	-28.8'	117.9°	42°45.6'	-29.9'	118.7°	11
12	45°01.3'	-23.8'	114.8°	44°35.7'	-25.0'	115.7°	44°09.3'	-26.2'	116.6°	43°42.1'	-27.3'	117.4°	43°14.1'	-28.4'	118.3°	42°45.3'	-29.5'	119.1°	42°15.7'	-30.6'	119.9°	12
13	44°37.5'	-24.6'	116.1°	44°10.7'	-25.8'	117.0°	43°43.1'	-27.0'	117.8°	43°14.8'	-28.1'	118.6°	42°45.6'	-29.2'	119.5°	42°15.7'	-30.2'	120.3°	41°45.2'	-31.3'	121.0°	13
14	44°12.9'	-25.5'	117.4°	43°44.9'	-26.6'	118.2°	43°16.2'	-27.8'	119.0°	42°46.7'	-28.8'	119.9°	42°16.4'	-29.9'	120.6°	41°45.5'	-30.9'	121.4°	41°13.9'	-31.9'	122.2°	14
15	43°47.4'	-26.3'	118.6°	43°18.3'	-27.4'	119.4°	42°48.4'	-28.5'	120.3°	42°17.8'	-29.6'	121.0°	41°46.5'	-30.6'	121.8°	41°14.6'	-31.6'	122.6°	40°42.0'	-32.6'	123.3°	15
16	43°21.1'	-27.1'	119.9°	42°50.9'	-28.2'	120.7°	42°19.9'	-29.2'	121.5°	41°48.3'	-30.3'	122.2°	41°15.9'	-31.3'	123.0°	40°43.0'	-32.2'	123.7°	40°09.4'	-33.2'	124.4°	16
17	42°54.0'	-27.9'	121.1°	42°22.7'	-28.9'	121.9°	41°50.7'	-30.0'	122.6°	41°18.0'	-31.0'	123.4°	40°44.7'	-31.9'	124.1°	40°10.7'	-32.9'	124.8°	39°36.2'	-33.8'	125.5°	17
18	42°26.1'	-28.6'	122.3°	41°53.8'	-29.6'	123.0°	41°20.7'	-30.6'	123.8°	40°47.0'	-31.6'	124.5°	40°12.7'	-32.6'	125.2°	39°37.8'	-33.5'	125.9°	38°22.4'	-34.4'	126.6°	18
19	41°57.5'	-29.3'	123.5°	41°24.1'	-30.3'	124.2°	40°50.1'	-31.3'	124.9°	40°15.4'	-32.2'	125.6°	39°40.2'	-33.2'	126.3°	39°04.4'	-34.1'	127.0°	37°08.0'	-34.9'	127.6°	19
20	41°28.2'	-30.0'	124.6°	40°53.8'	-31.0'	125.4°	40°18.8'	-31.9'	126.1°	39°43.2'	-32.9'	126.7°	39°07.0'	-33.8'	127.4°	38°30.3'	-34.6'	128.0°	37°53.1'	-35.5'	128.6°	20
21	40°58.2'	-30.7'	125.8°	40°22.8'	-31.6'	126.5°	39°46.8'	-32.6'	127.2°	39°10.3'	-33.5'	127.8°	38°33.3'	-34.3'								

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

40° 320° LHA

Latitude CONTRARY to Declination

40° 320° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	49°29.6'	-11.8'	98.3°	49°20.4'	-13.4'	99.4°	49°10.0'	-14.9'	100.6°	48°58.4'	-16.4'	101.7°	48°45.7'	-17.9'	102.8°	48°31.8'	-19.4'	103.9°	48°16.8'	-20.8'	105.0°	0
1	49°17.7'	-13.0'	99.8°	49°07.0'	-14.5'	100.9°	48°55.1'	-16.0'	102.0°	48°42.0'	-17.5'	103.2°	48°27.8'	-19.0'	104.3°	48°12.4'	-20.4'	105.3°	47°56.0'	-21.8'	106.4°	1
2	49°04.7'	-14.2'	101.3°	48°52.5'	-15.7'	102.4°	48°39.0'	-17.1'	103.5°	48°24.5'	-18.6'	104.6°	48°08.8'	-20.0'	105.7°	47°52.0'	-21.4'	106.7°	47°34.2'	-22.8'	107.8°	2
3	48°50.6'	-15.3'	102.7°	48°36.8'	-16.8'	103.9°	48°21.9'	-18.2'	104.9°	48°05.9'	-19.6'	106.0°	47°48.8'	-21.0'	107.1°	47°30.6'	-22.4'	108.1°	47°11.4'	-23.8'	109.2°	3
4	48°35.3'	-16.4'	104.2°	48°20.0'	-17.8'	105.3°	48°03.7'	-19.3'	106.4°	47°46.2'	-20.7'	107.4°	47°27.7'	-22.0'	108.5°	47°08.2'	-23.4'	109.5°	46°47.7'	-24.7'	110.5°	4
5	48°18.9'	-17.5'	105.7°	48°02.2'	-18.9'	106.7°	47°44.4'	-20.3'	107.8°	47°25.5'	-21.7'	108.8°	47°05.7'	-23.0'	109.8°	46°44.8'	-24.3'	110.9°	46°23.0'	-25.6'	111.8°	5
6	48°01.5'	-18.5'	107.1°	47°43.3'	-19.9'	108.1°	47°24.1'	-21.3'	109.2°	47°03.9'	-22.6'	110.2°	46°42.7'	-23.9'	111.2°	46°20.5'	-25.2'	112.2°	45°57.4'	-26.5'	113.1°	6
7	47°42.9'	-19.6'	108.5°	47°23.4'	-20.9'	109.5°	47°02.8'	-22.3'	110.6°	46°41.2'	-23.6'	111.6°	46°18.7'	-24.9'	112.5°	45°55.3'	-26.1'	113.5°	45°30.9'	-27.3'	114.4°	7
8	47°23.4'	-20.6'	109.9°	47°02.4'	-21.9'	110.9°	46°40.5'	-23.2'	111.9°	46°17.7'	-24.5'	112.9°	45°53.9'	-25.8'	113.8°	45°29.1'	-27.0'	114.8°	45°03.6'	-28.2'	115.7°	8
9	47°02.8'	-21.6'	111.3°	46°40.5'	-22.9'	112.3°	46°17.3'	-24.2'	113.3°	45°53.1'	-25.4'	114.2°	45°28.1'	-26.6'	115.1°	45°02.2'	-27.8'	116.0°	44°35.4'	-29.0'	116.9°	9
10	46°41.2'	-22.5'	112.7°	46°17.7'	-23.8'	113.6°	45°53.1'	-25.0'	114.6°	45°27.8'	-26.3'	115.5°	45°01.5'	-27.4'	116.4°	44°34.4'	-28.6'	117.3°	44°06.5'	-29.7'	118.2°	10
11	46°18.7'	-23.5'	114.0°	45°53.9'	-24.7'	115.0°	45°28.1'	-25.9'	115.9°	45°01.5'	-27.1'	116.8°	44°34.0'	-28.3'	117.7°	44°05.8'	-29.4'	118.5°	43°36.7'	-30.5'	119.4°	11
12	45°55.3'	-24.4'	115.3°	45°29.1'	-25.6'	116.3°	45°02.2'	-26.8'	117.2°	44°34.4'	-27.9'	118.0°	44°05.8'	-29.0'	118.9°	43°36.4'	-30.1'	119.7°	43°06.3'	-31.2'	120.6°	12
13	45°30.9'	-25.3'	116.6°	45°03.6'	-26.4'	117.5°	44°35.4'	-27.6'	118.4°	44°06.5'	-28.7'	119.3°	43°36.7'	-29.8'	120.1°	43°06.3'	-30.9'	120.9°	42°35.1'	-31.9'	121.7°	13
14	45°05.6'	-26.1'	117.9°	44°37.1'	-27.3'	118.8°	44°07.8'	-28.4'	119.7°	43°37.8'	-29.5'	120.5°	43°06.9'	-30.5'	121.3°	42°35.4'	-31.6'	122.1°	42°03.2'	-32.6'	122.9°	14
15	44°39.5'	-26.9'	119.2°	44°09.9'	-28.1'	120.1°	43°39.4'	-29.2'	120.9°	43°08.3'	-30.2'	121.7°	42°36.4'	-31.2'	122.5°	42°03.8'	-32.2'	123.2°	41°30.6'	-33.2'	124.0°	15
16	44°12.6'	-27.7'	120.5°	43°41.8'	-28.8'	121.3°	43°10.3'	-29.9'	122.1°	42°38.1'	-30.9'	122.9°	42°05.2'	-31.9'	123.6°	41°31.6'	-32.9'	124.4°	40°57.4'	-33.8'	125.1°	16
17	43°44.8'	-28.5'	121.7°	43°13.0'	-29.6'	122.5°	42°40.4'	-30.6'	123.3°	42°07.1'	-31.6'	124.0°	41°33.2'	-32.6'	124.8°	40°58.7'	-33.5'	125.5°	40°23.6'	-34.4'	126.2°	17
18	43°16.3'	-29.3'	122.9°	42°43.4'	-30.3'	123.7°	42°09.8'	-31.3'	124.4°	41°35.5'	-32.3'	125.2°	41°00.7'	-33.2'	125.9°	40°25.2'	-34.1'	126.6°	39°49.1'	-35.0'	127.3°	18
19	42°47.0'	-30.0'	124.1°	42°13.1'	-31.0'	124.9°	41°38.5'	-32.0'	125.6°	41°03.2'	-32.9'	126.3°	40°27.4'	-33.8'	127.0°	39°51.1'	-34.7'	127.7°	39°14.1'	-35.6'	128.3°	19
20	42°17.0'	-30.7'	125.3°	41°42.0'	-31.7'	126.0°	41°06.5'	-32.6'	126.7°	40°30.3'	-33.5'	127.4°	39°53.6'	-34.4'	128.1°	39°16.3'	-35.3'	128.7°	38°38.5'	-36.1'	129.3°	20
21	41°46.3'	-31.4'	126.4°	41°10.4'	-32.3'	127.1°	40°33.8'	-33.3'	127.8°	39°56.8'	-34.1'	128.5°	39°19.2'	-35.0'	129.1°	38°41.1'	-35.8'	129.8°	38°02.4'	-36.6'	130.4°	21
22	41°14.9'	-32.1'	127.6°	40°38.0'	-33.0'	128.2°	40°00.6'	-33.9'	128.9°	39°22.6'	-34.7'	129.6°	38°44.2'	-35.5'	130.2°	38°05.2'	-36.4'	130.8°	37°25.8'	-37.1'	131.4°	22
23	40°42.8'	-32.7'	128.7°	40°05.0'	-33.6'	129.3°	39°26.7'	-34.4'	130.0°	38°47.9'	-35.3'	130.6°	38°08.6'	-36.1'	131.2°	37°28.9'	-36.9'	131.8°	36°48.7'	-37.6'	132.4°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	7			8			9			10			11			12			13			

40° 320° LHA

Latitude CONTRARY to DECLINATION

40° 320° LHA

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

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

39° 321° LHA

Latitude CONTRARY to Declination

39° 321° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	50°28.5'	-12.1'	98.6°	50°19.0'	-13.7'	99.8°	50°08.2'	-15.2'	100.9°	49°56.2'	-16.8'	102.1°	49°43.1'	-18.3'	103.3°	49°28.7'	-19.7'	104.4°	49°13.2'	-21.2'	105.5°	0
1	50°16.4'	-13.3'	100.1°	50°05.3'	-14.9'	101.3°	49°53.0'	-16.4'	102.4°	49°39.5'	-17.9'	103.6°	49°24.8'	-19.4'	104.7°	49°09.0'	-20.8'	105.8°	48°52.0'	-22.2'	107.0°	1
2	50°03.1'	-14.5'	101.6°	49°50.5'	-16.0'	102.8°	49°36.6'	-17.5'	103.9°	49°21.6'	-19.0'	105.1°	49°05.4'	-20.4'	106.2°	48°48.2'	-21.9'	107.3°	48°29.8'	-23.3'	108.4°	2
3	49°48.6'	-15.6'	103.1°	49°34.4'	-17.1'	104.3°	49°19.1'	-18.6'	105.4°	49°02.6'	-20.1'	106.5°	48°45.0'	-21.5'	107.6°	48°26.3'	-22.9'	108.7°	48°06.5'	-24.2'	109.7°	3
4	49°33.0'	-16.8'	104.6°	49°17.3'	-18.3'	105.7°	49°00.5'	-19.7'	106.9°	48°42.5'	-21.1'	107.9°	48°23.5'	-22.5'	109.0°	48°03.4'	-23.9'	110.1°	47°42.3'	-25.2'	111.1°	4
5	49°16.2'	-17.9'	106.1°	48°59.0'	-19.3'	107.2°	48°40.7'	-20.8'	108.3°	48°21.4'	-22.2'	109.4°	48°01.0'	-23.5'	110.4°	47°39.5'	-24.8'	111.4°	47°17.1'	-26.1'	112.5°	5
6	48°58.3'	-19.0'	107.6°	48°39.7'	-20.4'	108.6°	48°20.0'	-21.8'	109.7°	47°59.2'	-23.1'	110.8°	47°37.5'	-24.5'	111.8°	47°14.7'	-25.8'	112.8°	46°51.0'	-27.0'	113.8°	6
7	48°39.3'	-20.1'	109.0°	48°19.3'	-21.4'	110.1°	47°58.2'	-22.8'	111.1°	47°36.1'	-24.1'	112.1°	47°13.0'	-25.4'	113.1°	46°49.0'	-26.7'	114.1°	46°24.0'	-27.9'	115.1°	7
8	48°19.3'	-21.1'	110.4°	47°57.8'	-22.4'	111.5°	47°35.4'	-23.8'	112.5°	47°12.0'	-25.1'	113.5°	46°47.6'	-26.3'	114.5°	46°22.3'	-27.5'	115.4°	45°56.1'	-28.7'	116.4°	8
9	47°58.2'	-22.1'	111.8°	47°35.4'	-23.4'	112.8°	47°11.6'	-24.7'	113.8°	46°46.9'	-26.0'	114.8°	46°21.3'	-27.2'	115.8°	45°54.8'	-28.4'	116.7°	45°27.4'	-29.5'	117.6°	9
10	47°36.1'	-23.1'	113.2°	47°12.0'	-24.4'	114.2°	46°46.9'	-25.6'	115.2°	46°20.9'	-26.9'	116.1°	45°54.1'	-28.0'	117.1°	45°26.4'	-29.2'	118.0°	44°57.8'	-30.3'	118.8°	10
11	47°13.0'	-24.0'	114.6°	46°47.6'	-25.3'	115.5°	46°21.3'	-26.5'	116.5°	45°54.1'	-27.7'	117.4°	45°26.0'	-28.9'	118.3°	44°57.2'	-30.0'	119.2°	44°27.5'	-31.1'	120.1°	11
12	46°49.0'	-25.0'	115.9°	46°22.3'	-26.2'	116.9°	45°54.8'	-27.4'	117.8°	45°26.4'	-28.5'	118.7°	44°57.2'	-29.7'	119.6°	44°27.2'	-30.8'	120.4°	43°56.4'	-31.8'	121.3°	12
13	46°24.0'	-25.9'	117.2°	45°56.1'	-27.1'	118.2°	45°27.4'	-28.2'	119.1°	44°57.8'	-29.3'	119.9°	44°27.5'	-30.4'	120.8°	43°56.4'	-31.5'	121.6°	43°24.6'	-32.5'	122.4°	13
14	45°58.1'	-26.7'	118.5°	45°29.0'	-27.9'	119.4°	44°59.2'	-29.0'	120.3°	44°28.5'	-30.1'	121.2°	43°57.1'	-31.2'	122.0°	43°24.9'	-32.2'	122.8°	42°52.1'	-33.2'	123.6°	14
15	45°31.4'	-27.6'	119.8°	45°01.1'	-28.7'	120.7°	44°30.1'	-29.8'	121.5°	43°58.4'	-30.9'	122.4°	43°25.9'	-31.9'	123.2°	42°52.7'	-32.9'	123.9°	42°18.9'	-33.9'	124.7°	15
16	45°03.8'	-28.4'	121.1°	44°32.4'	-29.5'	121.9°	44°00.3'	-30.6'	122.7°	43°27.5'	-31.6'	123.6°	42°54.0'	-32.6'	124.3°	42°19.8'	-33.6'	125.1°	41°45.0'	-34.5'	125.8°	16
17	44°35.3'	-29.2'	122.3°	44°02.9'	-30.3'	123.1°	43°29.7'	-31.3'	123.9°	42°55.9'	-32.3'	124.7°	42°21.4'	-33.3'	125.5°	41°46.3'	-34.2'	126.2°	41°10.5'	-35.1'	126.9°	17
18	44°06.1'	-30.0'	123.5°	43°32.6'	-31.0'	124.3°	42°58.5'	-32.0'	125.1°	42°23.6'	-33.0'	125.9°	41°48.2'	-33.9'	126.6°	41°12.1'	-34.8'	127.3°	40°35.4'	-35.7'	128.0°	18
19	43°36.2'	-30.7'	124.7°	43°01.6'	-31.7'	125.5°	42°26.5'	-32.7'	126.3°	41°50.7'	-33.6'	127.0°	41°14.3'	-34.5'	127.7°	40°37.3'	-35.4'	128.4°	39°59.8'	-36.2'	129.0°	19
20	43°05.4'	-31.4'	125.9°	42°29.9'	-32.4'	126.7°	41°53.8'	-33.3'	127.4°	41°17.0'	-34.2'	128.1°	40°39.7'	-35.1'	128.8°	40°01.9'	-36					

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

38° 322° LHA

Latitude CONTRARY to Declination

38° 322° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	51°27.3'	-12.4'	98.9°	51°17.5'	-14.0'	100.1°	51°06.4'	-15.6'	101.3°	50°54.0'	-17.1'	102.5°	50°40.3'	-18.6'	103.7°	50°25.5'	-20.1'	104.9°	50°09.5'	-21.6'	106.1°	0
1	51°15.0'	-13.6'	100.4°	51°03.5'	-15.2'	101.7°	50°50.8'	-16.7'	102.9°	50°36.8'	-18.3'	104.0°	50°21.7'	-19.8'	105.2°	50°05.4'	-21.2'	106.4°	49°47.9'	-22.7'	107.5°	1
2	51°01.4'	-14.8'	102.0°	50°48.4'	-16.4'	103.2°	50°34.1'	-17.9'	104.4°	50°18.6'	-19.4'	105.5°	50°01.9'	-20.9'	106.7°	49°44.1'	-22.3'	107.8°	49°25.2'	-23.7'	108.9°	2
3	50°46.6'	-16.0'	103.5°	50°32.0'	-17.6'	104.7°	50°16.1'	-19.1'	105.9°	49°59.2'	-20.5'	107.0°	49°41.0'	-22.0'	108.1°	49°21.8'	-23.4'	109.3°	49°01.5'	-24.7'	110.3°	3
4	50°30.6'	-17.2'	105.0°	50°14.4'	-18.7'	106.2°	49°57.1'	-20.2'	107.3°	49°38.6'	-21.6'	108.5°	49°19.1'	-23.0'	109.6°	48°58.4'	-24.4'	110.7°	48°36.7'	-25.7'	111.7°	4
5	50°13.4'	-18.3'	106.5°	49°55.7'	-19.8'	107.7°	49°36.9'	-21.3'	108.8°	49°17.0'	-22.7'	109.9°	48°56.1'	-24.0'	111.0°	48°34.1'	-25.4'	112.1°	48°11.0'	-26.7'	113.1°	5
6	49°55.0'	-19.5'	108.0°	49°35.9'	-20.9'	109.1°	49°15.7'	-22.3'	110.2°	48°54.4'	-23.7'	111.3°	48°32.0'	-25.0'	112.4°	48°08.7'	-26.3'	113.4°	47°44.4'	-27.6'	114.4°	6
7	49°35.6'	-20.6'	109.5°	49°15.0'	-22.0'	110.6°	48°53.4'	-23.3'	111.7°	48°30.7'	-24.7'	112.7°	48°07.0'	-26.0'	113.7°	47°42.4'	-27.2'	114.8°	47°16.8'	-28.5'	115.7°	7
8	49°15.0'	-21.6'	110.9°	48°53.0'	-23.0'	112.0°	48°30.0'	-24.3'	113.1°	48°06.0'	-25.6'	114.1°	47°41.1'	-26.9'	115.1°	47°15.2'	-28.1'	116.1°	46°48.3'	-29.3'	117.0°	8
9	48°53.4'	-22.7'	112.4°	48°30.0'	-24.0'	113.4°	48°05.7'	-25.3'	114.4°	47°40.4'	-26.6'	115.4°	47°14.2'	-27.8'	116.4°	46°47.0'	-29.0'	117.4°	46°19.0'	-30.1'	118.3°	9
10	48°30.7'	-23.7'	113.8°	48°06.0'	-25.0'	114.8°	47°40.4'	-26.2'	115.8°	47°13.9'	-27.5'	116.8°	46°46.4'	-28.7'	117.7°	46°18.1'	-29.8'	118.6°	45°48.9'	-30.9'	119.6°	10
11	48°07.0'	-24.6'	115.1°	47°41.1'	-25.9'	116.1°	47°14.2'	-27.1'	117.1°	46°46.4'	-28.3'	118.1°	46°17.7'	-29.5'	119.0°	45°48.2'	-30.6'	119.9°	45°17.9'	-31.7'	120.8°	11
12	47°42.4'	-25.6'	116.5°	47°15.2'	-26.8'	117.5°	46°47.0'	-28.0'	118.4°	46°18.1'	-29.2'	119.3°	45°48.2'	-30.3'	120.2°	45°17.6'	-31.4'	121.1°	44°46.2'	-32.5'	122.0°	12
13	47°16.8'	-26.5'	117.8°	46°48.3'	-27.7'	118.8°	46°19.0'	-28.9'	119.7°	45°48.9'	-30.0'	120.6°	45°17.9'	-31.1'	121.5°	44°46.2'	-32.1'	122.3°	44°13.8'	-33.2'	123.2°	13
14	46°50.3'	-27.4'	119.2°	46°20.6'	-28.6'	120.1°	45°50.1'	-29.7'	121.0°	45°18.9'	-30.8'	121.8°	44°46.8'	-31.8'	122.7°	44°14.1'	-32.9'	123.5°	43°40.6'	-33.9'	124.3°	14
15	46°22.9'	-28.3'	120.5°	45°52.1'	-29.4'	121.3°	45°20.4'	-30.5'	122.2°	44°48.1'	-31.5'	123.1°	44°15.0'	-32.6'	123.9°	43°41.2'	-33.6'	124.7°	43°06.7'	-34.5'	125.5°	15
16	45°54.6'	-29.1'	121.7°	45°22.7'	-30.2'	122.6°	44°50.0'	-31.3'	123.4°	44°16.5'	-32.3'	124.3°	43°42.4'	-33.3'	125.0°	43°07.6'	-34.2'	125.8°	42°32.2'	-35.2'	126.6°	16
17	45°25.5'	-29.9'	123.0°	44°52.5'	-31.0'	123.8°	44°18.7'	-32.0'	124.6°	43°44.3'	-33.0'	125.4°	43°09.2'	-33.9'	126.2°	42°33.4'	-34.9'	126.9°	41°57.1'	-35.8'	127.7°	17
18	44°55.6'	-30.7'	124.2°	44°21.5'	-31.7'	125.0°	43°46.7'	-32.7'	125.8°	43°11.3'	-33.7'	126.6°	42°35.2'	-34.6'	127.3°	41°58.6'	-35.5'	128.0°	41°21.3'	-36.4'	128.7°	18
19	44°24.9'	-31.4'	125.4°	43°49.8'	-32.4'	126.2°	43°14.0'	-33.4'	127.0°	42°37.6'	-34.3'	127.7°	42°00.6'	-35.2'	128.4°	41°23.1'	-36.1'	129.1°	40°44.9'	-36.9'	129.8°	19
20	43°53.5'	-32.2'	126.6°	43°17.4'	-33.1'	127.4°	42°40.6'	-34.0'	128.1°	42°03.3'	-34.9'	128.8°	41°25.4'	-35.8'	129.5°	40°47.0'	-36.7'	130.2°	40°08.0'	-37.5'	130.8°	20
21	43°21.3'	-32.9'	127.8°	42°44.2'	-33.8'	128.5°	42°06.6'	-34.7'	129.2°	41°28.4'	-35.6'	129.9°	40°49.6'	-36.4'	130.6°	40°10.3'	-37.2'	131.2°	39°30.5'	-38.0'	131.8°	21
22	42°48.4'	-33.5'	128.9°	42°10.4'	-34.4'	129.6°	41°31.9'	-35.3'	130.3°	40°52.8'	-36.1'	131.0°	40°13.2'	-36.9'	131.6°	39°33.1'	-37.7'	132.2°	38°52.6'	-38.5'	132.8°	22
23	42°14.9'	-34.2'	130.0°	41°36.0'	-35.0'	130.7°	40°56.6'	-35.9'	131.4°	40°16.7'	-36.7'	132.0°	39°36.3'	-37.5'	132.6°	38°55.4'	-38.2'	133.2°	38°14.1'	-39.0'	133.8°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	7			8			9			10			11			12			13			

38° 322° LHA

Latitude CONTRARY to DECLINATION

38° 322° LHA

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

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

37° 323° LHA

Latitude CONTRARY to Declination

37° 323° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	52°26.2'	-12.6'	99.2°	52°16.0'	-14.3'	100.5°	52°04.4'	-15.9'	101.7°	51°51.6'	-17.5'	103.0°	51°37.5'	-19.0'	104.2°	51°22.1'	-20.6'	105.4°	51°05.6'	-22.1'	106.6°	0
1	52°13.5'	-13.9'	100.8°	52°01.7'	-15.5'	102.0°	51°48.5'	-17.1'	103.3°	51°34.1'	-18.7'	104.5°	51°18.5'	-20.2'	105.7°	51°01.6'	-21.7'	106.9°	50°43.5'	-23.1'	108.1°	1
2	51°59.6'	-15.2'	102.4°	51°46.2'	-16.8'	103.6°	51°31.4'	-18.3'	104.8°	51°15.4'	-19.8'	106.0°	50°58.3'	-21.3'	107.2°	50°39.9'	-22.8'	108.4°	50°20.4'	-24.2'	109.5°	2
3	51°44.5'	-16.4'	103.9°	51°29.4'	-18.0'	105.2°	51°13.1'	-19.5'	106.4°	50°55.6'	-21.0'	107.5°	50°36.9'	-22.4'	108.7°	50°17.1'	-23.9'	109.9°	49°56.2'	-25.2'	111.0°	3
4	51°28.0'	-17.6'	105.5°	51°11.4'	-19.2'	106.7°	50°53.6'	-20.6'	107.9°	50°34.6'	-22.1'	109.0°	50°14.5'	-23.5'	110.2°	49°53.2'	-24.9'	111.3°	49°30.9'	-26.2'	112.4°	4
5	51°10.4'	-18.8'	107.0°	50°52.2'	-20.3'	108.2°	50°32.9'	-21.8'	109.4°	50°12.5'	-23.2'	110.5°	49°50.9'	-24.6'	111.6°	49°28.3'	-25.9'	112.7°	49°04.7'	-27.2'	113.8°	5
6	50°51.6'	-20.0'	108.5°	50°31.9'	-21.4'	109.7°	50°11.2'	-22.8'	110.8°	49°49.3'	-24.2'	111.9°	49°26.4'	-25.6'	113.0°	49°02.4'	-26.9'	114.1°	48°37.4'	-28.2'	115.1°	6
7	50°31.6'	-21.1'	110.0°	50°10.5'	-22.5'	111.1°	49°48.3'	-23.9'	112.2°	49°25.1'	-25.2'	113.3°	49°00.8'	-26.5'	114.4°	48°35.5'	-27.8'	115.4°	48°09.3'	-29.1'	116.4°	7
8	50°10.5'	-22.2'	111.5°	49°48.0'	-23.6'	112.6°	49°24.4'	-24.9'	113.7°	48°59.9'	-26.2'	114.7°	48°34.3'	-27.5'	115.8°	48°07.7'	-28.7'	116.8°	47°40.2'	-29.9'	117.7°	8
9	49°48.3'	-23.2'	112.9°	49°24.4'	-24.6'	114.0°	48°59.5'	-25.9'	115.1°	48°33.6'	-27.2'	116.1°	48°06.8'	-28.4'	117.1°	47°39.0'	-29.6'	118.1°	47°10.3'	-30.8'	119.0°	9
10	49°25.1'	-24.3'	114.3°	48°59.9'	-25.6'	115.4°	48°33.6'	-26.9'	116.4°	48°06.5'	-28.1'	117.4°	47°38.4'	-29.3'	118.4°	47°09.4'	-30.5'	119.4°	46°39.5'	-31.6'	120.3°	10
11	49°00.8'	-25.3'	115.7°	48°34.3'	-26.5'	116.8°	48°06.8'	-27.8'	117.8°	47°38.4'	-29.0'	118.7°	47°09.1'	-30.1'	119.7°	46°38.9'	-31.3'	120.6°	46°08.0'	-32.4'	121.5°	11
12	48°35.5'	-26.2'	117.1°	48°07.7'	-27.5'	118.1°	47°39.0'	-28.7'	119.1°	47°09.4'	-29.8'	120.0°	46°38.9'	-31.0'	121.0°	46°07.7'	-32.1'	121.9°	45°35.6'	-33.1'	122.7°	12
13	48°09.3'	-27.2'	118.5°	47°40.2'	-28.4'	119.4°	47°10.3'	-29.5'	120.4°	46°39.5'	-30.7'	121.3°	46°08.0'	-31.8'	122.2°	45°35.6'	-32.8'	123.1°	45°02.5'	-33.8'	123.9°	13
14	47°42.1'	-28.1'	119.8°	47°11.9'	-29.2'	120.8°	46°40.8'	-30.4'	121.7°	46°08.9'	-31.5'	122.6°	45°36.2'	-32.5'	123.4°	45°02.8'	-33.5'	124.3°	44°28.7'	-34.5'	125.1°	14
15	47°14.0'	-29.0'	121.1°	46°42.6'	-30.1'	122.0°	46°10.4'	-31.2'	122.9°	45°37.4'	-32.2'	123.8°	45°03.7'	-33.3'	124.6°	44°29.3'	-34.2'	125.4°	43°54.1'	-35.2'	126.2°	15
16	46°45.1'	-29.8'	122.4°	46°12.5'	-30.9'	123.3°	45°39.2'	-32.0'	124.1°	45°05.2'	-33.0'	125.0°	44°30.4'	-34.0'	125.8°	43°55.0'	-34.9'	126.6°	43°18.9'	-35.8'	127.3°	16
17	46°15.3'	-30.6'	123.7°	45°41.6'	-31.7'	124.5°	45°07.3'	-32.7'	125.4°	44°32.2'	-33.7'	126.2°	43°56.5'	-34.6'	126.9°	43°20.1'	-35.6'	127.7°	42°43.1'	-36.5'	128.4°	17
18	45°44.6'	-31.4'	124.9°	45°09.9'	-32.4'	125.7°	44°34.6'	-33.4'	126.5°	43°58.5'	-34.4'	127.3°	43°21.8'	-35.3'	128.1°	42°44.5'	-36.2'	128.8°	42°06.6'	-37.0'	129.5°	18
19	45°13.2'	-32.2'	126.1°	44°37.5'	-33.2'	126.9°	44°01.1'	-34.1'	127.7°	43°24.1'	-35.0'	128.4°	42°46.5'	-35.9'	129.2°	42°08.4'	-36.8'	129.9°	41°29.6'	-37.6'	130.6°	19
20	44°41.0'	-32.9'	127.3°	44°04.4'	-33.9'	128.1°	43°27.0'	-34.8'	128.8°	42°49.1'	-35.7'	129.6°	42°10.6									

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

36° 324° LHA

Latitude CONTRARY to Declination

36° 324° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	53°24.9'	-12.9'	99.5°	53°14.4'	-14.6'	100.8°	53°02.4'	-16.3'	102.2°	52°49.1'	-17.9'	103.4°	52°34.5'	-19.5'	104.7°	52°18.6'	-21.0'	106.0°	52°01.5'	-22.5'	107.2°	0
1	53°12.0'	-14.3'	101.2°	52°59.8'	-15.9'	102.5°	52°46.2'	-17.5'	103.7°	52°31.2'	-19.1'	105.0°	52°15.1'	-20.7'	106.3°	51°57.6'	-22.2'	107.5°	51°39.0'	-23.6'	108.7°	1
2	52°57.7'	-15.6'	102.8°	52°43.8'	-17.2'	104.1°	52°28.6'	-18.8'	105.3°	52°12.1'	-20.3'	106.6°	51°54.4'	-21.8'	107.8°	51°35.5'	-23.3'	109.0°	51°15.4'	-24.7'	110.2°	2
3	52°42.2'	-16.8'	104.4°	52°26.7'	-18.4'	105.6°	52°09.9'	-20.0'	106.9°	51°51.8'	-21.5'	108.1°	51°32.6'	-23.0'	109.3°	51°12.2'	-24.4'	110.5°	50°50.6'	-25.8'	111.6°	3
4	52°25.4'	-18.1'	106.0°	52°08.2'	-19.6'	107.2°	51°49.9'	-21.1'	108.4°	51°30.4'	-22.6'	109.6°	51°09.6'	-24.1'	110.8°	50°47.8'	-25.5'	111.9°	50°24.8'	-26.8'	113.1°	4
5	52°07.3'	-19.3'	107.5°	51°48.6'	-20.8'	108.7°	51°28.8'	-22.3'	109.9°	51°07.7'	-23.7'	111.1°	50°45.6'	-25.1'	112.2°	50°22.3'	-26.5'	113.4°	49°58.0'	-27.8'	114.4°	5
6	51°48.0'	-20.5'	109.0°	51°27.8'	-22.0'	110.2°	51°06.5'	-23.4'	111.4°	50°44.0'	-24.8'	112.5°	50°20.5'	-26.2'	113.7°	49°55.9'	-27.5'	114.8°	49°30.2'	-28.8'	115.8°	6
7	51°27.5'	-21.6'	110.6°	51°05.8'	-23.1'	111.7°	50°43.1'	-24.5'	112.9°	50°19.2'	-25.8'	114.0°	49°54.3'	-27.2'	115.1°	49°28.4'	-28.4'	116.1°	49°01.5'	-29.7'	117.2°	7
8	51°05.8'	-22.8'	112.1°	50°42.7'	-24.2'	113.2°	50°18.6'	-25.5'	114.3°	49°53.4'	-26.8'	115.4°	49°27.2'	-28.1'	116.4°	48°60.0'	-29.4'	117.5°	48°31.8'	-30.6'	118.5°	8
9	50°43.1'	-23.8'	113.5°	50°18.6'	-25.2'	114.6°	49°53.1'	-26.5'	115.7°	49°26.5'	-27.8'	116.8°	48°59.0'	-29.0'	117.8°	48°30.6'	-30.3'	118.8°	48°01.2'	-31.4'	119.8°	9
10	50°19.2'	-24.9'	115.0°	49°53.4'	-26.2'	116.0°	49°26.5'	-27.5'	117.1°	48°58.7'	-28.7'	118.1°	48°30.0'	-29.9'	119.1°	48°00.3'	-31.1'	120.1°	47°29.8'	-32.2'	121.0°	10
11	49°54.3'	-25.9'	116.4°	49°27.2'	-27.2'	117.4°	48°59.0'	-28.4'	118.5°	48°30.0'	-29.6'	119.5°	48°00.0'	-30.8'	120.4°	47°29.2'	-31.9'	121.4°	46°57.6'	-33.0'	122.3°	11
12	49°28.4'	-26.9'	117.8°	48°60.0'	-28.2'	118.8°	48°30.6'	-29.4'	119.8°	48°00.3'	-30.5'	120.8°	47°29.2'	-31.6'	121.7°	46°57.3'	-32.7'	122.6°	46°24.6'	-33.8'	123.5°	12
13	49°01.5'	-27.9'	119.1°	48°31.8'	-29.1'	120.1°	48°01.2'	-30.2'	121.1°	47°29.8'	-31.4'	122.0°	46°57.6'	-32.4'	123.0°	46°24.6'	-33.5'	123.8°	45°50.8'	-34.5'	124.7°	13
14	48°33.6'	-28.8'	120.5°	48°02.7'	-30.0'	121.5°	47°31.0'	-31.1'	122.4°	46°58.5'	-32.2'	123.3°	46°25.1'	-33.2'	124.2°	45°51.1'	-34.2'	125.0°	45°16.3'	-35.2'	125.9°	14
15	48°04.8'	-29.7'	121.8°	47°32.8'	-30.8'	122.7°	46°59.9'	-31.9'	123.6°	46°26.3'	-32.9'	124.5°	45°51.9'	-34.0'	125.4°	45°16.8'	-34.9'	126.2°	44°41.1'	-35.9'	127.0°	15
16	47°35.2'	-30.5'	123.1°	47°02.0'	-31.6'	124.0°	46°28.0'	-32.7'	124.9°	45°53.4'	-33.7'	125.7°	45°18.0'	-34.7'	126.6°	44°41.9'	-35.6'	127.4°	44°05.2'	-36.5'	128.1°	16
17	47°04.6'	-31.4'	124.4°	46°30.4'	-32.4'	125.2°	45°55.4'	-33.4'	126.1°	45°19.7'	-34.4'	126.9°	44°43.3'	-35.4'	127.7°	44°06.3'	-36.3'	128.5°	43°28.6'	-37.1'	129.2°	17
18	46°33.3'	-32.2'	125.6°	45°58.0'	-33.2'	126.5°	45°21.9'	-34.2'	127.3°	44°45.3'	-35.1'	128.1°	44°08.0'	-36.0'	128.8°	43°30.0'	-36.9'	129.6°	42°51.5'	-37.7'	130.3°	18
19	46°01.1'	-32.9'	126.8°	45°24.8'	-33.9'	127.7°	44°47.8'	-34.8'	128.4°	44°10.2'	-35.8'	129.2°	43°31.9'	-36.6'	130.0°	42°53.1'	-37.5'	130.7°	42°13.8'	-38.3'	131.4°	19
20	45°28.2'	-33.7'	128.0°	44°50.9'	-34.6'	128.8°	44°13.0'	-35.5'	129.6°	43°34.4'	-36.4'	130.3°	42°55.3'	-37.2'	131.0°	42°15.6'	-38.1'	131.7°	41°35.4'	-38.9'	132.4°	20
21	44°54.5'	-34.4'	129.2°	44°16.3'	-35.3'	130.0°	43°37.4'	-36.2'	130.7°	42°58.0'	-37.0'	131.4°	42°18.1'	-37.8'	132.1°	41°37.6'	-38.6'	132.8°	40°56.6'	-39.4'	133.4°	21
22	44°20.2'	-35.0'	130.4°	43°41.0'	-35.9'	131.1°	43°01.3'	-36.8'	131.8°	42°21.0'	-37.6'	132.5°	41°40.2'	-38.4'	133.1°	40°59.0'	-39.1'	133.8°	40°17.2'	-39.9'	134.4°	22
23	43°45.1'	-35.7'	131.5°	43°05.1'	-36.5'	132.2°	42°24.5'	-37.4'	132.9°	41°43.4'	-38.2'	133.5°	41°01.9'	-38.9'	134.2°	40°19.8'	-39.6'	134.8°	39°37.3'	-40.4'	135.4°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	7			8			9			10			11			12			13			

36° 324° LHA

Latitude CONTRARY to DECLINATION

36° 324° LHA

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

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

35° 325° LHA

Latitude CONTRARY to Declination

35° 325° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	54°23.6'	-13.3'	99.9°	54°12.7'	-15.0'	101.2°	54°00.3'	-16.6'	102.6°	53°46.5'	-18.3'	103.9°	53°31.4'	-19.9'	105.2°	53°15.0'	-21.5'	106.5°	52°57.3'	-23.0'	107.8°	0
1	54°10.4'	-14.6'	101.5°	53°57.7'	-16.3'	102.9°	53°43.7'	-17.9'	104.2°	53°28.2'	-19.6'	105.5°	53°11.5'	-21.1'	106.8°	52°53.5'	-22.7'	108.1°	52°34.3'	-24.2'	109.3°	1
2	53°55.7'	-16.0'	103.2°	53°41.4'	-17.6'	104.5°	53°25.7'	-19.2'	105.8°	53°08.7'	-20.8'	107.1°	52°50.4'	-22.3'	108.4°	52°30.9'	-23.8'	109.6°	52°10.1'	-25.3'	110.8°	2
3	53°39.8'	-17.3'	104.8°	53°23.8'	-18.9'	106.1°	53°06.5'	-20.5'	107.4°	52°47.9'	-22.0'	108.7°	52°28.1'	-23.5'	109.9°	52°07.1'	-24.9'	111.1°	51°44.9'	-26.4'	112.3°	3
4	53°22.5'	-18.6'	106.4°	53°04.9'	-20.1'	107.7°	52°46.0'	-21.7'	109.0°	52°25.9'	-23.2'	110.2°	52°04.6'	-24.6'	111.4°	51°42.1'	-26.0'	112.6°	51°18.5'	-27.4'	113.8°	4
5	53°04.0'	-19.8'	108.0°	52°44.8'	-21.3'	109.3°	52°24.4'	-22.8'	110.5°	52°02.8'	-24.3'	111.7°	51°40.0'	-25.7'	112.9°	51°16.1'	-27.1'	114.0°	50°51.1'	-28.4'	115.2°	5
6	52°44.2'	-21.0'	109.6°	52°23.4'	-22.5'	110.8°	52°01.5'	-24.0'	112.0°	51°38.5'	-25.4'	113.2°	51°14.3'	-26.8'	114.3°	50°49.0'	-28.1'	115.5°	50°22.7'	-29.4'	116.6°	6
7	52°23.1'	-22.2'	111.1°	52°00.9'	-23.7'	112.3°	51°37.5'	-25.1'	113.5°	51°13.1'	-26.5'	114.6°	50°47.5'	-27.8'	115.8°	50°20.9'	-29.1'	116.9°	49°53.3'	-30.3'	117.9°	7
8	52°00.9'	-23.4'	112.6°	51°37.2'	-24.8'	113.8°	51°12.5'	-26.1'	115.0°	50°46.6'	-27.5'	116.1°	50°19.7'	-28.8'	117.2°	49°51.8'	-30.0'	118.2°	49°23.0'	-31.2'	119.2°	8
9	51°37.5'	-24.5'	114.1°	51°12.5'	-25.8'	115.3°	50°46.3'	-27.2'	116.4°	50°19.1'	-28.5'	117.5°	49°51.0'	-29.7'	118.5°	49°21.8'	-30.9'	119.6°	48°51.8'	-32.1'	120.6°	9
10	51°13.1'	-25.6'	115.6°	50°46.6'	-26.9'	116.7°	50°19.1'	-28.2'	117.8°	49°50.7'	-29.4'	118.8°	49°21.3'	-30.6'	119.9°	48°50.9'	-31.8'	120.9°	48°19.7'	-32.9'	121.8°	10
11	50°47.5'	-26.6'	117.0°	50°19.7'	-27.9'	118.1°	49°51.0'	-29.1'	119.2°	49°21.3'	-30.3'	120.2°	48°50.6'	-31.5'	121.2°	48°19.1'	-32.6'	122.1°	47°46.8'	-33.7'	123.1°	11
12	50°20.9'	-27.6'	118.5°	49°51.8'	-28.8'	119.5°	49°21.8'	-30.1'	120.5°	48°50.9'	-31.2'	121.5°	48°19.1'	-32.3'	122.5°	47°46.5'	-33.4'	123.4°	47°13.1'	-34.5'	124.3°	12
13	49°53.3'	-28.6'	119.8°	49°23.0'	-29.8'	120.9°	48°51.8'	-30.9'	121.8°	48°19.7'	-32.1'	122.8°	47°46.8'	-33.2'	123.7°	47°13.1'	-34.2'	124.6°	46°38.6'	-35.2'	125.5°	13
14	49°24.7'	-29.5'	121.2°	48°53.2'	-30.7'	122.2°	48°20.8'	-31.8'	123.1°	47°47.6'	-32.9'	124.1°	47°13.6'	-33.9'	125.0°	46°38.9'	-34.9'	125.8°	46°03.4'	-35.9'	126.7°	14
15	48°55.2'	-30.4'	122.5°	48°22.6'	-31.5'	123.5°	47°49.1'	-32.6'	124.4°	47°14.8'	-33.7'	125.3°	46°39.7'	-34.7'	126.2°	46°04.0'	-35.7'	127.0°	45°27.5'	-36.6'	127.8°	15
16	48°24.8'	-31.3'	123.8°	47°51.0'	-32.4'	124.8°	47°16.4'	-33.4'	125.6°	46°41.1'	-34.4'	126.5°	46°05.0'	-35.4'	127.4°	45°28.3'	-36.3'	128.2°	44°50.9'	-37.2'	129.0°	16
17	47°53.6'	-32.1'	125.1°	47°18.7'	-33.2'	126.0°	46°43.0'	-34.2'	126.9°	46°06.7'	-35.1'	127.7°	45°29.7'	-36.1'	128.5°	44°52.0'	-37.0'	129.3°	44°13.7'	-37.9'	130.1°	17
18	47°21.4'	-32.9'	126.4°	46°45.5'	-33.9'	127.2°	46°08.9'	-34.9'	128.1°	45°31.5'	-35.8'	128.9°	44°53.6'	-36.7'	129.6°	44°15.0'	-37.6'	130.4°	43°35.8'	-38.5'	131.1°	18
19	46°48.5'	-33.7'	127.6°	46°11.6'	-34.7'	128.4°	45°34.0'	-35.6'	129.2°	44°55.7'	-36.5'	130.0°	44°16.8'	-37.4'	130.8°	43°37.4'	-38.2'	131.5°	42°57.4'	-39.0'	132.2°	19
20	46°14.8'	-34.4'	128.8°	45°36.9'	-35.4'	129.6°	44°58.4'	-36.3'	130.4°	44°19.2'	-37.1'	131.1°	43°39.5'	-38.0'	131.8°	42°59.2'						

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

34° 326° LHA

Latitude CONTRARY to Declination

34° 326° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	55°22.3'	-13.6'	100.2°	55°10.9'	-15.3'	101.7°	54°58.1'	-17.0'	103.1°	54°43.8'	-18.7'	104.4°	54°28.2'	-20.3'	105.8°	54°11.2'	-21.9'	107.1°	53°52.8'	-23.5'	108.4°	0
1	55°08.7'	-15.0'	102.0°	54°55.6'	-16.7'	103.3°	54°41.0'	-18.4'	104.7°	54°25.1'	-20.0'	106.1°	54°07.8'	-21.6'	107.4°	53°49.2'	-23.2'	108.7°	53°29.3'	-24.7'	110.0°	1
2	54°53.7'	-16.4'	103.6°	54°38.9'	-18.1'	105.0°	54°22.7'	-19.7'	106.4°	54°05.1'	-21.3'	107.7°	53°46.2'	-22.9'	109.0°	53°26.0'	-24.4'	110.3°	53°04.6'	-25.8'	111.5°	2
3	54°37.3'	-17.7'	105.3°	54°20.8'	-19.4'	106.7°	54°03.0'	-21.0'	108.0°	53°43.8'	-22.5'	109.3°	53°23.3'	-24.0'	110.6°	53°01.7'	-25.5'	111.8°	52°38.8'	-26.9'	113.0°	3
4	54°19.6'	-19.1'	107.0°	54°01.4'	-20.7'	108.3°	53°42.0'	-22.2'	109.6°	53°21.3'	-23.7'	110.8°	52°59.3'	-25.2'	112.1°	52°36.2'	-26.6'	113.3°	52°11.9'	-28.0'	114.5°	4
5	54°00.5'	-20.4'	108.6°	53°40.8'	-21.9'	109.9°	53°19.8'	-23.4'	111.1°	52°57.5'	-24.9'	112.4°	52°34.1'	-26.3'	113.6°	52°09.5'	-27.7'	114.8°	51°43.8'	-29.0'	115.9°	5
6	53°40.2'	-21.6'	110.2°	53°18.9'	-23.1'	111.4°	52°56.3'	-24.6'	112.7°	52°32.6'	-26.0'	113.9°	52°07.8'	-27.4'	115.1°	51°41.8'	-28.7'	116.2°	51°14.8'	-30.0'	117.3°	6
7	53°18.6'	-22.8'	111.7°	52°55.7'	-24.3'	113.0°	52°31.7'	-25.7'	114.2°	52°06.6'	-27.1'	115.3°	51°40.4'	-28.4'	116.5°	51°13.1'	-29.7'	117.6°	50°44.8'	-31.0'	118.7°	7
8	52°55.7'	-24.0'	113.3°	52°31.5'	-25.4'	114.5°	52°06.0'	-26.8'	115.6°	51°39.5'	-28.1'	116.8°	51°12.0'	-29.4'	117.9°	50°43.4'	-30.7'	119.0°	50°13.8'	-31.9'	120.0°	8
9	52°31.7'	-25.1'	114.8°	52°06.0'	-26.5'	116.0°	51°39.2'	-27.8'	117.1°	51°11.4'	-29.1'	118.2°	50°42.5'	-30.4'	119.3°	50°12.7'	-31.6'	120.3°	49°41.9'	-32.8'	121.4°	9
10	52°06.6'	-26.2'	116.3°	51°39.5'	-27.6'	117.4°	51°11.4'	-28.9'	118.5°	50°42.2'	-30.1'	119.6°	50°12.1'	-31.3'	120.6°	49°41.1'	-32.5'	121.7°	49°09.2'	-33.6'	122.6°	10
11	51°40.4'	-27.3'	117.7°	51°12.0'	-28.6'	118.8°	50°42.5'	-29.8'	119.9°	50°12.1'	-31.0'	121.0°	49°40.8'	-32.2'	122.0°	49°08.6'	-33.3'	123.0°	48°35.6'	-34.4'	123.9°	11
12	51°13.1'	-28.3'	119.2°	50°43.4'	-29.6'	120.2°	50°12.7'	-30.8'	121.3°	49°41.1'	-31.9'	122.3°	49°08.6'	-33.1'	123.3°	48°35.3'	-34.1'	124.2°	48°01.1'	-35.2'	125.1°	12
13	50°44.8'	-29.3'	120.6°	50°13.8'	-30.5'	121.6°	49°41.9'	-31.7'	122.6°	49°09.2'	-32.8'	123.6°	48°35.6'	-33.9'	124.5°	48°01.1'	-34.9'	125.5°	47°26.0'	-35.9'	126.3°	13
14	50°15.5'	-30.2'	121.9°	49°43.3'	-31.4'	122.9°	49°10.3'	-32.5'	123.9°	48°36.4'	-33.6'	124.9°	48°01.7'	-34.7'	125.8°	47°26.2'	-35.7'	126.7°	46°50.0'	-36.6'	127.5°	14
15	49°45.2'	-31.2'	123.3°	49°11.9'	-32.3'	124.2°	48°37.7'	-33.4'	125.2°	48°02.7'	-34.4'	126.1°	47°27.0'	-35.4'	127.0°	46°50.6'	-36.4'	127.8°	46°13.4'	-37.3'	128.7°	15
16	49°14.1'	-32.0'	124.6°	48°39.6'	-33.1'	125.5°	48°04.4'	-34.2'	126.4°	47°28.3'	-35.2'	127.3°	46°51.6'	-36.1'	128.2°	46°14.2'	-37.1'	129.0°	45°36.1'	-38.0'	129.8°	16
17	48°42.0'	-32.9'	125.9°	48°06.5'	-33.9'	126.8°	47°30.2'	-34.9'	127.7°	46°53.2'	-35.9'	128.5°	46°15.5'	-36.8'	129.3°	45°37.1'	-37.7'	130.1°	44°58.1'	-38.6'	130.9°	17
18	48°09.2'	-33.7'	127.1°	47°32.6'	-34.7'	128.0°	46°55.3'	-35.7'	128.9°	46°17.3'	-36.6'	129.7°	45°38.7'	-37.5'	130.5°	44°59.4'	-38.3'	131.2°	44°19.6'	-39.2'	132.0°	18
19	47°35.5'	-34.5'	128.4°	46°57.9'	-35.4'	129.2°	46°19.6'	-36.4'	130.0°	45°40.7'	-37.3'	130.8°	45°01.2'	-38.1'	131.6°	44°21.1'	-38.9'	132.3°	43°40.4'	-39.7'	133.0°	19
20	47°01.0'	-35.2'	129.6°	46°22.4'	-36.1'	130.4°	45°43.2'	-37.0'	131.2°	45°03.4'	-37.9'	131.9°	44°23.1'	-38.7'	132.7°	43°42.1'	-39.5'	133.4°	43°00.6'	-40.3'	134.1°	20
21	46°25.8'	-35.9'	130.8°	45°46.3'	-36.8'	131.5°	45°06.2'	-37.7'	132.3°	44°25.5'	-38.5'	133.0°	43°44.3'	-39.3'	133.7°	43°02.6'	-40.1'	134.4°	42°20.6'	-40.8'	135.1°	21
22	45°49.9'	-36.6'	131.9°	45°09.5'	-37.5'	132.7°	44°28.5'	-38.3'	133.4°	43°47.0'	-39.1'	134.1°	43°05.0'	-39.9'	134.8°	42°22.5'	-40.6'	135.4°	41°39.6'	-41.3'	136.1°	22
23	45°13.2'	-37.3'	133.0°	44°32.0'	-38.1'	133.8°	44°50.2'	-38.9'	134.5°	43°08.0'	-39.7'	135.1°	42°25.2'	-40.4'	135.8°	41°41.9'	-41.1'	136.4°	40°58.3'	-41.8'	137.0°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	7			8			9			10			11			12			13			

34° 326° LHA

Latitude CONTRARY to DECLINATION

34° 326° LHA

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

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

33° 327° LHA

Latitude CONTRARY to Declination

33° 327° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	56°20.8'	-13.9'	100.6°	56°09.1'	-15.7'	102.1°	55°55.7'	-17.5'	103.5°	55°41.0'	-19.2'	105.0°	55°24.8'	-20.8'	106.4°	55°07.2'	-22.5'	107.8°	54°48.2'	-24.0'	109.1°	0
1	56°06.9'	-15.4'	102.4°	55°53.3'	-17.1'	103.8°	55°38.3'	-18.9'	105.2°	55°21.8'	-20.5'	106.6°	55°03.9'	-22.1'	108.0°	54°44.7'	-23.7'	109.4°	54°24.1'	-25.3'	110.7°	1
2	55°51.5'	-16.8'	104.1°	55°36.2'	-18.5'	105.5°	55°19.4'	-20.2'	106.9°	55°01.3'	-21.8'	108.3°	54°41.8'	-23.4'	109.6°	54°21.0'	-24.9'	111.0°	53°58.9'	-26.4'	112.2°	2
3	55°34.7'	-18.2'	105.8°	55°17.7'	-19.9'	107.2°	54°59.2'	-21.5'	108.6°	54°39.5'	-23.1'	109.9°	54°18.4'	-24.6'	111.2°	53°56.0'	-26.1'	112.5°	53°32.5'	-27.6'	113.8°	3
4	55°16.5'	-19.6'	107.5°	54°57.8'	-21.2'	108.9°	54°37.7'	-22.8'	110.2°	54°16.4'	-24.3'	111.5°	53°53.7'	-25.8'	112.8°	53°29.9'	-27.3'	114.0°	53°04.9'	-28.6'	115.2°	4
5	54°56.9'	-20.9'	109.1°	54°36.5'	-22.5'	110.5°	54°14.9'	-24.0'	111.8°	53°52.9'	-25.5'	113.1°	53°27.9'	-27.0'	114.3°	53°02.7'	-28.3'	115.5°	52°36.3'	-29.7'	116.7°	5
6	54°36.0'	-22.2'	110.8°	54°14.0'	-23.7'	112.1°	53°50.9'	-25.2'	113.3°	53°26.5'	-26.7'	114.6°	53°01.0'	-28.1'	115.8°	52°34.3'	-29.4'	117.0°	52°06.6'	-30.7'	118.1°	6
7	54°13.8'	-23.4'	112.4°	53°50.3'	-24.9'	113.6°	53°25.7'	-26.4'	114.9°	52°59.9'	-27.8'	116.1°	52°32.9'	-29.1'	117.3°	52°04.9'	-30.4'	118.4°	51°35.9'	-31.7'	119.5°	7
8	53°50.3'	-24.6'	113.9°	53°25.4'	-26.1'	115.2°	52°59.3'	-27.5'	116.4°	52°32.1'	-28.8'	117.5°	52°03.8'	-30.1'	118.7°	51°34.5'	-31.4'	119.8°	51°04.2'	-32.6'	120.9°	8
9	53°25.7'	-25.8'	115.5°	52°59.3'	-27.2'	116.7°	52°31.8'	-28.5'	117.8°	52°03.3'	-29.8'	119.0°	51°33.7'	-31.1'	120.1°	51°03.1'	-32.3'	121.2°	50°31.6'	-33.5'	122.2°	9
10	52°59.9'	-26.9'	117.0°	52°32.1'	-28.3'	118.1°	52°03.3'	-29.6'	119.3°	51°33.4'	-30.8'	120.4°	51°02.6'	-32.0'	121.5°	50°30.8'	-33.2'	122.5°	49°58.2'	-34.3'	123.5°	10
11	52°32.9'	-28.0'	118.5°	52°03.8'	-29.3'	119.6°	51°33.7'	-30.6'	120.7°	51°02.6'	-31.8'	121.8°	50°30.6'	-32.9'	122.8°	49°57.6'	-34.1'	123.8°	49°23.8'	-35.1'	124.8°	11
12	52°04.9'	-29.0'	119.9°	51°34.5'	-30.3'	121.0°	51°03.1'	-31.5'	122.1°	50°30.8'	-32.7'	123.1°	49°57.6'	-33.8'	124.1°	49°23.6'	-34.9'	125.1°	48°48.7'	-35.9'	126.0°	12
13	51°35.9'	-30.1'	121.3°	51°04.2'	-31.3'	122.4°	50°31.6'	-32.4'	123.4°	49°58.2'	-33.5'	124.4°	49°23.8'	-34.6'	125.4°	48°48.7'	-35.7'	126.3°	48°12.8'	-36.7'	127.2°	13
14	51°05.8'	-31.0'	122.7°	50°32.9'	-32.2'	123.7°	49°59.2'	-33.3'	124.7°	49°24.6'	-34.4'	125.7°	48°49.2'	-35.4'	126.6°	48°13.0'	-36.4'	127.5°	47°36.1'	-37.4'	128.4°	14
15	50°34.8'	-31.9'	124.1°	50°00.8'	-33.1'	125.0°	49°25.9'	-34.1'	126.0°	48°50.2'	-35.2'	126.9°	48°13.8'	-36.2'	127.8°	47°36.6'	-37.1'	128.7°	46°58.8'	-38.0'	129.5°	15
16	50°02.9'	-32.8'	125.4°	49°27.7'	-33.9'	126.3°	48°51.8'	-34.9'	127.3°	48°15.1'	-35.9'	128.2°	47°37.6'	-36.9'	129.0°	46°59.5'	-37.8'	129.9°	46°20.7'	-38.7'	130.7°	16
17	49°30.0'	-33.7'	126.7°	48°53.8'	-34.7'	127.6°	48°16.8'	-35.7'	128.5°	47°39.1'	-36.7'	129.4°	47°00.7'	-37.6'	130.2°	46°21.7'	-38.5'	131.0°	45°42.0'	-39.3'	131.8°	17
18	48°56.4'	-34.5'	127.9°	48°19.1'	-35.5'	128.8°	47°41.1'	-36.4'	129.7°	47°02.5'	-37.4'	130.5°	46°23.2'	-38.2'	131.3°	45°43.2'	-39.1'	132.1°	45°02.7'	-39.9'	132.9°	18
19	48°21.9'	-35.3'	129.2°	47°43.6'	-36.2'	130.0°	47°04.7'	-37.1'	130.9°	46°25.1'	-38.0'	131.7°	45°44.9'	-38.9'	132.4°	45°04.2'	-39.7'	133.2°	44°22.8'	-40.5'	133.9°	19
20	47°46.6'	-36.0'	130.4°	47°07.4'	-36.9'	131.2°	46°27.6'	-37.8'	132.0°	45°47.1'	-38.7'	132.8°	45°06.1'	-39.5'	133.5°							

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

32° 328° LHA

Latitude CONTRARY to Declination

32° 328° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	57°19.3'	-14.3'	101.0°	57°07.1'	-16.1'	102.6°	56°53.3'	-17.9'	104.1°	56°38.0'	-19.7'	105.5°	56°21.2'	-21.3'	107.0°	56°02.9'	-23.0'	108.4°	55°43.3'	-24.6'	109.8°	0
1	57°05.0'	-15.8'	102.8°	56°51.0'	-17.6'	104.3°	56°35.4'	-19.3'	105.8°	56°18.3'	-21.0'	107.2°	55°59.8'	-22.7'	108.7°	55°39.9'	-24.3'	110.0°	55°18.7'	-25.8'	111.4°	1
2	56°49.2'	-17.3'	104.6°	56°33.4'	-19.0'	106.1°	56°16.0'	-20.7'	107.5°	55°57.3'	-22.4'	108.9°	55°37.1'	-24.0'	110.3°	55°15.7'	-25.5'	111.7°	54°52.9'	-27.0'	113.0°	2
3	56°31.9'	-18.7'	106.3°	56°14.3'	-20.4'	107.8°	55°55.3'	-22.1'	109.2°	55°34.9'	-23.7'	110.6°	55°13.1'	-25.2'	111.9°	54°50.1'	-26.7'	113.2°	54°25.8'	-28.2'	114.5°	3
4	56°13.2'	-20.1'	108.1°	55°53.9'	-21.8'	109.5°	55°33.2'	-23.4'	110.8°	55°11.2'	-24.9'	112.2°	54°47.9'	-26.5'	113.5°	54°23.4'	-27.9'	114.8°	53°57.6'	-29.3'	116.0°	4
5	55°53.0'	-21.5'	109.7°	55°32.1'	-23.1'	111.1°	55°09.8'	-24.7'	112.5°	54°46.3'	-26.2'	113.8°	54°21.5'	-27.6'	115.1°	53°55.5'	-29.0'	116.3°	53°28.3'	-30.4'	117.5°	5
6	55°31.5'	-22.8'	111.4°	55°09.0'	-24.4'	112.7°	54°45.2'	-25.9'	114.0°	54°20.1'	-27.3'	115.3°	53°53.8'	-28.7'	116.6°	53°26.4'	-30.1'	117.8°	52°57.9'	-31.4'	119.0°	6
7	55°08.7'	-24.1'	113.0°	54°44.6'	-25.6'	114.3°	54°19.3'	-27.1'	115.6°	53°52.8'	-28.5'	116.8°	53°25.1'	-29.8'	118.0°	52°56.3'	-31.1'	119.2°	52°26.5'	-32.4'	120.4°	7
8	54°44.6'	-25.3'	114.6°	54°19.0'	-26.8'	115.9°	53°52.2'	-28.2'	117.1°	53°24.3'	-29.5'	118.3°	52°55.3'	-30.8'	119.5°	52°25.2'	-32.1'	120.6°	51°54.2'	-33.3'	121.7°	8
9	54°19.3'	-26.5'	116.2°	53°52.2'	-27.9'	117.4°	53°24.0'	-29.3'	118.6°	52°54.8'	-30.6'	119.8°	52°24.4'	-31.8'	120.9°	51°53.1'	-33.0'	122.0°	51°20.9'	-34.2'	123.1°	9
10	53°52.8'	-27.7'	117.7°	53°24.3'	-29.0'	118.9°	52°54.8'	-30.3'	120.1°	52°24.2'	-31.6'	121.2°	51°52.6'	-32.8'	122.3°	51°20.1'	-33.9'	123.4°	50°46.7'	-35.1'	124.4°	10
11	53°25.1'	-28.8'	119.2°	52°55.3'	-30.1'	120.4°	52°24.4'	-31.3'	121.5°	51°52.6'	-32.5'	122.6°	51°19.8'	-33.7'	123.6°	50°46.1'	-34.8'	124.7°	50°11.6'	-35.9'	125.7°	11
12	52°56.3'	-29.8'	120.7°	52°25.2'	-31.1'	121.8°	51°53.1'	-32.3'	122.9°	51°20.1'	-33.4'	123.9°	50°46.1'	-34.6'	125.0°	50°11.3'	-35.6'	125.9°	49°35.7'	-36.7'	126.9°	12
13	52°26.5'	-30.8'	122.1°	51°54.2'	-32.0'	123.2°	51°20.9'	-33.2'	124.2°	50°46.7'	-34.3'	125.3°	50°11.6'	-35.4'	126.2°	49°35.7'	-36.4'	127.2°	48°59.1'	-37.4'	128.1°	13
14	51°55.7'	-31.8'	123.5°	51°22.1'	-33.0'	124.6°	50°47.7'	-34.1'	125.6°	50°12.3'	-35.1'	126.5°	49°36.2'	-36.2'	127.5°	48°59.3'	-37.2'	128.4°	48°21.7'	-38.1'	129.3°	14
15	51°23.9'	-32.7'	124.9°	50°49.2'	-33.8'	125.9°	50°13.6'	-34.9'	126.9°	49°37.2'	-35.9'	127.8°	49°00.0'	-36.9'	128.7°	48°22.1'	-37.9'	129.6°	47°43.6'	-38.8'	130.5°	15
16	50°51.2'	-33.6'	126.2°	50°15.3'	-34.7'	127.2°	49°38.7'	-35.7'	128.1°	49°01.2'	-36.7'	129.0°	48°23.1'	-37.7'	129.9°	47°44.3'	-38.6'	130.8°	47°04.8'	-39.4'	131.6°	16
17	50°17.6'	-34.5'	127.5°	49°40.6'	-35.5'	128.5°	49°02.9'	-36.5'	129.4°	48°24.5'	-37.4'	130.2°	47°45.4'	-38.3'	131.1°	47°05.7'	-39.2'	131.9°	46°25.3'	-40.1'	132.7°	17
18	49°43.1'	-35.3'	128.8°	49°05.1'	-36.3'	129.7°	48°26.4'	-37.2'	130.6°	47°47.1'	-38.1'	131.4°	47°07.1'	-39.0'	132.2°	46°26.5'	-39.8'	133.0°	45°45.3'	-40.6'	133.8°	18
19	49°07.8'	-36.1'	130.0°	48°28.8'	-37.0'	130.9°	47°49.2'	-37.9'	131.7°	47°09.0'	-38.8'	132.5°	46°28.1'	-39.6'	133.3°	45°46.6'	-40.4'	134.1°	45°04.6'	-41.2'	134.8°	19
20	48°31.7'	-36.8'	131.2°	47°51.8'	-37.7'	132.1°	47°11.3'	-38.6'	132.9°	46°30.2'	-39.4'	133.7°	45°48.5'	-40.2'	134.4°	45°06.2'	-41.0'	135.1°	44°23.4'	-41.7'	135.8°	20
21	47°54.9'	-37.5'	132.4°	47°14.1'	-38.4'	133.2°	46°32.7'	-39.2'	134.0°	45°50.7'	-40.0'	134.7°	45°08.2'	-40.8'	135.5°	44°25.2'	-41.5'	136.2°	43°41.7'	-42.3'	136.8°	21
22	47°17.3'	-38.2'	133.6°	46°35.7'	-39.1'	134.4°	45°53.4'	-39.9'	135.1°	45°10.7'	-40.6'	135.8°	44°27.4'	-41.4'	136.5°	43°43.6'	-42.1'	137.2°	42°59.4'	-42.7'	137.8°	22
23	46°39.1'	-38.9'	134.7°	45°56.6'	-39.7'	135.5°	45°13.6'	-40.4'	136.2°	44°30.1'	-41.2'	136.8°	43°46.1'	-41.9'	137.5°	43°01.6'	-42.6'	138.1°	42°16.7'	-43.2'	138.8°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	7			8			9			10			11			12			13			

32° 328° LHA

Latitude CONTRARY to DECLINATION

32° 328° LHA

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

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

31° 329° LHA

Latitude CONTRARY to Declination

31° 329° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	58°17.7'	-14.7'	101.5°	58°05.0'	-16.6'	103.0°	57°50.7'	-18.4'	104.6°	57°34.8'	-20.2'	106.1°	57°17.4'	-21.9'	107.6°	56°58.5'	-23.6'	109.1°	56°38.2'	-25.2'	110.5°	0
1	58°03.0'	-16.3'	103.3°	57°48.5'	-18.1'	104.9°	57°32.3'	-19.9'	106.4°	57°14.7'	-21.6'	107.9°	56°55.5'	-23.3'	109.3°	56°35.0'	-24.9'	110.8°	56°13.0'	-26.5'	112.2°	1
2	57°46.7'	-17.8'	105.1°	57°30.4'	-19.6'	106.6°	57°12.5'	-21.3'	108.1°	56°53.1'	-23.0'	109.6°	56°32.3'	-24.6'	111.0°	56°10.1'	-26.2'	112.4°	55°46.5'	-27.7'	113.8°	2
3	57°29.0'	-19.3'	106.9°	57°10.8'	-21.0'	108.4°	56°51.2'	-22.7'	109.8°	56°30.1'	-24.3'	111.3°	56°07.6'	-25.9'	112.7°	55°43.9'	-27.4'	114.0°	55°18.8'	-28.9'	115.3°	3
4	57°09.7'	-20.7'	108.7°	56°49.8'	-22.4'	110.1°	56°28.5'	-24.0'	111.5°	56°05.8'	-25.6'	112.9°	55°41.8'	-27.1'	114.3°	55°16.5'	-28.6'	115.6°	54°50.0'	-30.0'	116.9°	4
5	56°49.0'	-22.1'	110.4°	56°27.4'	-23.8'	111.8°	56°04.4'	-25.3'	113.2°	55°40.2'	-26.8'	114.5°	55°14.6'	-28.3'	115.8°	54°47.9'	-29.7'	117.1°	54°19.9'	-31.1'	118.4°	5
6	56°26.8'	-23.5'	112.1°	56°03.6'	-25.1'	113.4°	55°39.1'	-26.6'	114.8°	55°13.3'	-28.0'	116.1°	54°46.3'	-29.4'	117.4°	54°18.2'	-30.8'	118.6°	53°48.9'	-32.1'	119.8°	6
7	56°03.4'	-24.8'	113.7°	55°38.6'	-26.3'	115.1°	55°12.5'	-27.8'	116.4°	54°45.3'	-29.2'	117.6°	54°16.9'	-30.5'	118.9°	53°47.3'	-31.8'	120.1°	53°16.7'	-33.1'	121.2°	7
8	55°38.6'	-26.0'	115.3°	55°12.3'	-27.5'	116.6°	54°44.8'	-28.9'	117.9°	54°16.1'	-30.3'	119.1°	53°46.3'	-31.6'	120.3°	53°15.5'	-32.8'	121.5°	52°43.6'	-34.1'	122.6°	8
9	55°12.5'	-27.2'	116.9°	54°44.8'	-28.7'	118.2°	54°15.9'	-30.0'	119.4°	53°45.8'	-31.3'	120.6°	53°14.8'	-32.6'	121.8°	52°42.7'	-33.8'	122.9°	52°09.6'	-35.0'	124.0°	9
10	54°45.3'	-28.4'	118.5°	54°16.1'	-29.8'	119.7°	53°45.8'	-31.1'	120.9°	53°14.5'	-32.3'	122.1°	52°42.2'	-33.5'	123.2°	52°08.9'	-34.7'	124.3°	51°34.6'	-35.8'	125.3°	10
11	54°16.9'	-29.5'	120.0°	53°46.3'	-30.8'	121.2°	53°14.8'	-32.1'	122.3°	52°42.2'	-33.3'	123.5°	52°08.6'	-34.5'	124.5°	51°34.2'	-35.6'	125.6°	50°58.8'	-36.6'	126.6°	11
12	53°47.3'	-30.6'	121.5°	53°15.5'	-31.9'	122.6°	52°42.7'	-33.1'	123.7°	52°08.9'	-34.2'	124.8°	51°34.2'	-35.3'	125.9°	50°58.6'	-36.4'	126.9°	50°22.2'	-37.4'	127.8°	12
13	53°16.7'	-31.6'	122.9°	52°43.6'	-32.8'	124.0°	52°09.6'	-34.0'	125.1°	51°34.6'	-35.1'	126.1°	50°58.8'	-36.2'	127.1°	50°22.2'	-37.2'	128.1°	49°44.8'	-38.2'	129.0°	13
14	52°45.1'	-32.6'	124.3°	52°10.8'	-33.8'	125.4°	51°35.6'	-34.9'	126.4°	50°59.5'	-35.9'	127.4°	50°22.7'	-37.0'	128.4°	49°45.0'	-37.9'	129.3°	49°06.6'	-38.9'	130.2°	14
15	52°12.5'	-33.5'	125.7°	51°37.0'	-34.7'	126.8°	51°00.7'	-35.7'	127.7°	50°23.6'	-36.7'	128.7°	49°45.7'	-37.7'	129.6°	49°07.1'	-38.7'	130.5°	48°27.7'	-39.6'	131.4°	15
16	51°39.0'	-34.4'	127.1°	51°02.4'	-35.5'	128.1°	50°25.0'	-36.5'	129.0°	49°46.9'	-37.5'	129.9°	49°08.0'	-38.4'	130.8°	48°28.4'	-39.3'	131.7°	47°48.2'	-40.2'	132.5°	16
17	51°04.5'	-35.3'	128.4°	50°26.9'	-36.3'	129.3°	49°48.5'	-37.3'	130.3°	49°09.3'	-38.2'	131.1°	48°29.5'	-39.1'	132.0°	47°49.1'	-40.0'	132.8°	47°08.0'	-40.8'	133.6°	17
18	50°29.2'	-36.1'	129.7°	49°50.5'	-37.1'	130.6°	49°11.2'	-38.0'	131.5°	48°31.1'	-38.9'	132.3°	47°50.4'	-39.8'	133.1°	47°09.1'	-40.6'	133.9°	46°27.2'	-41.4'	134.7°	18
19	49°53.1'	-36.9'	130.9°	49°13.4'	-37.8'	131.8°	48°33.1'	-38.7'	132.6°	47°52.2'	-39.6'	133.5°	47°10.6'	-40.4'	134.2°	46°28.5'	-41.2'	135.0°	45°45.8'	-42.0'	135.7°	19
20	49°16.2'	-37.7'	132.1°	48°35.6'	-38.5'	133.0°	47°54.4'	-39.4'	133.8°	47°12.6'	-40.2'	134.6°	46°30.2'	-41.0'	135.3°	45°47.3'						

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

30° 330° LHA

Latitude CONTRARY to Declination

30° 330° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	59°16.1'	-15.1'	101.9°	59°02.9'	-17.0'	103.6°	58°48.0'	-18.9'	105.2°	58°31.5'	-20.7'	106.7°	58°13.4'	-22.5'	108.3°	57°53.9'	-24.2'	109.8°	57°32.8'	-25.8'	111.3°	0
1	59°00.9'	-16.8'	103.8°	58°45.8'	-18.6'	105.4°	58°29.1'	-20.4'	107.0°	58°10.8'	-22.2'	108.5°	57°51.0'	-23.9'	110.0°	57°29.7'	-25.5'	111.5°	57°07.0'	-27.1'	113.0°	1
2	58°44.2'	-18.3'	105.7°	58°27.2'	-20.1'	107.2°	58°08.7'	-21.9'	108.8°	57°48.6'	-23.6'	110.3°	57°27.1'	-25.2'	111.8°	57°04.2'	-26.8'	113.2°	56°39.9'	-28.4'	114.6°	2
3	58°25.9'	-19.9'	107.5°	58°07.1'	-21.6'	109.0°	57°46.8'	-23.3'	110.5°	57°25.0'	-25.0'	112.0°	57°01.8'	-26.6'	113.4°	56°37.3'	-28.1'	114.8°	56°11.5'	-29.6'	116.2°	3
4	58°06.0'	-21.3'	109.3°	57°45.5'	-23.0'	110.8°	57°23.5'	-24.7'	112.2°	57°00.0'	-26.3'	113.7°	56°35.3'	-27.8'	115.1°	56°09.2'	-29.3'	116.4°	55°41.9'	-30.7'	117.7°	4
5	57°44.7'	-22.8'	111.0°	57°22.4'	-24.4'	112.5°	56°58.8'	-26.0'	113.9°	56°33.8'	-27.6'	115.3°	56°07.5'	-29.0'	116.7°	55°39.9'	-30.5'	118.0°	55°11.2'	-31.8'	119.3°	5
6	57°21.9'	-24.2'	112.8°	56°58.0'	-25.8'	114.2°	56°32.7'	-27.3'	115.6°	56°06.2'	-28.8'	116.9°	55°38.4'	-30.2'	118.2°	55°09.5'	-31.6'	119.5°	54°39.4'	-32.9'	120.7°	6
7	56°57.7'	-25.5'	114.5°	56°32.2'	-27.0'	115.8°	56°05.4'	-28.5'	117.2°	55°37.4'	-29.9'	118.5°	55°08.2'	-31.3'	119.8°	54°37.9'	-32.6'	121.0°	54°06.5'	-33.9'	122.2°	7
8	56°32.2'	-26.8'	116.1°	56°05.2'	-28.3'	117.4°	55°36.9'	-29.7'	118.7°	55°07.5'	-31.0'	120.0°	54°36.9'	-32.4'	121.2°	54°05.3'	-33.6'	122.4°	53°32.6'	-34.8'	123.6°	8
9	56°05.4'	-28.0'	117.7°	55°36.9'	-29.4'	119.0°	55°07.3'	-30.8'	120.3°	54°36.5'	-32.1'	121.5°	54°04.6'	-33.4'	122.7°	53°31.7'	-34.6'	123.8°	52°57.8'	-35.7'	124.9°	9
10	55°37.4'	-29.2'	119.3°	55°07.5'	-30.6'	120.6°	54°36.5'	-31.9'	121.8°	54°04.3'	-33.1'	122.9°	53°31.2'	-34.3'	124.1°	52°57.1'	-35.5'	125.2°	52°22.1'	-36.6'	126.3°	10
11	55°08.2'	-30.3'	120.8°	54°36.9'	-31.6'	122.0°	54°04.6'	-32.9'	123.2°	53°31.2'	-34.1'	124.4°	52°56.9'	-35.3'	125.5°	52°21.6'	-36.4'	126.5°	51°45.5'	-37.4'	127.5°	11
12	54°37.9'	-31.4'	122.3°	54°05.3'	-32.7'	123.5°	53°31.7'	-33.9'	124.6°	52°57.1'	-35.0'	125.7°	52°21.6'	-36.1'	126.8°	51°45.3'	-37.2'	127.8°	51°08.1'	-38.2'	128.8°	12
13	54°06.5'	-32.5'	123.8°	53°32.6'	-33.7'	124.9°	52°57.8'	-34.8'	126.0°	52°22.1'	-35.9'	127.1°	51°45.5'	-37.0'	128.1°	51°08.1'	-38.0'	129.1°	50°29.9'	-38.9'	130.0°	13
14	53°34.0'	-33.4'	125.2°	52°59.0'	-34.6'	126.3°	52°23.0'	-35.7'	127.4°	51°46.2'	-36.8'	128.4°	51°08.5'	-37.8'	129.4°	50°30.1'	-38.7'	130.3°	49°50.9'	-39.7'	131.2°	14
15	53°00.6'	-34.4'	126.6°	52°24.4'	-35.5'	127.7°	51°47.3'	-36.5'	128.7°	51°09.4'	-37.6'	129.6°	50°30.7'	-38.5'	130.6°	49°51.4'	-39.4'	131.5°	49°11.3'	-40.3'	132.4°	15
16	52°26.2'	-35.3'	128.0°	51°48.9'	-36.3'	129.0°	51°10.7'	-37.4'	129.9°	50°31.8'	-38.3'	130.9°	49°52.2'	-39.2'	131.8°	49°11.9'	-40.1'	132.6°	48°30.9'	-41.0'	133.5°	16
17	51°50.9'	-36.2'	129.3°	51°12.5'	-37.2'	130.3°	50°33.4'	-38.1'	131.2°	49°53.5'	-39.0'	132.1°	49°13.0'	-39.9'	132.9°	48°31.8'	-40.8'	133.8°	47°50.0'	-41.6'	134.6°	17
18	51°14.8'	-37.0'	130.6°	50°35.4'	-37.9'	131.5°	49°55.3'	-38.9'	132.4°	49°14.5'	-39.7'	133.3°	48°33.1'	-40.6'	134.1°	47°51.0'	-41.4'	134.9°	47°08.4'	-42.2'	135.6°	18
19	50°37.8'	-37.8'	131.8°	49°57.4'	-38.7'	132.7°	49°16.4'	-39.6'	133.6°	48°34.7'	-40.4'	134.4°	47°52.5'	-41.2'	135.2°	47°09.6'	-42.0'	135.9°	46°26.2'	-42.7'	136.7°	19
20	50°00.0'	-38.5'	133.0°	49°18.8'	-39.4'	133.9°	48°36.9'	-40.2'	134.7°	47°54.3'	-41.0'	135.5°	47°11.3'	-41.8'	136.3°	46°27.7'	-42.5'	137.0°	45°43.5'	-43.2'	137.7°	20
21	49°21.5'	-39.2'	134.2°	48°39.4'	-40.0'	135.0°	47°56.6'	-40.8'	135.8°	47°13.3'	-41.6'	136.6°	46°29.5'	-42.4'	137.3°	45°45.1'	-43.1'	138.0°	45°00.3'	-43.7'	138.7°	21
22	48°42.3'	-39.9'	135.4°	47°59.3'	-40.7'	136.2°	47°15.8'	-41.4'	136.9°	46°31.7'	-42.2'	137.6°	45°47.1'	-42.9'	138.3°	45°02.1'	-43.6'	139.0°	44°16.6'	-44.2'	139.6°	22
23	48°02.4'	-40.5'	136.5°	47°18.7'	-41.3'	137.2°	46°34.3'	-42.0'	138.0°	45°49.5'	-42.7'	138.7°	45°04.2'	-43.4'	139.3°	44°18.5'	-44.0'	140.0°	43°32.4'	-44.7'	140.6°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	7			8			9			10			11			12			13			

30° 330° LHA

Latitude CONTRARY to DECLINATION

30° 330° LHA

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

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

29° 331° LHA

Latitude CONTRARY to Declination

29° 331° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	60°14.3'	-15.6'	102.4°	60°00.6'	-17.5'	104.1°	59°45.1'	-19.4'	105.8°	59°28.0'	-21.3'	107.4°	59°09.3'	-23.1'	109.0°	58°48.9'	-24.8'	110.6°	58°27.1'	-26.5'	112.1°	0
1	59°58.7'	-17.3'	104.3°	59°43.0'	-19.2'	106.0°	59°25.7'	-21.0'	107.6°	59°06.7'	-22.8'	109.2°	58°46.2'	-24.5'	110.8°	58°24.1'	-26.2'	112.3°	58°00.6'	-27.8'	113.8°	1
2	59°41.4'	-18.9'	106.2°	59°23.9'	-20.7'	107.9°	59°04.7'	-22.5'	109.5°	58°43.9'	-24.3'	111.0°	58°21.6'	-25.9'	112.5°	57°57.9'	-27.5'	114.0°	57°32.8'	-29.1'	115.5°	2
3	59°22.6'	-20.5'	108.1°	59°03.1'	-22.3'	109.7°	58°42.1'	-24.0'	111.3°	58°19.7'	-25.7'	112.8°	57°55.7'	-27.3'	114.2°	57°30.4'	-28.8'	115.7°	57°03.7'	-30.3'	117.1°	3
4	59°02.1'	-22.0'	110.0°	58°40.9'	-23.7'	111.5°	58°18.2'	-25.4'	113.0°	57°54.0'	-27.0'	114.5°	57°28.4'	-28.6'	115.9°	57°01.6'	-30.0'	117.3°	56°33.4'	-31.5'	118.7°	4
5	58°40.1'	-23.5'	111.8°	58°17.2'	-25.1'	113.3°	57°52.8'	-26.7'	114.7°	57°27.0'	-28.3'	116.2°	56°59.9'	-29.8'	117.5°	56°31.5'	-31.2'	118.9°	55°01.9'	-32.6'	120.2°	5
6	58°16.7'	-24.9'	113.5°	57°52.0'	-26.5'	115.0°	57°26.0'	-28.0'	116.4°	56°58.7'	-29.5'	117.8°	56°30.1'	-31.0'	119.1°	56°00.3'	-32.3'	120.4°	55°29.4'	-33.6'	121.7°	6
7	57°51.8'	-26.2'	115.2°	57°25.5'	-27.8'	116.7°	56°58.0'	-29.3'	118.0°	56°29.2'	-30.7'	119.4°	55°59.1'	-32.1'	120.7°	55°28.0'	-33.4'	121.9°	54°55.7'	-34.7'	123.1°	7
8	57°25.5'	-27.6'	116.9°	56°57.7'	-29.0'	118.3°	56°28.7'	-30.5'	119.6°	55°58.4'	-31.8'	120.9°	55°27.0'	-33.2'	122.2°	54°54.6'	-34.4'	123.4°	54°21.1'	-35.6'	124.5°	8
9	56°58.0'	-28.8'	118.6°	56°28.7'	-30.2'	119.9°	55°58.2'	-31.6'	121.2°	55°26.6'	-32.9'	122.4°	54°53.9'	-34.2'	123.6°	54°20.2'	-35.4'	124.8°	53°45.4'	-36.5'	125.9°	9
10	56°29.2'	-30.0'	120.2°	55°58.4'	-31.4'	121.4°	55°26.6'	-32.7'	122.7°	54°53.7'	-34.0'	123.9°	54°19.7'	-35.2'	125.0°	53°44.8'	-36.3'	126.2°	53°08.9'	-37.4'	127.2°	10
11	55°59.1'	-31.2'	121.7°	55°27.0'	-32.5'	122.9°	54°53.9'	-33.7'	124.1°	54°19.7'	-34.9'	125.3°	53°44.6'	-36.1'	126.4°	53°08.5'	-37.2'	127.5°	52°31.5'	-38.2'	128.5°	11
12	55°28.0'	-32.3'	123.2°	54°54.6'	-33.5'	124.4°	54°20.2'	-34.7'	125.6°	53°44.8'	-35.9'	126.7°	53°08.5'	-37.0'	127.8°	52°31.3'	-38.0'	128.8°	51°53.3'	-39.0'	129.8°	12
13	54°55.7'	-33.3'	124.7°	54°21.1'	-34.5'	125.9°	53°45.4'	-35.7'	127.0°	53°08.9'	-36.7'	128.0°	52°31.5'	-37.8'	129.1°	51°53.3'	-38.8'	130.1°	51°14.3'	-39.7'	131.0°	13
14	54°22.4'	-34.3'	126.1°	53°46.6'	-35.4'	127.2°	53°09.8'	-36.5'	128.3°	52°32.2'	-37.6'	129.3°	51°53.7'	-38.6'	130.3°	51°14.5'	-39.5'	131.3°	50°34.6'	-40.4'	132.2°	14
15	53°48.1'	-35.3'	127.5°	53°11.1'	-36.3'	128.6°	52°33.2'	-37.4'	129.6°	51°54.6'	-38.4'	130.6°	51°15.1'	-39.3'	131.6°	50°35.0'	-40.2'	132.5°	49°54.1'	-41.1'	133.4°	15
16	53°12.9'	-36.2'	128.9°	52°34.8'	-37.2'	129.9°	51°55.9'	-38.2'	130.9°	51°16.2'	-39.1'	131.9°	50°35.8'	-40.1'	132.8°	49°54.7'	-40.9'	133.6°	49°13.0'	-41.8'	134.5°	16
17	52°36.7'	-37.0'	130.2°	51°57.6'	-38.0'	131.2°	51°17.7'	-39.0'	132.1°	50°37.0'	-39.9'	133.1°	49°55.7'	-40.7'	133.9°	49°13.8'	-41.6'	134.8°	48°31.3'	-42.4'	135.6°	17
18	51°59.7'	-37.8'	131.5°	51°19.5'	-38.8'	132.5°	50°38.7'	-39.7'	133.4°	49°57.2'	-40.6'	134.2°	49°15.0'	-41.4'	135.1°	48°32.2'	-42.2'	135.9°	47°48.9'	-42.9'	136.6°	18
19	51°21.8'	-38.6'	132.8°	50°40.8'	-39.5'	133.7°	49°59.0'	-40.4'	134.5°	49°16.6'	-41.2'	135.4°	48°33.6'	-42.0'	136.2°	47°50.1'	-42.7'	136.9°	47°06.0'	-43.5'	137.7°	19
20	50°43.2'	-39.4'	134.0°	50°01.2'	-40.2'	134.8°	49°18.6'	-41.0'	135.7°	48°35.4'	-41.8'	136.5°	47°51.6'	-42.6'	137.2°							

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

28° 332° LHA

Latitude CONTRARY to Declination

28° 332° LHA

Dec°	7			8			9			10			11			12			13			Dec°			
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°				
0	61°12.4'	-16.1'	102.9°	60°58.1'	-18.1'	104.7°	60°42.1'	-20.0'	106.4°	60°24.3'	-21.9'	108.1°	60°04.8'	-23.7'	109.7°	59°43.8'	-25.5'	111.4°	59°21.1'	-27.2'	112.9°	0			
1	60°56.3'	-17.8'	104.9°	60°40.1'	-19.7'	106.6°	60°22.0'	-21.6'	108.3°	60°02.4'	-23.5'	110.0°	59°41.1'	-25.2'	111.6°	59°18.3'	-26.9'	113.1°	58°54.0'	-28.5'	114.7°	1			
2	60°38.5'	-19.5'	106.9°	60°20.3'	-21.4'	108.5°	60°00.4'	-23.2'	110.2°	59°38.9'	-24.9'	111.8°	59°15.9'	-26.6'	113.4°	58°51.4'	-28.3'	114.9°	58°25.4'	-29.8'	116.4°	2			
3	60°19.1'	-21.1'	108.8°	59°59.0'	-22.9'	110.4°	59°37.2'	-24.7'	112.0°	59°14.0'	-26.4'	113.6°	58°49.2'	-28.0'	115.1°	58°23.1'	-29.6'	116.6°	57°55.6'	-31.1'	118.0°	3			
4	59°58.0'	-22.7'	110.7°	59°36.0'	-24.4'	112.3°	59°12.5'	-26.1'	113.8°	58°47.6'	-27.8'	115.3°	58°21.2'	-29.3'	116.8°	57°53.5'	-30.8'	118.2°	57°24.5'	-32.3'	119.6°	4			
5	59°35.3'	-24.2'	112.5°	59°11.6'	-25.9'	114.1°	58°46.4'	-27.5'	115.6°	58°19.8'	-29.1'	117.0°	57°51.9'	-30.6'	118.4°	57°22.7'	-32.0'	119.8°	56°52.2'	-33.4'	121.2°	5			
6	59°11.1'	-25.6'	114.3°	58°45.7'	-27.3'	115.8°	58°18.9'	-28.8'	117.3°	57°50.7'	-30.3'	118.7°	57°21.3'	-31.8'	120.1°	56°50.7'	-33.1'	121.4°	56°18.8'	-34.5'	122.7°	6			
7	58°45.5'	-27.0'	116.0°	58°18.4'	-28.6'	117.5°	57°50.1'	-30.1'	118.9°	57°20.4'	-31.5'	120.3°	56°49.6'	-32.9'	121.6°	56°17.5'	-34.2'	122.9°	55°44.4'	-35.5'	124.1°	7			
8	58°18.4'	-28.4'	117.8°	57°49.8'	-29.9'	119.2°	57°20.0'	-31.3'	120.5°	56°48.9'	-32.7'	121.9°	56°16.6'	-34.0'	123.1°	55°43.3'	-35.2'	124.4°	55°08.9'	-36.4'	125.6°	8			
9	57°50.1'	-29.6'	119.4°	57°20.0'	-31.1'	120.8°	56°48.7'	-32.5'	122.1°	56°16.2'	-33.5'	123.4°	55°42.7'	-35.0'	124.6°	55°08.1'	-36.2'	125.8°	54°32.5'	-37.3'	126.9°	9			
10	57°20.4'	-30.9'	121.0°	56°48.9'	-32.2'	122.4°	56°16.2'	-33.5'	123.6°	55°42.4'	-34.8'	124.9°	55°07.6'	-36.0'	126.0°	54°31.9'	-37.1'	127.2°	53°55.1'	-38.2'	128.3°	10			
11	56°49.6'	-32.0'	122.6°	56°16.6'	-33.3'	123.9°	55°42.7'	-34.6'	125.1°	55°07.6'	-35.8'	126.3°	54°31.6'	-36.9'	127.4°	53°54.7'	-38.0'	128.5°	53°16.9'	-39.0'	129.6°	11			
12	56°17.5'	-33.1'	124.2°	55°43.3'	-34.4'	125.4°	55°08.1'	-35.6'	126.6°	54°31.9'	-36.7'	127.7°	53°54.7'	-37.8'	128.8°	53°16.7'	-38.8'	129.8°	52°37.9'	-39.8'	130.8°	12			
13	55°44.4'	-34.2'	125.7°	55°08.9'	-35.4'	126.8°	54°32.5'	-36.5'	128.0°	53°55.1'	-37.6'	129.0°	53°16.9'	-38.6'	130.1°	52°37.9'	-39.6'	131.1°	51°58.1'	-40.6'	132.1°	13			
14	55°10.2'	-35.2'	127.1°	54°33.5'	-36.3'	128.2°	53°56.0'	-37.4'	129.3°	53°17.5'	-38.4'	130.4°	52°38.3'	-39.4'	131.4°	51°58.3'	-40.4'	132.3°	51°17.5'	-41.3'	133.2°	14			
15	54°35.0'	-36.1'	128.5°	53°57.2'	-37.2'	129.6°	53°18.6'	-38.3'	130.6°	52°39.1'	-39.2'	131.6°	51°58.9'	-40.2'	132.6°	51°17.9'	-41.1'	133.5°	50°36.3'	-41.9'	134.4°	15			
16	53°58.9'	-37.0'	129.9°	53°20.0'	-38.1'	130.9°	52°40.3'	-39.1'	131.9°	51°59.9'	-40.0'	132.9°	51°18.7'	-40.9'	133.8°	50°36.8'	-41.7'	134.7°	49°54.3'	-42.5'	135.5°	16			
17	53°21.8'	-37.9'	131.2°	52°41.9'	-38.9'	132.2°	52°01.2'	-39.8'	133.1°	51°19.9'	-40.7'	134.1°	50°37.8'	-41.6'	134.9°	49°55.1'	-42.4'	135.8°	49°11.8'	-43.1'	136.6°	17			
18	52°43.9'	-38.7'	132.5°	52°03.0'	-39.7'	133.4°	51°21.4'	-40.5'	134.4°	50°39.2'	-41.4'	135.2°	49°56.2'	-42.2'	136.1°	49°12.7'	-43.0'	136.9°	48°28.7'	-43.7'	137.7°	18			
19	52°05.2'	-39.5'	133.7°	51°23.4'	-40.4'	134.7°	50°40.9'	-41.2'	135.5°	49°57.8'	-42.0'	136.4°	49°14.0'	-42.8'	137.2°	48°29.8'	-43.5'	137.9°	47°45.0'	-44.2'	138.7°	19			
20	51°25.7'	-40.2'	135.0°	50°43.0'	-41.1'	135.8°	49°59.7'	-41.9'	136.7°	49°15.7'	-42.6'	137.5°	48°31.2'	-43.4'	138.2°	47°46.2'	-44.1'	139.0°	47°00.7'	-44.7'	139.7°	20			
21	50°45.5'	-40.9'	136.1°	50°01.9'	-41.7'	137.0°	49°17.8'	-42.5'	137.8°	48°33.1'	-43.2'	138.5°	47°47.4'	-43.9'	139.3°	47°02.2'	-44.6'	140.0°	46°16.0'	-45.2'	140.7°	21			
22	50°04.6'	-41.6'	137.3°	49°20.2'	-42.3'	138.1°	48°35.3'	-43.1'	138.8°	47°49.9'	-43.8'	139.6°	47°03.9'	-44.4'	140.3°	46°17.6'	-45.1'	141.0°	45°30.8'	-45.7'	141.6°	22			
23	49°23.0'	-42.2'	138.4°	48°37.9'	-42.9'	139.2°	47°52.2'	-43.6'	139.9°	47°06.1'	-44.3'	140.6°	46°19.5'	-44.9'	141.3°	45°32.5'	-45.5'	141.9°	44°45.1'	-46.1'	142.5°	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°
	7			8			9			10			11			12			13					Dec°	

28° 332° LHA

Latitude CONTRARY to DECLINATION

28° 332° LHA

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

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

27° 333° LHA

Latitude CONTRARY to Declination

27° 333° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	62°10.4'	-16.6'	103.5°	61°55.5'	-18.6'	105.3°	61°38.8'	-20.6'	107.1°	61°20.3'	-22.5'	108.8°	61°00.1'	-24.4'	110.5°	60°38.3'	-26.2'	112.2°	60°14.8'	-27.9'	113.8°	0
1	61°53.8'	-18.4'	105.5°	61°36.9'	-20.4'	107.3°	61°18.2'	-22.3'	109.0°	60°57.8'	-24.1'	110.7°	60°35.7'	-25.9'	112.4°	60°12.1'	-27.7'	114.0°	59°46.9'	-29.3'	115.6°	1
2	61°35.4'	-20.1'	107.5°	61°16.5'	-22.0'	109.3°	60°55.9'	-23.9'	111.0°	60°33.6'	-25.7'	112.6°	60°09.8'	-27.4'	114.2°	59°44.4'	-29.0'	115.8°	59°17.6'	-30.6'	117.3°	2
3	61°15.3'	-21.8'	109.5°	60°54.5'	-23.6'	111.2°	60°32.0'	-25.4'	112.8°	60°08.0'	-27.1'	114.4°	59°42.4'	-28.8'	116.0°	59°15.4'	-30.4'	117.5°	58°47.0'	-31.9'	119.0°	3
4	60°53.6'	-23.4'	111.4°	60°30.9'	-25.2'	113.1°	60°06.6'	-26.9'	114.7°	59°40.8'	-28.6'	116.2°	59°13.6'	-30.1'	117.7°	58°45.0'	-31.6'	119.2°	58°15.1'	-33.1'	120.6°	4
5	60°30.2'	-25.0'	113.3°	60°05.7'	-26.7'	114.9°	59°39.7'	-28.3'	116.4°	59°12.2'	-29.9'	117.9°	58°43.4'	-31.4'	119.4°	58°13.3'	-32.8'	120.8°	57°42.0'	-34.2'	122.2°	5
6	60°05.2'	-26.4'	115.1°	59°39.0'	-28.1'	116.7°	59°11.4'	-29.7'	118.2°	58°42.4'	-31.2'	119.6°	58°12.0'	-32.6'	121.0°	57°40.5'	-34.0'	122.4°	57°07.8'	-35.3'	123.7°	6
7	59°38.8'	-27.9'	116.9°	59°10.9'	-29.4'	118.4°	58°41.7'	-30.9'	119.9°	58°11.2'	-32.4'	121.3°	57°39.4'	-33.8'	122.6°	57°06.5'	-35.1'	123.9°	56°32.5'	-36.3'	125.2°	7
8	59°10.9'	-29.2'	118.7°	58°41.5'	-30.7'	120.1°	58°10.7'	-32.2'	121.5°	57°38.8'	-33.5'	122.8°	57°05.7'	-34.8'	124.2°	56°31.4'	-36.1'	125.4°	55°56.2'	-37.3'	126.6°	8
9	58°41.7'	-30.5'	120.3°	58°10.7'	-32.0'	121.7°	57°38.6'	-33.3'	123.1°	57°05.3'	-34.6'	124.4°	56°30.8'	-35.9'	125.6°	55°55.4'	-37.1'	126.8°	55°18.9'	-38.2'	128.0°	9
10	58°11.2'	-31.7'	122.0°	57°38.8'	-33.1'	123.3°	57°05.3'	-34.4'	124.6°	56°30.6'	-35.7'	125.9°	55°54.9'	-36.9'	127.1°	55°18.3'	-38.0'	128.2°	54°40.7'	-39.1'	129.3°	10
11	57°39.4'	-32.9'	123.6°	57°05.7'	-34.2'	124.9°	56°30.8'	-35.5'	126.1°	55°54.9'	-36.7'	127.3°	55°18.1'	-37.8'	128.5°	54°40.3'	-38.9'	129.6°	54°01.6'	-39.9'	130.7°	11
12	57°06.5'	-34.0'	125.1°	56°31.4'	-35.3'	126.4°	55°55.4'	-36.5'	127.6°	55°18.3'	-37.6'	128.7°	54°40.3'	-38.7'	129.8°	54°01.4'	-39.7'	130.9°	53°21.8'	-40.7'	131.9°	12
13	56°32.5'	-35.1'	126.6°	55°56.2'	-36.3'	127.8°	55°18.9'	-37.4'	129.0°	54°40.7'	-38.5'	130.1°	54°01.6'	-39.5'	131.1°	53°21.8'	-40.5'	132.2°	52°41.1'	-41.4'	133.1°	13
14	55°57.4'	-36.1'	128.1°	55°19.9'	-37.2'	129.2°	54°41.5'	-38.3'	130.3°	54°02.2'	-39.3'	131.4°	53°22.1'	-40.3'	132.4°	52°41.3'	-41.2'	133.4°	51°59.7'	-42.1'	134.3°	14
15	55°21.3'	-37.0'	129.5°	54°42.7'	-38.1'	130.6°	54°03.2'	-39.1'	131.7°	53°22.9'	-40.1'	132.7°	52°41.9'	-41.0'	133.6°	52°00.1'	-41.9'	134.6°	51°17.6'	-42.7'	135.5°	15
16	54°44.2'	-38.0'	130.9°	54°04.5'	-39.0'	131.9°	53°24.1'	-39.9'	132.9°	52°42.8'	-40.9'	133.9°	52°00.8'	-41.7'	134.8°	51°18.2'	-42.6'	135.7°	50°34.9'	-43.3'	136.6°	16
17	54°06.3'	-38.8'	132.2°	53°25.6'	-39.8'	133.2°	52°44.1'	-40.7'	134.2°	52°01.9'	-41.6'	135.1°	51°19.1'	-42.4'	136.0°	50°35.6'	-43.2'	136.9°	49°51.6'	-43.9'	137.7°	17
18	53°27.5'	-39.6'	133.5°	52°45.8'	-40.5'	134.5°	52°03.4'	-41.4'	135.4°	51°20.4'	-42.2'	136.3°	50°36.7'	-43.0'	137.1°	49°52.5'	-43.8'	137.9°	49°07.6'	-44.5'	138.7°	18
19	52°47.9'	-40.4'	134.8°	52°05.3'	-41.3'	135.7°	51°22.0'	-42.1'	136.6°	50°38.1'	-42.9'	137.4°	49°53.7'	-43.6'	138.2°	49°08.7'	-44.3'	139.0°	48°23.2'	-45.0'	139.7°	19
20	52°07.5'	-41.1'	136.0°	51°24.0'	-41.9'	136.9°	50°39.9'	-42.7'	137.7°	49°55.3'	-43.5'	138.5°	49°10.1									

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

26° 334° LHA

Latitude CONTRARY to Declination

26° 334° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	63°08.2'	-17.1'	104.0°	62°52.7'	-19.2'	105.9°	62°35.4'	-21.3'	107.8°	62°16.1'	-23.2'	109.6°	61°55.1'	-25.1'	111.4°	61°32.4'	-26.9'	113.1°	61°08.1'	-28.7'	114.8°	0
1	62°51.1'	-19.0'	106.1°	62°33.5'	-21.0'	108.0°	62°14.1'	-23.0'	109.8°	61°52.9'	-24.9'	111.6°	61°30.0'	-26.7'	113.3°	61°05.5'	-28.4'	114.9°	60°39.4'	-30.1'	116.6°	1
2	62°32.1'	-20.8'	108.2°	62°12.5'	-22.7'	110.0°	61°51.1'	-24.6'	111.8°	61°28.0'	-26.5'	113.5°	61°03.3'	-28.2'	115.1°	60°37.0'	-29.9'	116.8°	60°09.3'	-31.5'	118.3°	2
3	62°11.4'	-22.5'	110.2°	61°49.7'	-24.4'	112.0°	61°26.5'	-26.2'	113.7°	61°01.6'	-28.0'	115.4°	60°35.1'	-29.6'	117.0°	60°07.2'	-31.2'	118.5°	59°37.8'	-32.7'	120.0°	3
4	61°48.9'	-24.2'	112.2°	61°25.3'	-26.0'	113.9°	61°00.2'	-27.7'	115.6°	60°33.6'	-29.4'	117.2°	60°05.5'	-31.0'	118.7°	59°36.0'	-32.5'	120.2°	59°05.1'	-33.9'	121.7°	4
5	61°24.7'	-25.8'	114.1°	60°59.4'	-27.5'	115.8°	60°32.5'	-29.2'	117.4°	60°04.2'	-30.7'	118.9°	59°34.5'	-32.3'	120.4°	59°03.5'	-33.7'	121.9°	58°31.2'	-35.1'	123.3°	5
6	60°58.9'	-27.3'	116.0°	60°31.9'	-28.9'	117.6°	60°03.4'	-30.5'	119.1°	59°33.5'	-32.0'	120.6°	59°02.2'	-33.5'	122.1°	58°29.8'	-34.9'	123.5°	57°56.1'	-36.2'	124.8°	6
7	60°31.7'	-28.7'	117.8°	60°02.9'	-30.3'	119.4°	59°32.8'	-31.8'	120.9°	59°01.4'	-33.3'	122.3°	58°28.8'	-34.6'	123.7°	57°54.9'	-35.9'	125.0°	57°19.9'	-37.2'	126.3°	7
8	60°02.9'	-30.1'	119.6°	59°32.6'	-31.6'	121.1°	59°01.0'	-33.1'	122.5°	58°28.1'	-34.4'	123.9°	57°54.1'	-35.7'	125.2°	57°19.0'	-37.0'	126.5°	56°42.8'	-38.2'	127.7°	8
9	59°32.8'	-31.4'	121.3°	59°01.0'	-32.9'	122.7°	58°27.9'	-34.2'	124.1°	57°53.7'	-35.5'	125.4°	57°18.4'	-36.8'	126.7°	56°42.0'	-37.9'	127.9°	56°04.6'	-39.1'	129.1°	9
10	59°01.4'	-32.7'	123.0°	58°28.1'	-34.0'	124.4°	57°53.7'	-35.3'	125.7°	57°18.2'	-36.6'	126.9°	56°41.6'	-37.8'	128.2°	56°04.0'	-38.9'	129.3°	55°25.5'	-39.9'	130.5°	10
11	58°28.8'	-33.8'	124.6°	57°54.1'	-35.1'	125.9°	57°18.4'	-36.4'	127.2°	56°41.6'	-37.6'	128.4°	56°03.8'	-38.7'	129.6°	55°25.2'	-39.7'	130.7°	54°45.6'	-40.7'	131.8°	11
12	57°54.9'	-35.0'	126.2°	57°19.0'	-36.2'	127.4°	56°42.0'	-37.4'	128.6°	56°04.0'	-38.5'	129.8°	55°25.2'	-39.6'	130.9°	54°45.4'	-40.6'	132.0°	54°04.9'	-41.5'	133.0°	12
13	57°19.9'	-36.0'	127.7°	56°42.8'	-37.2'	128.9°	56°04.6'	-38.3'	130.1°	55°25.5'	-39.4'	131.2°	54°45.6'	-40.4'	132.2°	54°04.9'	-41.3'	133.3°	53°23.4'	-42.2'	134.3°	13
14	56°43.9'	-37.0'	129.2°	56°05.6'	-38.1'	130.3°	55°26.3'	-39.2'	131.4°	54°46.2'	-40.2'	132.5°	54°05.2'	-41.2'	133.5°	53°23.6'	-42.1'	134.5°	52°41.2'	-42.9'	135.4°	14
15	56°06.9'	-38.0'	130.6°	55°27.4'	-39.0'	131.7°	54°47.1'	-40.0'	132.8°	54°06.0'	-41.0'	133.8°	53°24.1'	-41.9'	134.7°	52°41.5'	-42.7'	135.7°	51°58.2'	-43.6'	136.6°	15
16	55°28.9'	-38.9'	132.0°	54°48.4'	-39.9'	133.0°	54°07.0'	-40.8'	134.0°	53°25.0'	-41.7'	135.0°	52°42.2'	-42.6'	135.9°	51°58.8'	-43.4'	136.8°	51°14.7'	-44.2'	137.7°	16
17	54°50.0'	-39.7'	133.3°	54°08.5'	-40.7'	134.3°	53°26.2'	-41.6'	135.3°	52°43.2'	-42.4'	136.2°	51°59.6'	-43.2'	137.1°	51°15.4'	-44.0'	137.9°	50°30.5'	-44.7'	138.8°	17
18	54°10.3'	-40.5'	134.6°	53°27.8'	-41.4'	135.5°	52°44.6'	-42.3'	136.5°	52°00.8'	-43.1'	137.4°	51°16.4'	-43.9'	138.2°	50°31.4'	-44.6'	139.0°	49°45.8'	-45.3'	139.8°	18
19	53°29.8'	-41.3'	135.8°	52°46.4'	-42.1'	136.8°	52°02.4'	-42.9'	137.6°	51°17.7'	-43.7'	138.5°	50°32.5'	-44.4'	139.3°	49°46.8'	-45.1'	140.1°	49°00.5'	-45.8'	140.8°	19
20	52°48.5'	-42.0'	137.0°	52°04.2'	-42.8'	137.9°	51°19.4'	-43.6'	138.8°	50°34.0'	-44.3'	139.6°	49°48.1'	-45.0'	140.3°	49°01.6'	-45.6'	141.1°	48°14.7'	-46.3'	141.8°	20
21	52°06.5'	-42.7'	138.2°	51°21.4'	-43.4'	139.1°	50°35.8'	-44.2'	139.9°	49°49.7'	-44.9'	140.6°	49°03.1'	-45.5'	141.4°	48°16.0'	-46.1'	142.1°	47°28.9'	-46.7'	142.7°	21
22	51°23.8'	-43.3'	139.3°	50°38.0'	-44.0'	140.1°	49°51.7'	-44.7'	140.9°	49°04.9'	-45.4'	141.6°	48°17.6'	-46.0'	142.3°	47°29.9'	-46.6'	143.0°	46°41.7'	-47.2'	143.7°	22
23	50°40.5'	-43.9'	140.5°	49°54.0'	-44.6'	141.2°	49°07.0'	-45.3'	141.9°	48°19.5'	-45.9'	142.6°	47°31.6'	-46.5'	143.3°	46°43.3'	-47.0'	143.9°	45°54.6'	-47.6'	144.6°	23
Dec°	7			8			9			10			11			12			13			Dec°

26° 334° LHA

Latitude CONTRARY to DECLINATION

26° 334° LHA

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

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

25° 335° LHA

Latitude CONTRARY to Declination

25° 335° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	64°05.9'	-17.7'	104.6°	63°49.8'	-19.9'	106.6°	63°31.7'	-22.0'	108.5°	63°11.6'	-24.0'	110.4°	62°49.8'	-25.9'	112.3°	62°26.2'	-27.7'	114.0°	62°01.0'	-29.5'	115.8°	0
1	63°48.2'	-19.6'	106.8°	63°29.9'	-21.7'	108.7°	63°09.7'	-23.7'	110.6°	62°47.7'	-25.7'	112.4°	62°23.9'	-27.5'	114.2°	61°58.5'	-29.3'	115.9°	61°31.5'	-31.0'	117.6°	1
2	63°28.5'	-21.5'	109.0°	63°08.2'	-23.5'	110.8°	62°46.0'	-25.4'	112.6°	62°22.0'	-27.3'	114.4°	61°56.4'	-29.0'	116.1°	61°29.2'	-30.7'	117.8°	61°00.5'	-32.3'	119.4°	2
3	63°07.1'	-23.3'	111.0°	62°44.7'	-25.2'	112.8°	62°20.5'	-27.0'	114.6°	61°54.7'	-28.8'	116.3°	61°27.4'	-30.5'	118.0°	60°58.5'	-32.1'	119.6°	60°28.2'	-33.6'	121.1°	3
4	62°43.8'	-25.0'	113.1°	62°19.5'	-26.8'	114.8°	61°53.5'	-28.6'	116.5°	61°25.9'	-30.3'	118.2°	60°56.9'	-31.9'	119.8°	60°26.4'	-33.4'	121.3°	59°54.6'	-34.8'	122.8°	4
5	62°18.8'	-26.6'	115.0°	61°52.7'	-28.4'	116.7°	61°24.9'	-30.0'	118.4°	60°55.7'	-31.6'	120.0°	60°25.0'	-33.2'	121.5°	59°53.0'	-34.6'	123.0°	59°19.8'	-36.0'	124.4°	5
6	61°52.2'	-28.2'	116.9°	61°24.3'	-29.8'	118.6°	60°54.9'	-31.4'	120.2°	60°24.0'	-33.0'	121.7°	59°51.9'	-34.4'	123.2°	59°18.4'	-35.8'	124.6°	58°43.8'	-37.1'	125.9°	6
7	61°24.1'	-29.6'	118.8°	60°54.5'	-31.2'	120.4°	60°23.4'	-32.7'	121.9°	59°51.1'	-34.2'	123.4°	59°17.5'	-35.6'	124.8°	58°42.6'	-36.9'	126.1°	58°06.7'	-38.1'	127.4°	7
8	60°54.5'	-31.0'	120.6°	60°23.2'	-32.6'	122.1°	59°50.7'	-34.0'	123.6°	59°16.9'	-35.4'	125.0°	58°41.9'	-36.7'	126.3°	58°05.8'	-37.9'	127.6°	57°28.6'	-39.0'	128.9°	8
9	60°23.4'	-32.4'	122.3°	59°50.7'	-33.8'	123.8°	59°16.7'	-35.2'	125.2°	58°41.5'	-36.5'	126.6°	58°05.2'	-37.7'	127.8°	57°27.9'	-38.9'	129.1°	56°49.6'	-40.0'	130.3°	9
10	59°51.1'	-33.6'	124.0°	59°16.9'	-35.0'	125.4°	58°41.5'	-36.3'	126.8°	58°05.0'	-37.5'	128.1°	57°27.5'	-38.7'	129.3°	56°49.0'	-39.8'	130.5°	56°09.6'	-40.8'	131.6°	10
11	59°17.5'	-34.8'	125.7°	58°41.9'	-36.1'	127.0°	58°05.2'	-37.3'	128.3°	57°27.5'	-38.5'	129.5°	56°48.9'	-39.6'	130.7°	56°09.3'	-40.6'	131.9°	55°28.8'	-41.6'	132.9°	11
12	58°42.6'	-35.9'	127.3°	58°05.8'	-37.2'	128.5°	57°27.9'	-38.3'	129.8°	56°49.0'	-39.4'	130.9°	56°09.3'	-40.5'	132.1°	55°28.6'	-41.4'	133.2°	54°47.2'	-42.4'	134.2°	12
13	58°06.7'	-37.0'	128.8°	57°28.6'	-38.2'	130.0°	56°49.6'	-39.3'	131.2°	56°09.6'	-40.3'	132.3°	55°28.8'	-41.3'	133.4°	54°47.2'	-42.2'	134.4°	54°04.8'	-43.1'	135.4°	13
14	57°29.7'	-38.0'	130.3°	56°50.5'	-39.1'	131.4°	56°10.3'	-40.1'	132.6°	55°29.3'	-41.1'	133.6°	54°47.5'	-42.0'	134.7°	54°05.0'	-42.9'	135.6°	53°21.8'	-43.8'	136.6°	14
15	56°51.7'	-38.9'	131.7°	56°11.4'	-40.0'	132.8°	55°30.2'	-41.0'	133.9°	54°48.2'	-41.9'	134.9°	54°05.5'	-42.8'	135.9°	53°22.1'	-43.6'	136.8°	52°38.0'	-44.4'	137.7°	15
16	56°12.8'	-39.8'	133.1°	55°31.4'	-40.8'	134.1°	54°49.2'	-41.7'	135.2°	54°06.3'	-42.6'	136.1°	53°22.7'	-43.4'	137.1°	52°38.5'	-44.2'	138.0°	51°53.6'	-45.0'	138.8°	16
17	55°33.0'	-40.7'	134.4°	54°50.6'	-41.6'	135.4°	54°07.5'	-42.5'	136.4°	53°23.7'	-43.3'	137.3°	52°39.3'	-44.1'	138.2°	51°54.2'	-44.8'	139.1°	51°08.6'	-45.5'	139.9°	17
18	54°52.3'	-41.5'	135.7°	54°09.0'	-42.3'	136.7°	53°25.0'	-43.2'	137.6°	52°40.4'	-44.0'	138.5°	51°55.2'	-44.7'	139.3°	51°09.4'	-45.4'	140.1°	50°23.1'	-46.1'	140.9°	18
19	54°10.8'	-42.2'	136.9°	53°26.7'	-43.0'	137.9°	52°41.9'	-43.8'	138.7°	51°56.5'	-44.6'	139.6°	51°10.5'	-45.3'	140.4°	50°24.0'	-45.9'	141.2°	49°37.0'	-46.6'	141.9°	19
20	53°28.6'	-42.9'	138.1°	52°43.6'	-43.7'	139.0°	51°58.1'	-44.4'	139.9°	51°11.9'	-45.1'	140.7°	50°25.2'	-45.8'	141.4°	49°38.1'	-46.4'	142.2°	48°50.5'	-47.0'	142.9°	20
21	52°45.7'	-43.6'	139.3°	51°59.9'	-44.3'	140.1°	51°13.6'	-45.0'	140.9°	50°26.8'	-45.7'	141.7°	49°39.4'									

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

24° 336° LHA

Latitude CONTRARY to Declination

24° 336° LHA

Table with 13 columns (7-13) and 24 rows (0-23). Each cell contains three values: Hc°, d', Z°. The table is a grid of astronomical data for declination 24°.

24° 336° LHA

Latitude CONTRARY to DECLINATION

24° 336° LHA

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

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

23° 337° LHA

Latitude CONTRARY to Declination

23° 337° LHA

Table with 13 columns (7-13) and 24 rows (0-23). Each cell contains three values: Hc°, d', Z°. The table is a grid of astronomical data for declination 23°.

23° 337° LHA

Latitude CONTRARY to DECLINATION

23° 337° LHA

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

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

22° 338° LHA

Latitude CONTRARY to Declination

22° 338° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	66°57.9'	-19.8'	106.8°	66°39.5'	-22.1'	109.0°	66°18.9'	-24.4'	111.2°	65°56.2'	-26.5'	113.3°	65°31.6'	-28.5'	115.3°	65°05.0'	-30.4'	117.2°	64°36.7'	-32.3'	119.1°	0
1	66°38.1'	-21.9'	109.2°	66°17.4'	-24.2'	111.3°	65°54.5'	-26.3'	113.4°	65°29.7'	-28.3'	115.4°	65°03.0'	-30.2'	117.4°	64°34.6'	-32.1'	119.3°	64°04.4'	-33.8'	121.1°	1
2	66°16.2'	-23.9'	111.5°	65°53.2'	-26.1'	113.6°	65°28.3'	-28.1'	115.6°	65°01.4'	-30.0'	117.5°	64°32.8'	-31.8'	119.4°	64°02.5'	-33.6'	121.2°	63°30.7'	-35.2'	122.9°	2
3	65°52.3'	-25.9'	113.8°	65°27.2'	-27.9'	115.8°	65°00.2'	-29.8'	117.7°	64°31.4'	-31.6'	119.6°	64°01.0'	-33.4'	121.4°	63°29.0'	-35.0'	123.1°	62°55.5'	-36.5'	124.7°	3
4	65°26.4'	-27.7'	116.0°	64°59.3'	-29.6'	117.9°	64°30.3'	-31.5'	119.8°	63°59.7'	-33.2'	121.5°	63°27.6'	-34.8'	123.2°	62°54.0'	-36.3'	124.9°	62°19.0'	-37.7'	126.5°	4
5	64°58.7'	-29.5'	118.1°	64°29.6'	-31.3'	119.9°	63°58.9'	-33.0'	121.7°	63°26.6'	-34.6'	123.4°	62°52.8'	-36.1'	125.1°	62°17.7'	-37.5'	126.6°	61°41.3'	-38.9'	128.1°	5
6	64°29.3'	-31.1'	120.1°	63°58.3'	-32.8'	121.9°	63°25.9'	-34.4'	123.6°	62°52.0'	-35.9'	125.2°	62°16.7'	-37.4'	126.8°	61°40.1'	-38.7'	128.3°	61°02.4'	-39.9'	129.7°	6
7	63°58.2'	-32.6'	122.1°	63°25.5'	-34.2'	123.8°	62°51.5'	-35.8'	125.4°	62°16.0'	-37.2'	127.0°	61°39.3'	-38.5'	128.5°	61°01.5'	-39.8'	129.9°	60°22.4'	-41.0'	131.2°	7
8	63°25.5'	-34.1'	124.0°	62°51.3'	-35.6'	125.6°	62°15.7'	-37.0'	127.2°	61°38.9'	-38.4'	128.6°	61°00.8'	-39.6'	130.0°	60°21.7'	-40.8'	131.4°	59°41.5'	-41.9'	132.7°	8
9	62°51.5'	-35.4'	125.8°	62°15.7'	-36.9'	127.3°	61°38.7'	-38.2'	128.8°	61°00.5'	-39.4'	130.2°	60°21.2'	-40.6'	131.6°	59°40.9'	-41.7'	132.9°	58°59.6'	-42.8'	134.1°	9
10	62°16.0'	-36.7'	127.6°	61°38.9'	-38.0'	129.0°	61°00.5'	-39.3'	130.4°	60°21.1'	-40.5'	131.8°	59°40.6'	-41.6'	133.1°	58°59.2'	-42.6'	134.3°	58°16.8'	-43.6'	135.4°	10
11	61°39.3'	-37.9'	129.2°	61°00.8'	-39.1'	130.6°	60°21.2'	-40.3'	132.0°	59°40.6'	-41.4'	133.3°	58°59.0'	-42.5'	134.5°	58°16.5'	-43.4'	135.6°	57°33.3'	-44.3'	136.7°	11
12	61°01.5'	-39.0'	130.9°	60°21.7'	-40.2'	132.2°	59°40.9'	-41.3'	133.5°	58°59.2'	-42.3'	134.7°	58°16.5'	-43.3'	135.8°	57°33.1'	-44.2'	136.9°	56°48.9'	-45.1'	138.0°	12
13	60°22.4'	-40.0'	132.4°	59°41.5'	-41.2'	133.7°	58°59.6'	-42.2'	134.9°	58°16.8'	-43.2'	136.0°	57°33.3'	-44.1'	137.1°	56°48.9'	-44.9'	138.2°	56°03.8'	-45.7'	139.2°	13
14	59°42.4'	-41.0'	133.9°	59°00.3'	-42.1'	135.1°	58°17.4'	-43.0'	136.2°	57°33.7'	-43.9'	137.3°	56°49.2'	-44.8'	138.4°	56°04.0'	-45.6'	139.4°	55°18.1'	-46.3'	140.3°	14
15	59°01.4'	-41.9'	135.3°	58°18.3'	-42.9'	136.5°	57°34.4'	-43.8'	137.6°	56°49.7'	-44.7'	138.6°	56°04.4'	-45.5'	139.6°	55°18.4'	-46.2'	140.5°	54°31.8'	-46.9'	141.4°	15
16	58°19.4'	-42.8'	136.7°	57°35.4'	-43.7'	137.8°	56°50.6'	-44.5'	138.8°	56°05.1'	-45.3'	139.8°	55°18.9'	-46.1'	140.7°	54°32.2'	-46.8'	141.6°	53°44.8'	-47.5'	142.5°	16
17	57°36.7'	-43.6'	138.0°	56°51.7'	-44.4'	139.1°	56°06.0'	-45.2'	140.0°	55°19.7'	-46.0'	141.0°	54°32.8'	-46.7'	141.9°	53°45.4'	-47.4'	142.7°	52°57.4'	-48.0'	143.5°	17
18	56°53.1'	-44.3'	139.3°	56°07.3'	-45.1'	140.3°	55°20.8'	-45.9'	141.2°	54°33.7'	-46.6'	142.1°	53°46.1'	-47.2'	142.9°	52°58.0'	-47.9'	143.7°	52°09.4'	-48.5'	144.5°	18
19	56°08.8'	-45.0'	140.5°	55°22.1'	-45.8'	141.4°	54°34.9'	-46.5'	142.3°	53°47.2'	-47.1'	143.2°	52°58.9'	-47.8'	144.0°	52°10.1'	-48.4'	144.7°	51°20.9'	-48.9'	145.5°	19
20	55°23.7'	-45.7'	141.7°	54°36.4'	-46.4'	142.6°	53°48.4'	-47.0'	143.4°	53°00.0'	-47.7'	144.2°	52°11.1'	-48.2'	145.0°	51°21.8'	-48.8'	145.7°	50°32.0'	-49.3'	146.4°	20
21	54°38.1'	-46.3'	142.8°	53°50.0'	-46.9'	143.7°	53°01.4'	-47.6'	144.4°	52°12.4'	-48.1'	145.2°	51°22.9'	-48.7'	145.9°	50°33.0'	-49.2'	146.6°	49°42.7'	-49.7'	147.3°	21
22	53°51.8'	-46.9'	143.9°	53°03.0'	-47.5'	144.7°	52°13.8'	-48.1'	145.5°	51°24.2'	-48.6'	146.2°	50°34.2'	-49.1'	146.8°	49°43.8'	-49.6'	147.5°	48°53.0'	-50.1'	148.1°	22
23	53°04.9'	-47.4'	145.0°	52°15.6'	-48.0'	145.7°	51°25.8'	-48.5'	146.4°	50°35.6'	-49.0'	147.1°	49°45.0'	-49.5'	147.7°	48°54.1'	-50.0'	148.4°	48°02.9'	-50.4'	148.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	7			8			9			10			11			12			13			

22° 338° LHA

Latitude CONTRARY to DECLINATION

22° 338° LHA

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

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

21° 339° LHA

Latitude CONTRARY to Declination

21° 339° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	67°54.8'	-20.6'	107.6°	67°35.5'	-23.0'	109.9°	67°14.0'	-25.3'	112.2°	66°50.3'	-27.5'	114.3°	66°24.6'	-29.5'	116.4°	65°56.9'	-31.5'	118.4°	65°27.4'	-33.3'	120.4°	0
1	67°34.2'	-22.8'	110.1°	67°12.6'	-25.1'	112.3°	66°48.7'	-27.3'	114.5°	66°22.8'	-29.3'	116.6°	65°55.0'	-31.3'	118.6°	65°25.5'	-33.1'	120.5°	64°54.2'	-34.8'	122.4°	1
2	67°11.4'	-24.9'	112.5°	66°47.5'	-27.1'	114.7°	66°21.4'	-29.1'	116.7°	65°53.5'	-31.1'	118.7°	65°23.8'	-32.9'	120.7°	64°52.4'	-34.6'	122.5°	64°19.4'	-36.2'	124.3°	2
3	66°46.6'	-26.9'	114.8°	66°20.4'	-28.9'	116.9°	65°52.3'	-30.9'	118.9°	65°22.5'	-32.7'	120.8°	64°50.9'	-34.4'	122.6°	64°17.8'	-36.0'	124.4°	63°43.1'	-37.5'	126.1°	3
4	66°19.7'	-28.7'	117.1°	65°51.5'	-30.7'	119.1°	65°21.5'	-32.5'	121.0°	64°49.8'	-34.2'	122.8°	64°16.5'	-35.8'	124.6°	63°41.7'	-37.4'	126.2°	63°05.6'	-38.8'	127.8°	4
5	65°51.0'	-30.5'	119.2°	65°20.8'	-32.3'	121.1°	64°48.9'	-34.1'	123.0°	64°15.5'	-35.7'	124.7°	63°40.6'	-37.2'	126.4°	63°04.4'	-38.6'	128.0°	62°26.8'	-39.9'	129.5°	5
6	65°20.5'	-32.2'	121.3°	64°48.5'	-33.9'	123.1°	64°14.9'	-35.5'	124.9°	63°39.9'	-37.0'	126.5°	63°03.5'	-38.4'	128.1°	62°25.8'	-39.7'	129.6°	61°46.9'	-41.0'	131.1°	6
7	64°48.3'	-33.7'	123.3°	64°14.6'	-35.3'	125.1°	63°39.4'	-36.8'	126.7°	63°02.8'	-38.3'	128.3°	62°25.0'	-39.6'	129.8°	61°46.0'	-40.8'	131.2°	61°06.0'	-42.0'	132.6°	7
8	64°14.6'	-35.2'	125.2°	63°39.2'	-36.7'	126.9°	63°02.5'	-38.1'	128.5°	62°24.6'	-39.4'	130.0°	61°45.5'	-40.7'	131.4°	61°05.2'	-41.8'	132.8°	60°24.0'	-42.9'	134.1°	8
9	63°39.4'	-36.5'	127.1°	63°02.5'	-38.0'	128.7°	62°24.4'	-39.3'	130.2°	61°45.2'	-40.5'	131.6°	61°04.8'	-41.7'	133.0°	60°23.4'	-42.7'	134.2°	59°41.1'	-43.7'	135.5°	9
10	63°02.8'	-37.8'	128.9°	62°24.6'	-39.1'	130.4°	61°45.2'	-40.4'	131.8°	61°04.7'	-41.5'	133.1°	60°23.1'	-42.6'	134.4°	59°40.7'	-43.6'	135.6°	58°57.4'	-44.5'	136.8°	10
11	62°25.0'	-39.0'	130.6°	61°45.5'	-40.2'	132.0°	61°04.8'	-41.4'	133.3°	60°23.1'	-42.5'	134.6°	59°40.5'	-43.5'	135.8°	58°57.1'	-44.4'	137.0°	58°12.8'	-45.3'	138.1°	11
12	61°46.0'	-40.1'	132.2°	61°05.2'	-41.2'	133.5°	60°23.4'	-42.3'	134.8°	59°40.7'	-43.3'	136.0°	58°57.1'	-44.3'	137.2°	58°12.7'	-45.2'	138.3°	57°27.5'	-46.0'	139.3°	12
13	61°06.0'	-41.1'	133.7°	60°24.0'	-42.2'	135.0°	59°41.1'	-43.2'	136.2°	58°57.4'	-44.1'	137.4°	58°12.8'	-45.0'	138.5°	57°27.5'	-45.9'	139.5°	56°41.6'	-46.6'	140.5°	13
14	60°24.8'	-42.1'	135.2°	59°41.8'	-43.1'	136.4°	58°57.9'	-44.0'	137.6°	58°13.2'	-44.9'	138.7°	57°27.8'	-45.7'	139.7°	56°41.7'	-46.5'	140.7°	55°54.9'	-47.2'	141.6°	14
15	59°42.8'	-43.0'	136.7°	58°58.7'	-43.9'	137.8°	58°13.9'	-44.8'	138.9°	57°28.3'	-45.6'	139.9°	56°42.1'	-46.4'	140.9°	55°55.2'	-47.1'	141.8°	55°07.7'	-47.8'	142.7°	15
16	58°59.8'	-43.8'	138.0°	58°14.8'	-44.7'	139.1°	57°29.1'	-45.5'	140.1°	56°42.7'	-46.3'	141.1°	55°55.7'	-47.0'	142.1°	55°08.1'	-47.7'	142.9°	54°19.9'	-48.3'	143.8°	16
17	58°16.0'	-44.6'	139.3°	57°30.1'	-45.4'	140.4°	56°43.6'	-46.2'	141.3°	55°56.4'	-46.9'	142.3°	55°08.7'	-47.6'	143.2°	54°20.4'	-48.2'	144.0°	53°31.6'	-48.8'	144.8°	17
18	57°31.4'	-45.3'	140.6°	56°44.7'	-46.1'	141.6°	55°57.4'	-46.8'	142.5°	55°09.5'	-47.5'	143.4°	54°21.1'	-48.1'	144.2°	53°32.2'	-48.7'	145.0°	52°42.8'	-49.3'	145.8°	18
19	56°46.1'	-46.0'	141.8°	55°58.6'	-46.7'	142.7°	55°10.6'	-47.4'	143.6°	54°22.1'	-48.0'	144.4°	53°33.0'	-48.6'	145.2°	52°43.5'	-49.2'	146.0°	51°53.6'	-49.7'	146.7°	19
20	56°00.1'	-46.6'	143.0°	55°12.0'	-47.3'	143.8°	54°23.3'	-47.9'	144.7°	53°34.1'	-48.5'	145.5°	52°44.4'	-49.1'	146.2°	51°54.4'						

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

20° 340° LHA

Latitude CONTRARY to Declination

20° 340° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	68°51.4'	-21.5'	108.5°	68°31.2'	-23.9'	110.9°	68°08.6'	-26.3'	113.3°	67°43.9'	-28.5'	115.5°	67°17.0'	-30.6'	117.7°	66°48.2'	-32.5'	119.7°	66°17.5'	-34.4'	121.7°	0
1	68°30.0'	-23.7'	111.1°	68°07.3'	-26.1'	113.4°	67°42.4'	-28.3'	115.7°	67°15.4'	-30.4'	117.8°	66°46.4'	-32.3'	119.9°	66°15.7'	-34.2'	121.8°	65°43.2'	-35.9'	123.7°	1
2	68°06.2'	-25.9'	113.6°	67°41.2'	-28.1'	115.8°	67°14.1'	-30.2'	118.0°	66°45.0'	-32.2'	120.0°	66°14.1'	-34.0'	122.0°	65°41.5'	-35.7'	123.9°	65°07.3'	-37.3'	125.7°	2
3	67°40.4'	-27.9'	116.0°	67°13.1'	-30.0'	118.1°	66°43.9'	-32.0'	120.2°	66°12.9'	-33.8'	122.1°	65°40.1'	-35.5'	124.0°	65°05.8'	-37.1'	125.8°	64°30.0'	-38.6'	127.5°	3
4	67°12.5'	-29.8'	118.3°	66°43.1'	-31.8'	120.3°	66°11.9'	-33.6'	122.3°	65°39.0'	-35.4'	124.2°	65°04.6'	-37.0'	125.9°	64°28.6'	-38.5'	127.6°	63°51.3'	-39.8'	129.3°	4
5	66°42.6'	-31.6'	120.5°	66°11.3'	-33.5'	122.4°	65°38.3'	-35.2'	124.3°	65°03.7'	-36.8'	126.1°	64°27.6'	-38.3'	127.8°	63°50.2'	-39.7'	129.4°	63°11.5'	-41.0'	130.9°	5
6	66°11.0'	-33.3'	122.6°	65°37.8'	-35.0'	124.5°	65°03.1'	-36.6'	126.3°	64°26.9'	-38.1'	127.9°	63°49.3'	-39.5'	129.6°	63°10.5'	-40.8'	131.1°	62°30.5'	-42.0'	132.5°	6
7	65°37.7'	-34.9'	124.7°	65°02.8'	-36.5'	126.4°	64°26.5'	-38.0'	128.1°	63°48.8'	-39.4'	129.7°	63°09.8'	-40.7'	131.2°	62°29.7'	-41.9'	132.7°	61°48.5'	-43.0'	134.1°	7
8	65°02.8'	-36.3'	126.6°	64°26.3'	-37.8'	128.3°	63°48.5'	-39.2'	129.9°	63°09.4'	-40.5'	131.4°	62°29.1'	-41.7'	132.8°	61°47.8'	-42.9'	134.2°	61°05.5'	-43.9'	135.5°	8
9	64°26.5'	-37.7'	128.5°	63°48.5'	-39.1'	130.1°	63°09.3'	-40.4'	131.6°	62°28.9'	-41.6'	133.0°	61°47.4'	-42.7'	134.4°	61°05.0'	-43.8'	135.7°	60°21.6'	-44.7'	136.9°	9
10	63°48.8'	-39.0'	130.2°	63°09.4'	-40.3'	131.8°	62°28.9'	-41.5'	133.2°	61°47.3'	-42.6'	134.6°	61°04.7'	-43.6'	135.9°	60°21.2'	-44.6'	137.1°	59°36.8'	-45.5'	138.2°	10
11	63°09.8'	-40.1'	132.0°	62°29.1'	-41.3'	133.4°	61°47.4'	-42.5'	134.7°	61°04.7'	-43.5'	136.0°	60°21.1'	-44.5'	137.3°	59°36.6'	-45.4'	138.4°	58°51.3'	-46.2'	139.5°	11
12	62°29.7'	-41.2'	133.6°	61°47.8'	-42.3'	134.9°	61°05.0'	-43.4'	136.2°	60°21.2'	-44.4'	137.4°	59°36.6'	-45.3'	138.6°	58°51.2'	-46.1'	139.7°	58°05.1'	-46.9'	140.7°	12
13	61°48.5'	-42.2'	135.1°	61°05.5'	-43.3'	136.4°	60°21.6'	-44.2'	137.6°	59°36.8'	-45.1'	138.8°	58°51.3'	-46.0'	139.9°	58°05.1'	-46.8'	140.9°	57°18.2'	-47.5'	141.9°	13
14	61°06.3'	-43.2'	136.6°	60°22.2'	-44.1'	137.8°	59°37.3'	-45.0'	139.0°	58°51.7'	-45.9'	140.1°	58°05.3'	-46.7'	141.1°	57°18.3'	-47.4'	142.1°	56°30.7'	-48.1'	143.0°	14
15	60°23.1'	-44.0'	138.0°	59°38.1'	-44.9'	139.2°	58°52.3'	-45.8'	140.3°	58°05.8'	-46.6'	141.3°	57°18.6'	-47.3'	142.3°	56°30.9'	-48.0'	143.2°	55°42.5'	-48.6'	144.1°	15
16	59°39.1'	-44.8'	139.4°	58°53.1'	-45.7'	140.5°	58°06.5'	-46.5'	141.5°	57°19.2'	-47.2'	142.5°	56°31.3'	-47.9'	143.4°	55°42.9'	-48.5'	144.3°	54°53.9'	-49.1'	145.1°	16
17	58°54.2'	-45.6'	140.7°	58°07.5'	-46.4'	141.7°	57°20.0'	-47.1'	142.7°	56°32.0'	-47.8'	143.6°	55°43.4'	-48.4'	144.5°	54°54.3'	-49.0'	145.3°	54°04.8'	-49.6'	146.1°	17
18	58°08.7'	-46.3'	142.0°	57°21.1'	-47.0'	142.9°	56°32.9'	-47.7'	143.8°	55°44.2'	-48.3'	144.7°	54°55.0'	-48.9'	145.5°	54°05.3'	-49.5'	146.3°	53°15.2'	-50.0'	147.1°	18
19	57°22.4'	-46.9'	143.1°	56°34.1'	-47.6'	144.1°	55°45.2'	-48.3'	144.9°	54°55.9'	-48.9'	145.7°	54°06.1'	-49.4'	146.5°	53°15.8'	-50.0'	147.3°	52°25.1'	-50.4'	148.0°	19
20	56°35.4'	-47.5'	144.3°	55°46.5'	-48.2'	145.2°	54°57.0'	-48.8'	146.0°	54°07.0'	-49.3'	146.7°	53°16.6'	-49.9'	147.5°	52°25.8'	-50.4'	148.2°	51°34.7'	-50.8'	148.9°	20
21	55°47.9'	-48.1'	145.4°	54°58.3'	-48.7'	146.2°	54°08.2'	-49.3'	147.0°	53°17.7'	-49.8'	147.7°	52°26.8'	-50.3'	148.4°	51°35.5'	-50.7'	149.1°	50°43.8'	-51.2'	149.7°	21
22	54°59.8'	-48.6'	146.4°	54°09.6'	-49.2'	147.2°	53°18.9'	-49.7'	147.9°	52°27.9'	-50.2'	148.6°	51°36.5'	-50.7'	149.3°	50°44.7'	-51.1'	149.9°	49°52.7'	-51.5'	150.5°	22
23	54°11.2'	-49.1'	147.4°	53°20.4'	-49.6'	148.2°	52°29.2'	-50.1'	148.9°	51°37.7'	-50.6'	149.5°	50°45.8'	-51.0'	150.1°	49°53.6'	-51.4'	150.7°	49°01.1'	-51.8'	151.3°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	7			8			9			10			11			12			13			

20° 340° LHA

Latitude CONTRARY to DECLINATION

20° 340° LHA

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

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

19° 341° LHA

Latitude CONTRARY to Declination

19° 341° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	69°47.7'	-22.4'	109.5°	69°26.5'	-24.9'	112.0°	69°02.9'	-27.3'	114.4°	68°36.9'	-29.6'	116.8°	68°08.9'	-31.7'	119.0°	67°38.8'	-33.7'	121.1°	67°06.9'	-35.5'	123.2°	0
1	69°25.3'	-24.8'	112.2°	69°01.6'	-27.1'	114.6°	68°35.5'	-29.4'	116.9°	68°07.3'	-31.5'	119.1°	67°37.2'	-33.5'	121.2°	67°05.1'	-35.3'	123.3°	66°31.4'	-37.0'	125.2°	1
2	69°00.6'	-27.0'	114.7°	68°34.4'	-29.2'	117.0°	68°06.1'	-31.3'	119.3°	67°35.8'	-33.3'	121.4°	67°03.7'	-35.2'	123.4°	66°29.8'	-36.9'	125.3°	65°54.3'	-38.5'	127.2°	2
3	68°33.7'	-29.1'	117.2°	68°05.2'	-31.2'	119.4°	67°34.8'	-33.1'	121.5°	67°02.5'	-35.0'	123.5°	66°28.5'	-36.7'	125.5°	65°52.9'	-38.3'	127.3°	65°15.9'	-39.8'	129.0°	3
4	68°04.6'	-31.0'	119.6°	67°34.0'	-33.0'	121.7°	67°01.6'	-34.8'	123.7°	66°27.5'	-36.5'	125.6°	65°51.8'	-38.1'	127.4°	65°14.7'	-39.6'	129.1°	64°36.1'	-41.0'	130.8°	4
5	67°33.6'	-32.8'	121.8°	67°01.0'	-34.7'	123.8°	66°26.8'	-36.4'	125.7°	65°51.0'	-38.0'	127.6°	65°13.7'	-39.4'	129.3°	64°35.0'	-40.8'	130.9°	63°55.1'	-42.1'	132.5°	5
6	67°00.8'	-34.5'	124.0°	66°26.4'	-36.2'	125.9°	65°50.4'	-37.8'	127.7°	65°13.0'	-39.3'	129.4°	64°34.3'	-40.7'	131.1°	63°54.2'	-41.9'	132.6°	63°13.1'	-43.1'	134.1°	6
7	66°26.2'	-36.1'	126.1°	65°50.2'	-37.7'	127.9°	65°12.6'	-39.2'	129.6°	64°33.7'	-40.5'	131.2°	63°53.6'	-41.8'	132.7°	63°12.3'	-43.0'	134.2°	62°29.9'	-44.1'	135.6°	7
8	65°50.2'	-37.5'	128.0°	65°12.5'	-39.0'	129.7°	64°33.5'	-40.4'	131.4°	63°53.2'	-41.7'	132.9°	63°11.8'	-42.8'	134.4°	62°29.3'	-43.9'	135.7°	61°45.9'	-44.9'	137.0°	8
9	65°12.6'	-38.9'	129.9°	64°33.5'	-40.3'	131.5°	63°53.1'	-41.5'	133.1°	63°11.5'	-42.7'	134.5°	62°29.0'	-43.8'	135.9°	61°45.4'	-44.8'	137.2°	61°00.9'	-45.8'	138.4°	9
10	64°33.7'	-40.1'	131.7°	63°53.2'	-41.4'	133.2°	63°11.5'	-42.6'	134.7°	62°28.8'	-43.7'	136.1°	61°45.2'	-44.7'	137.4°	61°00.6'	-45.6'	138.6°	60°15.2'	-46.5'	139.7°	10
11	63°53.6'	-41.3'	133.4°	63°11.8'	-42.5'	134.9°	62°29.0'	-43.6'	136.2°	61°45.2'	-44.6'	137.5°	61°00.5'	-45.5'	138.7°	60°15.0'	-46.4'	139.9°	59°28.7'	-47.2'	141.0°	11
12	63°12.3'	-42.4'	135.1°	62°29.3'	-43.4'	136.4°	61°45.4'	-44.5'	137.7°	61°00.6'	-45.4'	138.9°	60°15.0'	-46.3'	140.1°	59°28.6'	-47.1'	141.2°	58°41.5'	-47.8'	142.2°	12
13	62°29.9'	-43.3'	136.6°	61°45.9'	-44.4'	137.9°	61°00.9'	-45.3'	139.1°	60°15.2'	-46.2'	140.3°	59°28.7'	-47.0'	141.3°	58°41.5'	-47.7'	142.4°	57°53.7'	-48.4'	143.4°	13
14	61°46.6'	-44.3'	138.1°	61°01.5'	-45.2'	139.3°	60°15.6'	-46.1'	140.4°	59°29.0'	-46.9'	141.5°	58°41.7'	-47.6'	142.6°	57°53.8'	-48.3'	143.5°	57°05.2'	-49.0'	144.5°	14
15	61°02.4'	-45.1'	139.5°	60°16.3'	-46.0'	140.6°	59°29.6'	-46.8'	141.7°	58°42.2'	-47.5'	142.7°	57°54.1'	-48.2'	143.7°	57°05.4'	-48.9'	144.6°	56°16.2'	-49.5'	145.5°	15
16	60°17.3'	-45.9'	140.8°	59°30.4'	-46.7'	141.9°	58°42.8'	-47.4'	142.9°	57°54.6'	-48.1'	143.9°	57°05.9'	-48.8'	144.8°	56°16.6'	-49.4'	145.7°	55°26.8'	-50.0'	146.5°	16
17	59°31.4'	-46.6'	142.1°	58°43.7'	-47.3'	143.1°	57°55.4'	-48.0'	144.1°	57°06.5'	-48.7'	145.0°	56°17.1'	-49.3'	145.9°	55°27.2'	-49.9'	146.7°	54°36.8'	-50.4'	147.5°	17
18	58°44.8'	-47.3'	143.4°	57°56.3'	-48.0'	144.3°	57°07.3'	-48.6'	145.2°	56°17.8'	-49.2'	146.1°	55°27.8'	-49.8'	146.9°	54°37.3'	-50.3'	147.7°	53°46.4'	-50.8'	148.4°	18
19	57°57.5'	-47.9'	144.5°	57°08.4'	-48.5'	145.4°	56°18.7'	-49.1'	146.3°	55°28.6'	-49.7'	147.1°	54°38.0'	-50.2'	147.9°	53°46.9'	-50.7'	148.6°	52°55.5'	-51.2'	149.3°	19
20	57°09.6'	-48.5'	145.7°	56°19.8'	-49.1'	146.5°	55°29.6'	-49.6'	147.3°	54°38.8'	-50.2'	148.1°	53°47.7'	-50.7'	148.8°	52°56.2'						

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

18° 342° LHA

Latitude CONTRARY to Declination

18° 342° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	70°43.7'	-23.4'	110.6°	70°21.4'	-26.0'	113.2°	69°56.5'	-28.5'	115.7°	69°29.4'	-30.8'	118.1°	69°00.0'	-32.9'	120.4°	68°28.7'	-34.9'	122.6°	67°55.4'	-36.7'	124.7°	0
1	70°20.3'	-25.9'	113.3°	69°55.3'	-28.3'	115.8°	69°28.1'	-30.6'	118.2°	68°58.6'	-32.7'	120.5°	68°27.1'	-34.7'	122.7°	67°53.8'	-36.5'	124.8°	67°18.7'	-38.2'	126.8°	1
2	69°54.4'	-28.1'	116.0°	69°27.0'	-30.4'	118.4°	68°57.5'	-32.6'	120.7°	68°25.9'	-34.5'	122.9°	67°52.4'	-36.4'	124.9°	67°17.2'	-38.1'	126.9°	66°40.4'	-39.6'	128.7°	2
3	69°26.3'	-30.3'	118.5°	68°56.6'	-32.4'	120.8°	68°24.9'	-34.4'	123.0°	67°51.3'	-36.2'	125.0°	67°16.0'	-37.9'	127.0°	66°39.1'	-39.5'	128.9°	66°00.8'	-40.9'	130.6°	3
4	68°56.0'	-32.3'	121.0°	68°24.2'	-34.2'	123.1°	67°50.5'	-36.1'	125.2°	67°15.1'	-37.8'	127.1°	66°38.1'	-39.3'	129.0°	65°59.7'	-40.8'	130.7°	65°19.8'	-42.1'	132.4°	4
5	68°23.8'	-34.1'	123.3°	67°50.0'	-35.9'	125.3°	67°14.4'	-37.6'	127.3°	66°37.3'	-39.2'	129.1°	65°58.8'	-40.6'	130.9°	65°18.9'	-42.0'	132.5°	64°37.7'	-43.2'	134.1°	5
6	67°49.7'	-35.8'	125.5°	67°14.0'	-37.5'	127.4°	66°36.8'	-39.1'	129.3°	65°58.1'	-40.5'	131.0°	65°18.1'	-41.8'	132.6°	64°36.9'	-43.1'	134.2°	63°54.5'	-44.2'	135.7°	6
7	67°13.9'	-37.4'	127.6°	66°36.6'	-38.9'	129.4°	65°57.8'	-40.4'	131.2°	65°17.6'	-41.7'	132.8°	64°36.3'	-43.0'	134.3°	63°53.8'	-44.1'	135.8°	63°10.3'	-45.1'	137.2°	7
8	66°36.6'	-38.8'	129.6°	65°57.6'	-40.2'	131.3°	65°17.4'	-41.6'	132.9°	64°35.9'	-42.8'	134.5°	63°53.3'	-44.0'	135.9°	63°09.7'	-45.0'	137.3°	62°25.1'	-46.0'	138.6°	8
9	65°57.8'	-40.1'	131.5°	65°17.4'	-41.5'	133.1°	64°35.8'	-42.7'	134.6°	63°53.1'	-43.8'	136.1°	63°09.4'	-44.9'	137.5°	62°24.7'	-45.9'	138.8°	61°39.1'	-46.8'	140.0°	9
10	65°17.6'	-41.4'	133.3°	64°35.9'	-42.6'	134.8°	63°53.1'	-43.7'	136.3°	63°09.3'	-44.8'	137.6°	62°24.5'	-45.8'	138.9°	61°38.8'	-46.7'	140.1°	60°52.4'	-47.5'	141.3°	10
11	64°36.3'	-42.5'	135.0°	63°53.3'	-43.6'	136.4°	63°09.4'	-44.7'	137.8°	62°24.5'	-45.7'	139.1°	61°38.7'	-46.6'	140.3°	60°52.2'	-47.4'	141.5°	60°04.9'	-48.2'	142.5°	11
12	63°53.8'	-43.5'	136.6°	63°09.7'	-44.6'	138.0°	62°24.7'	-45.6'	139.3°	61°38.8'	-46.4'	140.5°	60°52.2'	-47.3'	141.6°	60°04.8'	-48.1'	142.7°	59°16.7'	-48.8'	143.7°	12
13	63°10.3'	-44.5'	138.2°	62°25.1'	-45.5'	139.4°	61°39.1'	-46.4'	140.6°	60°52.4'	-47.2'	141.8°	60°04.9'	-48.0'	142.9°	59°16.7'	-48.7'	143.9°	58°27.9'	-49.3'	144.9°	13
14	62°25.8'	-45.4'	139.6°	61°39.7'	-46.3'	140.8°	60°52.8'	-47.1'	142.0°	60°05.2'	-47.9'	143.0°	59°16.9'	-48.6'	144.1°	58°28.0'	-49.2'	145.0°	57°38.6'	-49.9'	145.9°	14
15	61°40.4'	-46.2'	141.0°	60°53.4'	-47.0'	142.2°	60°05.7'	-47.8'	143.2°	59°17.3'	-48.5'	144.2°	58°28.3'	-49.2'	145.2°	57°38.8'	-49.8'	146.1°	56°48.7'	-50.3'	147.0°	15
16	60°54.3'	-46.9'	142.3°	60°06.4'	-47.7'	143.4°	59°17.9'	-48.4'	144.4°	58°28.8'	-49.1'	145.4°	57°39.2'	-49.7'	146.3°	56°49.0'	-50.3'	147.1°	55°58.4'	-50.8'	147.9°	16
17	60°07.3'	-47.6'	143.6°	59°18.7'	-48.3'	144.6°	58°29.5'	-49.0'	145.6°	57°39.8'	-49.6'	146.5°	56°49.5'	-50.2'	147.3°	55°58.8'	-50.7'	148.1°	55°07.6'	-51.2'	148.9°	17
18	59°19.7'	-48.3'	144.8°	58°30.4'	-48.9'	145.8°	57°40.5'	-49.5'	146.7°	56°50.2'	-50.1'	147.5°	55°59.3'	-50.6'	148.3°	55°08.1'	-51.1'	149.1°	54°16.4'	-51.6'	149.8°	18
19	58°31.5'	-48.8'	146.0°	57°41.5'	-49.5'	146.9°	56°51.0'	-50.0'	147.7°	56°00.1'	-50.6'	148.5°	55°08.7'	-51.1'	149.3°	54°16.9'	-51.5'	150.0°	53°24.8'	-52.0'	150.6°	19
20	57°42.6'	-49.4'	147.1°	56°52.0'	-50.0'	147.9°	56°01.0'	-50.5'	148.7°	55°09.5'	-51.0'	149.5°	54°17.6'	-51.5'	150.2°	53°25.4'	-51.9'	150.8°	52°32.8'	-52.3'	151.5°	20
21	56°53.2'	-49.9'	148.1°	56°02.1'	-50.4'	148.9°	55°10.5'	-50.9'	149.7°	54°18.5'	-51.4'	150.4°	53°26.2'	-51.8'	151.0°	52°33.5'	-52.2'	151.7°	51°40.6'	-52.6'	152.3°	21
22	56°03.3'	-50.4'	149.1°	55°11.6'	-50.9'	149.9°	54°19.5'	-51.3'	150.6°	53°27.1'	-51.8'	151.2°	52°34.4'	-52.2'	151.9°	51°41.3'	-52.5'	152.5°	50°48.0'	-52.9'	153.0°	22
23	55°13.0'	-50.8'	150.1°	54°20.8'	-51.3'	150.8°	53°28.2'	-51.7'	151.5°	52°35.4'	-52.1'	152.1°	51°42.2'	-52.5'	152.7°	50°48.8'	-52.8'	153.2°	49°55.1'	-53.2'	153.8°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	7			8			9			10			11			12			13			Dec°

18° 342° LHA

Latitude CONTRARY to DECLINATION

18° 342° LHA

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

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

17° 343° LHA

Latitude CONTRARY to Declination

17° 343° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	71°39.2'	-24.5'	111.7°	71°15.7'	-27.2'	114.5°	70°49.6'	-29.7'	117.1°	70°21.1'	-32.0'	119.6°	69°50.4'	-34.2'	122.0°	69°17.6'	-36.2'	124.2°	68°43.0'	-38.0'	126.3°	0
1	71°14.7'	-27.1'	114.6°	70°48.5'	-29.6'	117.2°	70°19.9'	-31.9'	119.7°	69°49.1'	-34.0'	122.1°	69°16.2'	-36.0'	124.3°	68°41.5'	-37.8'	126.4°	68°05.0'	-39.5'	128.4°	1
2	70°47.6'	-29.4'	117.3°	70°19.0'	-31.7'	119.8°	69°48.0'	-33.9'	122.2°	69°15.1'	-35.8'	124.4°	68°40.2'	-37.7'	126.6°	68°03.7'	-39.4'	128.6°	67°25.5'	-40.9'	130.4°	2
3	70°18.3'	-31.6'	120.0°	69°47.2'	-33.7'	122.3°	69°14.2'	-35.7'	124.6°	68°39.2'	-37.5'	126.7°	68°02.6'	-39.2'	128.7°	67°24.3'	-40.7'	130.5°	66°44.6'	-42.2'	132.3°	3
4	69°46.7'	-33.6'	122.5°	69°13.5'	-35.6'	124.7°	68°38.5'	-37.4'	126.8°	68°01.7'	-39.1'	128.8°	67°23.4'	-40.6'	130.7°	66°43.6'	-42.0'	132.4°	66°02.4'	-43.3'	134.1°	4
5	69°13.1'	-35.4'	124.8°	68°38.0'	-37.2'	126.9°	68°01.1'	-38.9'	128.9°	67°22.6'	-40.5'	130.8°	66°42.7'	-41.9'	132.5°	66°01.5'	-43.2'	134.2°	65°19.1'	-44.4'	135.8°	5
6	68°37.7'	-37.1'	127.1°	68°00.7'	-38.8'	129.0°	67°22.2'	-40.3'	130.9°	66°42.2'	-41.8'	132.7°	66°00.9'	-43.1'	134.3°	65°18.3'	-44.3'	135.9°	64°34.7'	-45.4'	137.4°	6
7	68°00.6'	-38.7'	129.2°	67°21.9'	-40.2'	131.1°	66°41.8'	-41.6'	132.8°	66°00.4'	-42.9'	134.5°	65°17.8'	-44.1'	136.0°	64°34.1'	-45.2'	137.5°	63°49.4'	-46.2'	138.9°	7
8	67°21.9'	-40.1'	131.2°	66°41.7'	-41.5'	133.0°	66°00.2'	-42.8'	134.6°	65°17.5'	-44.0'	136.2°	64°33.7'	-45.1'	137.6°	63°48.9'	-46.1'	139.0°	63°03.1'	-47.1'	140.3°	8
9	66°41.8'	-41.4'	133.1°	66°00.2'	-42.7'	134.8°	65°17.4'	-43.9'	136.3°	64°33.5'	-45.0'	137.8°	63°48.5'	-46.0'	139.1°	63°02.7'	-46.9'	140.4°	62°16.1'	-47.8'	141.6°	9
10	66°00.4'	-42.6'	134.9°	65°17.5'	-43.8'	136.5°	64°33.5'	-44.9'	137.9°	63°48.4'	-45.9'	139.3°	63°02.5'	-46.8'	140.6°	62°15.8'	-47.7'	141.8°	61°28.3'	-48.5'	142.9°	10
11	65°17.8'	-43.7'	136.6°	64°33.7'	-44.8'	138.1°	63°48.5'	-45.8'	139.4°	63°02.5'	-46.7'	140.7°	62°15.7'	-47.6'	141.9°	61°28.1'	-48.4'	143.1°	60°39.8'	-49.1'	144.1°	11
12	64°34.1'	-44.7'	138.2°	63°48.9'	-45.7'	139.6°	63°02.7'	-46.7'	140.9°	62°15.8'	-47.5'	142.1°	61°28.1'	-48.3'	143.2°	60°39.7'	-49.0'	144.3°	59°50.7'	-49.7'	145.3°	12
13	63°49.4'	-45.6'	139.8°	63°03.1'	-46.6'	141.1°	62°16.1'	-47.4'	142.3°	61°28.3'	-48.2'	143.4°	60°39.8'	-48.9'	144.4°	59°50.7'	-49.6'	145.5°	59°01.0'	-50.2'	146.4°	13
14	63°03.7'	-46.5'	141.2°	62°16.6'	-47.3'	142.4°	61°28.6'	-48.1'	143.6°	60°40.1'	-48.9'	144.6°	59°50.8'	-49.5'	145.6°	59°01.0'	-50.2'	146.6°	58°10.7'	-50.7'	147.5°	14
15	62°17.2'	-47.3'	142.6°	61°29.2'	-48.0'	143.7°	60°40.5'	-48.8'	144.8°	59°51.2'	-49.4'	145.8°	59°01.3'	-50.1'	146.7°	58°10.9'	-50.6'	147.6°	57°20.0'	-51.2'	148.5°	15
16	61°30.0'	-48.0'	143.9°	60°41.2'	-48.7'	145.0°	59°51.7'	-49.4'	146.0°	59°01.8'	-50.0'	146.9°	58°11.2'	-50.6'	147.8°	57°20.2'	-51.1'	148.6°	56°28.8'	-51.6'	149.4°	16
17	60°42.0'	-48.6'	145.2°	59°52.5'	-49.3'	146.1°	59°02.4'	-49.9'	147.1°	58°11.8'	-50.5'	148.0°	57°20.7'	-51.0'	148.8°	56°29.1'	-51.5'	149.6°	55°37.2'	-52.0'	150.3°	17
18	59°53.4'	-49.2'	146.3°	59°03.2'	-49.9'	147.3°	58°12.4'	-50.4'	148.1°	57°21.3'	-51.0'	149.0°	56°29.6'	-51.5'	149.8°	55°37.6'	-51.9'	150.5°	54°45.2'	-52.4'	151.2°	18
19	59°04.1'	-49.8'	147.5°	58°13.3'	-50.4'	148.3°	57°22.0'	-50.9'	149.2°	56°30.3'	-51.4'	149.9°	55°38.2'	-51.9'	150.7°	54°45.7'	-52.3'	151.4°	53°52.8'	-52.7'	152.0°	19
20	58°14.3'	-50.3'	148.5°	57°22.9'	-50.8'	149.4°	56°31.1'	-51.3'	150.1°	55°38.9'	-51.8'	150.9°	54°46.3'	-52.2'	151.6							

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

16° 344° LHA

Latitude CONTRARY to Declination

16° 344° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	72°34.3'	-25.8'	113.0°	72°09.5'	-28.5'	115.9°	71°42.0'	-31.1'	118.6°	71°12.1'	-33.4'	121.2°	70°39.9'	-35.5'	123.6°	70°05.7'	-37.5'	125.9°	69°29.5'	-39.3'	128.1°	0
1	72°08.5'	-28.4'	116.0°	71°41.0'	-30.9'	118.7°	71°11.0'	-33.2'	121.3°	70°38.7'	-35.4'	123.7°	70°04.4'	-37.4'	126.0°	69°28.2'	-39.2'	128.2°	68°50.2'	-40.8'	130.2°	1
2	71°40.2'	-30.8'	118.8°	71°10.1'	-33.1'	121.4°	70°37.7'	-35.2'	123.8°	70°03.3'	-37.2'	126.1°	69°27.0'	-39.0'	128.3°	68°49.0'	-40.7'	130.3°	68°09.4'	-42.2'	132.2°	2
3	71°09.5'	-33.0'	121.5°	70°37.0'	-35.1'	124.0°	70°02.5'	-37.1'	126.3°	69°26.1'	-38.9'	128.4°	68°48.0'	-40.5'	130.4°	68°08.3'	-42.0'	132.3°	67°27.2'	-43.4'	134.1°	3
4	70°36.5'	-35.0'	124.1°	70°01.9'	-37.0'	126.4°	69°25.4'	-38.8'	128.5°	68°47.2'	-40.4'	130.5°	68°07.4'	-41.9'	132.4°	67°26.3'	-43.3'	134.2°	66°43.8'	-44.5'	135.9°	4
5	70°01.5'	-36.8'	126.5°	69°24.9'	-38.6'	128.6°	68°46.6'	-40.3'	130.7°	68°06.8'	-41.8'	132.6°	67°25.5'	-43.2'	134.3°	66°43.0'	-44.4'	136.0°	65°59.2'	-45.6'	137.6°	5
6	69°24.7'	-38.5'	128.8°	68°46.3'	-40.2'	130.8°	68°06.3'	-41.7'	132.7°	67°25.0'	-43.1'	134.5°	66°42.3'	-44.3'	136.1°	65°58.5'	-45.5'	137.7°	65°13.7'	-46.5'	139.1°	6
7	68°46.2'	-40.1'	130.9°	68°06.1'	-41.6'	132.8°	67°24.7'	-42.9'	134.6°	66°41.9'	-44.2'	136.2°	65°58.0'	-45.3'	137.8°	65°13.1'	-46.4'	139.3°	64°27.2'	-47.4'	140.6°	7
8	68°06.1'	-41.5'	133.0°	67°24.6'	-42.8'	134.7°	66°41.7'	-44.1'	136.4°	65°57.7'	-45.2'	137.9°	65°12.7'	-46.3'	139.4°	64°26.7'	-47.3'	140.7°	63°39.8'	-48.1'	142.0°	8
9	67°24.7'	-42.7'	134.9°	66°41.7'	-44.0'	136.5°	65°57.6'	-45.1'	138.1°	65°12.5'	-46.2'	139.5°	64°26.4'	-47.2'	140.9°	63°39.4'	-48.0'	142.2°	62°51.7'	-48.8'	143.4°	9
10	66°41.9'	-43.9'	136.7°	65°57.7'	-45.0'	138.2°	65°12.5'	-46.1'	139.7°	64°26.3'	-47.1'	141.0°	63°39.2'	-47.9'	142.3°	62°51.4'	-48.7'	143.5°	62°02.8'	-49.5'	144.6°	10
11	65°58.0'	-45.0'	138.4°	65°12.7'	-46.0'	139.8°	64°26.4'	-47.0'	141.2°	63°39.2'	-47.9'	142.4°	62°51.3'	-48.7'	143.6°	62°02.7'	-49.4'	144.7°	61°13.3'	-50.1'	145.8°	11
12	65°13.1'	-45.9'	140.0°	64°26.7'	-46.9'	141.3°	63°39.4'	-47.8'	142.6°	62°51.4'	-48.6'	143.8°	62°02.7'	-49.3'	144.9°	61°13.2'	-50.0'	145.9°	60°23.3'	-50.6'	146.9°	12
13	64°27.2'	-46.8'	141.5°	63°39.8'	-47.7'	142.7°	62°51.7'	-48.5'	143.9°	62°02.8'	-49.2'	145.0°	61°13.3'	-49.9'	146.1°	60°23.3'	-50.5'	147.1°	59°32.6'	-51.1'	148.0°	13
14	63°40.3'	-47.6'	142.9°	62°52.1'	-48.4'	144.1°	62°03.2'	-49.2'	145.2°	61°13.6'	-49.8'	146.2°	60°23.4'	-50.5'	147.2°	59°32.7'	-51.1'	148.2°	58°41.5'	-51.6'	149.0°	14
15	62°52.7'	-48.4'	144.3°	62°03.7'	-49.1'	145.4°	61°14.0'	-49.8'	146.4°	60°23.7'	-50.4'	147.4°	59°32.9'	-51.0'	148.3°	58°41.6'	-51.5'	149.2°	57°49.9'	-52.0'	150.0°	15
16	62°04.4'	-49.0'	145.5°	61°14.6'	-49.7'	146.6°	60°24.2'	-50.3'	147.6°	59°33.3'	-50.9'	148.5°	58°42.0'	-51.4'	149.3°	57°50.1'	-51.9'	150.2°	56°57.9'	-52.4'	150.9°	16
17	61°15.4'	-49.6'	146.8°	60°24.9'	-50.3'	147.7°	59°33.9'	-50.8'	148.6°	58°42.4'	-51.4'	149.5°	57°50.5'	-51.9'	150.3°	56°58.2'	-52.3'	151.1°	56°05.5'	-52.8'	151.8°	17
18	60°25.7'	-50.2'	147.9°	59°34.6'	-50.8'	148.8°	58°43.1'	-51.3'	149.7°	57°51.0'	-51.8'	150.5°	56°58.6'	-52.3'	151.2°	56°05.9'	-52.7'	152.0°	55°12.7'	-53.1'	152.6°	18
19	59°35.5'	-50.7'	149.0°	58°43.8'	-51.3'	149.9°	57°51.7'	-51.8'	150.7°	56°59.2'	-52.2'	151.4°	56°06.4'	-52.6'	152.1°	55°13.1'	-53.0'	152.8°	54°19.6'	-53.4'	153.5°	19
20	58°44.8'	-51.2'	150.1°	57°52.6'	-51.7'	150.9°	56°60.0'	-52.2'	151.6°	56°07.0'	-52.6'	152.3°	55°13.7'	-53.0'	153.0°	54°20.1'	-53.4'	153.6°	53°26.2'	-53.7'	154.2°	20
21	57°53.5'	-51.7'	151.0°	57°00.9'	-52.1'	151.8°	56°07.8'	-52.5'	152.5°	55°14.4'	-52.9'	153.2°	54°20.7'	-53.3'	153.8°	53°26.8'	-53.6'	154.4°	52°32.5'	-54.0'	155.0°	21
22	57°01.9'	-52.1'	152.0°	56°08.7'	-52.5'	152.7°	55°15.3'	-52.9'	153.4°	54°21.5'	-53.2'	154.0°	53°27.4'	-53.6'	154.6°	52°33.1'	-53.9'	155.1°	51°38.6'	-54.2'	155.7°	22
23	56°09.8'	-52.4'	152.9°	55°16.3'	-52.8'	153.6°	54°22.4'	-53.2'	154.2°	53°28.2'	-53.5'	154.8°	52°33.8'	-53.9'	155.3°	51°39.2'	-54.2'	155.9°	50°44.3'	-54.4'	156.4°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	7			8			9			10			11			12			13			

16° 344° LHA

Latitude CONTRARY to DECLINATION

16° 344° LHA

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

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

15° 345° LHA

Latitude CONTRARY to Declination

15° 345° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	73°28.8'	-27.1'	114.5°	73°02.6'	-29.9'	117.4°	72°33.6'	-32.5'	120.3°	72°02.2'	-34.9'	122.9°	71°28.4'	-37.0'	125.5°	70°52.6'	-39.0'	127.8°	70°14.9'	-40.7'	130.0°	0
1	73°01.7'	-29.8'	117.6°	72°32.7'	-32.4'	120.4°	72°01.1'	-34.7'	123.0°	71°27.3'	-36.9'	125.5°	70°51.4'	-38.8'	127.9°	70°13.7'	-40.6'	130.1°	69°34.2'	-42.2'	132.2°	1
2	72°31.9'	-32.2'	120.5°	72°00.3'	-34.6'	123.1°	71°26.4'	-36.7'	125.6°	70°50.5'	-38.7'	128.0°	70°12.6'	-40.5'	130.2°	69°33.1'	-42.1'	132.2°	68°52.0'	-43.5'	134.2°	2
3	71°59.7'	-34.4'	123.3°	71°25.8'	-36.6'	125.8°	70°49.7'	-38.5'	128.1°	70°11.8'	-40.3'	130.3°	69°32.2'	-41.9'	132.3°	68°51.0'	-43.4'	134.2°	68°08.5'	-44.7'	136.0°	3
4	71°25.3'	-36.5'	125.9°	70°49.2'	-38.4'	128.2°	70°11.2'	-40.2'	130.4°	69°31.5'	-41.8'	132.4°	68°50.2'	-43.3'	134.3°	68°07.6'	-44.6'	136.1°	67°23.8'	-45.8'	137.8°	4
5	70°48.8'	-38.3'	128.3°	70°10.7'	-40.1'	130.5°	69°31.0'	-41.7'	132.5°	68°49.6'	-43.2'	134.4°	68°07.0'	-44.5'	136.2°	67°23.0'	-45.7'	137.9°	66°38.0'	-46.8'	139.5°	5
6	70°10.5'	-40.0'	130.6°	69°30.6'	-41.6'	132.7°	68°49.3'	-43.1'	134.6°	68°06.5'	-44.2'	136.3°	67°22.5'	-45.6'	138.0°	66°37.3'	-46.7'	139.6°	65°51.2'	-47.7'	141.0°	6
7	69°30.5'	-41.5'	132.8°	68°49.1'	-43.0'	134.7°	68°06.2'	-44.3'	136.5°	67°22.1'	-45.5'	138.1°	66°36.9'	-46.6'	139.7°	65°50.7'	-47.6'	141.1°	65°03.5'	-48.5'	142.5°	7
8	68°49.1'	-42.9'	134.8°	68°06.1'	-44.2'	136.6°	67°21.9'	-45.4'	138.2°	66°36.6'	-46.5'	139.8°	65°50.3'	-47.5'	141.2°	65°03.1'	-48.4'	142.6°	64°15.0'	-49.2'	143.8°	8
9	68°06.2'	-44.1'	136.7°	67°21.9'	-45.3'	138.4°	66°36.5'	-46.4'	139.9°	65°50.1'	-47.4'	141.4°	65°02.8'	-48.3'	142.7°	64°14.7'	-49.1'	144.0°	63°25.8'	-49.9'	145.1°	9
10	67°22.1'	-45.2'	138.5°	66°36.6'	-46.3'	140.1°	65°50.1'	-47.3'	141.5°	65°02.8'	-48.2'	142.8°	64°14.5'	-49.0'	144.1°	63°25.6'	-49.8'	145.3°	62°35.9'	-50.5'	146.4°	10
11	66°36.9'	-46.2'	140.2°	65°50.3'	-47.2'	141.6°	65°02.8'	-48.1'	143.0°	64°14.5'	-49.0'	144.2°	63°25.5'	-49.7'	145.4°	62°35.8'	-50.4'	146.5°	61°45.5'	-51.0'	147.5°	11
12	65°50.7'	-47.1'	141.8°	65°03.1'	-48.1'	143.1°	64°14.7'	-48.9'	144.4°	63°25.6'	-49.6'	145.5°	62°35.8'	-50.3'	146.6°	61°45.4'	-51.0'	147.7°	60°54.4'	-51.5'	148.6°	12
13	65°03.5'	-48.0'	143.3°	64°15.0'	-48.8'	144.5°	63°25.8'	-49.6'	145.7°	62°35.9'	-50.3'	146.8°	61°45.5'	-50.9'	147.8°	60°54.4'	-51.5'	148.8°	60°02.9'	-52.0'	149.7°	13
14	64°15.5'	-48.7'	144.7°	63°26.2'	-49.5'	145.8°	62°36.3'	-50.2'	146.9°	61°45.7'	-50.8'	147.9°	60°54.6'	-51.4'	148.9°	60°03.0'	-51.9'	149.8°	59°10.9'	-52.4'	150.6°	14
15	63°26.8'	-49.4'	146.0°	62°36.7'	-50.1'	147.1°	61°46.1'	-50.8'	148.1°	60°54.9'	-51.3'	149.1°	60°03.2'	-51.9'	149.9°	59°11.0'	-52.4'	150.8°	58°18.4'	-52.8'	151.6°	15
16	62°37.3'	-50.1'	147.2°	61°46.6'	-50.7'	148.3°	60°55.3'	-51.3'	149.2°	60°03.5'	-51.8'	150.1°	59°11.3'	-52.3'	150.9°	58°18.6'	-52.8'	151.7°	57°25.6'	-53.2'	152.5°	16
17	61°47.3'	-50.6'	148.4°	60°55.9'	-51.2'	149.4°	60°04.0'	-51.8'	150.3°	59°11.7'	-52.3'	151.1°	58°19.0'	-52.7'	151.9°	57°25.9'	-53.1'	152.6°	56°32.4'	-53.5'	153.3°	17
18	60°56.6'	-51.2'	149.5°	60°04.7'	-51.7'	150.4°	59°12.3'	-52.2'	151.3°	58°19.5'	-52.7'	152.0°	57°26.3'	-53.1'	152.8°	56°32.8'	-53.5'	153.5°	55°38.9'	-53.8'	154.1°	18
19	60°05.4'	-51.7'	150.6°	59°13.0'	-52.1'	151.4°	58°20.1'	-52.6'	152.2°	57°26.8'	-53.0'	152.9°	56°33.2'	-53.4'	153.6°	55°39.3'	-53.8'	154.3°	54°45.1'	-54.1'	154.9°	19
20	59°13.8'	-52.1'	151.6°	58°20.8'	-52.6'	152.4°	57°27.5'	-53.0'	153.1°	56°33.8'	-53.4'	153.8°	55°39.8'	-53.7'	154.5°							

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

14° 346° LHA

Latitude CONTRARY to Declination

14° 346° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	74°22.7'	-28.6'	116.0°	73°54.9'	-31.5'	119.2°	73°24.3'	-34.1'	122.1°	72°51.2'	-36.4'	124.9°	72°15.8'	-38.5'	127.4°	71°38.4'	-40.5'	129.8°	70°59.0'	-42.2'	132.1°	0
1	73°54.1'	-31.3'	119.3°	73°23.5'	-33.9'	122.2°	72°50.3'	-36.3'	124.9°	72°14.8'	-38.4'	127.5°	71°37.3'	-40.3'	129.9°	70°57.9'	-42.1'	132.1°	70°16.8'	-43.6'	134.2°	1
2	73°22.8'	-33.8'	122.3°	72°49.5'	-36.2'	125.0°	72°14.0'	-38.3'	127.6°	71°36.4'	-40.2'	130.0°	70°56.9'	-41.9'	132.2°	70°15.8'	-43.5'	134.3°	69°33.2'	-44.9'	136.2°	2
3	72°49.0'	-36.0'	125.1°	72°13.4'	-38.2'	127.7°	71°35.7'	-40.1'	130.1°	70°56.2'	-41.8'	132.3°	70°15.0'	-43.4'	134.4°	69°32.3'	-44.8'	136.3°	68°48.3'	-46.0'	138.1°	3
4	72°13.0'	-38.1'	127.8°	71°35.2'	-40.0'	130.2°	70°55.6'	-41.7'	132.4°	70°14.4'	-43.3'	134.5°	69°31.6'	-44.7'	136.4°	68°47.6'	-45.9'	138.2°	68°02.3'	-47.1'	139.8°	4
5	71°34.9'	-39.9'	130.3°	70°55.2'	-41.6'	132.5°	70°13.9'	-43.2'	134.6°	69°31.1'	-44.6'	136.5°	68°47.0'	-45.8'	138.2°	68°01.6'	-47.0'	139.9°	67°15.2'	-48.0'	141.4°	5
6	70°55.0'	-41.5'	132.6°	70°13.6'	-43.1'	134.7°	69°30.7'	-44.5'	136.6°	68°46.5'	-45.7'	138.3°	68°01.1'	-46.9'	140.0°	67°14.6'	-47.9'	141.5°	66°27.2'	-48.8'	143.0°	6
7	70°13.5'	-43.0'	134.8°	69°30.6'	-44.4'	136.7°	68°46.3'	-45.6'	138.5°	68°00.8'	-46.8'	140.1°	67°14.2'	-47.8'	141.6°	66°26.7'	-48.8'	143.1°	65°38.3'	-49.6'	144.4°	7
8	69°30.6'	-44.3'	136.8°	68°46.2'	-45.6'	138.6°	68°00.6'	-46.7'	140.2°	67°14.0'	-47.7'	141.8°	66°26.4'	-48.7'	143.2°	65°38.0'	-49.5'	144.5°	64°48.7'	-50.3'	145.7°	8
9	68°46.3'	-45.5'	138.7°	68°00.6'	-46.6'	140.3°	67°13.9'	-47.7'	141.9°	66°26.3'	-48.6'	143.3°	65°37.7'	-49.4'	144.6°	64°48.5'	-50.2'	145.9°	63°58.5'	-50.9'	147.0°	9
10	68°00.8'	-46.6'	140.5°	67°14.0'	-47.6'	142.0°	66°26.3'	-48.5'	143.4°	65°37.7'	-49.4'	144.7°	64°48.3'	-50.1'	146.0°	63°58.2'	-50.8'	147.1°	63°07.6'	-51.5'	148.2°	10
11	67°14.2'	-47.5'	142.1°	66°26.4'	-48.4'	143.5°	65°37.7'	-49.3'	144.9°	64°48.3'	-50.1'	146.1°	63°58.2'	-50.8'	147.2°	63°07.4'	-51.4'	148.3°	62°16.1'	-52.0'	149.3°	11
12	66°26.7'	-48.4'	143.7°	65°38.0'	-49.2'	145.0°	64°48.5'	-50.0'	146.2°	63°58.2'	-50.7'	147.4°	63°07.4'	-51.3'	148.4°	62°16.0'	-51.9'	149.4°	61°24.1'	-52.4'	150.4°	12
13	65°38.3'	-49.2'	145.1°	64°48.7'	-49.9'	146.4°	63°58.5'	-50.6'	147.5°	63°07.6'	-51.3'	148.6°	62°16.1'	-51.9'	149.6°	61°24.1'	-52.4'	150.5°	60°31.7'	-52.9'	151.4°	13
14	64°49.2'	-49.9'	146.5°	63°58.8'	-50.6'	147.6°	63°07.8'	-51.2'	148.7°	62°16.3'	-51.8'	149.7°	61°24.2'	-52.3'	150.6°	60°31.7'	-52.8'	151.5°	59°38.8'	-53.3'	152.3°	14
15	63°59.3'	-50.5'	147.8°	63°08.2'	-51.2'	148.9°	62°16.6'	-51.7'	149.8°	61°24.5'	-52.3'	150.8°	60°31.9'	-52.8'	151.6°	59°38.9'	-53.2'	152.5°	58°45.5'	-53.6'	153.2°	15
16	63°08.8'	-51.1'	149.0°	62°17.1'	-51.7'	150.0°	61°24.9'	-52.2'	150.9°	60°32.2'	-52.7'	151.8°	59°39.2'	-53.2'	152.6°	58°45.7'	-53.6'	153.4°	57°51.9'	-53.9'	154.1°	16
17	62°17.7'	-51.6'	150.2°	61°25.4'	-52.2'	151.1°	60°32.7'	-52.7'	151.9°	59°39.5'	-53.1'	152.7°	58°46.0'	-53.5'	153.5°	57°52.1'	-53.9'	154.2°	56°58.0'	-54.2'	154.9°	17
18	61°26.0'	-52.1'	151.2°	60°33.2'	-52.6'	152.1°	59°40.0'	-53.1'	152.9°	58°46.4'	-53.5'	153.7°	57°52.5'	-53.8'	154.4°	56°58.2'	-54.2'	155.0°	56°03.7'	-54.5'	155.7°	18
19	60°33.9'	-52.6'	152.3°	59°40.6'	-53.0'	153.1°	58°47.0'	-53.4'	153.8°	57°53.0'	-53.8'	154.5°	56°58.6'	-54.2'	155.2°	56°04.0'	-54.5'	155.8°	55°09.2'	-54.8'	156.4°	19
20	59°41.4'	-53.0'	153.2°	58°47.6'	-53.4'	154.0°	57°53.5'	-53.8'	154.7°	56°59.2'	-54.1'	155.3°	56°04.5'	-54.4'	156.0°	55°09.6'	-54.7'	156.6°	54°14.4'	-55.0'	157.1°	20
21	58°48.4'	-53.3'	154.1°	57°54.2'	-53.7'	154.8°	56°59.8'	-54.1'	155.5°	56°05.0'	-54.4'	156.1°	55°10.1'	-54.7'	156.7°	54°14.8'	-55.0'	157.3°	53°19.4'	-55.2'	157.8°	21
22	57°55.0'	-53.7'	155.0°	57°00.5'	-54.0'	155.7°	56°05.7'	-54.4'	156.3°	55°10.7'	-54.7'	156.9°	54°15.4'	-54.9'	157.4°	53°19.9'	-55.2'	157.9°	52°24.2'	-55.4'	158.4°	22
23	57°01.4'	-54.0'	155.9°	56°06.5'	-54.3'	156.5°	55°11.4'	-54.6'	157.0°	54°16.0'	-54.9'	157.6°	53°20.4'	-55.2'	158.1°	52°24.7'	-55.4'	158.6°	51°28.7'	-55.6'	159.0°	23
Dec°	7			8			9			10			11			12			13			Dec°

14° 346° LHA

Latitude CONTRARY to DECLINATION

14° 346° LHA

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

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

13° 347° LHA

Latitude CONTRARY to Declination

13° 347° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	75°15.8'	-30.2'	117.8°	74°46.3'	-33.1'	121.1°	74°14.0'	-35.7'	124.1°	73°39.1'	-38.1'	126.9°	73°01.9'	-40.2'	129.6°	72°22.7'	-42.0'	132.0°	71°41.7'	-43.7'	134.3°	0
1	74°45.5'	-33.0'	121.2°	74°13.2'	-35.6'	124.2°	73°38.2'	-38.0'	127.0°	73°01.0'	-40.1'	129.6°	72°21.7'	-41.9'	132.1°	71°40.7'	-43.6'	134.3°	70°58.0'	-45.1'	136.4°	1
2	74°12.5'	-35.5'	124.3°	73°37.6'	-37.8'	127.1°	73°00.3'	-39.9'	129.7°	72°21.0'	-41.8'	132.1°	71°39.8'	-43.5'	134.4°	70°57.1'	-45.0'	136.5°	70°12.9'	-46.3'	138.4°	2
3	73°37.1'	-37.7'	127.2°	72°59.7'	-39.8'	129.8°	72°20.3'	-41.7'	132.2°	71°39.1'	-43.4'	134.5°	70°56.3'	-44.9'	136.5°	70°12.1'	-46.2'	138.5°	69°26.6'	-47.4'	140.2°	3
4	72°59.4'	-39.7'	129.9°	72°19.9'	-41.6'	132.3°	71°38.6'	-43.3'	134.6°	70°55.4'	-44.7'	136.7°	70°11.0'	-46.0'	138.6°	69°25.4'	-47.2'	140.4°	68°38.6'	-48.2'	142.0°	4
5	72°19.6'	-41.5'	132.4°	71°38.3'	-43.2'	134.7°	70°55.4'	-44.7'	136.7°	70°10.7'	-45.9'	138.7°	69°25.0'	-47.1'	140.5°	68°38.1'	-48.2'	142.1°	67°50.3'	-49.2'	143.6°	5
6	71°38.1'	-43.1'	134.8°	70°55.1'	-44.6'	136.8°	70°10.7'	-45.9'	138.7°	69°25.0'	-47.1'	140.5°	68°38.1'	-48.2'	142.1°	67°50.3'	-49.2'	143.6°	67°01.6'	-50.0'	145.0°	6
7	70°55.0'	-44.5'	136.9°	70°10.5'	-45.8'	138.8°	69°24.7'	-47.0'	140.6°	68°37.9'	-48.1'	142.2°	67°50.0'	-49.1'	143.7°	67°01.2'	-49.9'	145.1°	66°11.5'	-50.7'	146.4°	7
8	70°10.5'	-45.8'	138.9°	69°24.7'	-47.0'	140.7°	68°37.7'	-48.0'	142.3°	67°49.7'	-49.0'	143.8°	67°00.9'	-49.9'	145.2°	66°11.2'	-50.6'	146.5°	65°20.8'	-51.4'	147.7°	8
9	69°24.7'	-46.9'	140.8°	68°37.7'	-48.0'	142.4°	67°49.7'	-48.9'	143.9°	67°00.7'	-49.8'	145.3°	66°11.0'	-50.6'	146.6°	65°20.6'	-51.3'	147.8°	64°29.5'	-51.9'	148.9°	9
10	68°37.9'	-47.9'	142.6°	67°49.7'	-48.9'	144.1°	67°00.7'	-49.7'	145.4°	66°10.9'	-50.5'	146.7°	65°20.4'	-51.2'	147.9°	64°29.3'	-51.9'	149.0°	63°37.5'	-52.4'	150.1°	10
11	67°50.0'	-48.8'	144.2°	67°00.9'	-49.7'	145.6°	66°11.0'	-50.4'	146.8°	65°20.4'	-51.2'	148.0°	64°29.2'	-51.8'	149.2°	63°37.4'	-52.4'	150.2°	62°45.1'	-52.9'	151.2°	11
12	67°01.2'	-49.6'	145.7°	66°11.2'	-50.4'	147.0°	65°20.6'	-51.1'	148.2°	64°29.3'	-51.7'	149.3°	63°37.4'	-52.3'	150.3°	62°45.0'	-52.8'	151.3°	61°52.2'	-53.3'	152.2°	12
13	66°11.5'	-50.3'	147.1°	65°20.8'	-51.0'	148.3°	64°29.5'	-51.7'	149.4°	63°37.5'	-52.3'	150.4°	62°45.1'	-52.8'	151.4°	61°52.2'	-53.3'	152.3°	60°58.9'	-53.7'	153.1°	13
14	65°21.2'	-51.0'	148.4°	64°29.8'	-51.6'	149.5°	63°37.8'	-52.2'	150.6°	62°45.3'	-52.7'	151.5°	61°52.3'	-53.2'	152.4°	60°58.9'	-53.7'	153.3°	60°05.2'	-54.1'	154.0°	14
15	64°30.2'	-51.6'	149.7°	63°38.1'	-52.2'	150.7°	62°45.6'	-52.7'	151.7°	61°52.5'	-53.2'	152.6°	60°59.1'	-53.6'	153.4°	60°05.3'	-54.0'	154.2°	59°11.1'	-54.4'	154.9°	15
16	63°38.6'	-52.1'	150.9°	62°46.0'	-52.6'	151.8°	61°52.9'	-53.1'	152.7°	60°59.4'	-53.6'	153.5°	60°05.5'	-54.0'	154.3°	59°11.3'	-54.3'	155.0°	58°16.7'	-54.7'	155.7°	16
17	62°46.5'	-52.6'	152.0°	61°53.3'	-53.1'	152.8°	60°59.8'	-53.5'	153.7°	60°05.8'	-53.9'	154.4°	59°11.5'	-54.3'	155.2°	58°16.9'	-54.6'	155.8°	57°22.0'	-55.0'	156.5°	17
18	61°53.9'	-53.0'	153.0°	61°00.3'	-53.5'	153.8°	60°06.2'	-53.9'	154.6°	59°11.9'	-54.3'	155.3°	58°17.2'	-54.6'	156.0°	57°22.3'	-54.9'	156.6°	56°27.1'	-55.2'	157.2°	18
19	61°00.9'	-53.4'	154.0°	60°06.8'	-53.8'	154.7°	59°12.4'	-54.2'	155.5°	58°17.6'	-54.6'	156.1°	57°22.6'	-54.9'	156.8°	56°27.4'	-55.2'	157.4°	55°31.9'	-55.4'	157.9°	19
20	60°07.4'	-53.8'	154.9°	59°12.9'	-54.2'	155.6°	58°18.1'	-54.5'	156.3°	57°23.1'	-54.8'	156.9°	56°27.8'	-55.1'	157.5°	55°32.2'	-55.4'	158.1°	54°36.4'	-55.6'	158.6°	20
21	59°13.6'	-54.1'	155.8°	58°18.7'	-54.5'	156.4°	57°23.6'	-54.8'	157.1°	56°28.2'	-55.1'	157.7°	55°32.6'									

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

12° 348° LHA

Latitude CONTRARY to Declination

12° 348° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	76°08.0'	-32.0'	119.8°	75°36.6'	-34.9'	123.2°	75°02.4'	-37.5'	126.4°	74°25.6'	-39.9'	129.2°	73°46.6'	-41.9'	131.9°	73°05.5'	-43.7'	134.4°	72°22.7'	-45.3'	136.6°	0
1	75°35.9'	-34.8'	123.3°	75°01.7'	-37.4'	126.4°	74°24.8'	-39.7'	129.3°	73°45.7'	-41.8'	132.0°	73°04.7'	-43.6'	134.4°	72°21.8'	-45.2'	136.7°	71°37.4'	-46.6'	138.7°	1
2	75°01.1'	-37.3'	126.5°	74°24.2'	-39.6'	129.4°	73°45.1'	-41.7'	132.0°	73°04.0'	-43.5'	134.5°	72°21.1'	-45.1'	136.7°	71°36.6'	-46.5'	138.8°	70°50.8'	-47.7'	140.7°	2
3	74°23.8'	-39.5'	129.5°	73°44.6'	-41.6'	132.1°	73°03.4'	-43.4'	134.6°	72°20.5'	-45.0'	136.8°	71°36.0'	-46.4'	138.9°	70°50.1'	-47.7'	140.8°	70°03.1'	-48.8'	142.5°	3
4	73°44.3'	-41.5'	132.2°	73°03.0'	-43.3'	134.6°	72°20.0'	-44.9'	136.9°	71°35.5'	-46.3'	138.9°	70°49.6'	-47.6'	140.8°	70°02.5'	-48.7'	142.6°	69°14.3'	-49.7'	144.2°	4
5	73°02.8'	-43.2'	134.7°	72°19.7'	-44.8'	137.0°	71°35.1'	-46.2'	139.0°	70°49.2'	-47.5'	140.9°	70°02.0'	-48.6'	142.7°	69°13.8'	-49.6'	144.3°	68°24.6'	-50.5'	145.7°	5
6	72°19.6'	-44.7'	137.1°	71°34.9'	-46.2'	139.1°	70°48.9'	-47.4'	141.0°	70°01.7'	-48.5'	142.7°	69°13.4'	-49.5'	144.3°	68°24.2'	-50.4'	145.8°	67°34.2'	-51.2'	147.2°	6
7	71°34.8'	-46.1'	139.2°	70°48.7'	-47.3'	141.1°	70°01.5'	-48.5'	142.8°	69°13.2'	-49.4'	144.4°	68°23.9'	-50.3'	145.9°	67°33.8'	-51.1'	147.3°	66°43.0'	-51.8'	148.5°	7
8	70°48.7'	-47.3'	141.2°	70°01.4'	-48.4'	142.9°	69°13.0'	-49.4'	144.5°	68°23.7'	-50.2'	146.1°	67°33.5'	-51.0'	147.5°	66°42.5'	-51.7'	148.7°	65°50.9'	-52.3'	149.9°	8
9	70°01.5'	-48.3'	143.1°	69°13.0'	-49.3'	144.6°	68°23.6'	-50.2'	146.1°	67°33.5'	-50.9'	147.6°	66°42.5'	-51.6'	148.8°	65°50.8'	-52.3'	150.0°	64°58.6'	-52.9'	151.0°	9
10	69°13.2'	-49.3'	144.8°	68°23.7'	-50.1'	146.2°	67°33.5'	-50.9'	147.6°	66°42.5'	-51.6'	148.8°	65°50.8'	-52.3'	150.0°	64°58.6'	-52.9'	151.0°	64°05.8'	-53.4'	152.0°	10
11	68°23.9'	-50.1'	146.3°	67°33.6'	-50.9'	147.7°	66°42.5'	-51.6'	148.9°	65°50.8'	-52.2'	150.1°	64°58.5'	-52.8'	151.2°	64°05.7'	-53.3'	152.1°	63°12.4'	-53.8'	153.1°	11
12	67°33.8'	-50.8'	147.8°	66°42.7'	-51.5'	149.0°	65°50.9'	-52.2'	150.2°	64°58.6'	-52.8'	151.3°	64°05.7'	-53.3'	152.3°	63°12.4'	-53.8'	153.2°	62°18.6'	-54.2'	154.0°	12
13	66°43.0'	-51.5'	149.2°	65°51.1'	-52.1'	150.3°	64°58.7'	-52.7'	151.4°	64°05.8'	-53.2'	152.4°	63°12.4'	-53.7'	153.3°	62°18.6'	-54.1'	154.2°	61°24.5'	-54.5'	155.0°	13
14	65°51.5'	-52.1'	150.4°	64°59.0'	-52.7'	151.5°	64°06.0'	-53.2'	152.5°	63°12.6'	-53.7'	153.4°	62°18.7'	-54.1'	154.3°	61°24.5'	-54.5'	155.1°	60°29.9'	-54.8'	155.8°	14
15	64°59.4'	-52.6'	151.6°	64°06.4'	-53.1'	152.6°	63°12.9'	-53.6'	153.5°	62°18.9'	-54.0'	154.4°	61°24.7'	-54.4'	155.2°	60°30.0'	-54.8'	155.9°	59°35.1'	-55.1'	156.6°	15
16	64°06.8'	-53.1'	152.8°	63°13.2'	-53.6'	153.7°	62°19.2'	-54.0'	154.5°	61°24.9'	-54.4'	155.3°	60°30.2'	-54.8'	156.1°	59°35.2'	-55.1'	156.7°	58°40.0'	-55.4'	157.4°	16
17	63°13.7'	-53.5'	153.8°	62°19.6'	-54.0'	154.7°	61°25.2'	-54.4'	155.4°	60°30.5'	-54.7'	156.2°	59°35.5'	-55.0'	156.9°	58°40.1'	-55.3'	157.5°	57°44.6'	-55.6'	158.1°	17
18	62°20.1'	-53.9'	154.8°	61°25.7'	-54.3'	155.6°	60°30.9'	-54.7'	156.3°	59°35.8'	-55.0'	157.0°	58°40.4'	-55.3'	157.6°	57°44.8'	-55.6'	158.3°	56°49.0'	-55.8'	158.8°	18
19	61°26.2'	-54.3'	155.7°	60°31.3'	-54.7'	156.5°	59°36.2'	-55.0'	157.1°	58°40.8'	-55.3'	157.8°	57°45.1'	-55.6'	158.4°	56°49.2'	-55.8'	158.9°	55°53.1'	-56.0'	159.5°	19
20	60°31.9'	-54.6'	156.6°	59°36.7'	-54.9'	157.3°	58°41.2'	-55.2'	157.9°	57°45.5'	-55.5'	158.5°	56°49.5'	-55.8'	159.1°	55°53.4'	-56.0'	159.6°	54°57.1'	-56.2'	160.1°	20
21	59°37.3'	-54.9'	157.4°	58°41.7'	-55.2'	158.1°	57°46.0'	-55.5'	158.4°	56°50.0'	-55.7'	159.2°	55°53.7'	-56.0'	159.7°	54°57.4'	-56.2'	160.2°	54°00.8'	-56.4'	160.7°	21
22	58°42.3'	-55.2'	158.2°	57°46.5'	-55.5'	158.8°	56°50.5'	-55.7'	159.4°	55°54.2'	-55.9'	159.9°	54°57.8'	-56.2'	160.4°	54°01.2'	-56.4'	160.8°	53°04.4'	-56.6'	161.3°	22
23	57°47.1'	-55.4'	159.0°	56°51.0'	-55.7'	159.5°	55°54.7'	-55.9'	160.0°	54°58.3'	-56.1'	160.5°	54°01.6'	-56.3'	161.0°	53°04.8'	-56.5'	161.4°	52°07.9'	-56.7'	161.8°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	7			8			9			10			11			12			13			

12° 348° LHA

Latitude CONTRARY to DECLINATION

12° 348° LHA

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

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

11° 349° LHA

Latitude CONTRARY to Declination

11° 349° LHA

Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	76°59.0'	-34.0'	122.1°	76°25.7'	-36.9'	125.6°	75°49.4'	-39.5'	128.8°	75°10.5'	-41.7'	131.8°	74°29.5'	-43.7'	134.5°	73°46.6'	-45.4'	136.9°	73°01.9'	-46.9'	139.2°	0
1	76°25.0'	-36.8'	125.7°	75°48.7'	-39.4'	128.9°	75°09.9'	-41.6'	131.8°	74°28.8'	-43.6'	134.5°	73°45.8'	-45.3'	137.0°	73°01.1'	-46.8'	139.2°	72°15.0'	-48.1'	141.3°	1
2	75°48.2'	-39.3'	129.0°	75°09.3'	-41.5'	131.9°	74°28.2'	-43.5'	134.6°	73°45.2'	-45.2'	137.0°	73°00.5'	-46.7'	139.3°	72°14.3'	-48.0'	141.3°	71°26.9'	-49.2'	143.2°	2
3	75°09.0'	-41.5'	132.0°	74°27.8'	-43.4'	134.7°	73°44.7'	-45.1'	137.1°	72°60.0'	-46.6'	139.3°	72°13.8'	-48.0'	141.4°	71°26.3'	-49.1'	143.2°	70°37.7'	-50.1'	144.9°	3
4	74°27.5'	-43.3'	134.7°	73°44.4'	-45.1'	137.2°	72°59.6'	-46.6'	139.4°	72°13.0'	-47.8'	141.5°	71°25.4'	-49.0'	143.4°	70°36.7'	-50.0'	145.1°	69°47.1'	-50.9'	146.6°	4
5	73°44.2'	-45.0'	137.3°	72°59.3'	-46.5'	139.5°	71°25.2'	-48.9'	143.4°	70°36.5'	-49.9'	145.1°	69°46.8'	-50.8'	146.7°	68°56.2'	-51.6'	148.1°	68°04.9'	-52.3'	149.4°	5
6	72°59.2'	-46.4'	139.6°	72°12.8'	-47.7'	141.6°	71°25.2'	-48.9'	143.4°	70°36.5'	-49.9'	145.1°	69°46.8'	-50.8'	146.7°	68°56.2'	-51.6'	148.1°	67°12.5'	-52.9'	150.7°	6
7	72°12.7'	-47.7'	141.7°	71°25.1'	-48.8'	143.5°	70°36.3'	-49.9'	145.2°	69°46.5'	-50.8'	146.8°	68°55.9'	-51.6'	148.2°	68°04.6'	-52.3'	149.5°	67°12.5'	-52.9'	150.7°	7
8	71°25.1'	-48.8'	143.6°	70°36.2'	-49.8'	145.3°	69°46.4'	-50.7'	146.9°	68°55.8'	-51.5'	148.3°	68°04.4'	-52.2'	149.6°	67°12.3'	-52.9'	150.8°	66°19.6'	-53.4'	151.9°	8
9	70°36.3'	-49.8'	145.4°	69°46.4'	-50.7'	147.0°	68°55.7'	-51.5'	148.4°	68°04.3'	-52.2'	149.7°	67°12.1'	-52.8'	150.9°	66°19.4'	-53.4'	152.0°	65°26.2'	-53.9'	153.0°	9
10	69°46.5'	-50.6'	147.1°	68°55.8'	-51.4'	148.5°	68°04.3'	-52.1'	149.8°	67°12.1'	-52.8'	151.0°	66°19.3'	-53.3'	152.1°	65°26.1'	-53.8'	153.1°	64°32.3'	-54.3'	154.1°	10
11	68°55.9'	-51.4'	148.6°	68°04.4'	-52.1'	149.9°	67°12.1'	-52.7'	151.1°	66°19.3'	-53.3'	152.2°	65°26.0'	-53.8'	153.2°	64°32.2'	-54.3'	154.2°	63°38.0'	-54.7'	155.1°	11
12	68°04.6'	-52.0'	150.0°	67°12.3'	-52.7'	151.2°	66°19.4'	-53.2'	152.3°	65°26.1'	-53.7'	153.3°	64°32.2'	-54.2'	154.3°	63°38.0'	-54.6'	155.1°	62°43.3'	-55.0'	156.0°	12
13	67°12.5'	-52.6'	151.3°	66°19.6'	-53.2'	152.4°	65°26.2'	-53.7'	153.4°	64°32.3'	-54.2'	154.4°	63°38.0'	-54.6'	155.3°	62°43.3'	-55.0'	156.1°	61°48.3'	-55.3'	156.8°	13
14	66°19.9'	-53.2'	152.5°	65°26.4'	-53.7'	153.5°	64°32.5'	-54.1'	154.5°	63°38.1'	-54.5'	155.4°	62°43.4'	-54.9'	156.2°	61°48.4'	-55.3'	156.9°	60°53.0'	-55.6'	157.6°	14
15	65°26.8'	-53.6'	153.7°	64°32.8'	-54.1'	154.6°	63°38.4'	-54.5'	155.5°	62°43.6'	-54.9'	156.3°	61°48.5'	-55.2'	157.0°	60°53.1'	-55.5'	157.7°	59°57.5'	-55.8'	158.4°	15
16	64°33.1'	-54.1'	154.7°	63°38.7'	-54.5'	155.6°	62°43.9'	-54.9'	156.4°	61°48.7'	-55.2'	157.2°	60°53.3'	-55.5'	157.9°	59°57.6'	-55.8'	158.5°	59°01.6'	-56.1'	159.1°	16
17	63°39.1'	-54.4'	155.7°	62°44.2'	-54.8'	156.5°	61°49.0'	-55.2'	157.3°	60°53.5'	-55.5'	158.0°	59°57.8'	-55.8'	158.6°	59°01.8'	-56.0'	159.2°	58°05.6'	-56.3'	159.8°	17
18	62°44.6'	-54.8'	156.7°	61°49.4'	-55.1'	157.4°	60°53.8'	-55.4'	158.1°	59°58.0'	-55.7'	158.7°	59°02.0'	-56.0'	159.3°	58°05.8'	-56.2'	159.9°	57°09.3'	-56.5'	160.5°	18
19	61°49.8'	-55.1'	157.5°	60°54.2'	-55.4'	158.2°	59°58.4'	-55.7'	158.9°	59°02.3'	-56.0'	159.5°	58°06.0'	-56.2'	160.0°	57°09.5'	-56.4'	160.6°	55°12.8'	-56.6'	161.1°	19
20	60°54.7'	-55.4'	158.4°	59°58.8'	-55.7'	159.0°	59°02.7'	-55.9'	159.6°	58°06.3'	-56.2'	160.2°	57°09.8'	-56.4'	160.7°	56°13.1'						

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

10° 350° LHA

Latitude CONTRARY to Declination

10° 350° LHA

Table with 13 columns (Dec, 7, 8, 9, 10, 11, 12, 13, Dec) and 24 rows of astronomical data including Hc, d, and Z values.

10° 350° LHA

Latitude CONTRARY to DECLINATION

10° 350° LHA

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

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

9° 351° LHA

Latitude CONTRARY to Declination

9° 351° LHA

Table with 13 columns (Dec, 7, 8, 9, 10, 11, 12, 13, Dec) and 24 rows of astronomical data including Hc, d, and Z values.

9° 351° LHA

Latitude CONTRARY to DECLINATION

9° 351° LHA

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

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

8° 352° LHA			Latitude CONTRARY to Declination												8° 352° LHA										
Dec°	7			8			9			10			11			12			13			Dec°			
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°				
0	79°23.0'	-41.2'	130.9°	78°42.3'	-43.9'	134.7°	77°58.8'	-46.1'	138.1°	77°13.2'	-47.9'	141.0°	76°25.7'	-49.5'	143.6°	75°36.6'	-50.8'	145.9°	74°46.3'	-51.9'	148.0°	0			
1	78°41.9'	-43.8'	134.8°	77°58.4'	-46.0'	138.1°	77°12.7'	-47.9'	141.0°	76°25.2'	-49.4'	143.7°	75°36.2'	-50.7'	146.0°	74°45.8'	-51.8'	148.0°	73°54.4'	-52.7'	149.9°	1			
2	77°58.1'	-45.9'	138.1°	77°12.4'	-47.8'	141.1°	76°24.9'	-49.4'	143.7°	75°35.8'	-50.7'	146.0°	74°45.5'	-51.8'	148.1°	73°54.0'	-52.7'	149.9°	73°01.7'	-53.5'	151.5°	2			
3	77°12.2'	-47.7'	141.1°	76°24.6'	-49.3'	143.7°	75°35.5'	-50.6'	146.0°	74°45.2'	-51.7'	148.1°	73°53.7'	-52.6'	149.9°	73°01.4'	-53.4'	151.6°	72°08.2'	-54.1'	153.1°	3			
4	76°24.4'	-49.2'	143.8°	75°35.3'	-50.6'	146.1°	74°44.9'	-51.7'	148.1°	73°53.5'	-52.6'	150.0°	73°01.1'	-53.4'	151.6°	72°07.9'	-54.1'	153.1°	71°14.1'	-54.7'	154.4°	4			
5	75°35.2'	-50.5'	146.2°	74°44.8'	-51.6'	148.2°	73°53.3'	-52.5'	150.0°	73°00.9'	-53.3'	151.7°	72°07.7'	-54.0'	153.1°	71°13.8'	-54.6'	154.5°	70°19.4'	-55.1'	155.7°	5			
6	74°44.7'	-51.6'	148.3°	73°53.2'	-52.5'	150.1°	73°00.7'	-53.3'	151.7°	72°07.5'	-54.0'	153.2°	71°13.7'	-54.6'	154.5°	70°19.2'	-55.1'	155.7°	69°24.3'	-55.6'	156.8°	6			
7	73°53.1'	-52.5'	150.2°	73°00.7'	-53.3'	151.8°	72°07.4'	-54.0'	153.3°	71°13.5'	-54.6'	154.6°	70°19.1'	-55.1'	155.8°	69°24.1'	-55.5'	156.9°	68°28.7'	-55.9'	157.9°	7			
8	73°00.7'	-53.2'	151.9°	72°07.4'	-53.9'	153.3°	71°13.5'	-54.5'	154.6°	70°19.0'	-55.0'	155.8°	69°24.0'	-55.5'	156.9°	68°28.6'	-55.9'	157.9°	67°32.8'	-56.2'	158.8°	8			
9	72°07.4'	-53.9'	153.4°	71°13.5'	-54.5'	154.7°	70°18.9'	-55.0'	155.9°	69°23.9'	-55.4'	157.1°	68°28.5'	-55.9'	158.0°	67°32.7'	-56.2'	158.9°	66°36.5'	-56.5'	159.7°	9			
10	71°13.5'	-54.5'	154.8°	70°19.0'	-55.0'	156.0°	69°23.9'	-55.4'	157.1°	68°28.5'	-55.8'	158.1°	67°32.6'	-56.2'	159.0°	66°36.5'	-56.5'	159.8°	65°40.0'	-56.8'	160.6°	10			
11	70°19.1'	-55.0'	156.1°	69°24.0'	-55.4'	157.2°	68°28.5'	-55.8'	158.1°	67°32.6'	-56.2'	159.0°	66°36.4'	-56.5'	159.9°	65°40.0'	-56.8'	160.6°	64°43.2'	-57.0'	161.3°	11			
12	69°24.1'	-55.4'	157.2°	68°28.6'	-55.8'	158.2°	67°32.7'	-56.1'	159.1°	66°36.5'	-56.5'	159.9°	65°40.0'	-56.7'	160.7°	64°43.2'	-57.0'	161.4°	63°46.2'	-57.2'	162.1°	12			
13	68°28.7'	-55.8'	158.3°	67°32.8'	-56.1'	159.2°	66°36.5'	-56.4'	160.0°	65°40.0'	-56.7'	160.8°	64°43.2'	-57.0'	161.5°	63°46.2'	-57.2'	162.1°	62°49.0'	-57.4'	162.7°	13			
14	67°33.0'	-56.1'	159.3°	66°36.7'	-56.4'	160.1°	65°40.1'	-56.7'	160.9°	64°43.3'	-56.9'	161.6°	63°46.3'	-57.2'	162.2°	62°49.1'	-57.4'	162.8°	61°51.7'	-57.5'	163.4°	14			
15	66°36.9'	-56.4'	160.2°	65°40.3'	-56.7'	161.0°	64°43.4'	-56.9'	161.6°	63°46.4'	-57.1'	162.3°	62°49.1'	-57.3'	162.9°	61°51.7'	-57.5'	163.4°	60°54.1'	-57.7'	164.0°	15			
16	65°40.5'	-56.7'	161.0°	64°43.6'	-56.9'	161.7°	63°46.5'	-57.1'	162.4°	62°49.2'	-57.3'	163.0°	61°51.8'	-57.5'	163.5°	60°54.2'	-57.7'	164.0°	59°56.4'	-57.8'	164.5°	16			
17	64°43.8'	-56.9'	161.8°	63°46.7'	-57.1'	162.5°	62°49.4'	-57.3'	163.1°	61°51.9'	-57.5'	163.6°	60°54.3'	-57.7'	164.1°	59°56.5'	-57.8'	164.6°	58°58.6'	-57.9'	165.0°	17			
18	63°46.9'	-57.1'	162.6°	62°49.6'	-57.3'	163.2°	61°52.1'	-57.5'	163.7°	60°54.4'	-57.6'	164.2°	59°56.6'	-57.8'	164.7°	58°58.7'	-57.9'	165.1°	58°00.7'	-58.1'	165.5°	18			
19	62°49.8'	-57.3'	163.3°	61°52.3'	-57.5'	163.8°	60°54.6'	-57.6'	164.3°	59°56.8'	-57.8'	164.8°	58°58.8'	-57.9'	165.2°	58°00.8'	-58.0'	165.6°	57°02.6'	-58.2'	166.0°	19			
20	61°52.6'	-57.4'	163.9°	60°54.8'	-57.6'	164.4°	59°57.0'	-57.8'	164.9°	58°59.0'	-57.9'	165.3°	58°00.9'	-58.0'	165.7°	57°02.7'	-58.1'	166.1°	56°04.4'	-58.2'	166.4°	20			
21	60°55.1'	-57.6'	164.5°	59°57.2'	-57.7'	165.0°	58°59.2'	-57.9'	165.4°	58°01.1'	-58.0'	165.8°	57°02.9'	-58.1'	166.2°	56°04.6'	-58.2'	166.6°	55°06.7'	-58.3'	166.9°	21			
22	59°57.5'	-57.7'	165.1°	58°59.5'	-57.9'	165.5°	58°01.3'	-58.0'	165.9°	57°03.1'	-58.1'	166.3°	56°04.8'	-58.2'	166.6°	55°06.9'	-58.3'	167.0°	54°07.9'	-58.4'	167.3°	22			
23	58°59.8'	-57.9'	165.6°	58°01.6'	-58.0'	166.0°	57°03.3'	-58.1'	166.4°	56°05.0'	-58.2'	166.7°	55°06.6'	-58.3'	167.1°	54°08.0'	-58.4'	167.4°	53°09.5'	-58.5'	167.7°	23			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	7			8			9			10			11			12			13						

8° 352° LHA Latitude CONTRARY to DECLINATION 8° 352° LHA

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

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

7° 353° LHA			Latitude CONTRARY to Declination												7° 353° LHA							
Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	80°06.7'	-44.0'	134.8°	79°23.1'	-46.4'	138.6°	78°37.0'	-48.5'	141.9°	77°48.8'	-50.1'	144.7°	76°59.1'	-51.4'	147.2°	76°08.0'	-52.5'	149.4°	75°15.8'	-53.5'	151.4°	0
1	79°22.7'	-46.4'	138.6°	78°36.6'	-48.4'	141.9°	77°48.5'	-50.0'	144.8°	76°58.7'	-51.4'	147.3°	76°07.7'	-52.5'	149.5°	75°15.5'	-53.4'	151.4°	74°22.4'	-54.2'	153.1°	1
2	78°36.4'	-48.3'	141.9°	77°48.2'	-50.0'	144.8°	76°58.5'	-51.3'	147.3°	76°07.4'	-52.4'	149.5°	75°15.2'	-53.4'	151.4°	74°22.0'	-54.2'	153.1°	73°28.2'	-54.8'	154.7°	2
3	77°48.1'	-49.9'	144.8°	76°58.3'	-51.3'	147.3°	76°07.1'	-52.4'	149.5°	75°14.9'	-53.3'	151.4°	74°21.8'	-54.1'	153.2°	73°27.9'	-54.8'	154.7°	72°33.3'	-55.3'	156.0°	3
4	76°58.1'	-51.2'	147.4°	76°07.0'	-52.4'	149.6°	75°14.7'	-53.3'	151.5°	74°21.6'	-54.1'	153.2°	73°27.7'	-54.7'	154.7°	72°33.1'	-55.3'	156.1°	71°38.0'	-55.8'	157.3°	4
5	76°06.9'	-52.3'	149.6°	75°14.6'	-53.3'	151.5°	74°21.4'	-54.0'	153.2°	73°27.5'	-54.7'	154.8°	72°32.9'	-55.3'	156.1°	71°37.8'	-55.8'	157.3°	70°46.2'	-56.2'	158.4°	5
6	75°14.5'	-53.2'	151.6°	74°21.3'	-54.0'	153.3°	73°27.4'	-54.7'	154.8°	72°32.8'	-55.2'	156.2°	71°37.7'	-55.7'	157.4°	70°42.0'	-56.1'	158.5°	69°42.0'	-56.5'	159.5°	6
7	74°21.3'	-54.0'	153.3°	73°27.3'	-54.6'	154.9°	72°32.7'	-55.2'	156.2°	71°37.6'	-55.7'	157.4°	70°41.9'	-56.1'	158.5°	69°45.9'	-56.5'	159.5°	68°49.5'	-56.8'	160.4°	7
8	73°27.3'	-54.6'	154.9°	72°32.7'	-55.2'	156.3°	71°37.5'	-55.7'	157.5°	70°41.9'	-56.1'	158.6°	69°45.8'	-56.5'	159.6°	68°49.4'	-56.8'	160.5°	67°52.7'	-57.1'	161.3°	8
9	72°32.7'	-55.2'	156.3°	71°37.5'	-55.6'	157.6°	70°41.8'	-56.1'	158.6°	69°45.8'	-56.4'	159.6°	68°49.4'	-56.8'	160.5°	67°52.6'	-57.0'	161.4°	66°55.7'	-57.3'	162.1°	9
10	71°37.6'	-55.6'	157.6°	70°41.9'	-56.0'	158.7°	69°45.8'	-56.4'	159.7°	68°49.3'	-56.7'	160.6°	67°52.6'	-57.0'	161.4°	66°55.6'	-57.3'	162.2°	65°58.4'	-57.5'	162.9°	10
11	70°41.9'	-56.0'	158.8°	69°45.8'	-56.4'	159.8°	68°49.4'	-56.7'	160.7°	67°52.6'	-57.0'	161.5°	66°55.6'	-57.2'	162.2°	65°58.3'	-57.5'	162.9°	65°00.9'	-57.7'	163.5°	11
12	69°45.9'	-56.4'	159.8°	68°49.4'	-56.7'	160.7°	67°52.6'	-57.0'	161.5°	66°55.6'	-57.2'	162.3°	65°58.3'	-57.4'	163.0°	65°00.9'	-57.6'	163.6°	64°03.2'	-57.8'	164.2°	12
13	68°49.5'	-56.7'	160.8°	67°52.7'	-57.0'	161.6°	66°55.7'	-57.2'	162.4°	65°58.4'	-57.4'	163.0°	65°00.9'	-57.6'	163.7°	64°03.2'	-57.8'	164.3°	63°05.4'	-58.0'	164.8°	13
14	67°52.8'	-56.9'	161.7°	66°55.8'	-57.2'	162.4°	65°58.4'	-57.4'	163.1°	65°00.9'	-57.6'	163.7°	64°03.3'	-57.8'	164.3°	63°05.4'	-58.0'	164.9°	62°07.4'	-58.1'	165.4°	14
15	66°55.9'	-57.2'	162.5°	65°58.6'	-57.4'	163.2°	65°01.0'	-57.6'	163.8°	64°03.3'	-57.8'	164.4°	63°05.5'	-57.9'	164.9°	62°07.5'	-58.1'	165.4°	61°09.3'	-58.2'	165.9°	15
16	65°58.7'	-57.4'	163.3°	65°01.2'	-57.6'	163.9°	64°03.4'	-57.8'	164.5°	63°05.5'	-57.9'	165.0°	62°07.5'	-58.1'	165.5°	61°09.4'	-58.2'	165.9°	60°11.1'	-58.3'	166.4°	16
17	65°01.3'	-57.6'	164.0°	64°03.6'	-57.8'	164.5°	63°05.7'	-57.9'	165.1°	62°07.6'	-58.1'	165.6°	61°09.5'	-58.2'	166.0°	60°11.2'	-58.3'	166.4°	59°12.8'	-58.4'	166.8°	17
18	64°03.7'	-57.7'	164.6°	63°05.8'	-57.9'	165.2°	62°07.8'	-58.0'	165.6°	61°09.6'	-58.2'	166.1°	60°11.3'	-58.3'	166.5°	59°12.9'	-58.4'	166.9°	58°14.4'	-58.5'	167.3°	18
19	63°06.0'	-57.9'	165.2°	62°07.9'	-58.0'	165.7°	61°09.7'	-58.2'	166.2°	60°11.4'	-58.3'	166.6°	59°13.0'	-58.4'	167.0°	58°14.5'	-58.5'	167.4°	57°15.9'	-58.6'	167.7°	19
20	62°08.1'	-58.0'	165.8°	61°09.9'	-58.1'	166.3°	60°11.6'	-58.3'	166.7°	59°13.1'	-58.4'	167.1°	58°14.6'	-58.5'	167.4°	57°16.0'	-58.6'	167.8°	56°17.3'	-58.6'	168.1°	20
21	61°10.1'	-58.1'	166.4°	60°11.7'	-58.3'	166.8°	59°13.3'	-58.4'	167.2°	58°14.8'	-58.5'	167.5°	57°16.1'	-58.6'	167.9°	56°17.4'	-58.					

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

6° 354° LHA			Latitude CONTRARY to Declination										6° 354° LHA									
Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	80°47.4'	-46.9'	139.2°	80°00.7'	-49.1'	142.9°	79°11.8'	-50.8'	146.1°	78°21.2'	-52.2'	148.8°	77°29.3'	-53.3'	151.2°	76°36.2'	-54.2'	153.2°	75°42.2'	-55.0'	155.0°	0
1	80°00.4'	-49.1'	143.0°	79°11.6'	-50.8'	146.1°	78°21.0'	-52.2'	148.8°	77°29.0'	-53.3'	151.2°	76°35.9'	-54.2'	153.2°	75°42.0'	-54.9'	155.0°	74°47.2'	-55.6'	156.5°	1
2	79°11.3'	-50.8'	146.2°	78°20.8'	-52.1'	148.9°	77°28.8'	-53.3'	151.2°	76°35.7'	-54.2'	153.2°	75°41.7'	-54.9'	155.0°	74°47.0'	-55.5'	156.5°	73°51.7'	-56.1'	157.9°	2
3	78°20.6'	-52.1'	148.9°	77°28.6'	-53.2'	151.2°	76°35.5'	-54.1'	153.2°	75°41.5'	-54.9'	155.0°	74°46.8'	-55.5'	156.6°	73°51.5'	-56.0'	157.9°	72°55.6'	-56.5'	159.2°	3
4	77°28.5'	-53.2'	151.3°	76°35.4'	-54.1'	153.3°	75°41.4'	-54.9'	155.0°	74°46.7'	-55.5'	156.6°	73°51.3'	-56.0'	158.0°	72°55.4'	-56.4'	159.2°	71°59.1'	-56.8'	160.3°	4
5	76°35.3'	-54.1'	153.3°	75°41.3'	-54.8'	155.1°	74°46.5'	-55.4'	156.6°	73°51.2'	-56.0'	158.0°	72°55.3'	-56.4'	159.2°	71°59.0'	-56.8'	160.3°	71°02.3'	-57.1'	161.3°	5
6	75°41.3'	-54.8'	155.1°	74°46.5'	-55.4'	156.7°	73°51.1'	-55.9'	158.1°	72°55.2'	-56.4'	159.3°	71°58.9'	-56.8'	160.4°	71°02.2'	-57.1'	161.3°	70°05.2'	-57.4'	162.2°	6
7	74°46.5'	-55.4'	156.7°	73°51.1'	-55.9'	158.1°	72°55.2'	-56.4'	159.3°	71°58.8'	-56.7'	160.4°	71°02.1'	-57.1'	161.4°	70°05.1'	-57.4'	162.3°	69°07.8'	-57.6'	163.1°	7
8	73°51.1'	-55.9'	158.2°	72°55.1'	-56.4'	159.4°	71°58.8'	-56.7'	160.5°	71°02.1'	-57.1'	161.4°	70°05.0'	-57.3'	162.4°	69°07.7'	-57.6'	163.2°	68°10.2'	-57.8'	163.9°	8
9	72°55.2'	-56.3'	159.4°	71°58.8'	-56.7'	160.5°	71°02.0'	-57.0'	161.5°	70°05.0'	-57.3'	162.4°	69°07.7'	-57.6'	163.2°	68°10.1'	-57.8'	163.9°	67°12.4'	-58.0'	164.5°	9
10	71°58.8'	-56.7'	160.6°	71°02.1'	-57.0'	161.5°	70°05.0'	-57.3'	162.4°	69°07.7'	-57.6'	163.2°	68°10.1'	-57.8'	163.9°	67°12.4'	-58.0'	164.6°	66°14.5'	-58.1'	165.2°	10
11	71°02.1'	-57.0'	161.6°	70°05.0'	-57.3'	162.5°	69°07.7'	-57.5'	163.3°	68°10.1'	-57.8'	164.0°	67°12.4'	-57.9'	164.7°	66°14.4'	-58.1'	165.3°	65°16.3'	-58.2'	166.0°	11
12	70°05.1'	-57.3'	162.5°	69°07.8'	-57.5'	163.3°	68°10.2'	-57.7'	164.0°	67°12.4'	-57.9'	164.7°	66°14.4'	-58.1'	165.3°	65°16.3'	-58.2'	165.9°	64°18.1'	-58.4'	166.4°	12
13	69°07.8'	-57.5'	163.4°	68°10.2'	-57.7'	164.1°	67°12.4'	-57.9'	164.8°	66°14.5'	-58.1'	165.4°	65°16.3'	-58.2'	165.9°	64°18.1'	-58.4'	166.4°	63°19.7'	-58.5'	166.9°	13
14	68°10.3'	-57.7'	164.2°	67°12.5'	-57.9'	164.8°	66°14.5'	-58.1'	165.4°	65°16.4'	-58.2'	166.0°	64°18.1'	-58.4'	166.5°	63°19.7'	-58.5'	166.9°	62°21.2'	-58.6'	167.4°	14
15	67°12.6'	-57.9'	164.9°	66°14.6'	-58.1'	165.5°	65°16.4'	-58.2'	166.0°	64°18.2'	-58.3'	166.5°	63°19.7'	-58.5'	167.0°	62°21.2'	-58.6'	167.4°	61°22.6'	-58.7'	167.8°	15
16	66°14.7'	-58.1'	165.6°	65°16.5'	-58.2'	166.1°	64°18.2'	-58.3'	166.6°	63°19.8'	-58.5'	167.1°	62°21.3'	-58.6'	167.5°	61°22.7'	-58.7'	167.9°	60°24.0'	-58.7'	168.3°	16
17	65°16.7'	-58.2'	166.2°	64°18.3'	-58.3'	166.7°	63°19.9'	-58.4'	167.1°	62°21.4'	-58.6'	167.6°	61°22.7'	-58.6'	168.0°	60°24.0'	-58.7'	168.3°	59°25.2'	-58.8'	168.7°	17
18	64°18.5'	-58.3'	166.7°	63°20.0'	-58.4'	167.2°	62°21.5'	-58.5'	167.6°	61°22.8'	-58.6'	168.0°	60°24.1'	-58.7'	168.4°	59°25.3'	-58.8'	168.7°	58°26.4'	-58.9'	169.1°	18
19	63°20.2'	-58.4'	167.3°	62°21.6'	-58.5'	167.7°	61°22.9'	-58.6'	168.1°	60°24.2'	-58.7'	168.5°	59°25.3'	-58.8'	168.8°	58°26.5'	-58.9'	169.1°	57°27.5'	-58.9'	169.4°	19
20	62°21.7'	-58.5'	167.8°	61°23.0'	-58.6'	168.2°	60°24.3'	-58.7'	168.5°	59°25.4'	-58.8'	168.9°	58°26.5'	-58.9'	169.2°	57°27.6'	-58.9'	169.5°	56°28.6'	-59.0'	169.8°	20
21	61°23.2'	-58.6'	168.2°	60°24.4'	-58.7'	168.6°	59°25.6'	-58.8'	169.0°	58°26.8'	-58.9'	169.3°	57°27.7'	-58.9'	169.5°	56°28.6'	-59.0'	169.8°	55°29.6'	-59.0'	170.1°	21
22	60°24.6'	-58.7'	168.7°	59°25.7'	-58.8'	169.0°	58°26.8'	-58.9'	169.3°	57°27.8'	-58.9'	169.6°	56°28.7'	-59.0'	169.9°	55°29.7'	-59.0'	170.1°	54°30.5'	-59.1'	170.4°	22
23	59°25.9'	-58.8'	169.1°	58°26.9'	-58.8'	169.4°	57°27.9'	-58.9'	169.7°	56°28.9'	-59.0'	170.0°	55°29.8'	-59.0'	170.2°	54°30.6'	-59.1'	170.5°	53°31.4'	-59.1'	170.7°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	7			8			9			10			11			12			13			

6° 354° LHA

Latitude CONTRARY to DECLINATION

6° 354° LHA

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

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

5° 355° LHA			Latitude CONTRARY to Declination										5° 355° LHA									
Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	81°24.2'	-50.0'	144.3°	80°34.5'	-51.8'	147.8°	79°42.9'	-53.2'	150.8°	78°49.9'	-54.3'	153.3°	77°55.8'	-55.1'	155.4°	77°00.8'	-55.8'	157.2°	76°05.2'	-56.4'	158.7°	0
1	80°34.3'	-51.8'	147.9°	79°42.7'	-53.2'	150.8°	78°49.7'	-54.2'	153.3°	77°55.6'	-55.1'	155.4°	77°00.7'	-55.8'	157.2°	76°05.0'	-56.4'	158.8°	75°08.8'	-56.8'	160.1°	1
2	79°42.5'	-53.1'	150.8°	78°49.5'	-54.2'	153.3°	77°55.4'	-55.1'	155.4°	77°00.5'	-55.8'	157.2°	76°04.9'	-56.3'	158.8°	75°08.7'	-56.8'	160.1°	74°12.0'	-57.2'	161.3°	2
3	78°49.4'	-54.2'	153.3°	77°55.3'	-55.0'	155.4°	77°00.4'	-55.7'	157.2°	76°04.7'	-56.3'	158.8°	75°08.5'	-56.8'	160.2°	74°11.9'	-57.2'	161.4°	73°14.9'	-57.5'	162.4°	3
4	77°55.3'	-55.0'	155.5°	77°00.3'	-55.7'	157.3°	76°04.6'	-56.3'	158.8°	75°08.4'	-56.7'	160.2°	74°11.7'	-57.1'	161.4°	73°14.6'	-57.4'	162.5°	72°17.3'	-57.7'	163.4°	4
5	77°00.2'	-55.7'	157.3°	76°04.6'	-56.3'	158.8°	75°08.3'	-56.7'	160.2°	74°11.6'	-57.1'	161.4°	73°14.6'	-57.4'	162.5°	72°17.2'	-57.7'	163.4°	71°19.6'	-57.9'	164.3°	5
6	76°04.5'	-56.2'	158.9°	75°08.3'	-56.7'	160.2°	74°11.6'	-57.1'	161.4°	73°14.6'	-57.4'	162.5°	72°17.2'	-57.7'	163.4°	71°19.6'	-57.9'	164.3°	70°21.7'	-58.1'	165.1°	6
7	75°08.3'	-56.7'	160.3°	74°11.6'	-57.1'	161.5°	73°14.5'	-57.4'	162.5°	72°17.1'	-57.7'	163.5°	71°19.5'	-57.9'	164.3°	70°21.6'	-58.1'	165.1°	69°23.5'	-58.3'	165.8°	7
8	74°11.6'	-57.1'	161.5°	73°14.5'	-57.4'	162.6°	72°17.1'	-57.7'	163.5°	71°19.5'	-57.9'	164.4°	70°21.6'	-58.1'	165.1°	69°23.5'	-58.3'	165.8°	68°25.2'	-58.4'	166.4°	8
9	73°14.5'	-57.4'	162.6°	72°17.1'	-57.7'	163.6°	71°19.4'	-57.9'	164.4°	70°21.5'	-58.1'	165.2°	69°23.4'	-58.3'	165.8°	68°25.2'	-58.4'	166.5°	67°26.8'	-58.6'	167.0°	9
10	72°17.1'	-57.6'	163.6°	71°19.5'	-57.9'	164.5°	70°21.5'	-58.1'	165.2°	69°23.4'	-58.3'	165.9°	68°25.2'	-58.4'	166.5°	67°26.8'	-58.6'	167.1°	66°28.2'	-58.7'	167.6°	10
11	71°19.5'	-57.9'	164.5°	70°21.6'	-58.1'	165.3°	69°23.4'	-58.3'	165.9°	68°25.2'	-58.4'	166.5°	67°26.7'	-58.5'	167.1°	66°28.2'	-58.7'	167.6°	65°29.5'	-58.8'	168.1°	11
12	70°21.6'	-58.1'	165.3°	69°23.5'	-58.2'	166.0°	68°25.2'	-58.4'	166.6°	67°26.8'	-58.5'	167.2°	66°28.2'	-58.7'	167.7°	65°29.5'	-58.8'	168.1°	64°30.8'	-58.9'	168.6°	12
13	69°23.5'	-58.2'	166.0°	68°25.2'	-58.4'	166.7°	67°26.8'	-58.5'	167.2°	66°28.2'	-58.7'	167.7°	65°29.5'	-58.8'	168.2°	64°30.8'	-58.9'	168.6°	63°31.9'	-58.9'	169.0°	13
14	68°25.3'	-58.4'	166.7°	67°26.8'	-58.5'	167.3°	66°28.3'	-58.6'	167.8°	65°29.6'	-58.7'	168.2°	64°30.8'	-58.8'	168.7°	63°31.9'	-58.9'	169.1°	62°33.0'	-59.0'	169.4°	14
15	67°26.9'	-58.5'	167.3°	66°28.3'	-58.6'	167.8°	65°29.6'	-58.7'	168.3°	64°30.8'	-58.8'	168.7°	63°31.9'	-58.9'	169.1°	62°33.0'	-59.0'	169.5°	61°34.0'	-59.1'	169.8°	15
16	66°28.4'	-58.6'	167.9°	65°29.7'	-58.7'	168.3°	64°30.9'	-58.8'	168.8°	63°32.0'	-58.9'	169.2°	62°33.0'	-59.0'	169.5°	61°34.0'	-59.1'	169.9°	60°34.9'	-59.1'	170.2°	16
17	65°29.8'	-58.7'	168.4°	64°30.9'	-58.8'	168.8°	63°32.0'	-58.9'	169.2°	62°33.1'	-59.0'	169.6°	61°34.0'	-59.1'	169.9°	60°34.9'	-59.1'	170.2°	59°35.8'	-59.2'	170.5°	17
18	64°31.0'	-58.8'	168.9°	63°32.1'	-58.9'	169.3°	62°33.1'	-59.0'	169.6°	61°34.1'	-59.0'	170.0°	60°35.0'	-59.1'	170.3°	59°35.8'	-59.2'	170.6°	58°36.6'	-59.2'	170.8°	18
19	63°32.2'	-58.9'	169.3°	62°33.2'	-59.0'	169.7°	61°34.2'	-59.0'	170.0°	60°35.0'	-59.1'	170.3°	59°35.9'	-59.2'	170.6°	58°36.6'	-59.2'	170.9°	57°37.4'	-59.3'	171.1°	19
20	62°33.3'	-59.0'	169.8°	61°34.3'	-59.0'	170.1°	60°35.1'	-59.1'	170.4°	59°35.9'	-59.2'	170.7°	58°36.7'	-59.2'	171.0°	57°37.4'	-59.3'	171.2°	56°38.1'	-59.3'	171.4°	20
21	61°34.4'	-59.0'	170.2°	60°35.2'	-59.1'	170.5°	59°36.0'	-59.2'	170.7°	58°36.8'	-59.2'	171.0°	57°37									

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

4° 356° LHA			Latitude CONTRARY to Declination						4° 356° LHA													
Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	81°56.5'	-53.0'	150.2°	81°03.7'	-54.3'	153.3°	80°09.5'	-55.4'	155.9°	79°14.2'	-56.1'	158.1°	78°18.2'	-56.7'	159.9°	77°21.6'	-57.2'	161.4°	76°24.5'	-57.6'	162.7°	0
1	81°03.5'	-54.3'	153.3°	80°09.4'	-55.3'	155.9°	79°14.1'	-56.1'	158.1°	78°18.1'	-56.7'	159.9°	77°21.5'	-57.2'	161.4°	76°24.4'	-57.6'	162.7°	75°26.9'	-57.9'	163.9°	1
2	80°09.2'	-55.3'	155.9°	79°14.0'	-56.1'	158.1°	78°18.0'	-56.7'	159.9°	77°21.4'	-57.2'	161.4°	76°24.3'	-57.6'	162.7°	75°26.8'	-57.9'	163.9°	74°29.0'	-58.1'	164.9°	2
3	79°13.9'	-56.1'	158.1°	78°17.9'	-56.7'	159.9°	77°21.3'	-57.2'	161.4°	76°24.2'	-57.6'	162.8°	75°26.7'	-57.9'	163.9°	74°28.9'	-58.1'	164.9°	73°30.9'	-58.3'	165.8°	3
4	78°17.9'	-56.7'	159.9°	77°21.2'	-57.2'	161.5°	76°24.1'	-57.5'	162.8°	75°26.6'	-57.9'	163.9°	74°28.8'	-58.1'	164.9°	73°30.8'	-58.3'	165.8°	72°32.5'	-58.5'	166.6°	4
5	77°21.2'	-57.1'	161.5°	76°24.1'	-57.5'	162.8°	75°26.6'	-57.8'	163.9°	74°28.8'	-58.1'	164.9°	73°30.7'	-58.3'	165.9°	72°32.4'	-58.5'	166.6°	71°34.0'	-58.7'	167.3°	5
6	76°24.1'	-57.5'	162.8°	75°26.6'	-57.8'	164.0°	74°28.7'	-58.1'	165.0°	73°30.7'	-58.3'	165.9°	72°32.4'	-58.5'	166.7°	71°33.9'	-58.8'	168.0°	70°35.3'	-58.8'	168.0°	6
7	75°26.6'	-57.8'	164.0°	74°28.7'	-58.1'	165.0°	73°30.7'	-58.3'	165.9°	72°32.3'	-58.5'	166.7°	71°33.9'	-58.6'	167.4°	70°35.3'	-58.8'	168.0°	69°36.5'	-58.9'	168.5°	7
8	74°28.7'	-58.1'	165.0°	73°30.6'	-58.3'	165.9°	72°32.3'	-58.5'	166.7°	71°33.9'	-58.6'	167.4°	70°35.2'	-58.8'	168.0°	69°36.5'	-58.9'	168.6°	68°37.6'	-59.0'	169.1°	8
9	73°30.7'	-58.3'	166.0°	72°32.3'	-58.5'	166.7°	71°33.9'	-58.6'	167.4°	70°35.2'	-58.8'	168.1°	69°36.5'	-58.9'	168.6°	68°37.6'	-59.0'	169.1°	67°38.7'	-59.1'	169.6°	9
10	72°32.4'	-58.5'	166.8°	71°33.9'	-58.6'	167.5°	70°35.2'	-58.8'	168.1°	69°36.5'	-58.9'	168.6°	68°37.6'	-59.0'	169.1°	67°38.6'	-59.1'	169.6°	66°39.6'	-59.1'	170.0°	10
11	71°33.9'	-58.6'	167.5°	70°35.3'	-58.8'	168.1°	69°36.5'	-58.9'	168.7°	68°37.6'	-59.0'	169.2°	67°38.6'	-59.1'	169.6°	66°39.6'	-59.1'	170.0°	65°40.4'	-59.2'	170.4°	11
12	70°35.3'	-58.7'	168.2°	69°36.5'	-58.9'	168.7°	68°37.6'	-59.0'	169.2°	67°38.6'	-59.1'	169.7°	66°39.6'	-59.1'	170.1°	65°40.4'	-59.2'	170.5°	64°41.2'	-59.3'	170.8°	12
13	69°36.5'	-58.9'	168.8°	68°37.6'	-59.0'	169.3°	67°38.7'	-59.0'	169.7°	66°39.6'	-59.1'	170.1°	65°40.4'	-59.2'	170.5°	64°41.2'	-59.3'	170.9°	63°42.0'	-59.3'	171.2°	13
14	68°37.7'	-59.0'	169.3°	67°38.7'	-59.0'	169.7°	66°39.6'	-59.1'	170.2°	65°40.5'	-59.2'	170.5°	64°41.2'	-59.3'	170.9°	63°42.0'	-59.3'	171.2°	62°42.6'	-59.4'	171.5°	14
15	67°38.7'	-59.0'	169.8°	66°39.6'	-59.1'	170.2°	65°40.5'	-59.2'	170.6°	64°41.3'	-59.2'	170.9°	63°42.0'	-59.3'	171.3°	62°42.7'	-59.4'	171.5°	61°43.3'	-59.4'	171.8°	15
16	66°39.7'	-59.1'	170.3°	65°40.5'	-59.2'	170.6°	64°41.3'	-59.2'	171.0°	63°42.1'	-59.3'	171.3°	62°42.7'	-59.3'	171.6°	61°43.3'	-59.4'	171.9°	60°43.9'	-59.4'	172.1°	16
17	65°40.6'	-59.2'	170.7°	64°41.3'	-59.2'	171.0°	63°42.1'	-59.3'	171.3°	62°42.7'	-59.3'	171.6°	61°43.3'	-59.4'	171.9°	60°43.9'	-59.4'	172.2°	59°44.5'	-59.5'	172.4°	17
18	64°41.4'	-59.2'	171.1°	63°42.1'	-59.3'	171.4°	62°42.8'	-59.3'	171.7°	61°43.4'	-59.4'	172.0°	60°44.0'	-59.4'	172.2°	59°44.5'	-59.5'	172.4°	58°45.0'	-59.5'	172.7°	18
19	63°42.2'	-59.3'	171.4°	62°42.8'	-59.3'	171.7°	61°43.4'	-59.4'	172.0°	60°44.0'	-59.4'	172.2°	59°44.5'	-59.5'	172.5°	58°45.0'	-59.5'	172.7°	57°45.5'	-59.5'	172.9°	19
20	62°42.9'	-59.3'	171.8°	61°43.5'	-59.4'	172.0°	60°44.0'	-59.4'	172.3°	59°44.6'	-59.5'	172.5°	58°45.1'	-59.5'	172.7°	57°45.5'	-59.5'	172.9°	56°46.0'	-59.5'	173.1°	20
21	61°43.5'	-59.4'	172.1°	60°44.1'	-59.4'	172.3°	59°44.6'	-59.5'	172.6°	58°45.2'	-59.5'	172.8°	57°45.6'	-59.5'	173.0°	56°46.0'	-59.5'	173.2°	55°46.8'	-59.6'	173.4°	21
22	60°44.2'	-59.4'	172.4°	59°44.7'	-59.4'	172.6°	58°45.2'	-59.5'	172.8°	57°45.7'	-59.5'	173.1°	56°46.1'	-59.5'	173.3°	55°46.5'	-59.6'	173.4°	54°46.8'	-59.6'	173.6°	22
23	59°44.8'	-59.4'	172.7°	58°45.2'	-59.5'	172.9°	57°45.7'	-59.5'	173.1°	56°46.1'	-59.5'	173.3°	55°46.5'	-59.6'	173.4°	54°46.9'	-59.6'	173.6°	53°47.3'	-59.6'	173.8°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	7			8			9			10			11			12			13			

4° 356° LHA

Latitude CONTRARY to DECLINATION

4° 356° LHA

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

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

3° 357° LHA			Latitude CONTRARY to Declination						3° 357° LHA													
Dec°	7			8			9			10			11			12			13			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	82°23.2'	-55.7'	156.7°	81°27.6'	-56.6'	159.4°	80°31.0'	-57.3'	161.5°	79°33.8'	-57.7'	163.2°	78°36.1'	-58.1'	164.6°	77°38.1'	-58.4'	165.9°	76°39.8'	-58.6'	166.9°	0
1	81°27.4'	-56.6'	159.4°	80°31.0'	-57.2'	161.5°	79°33.8'	-57.7'	163.2°	78°36.1'	-58.1'	164.7°	77°38.0'	-58.4'	165.9°	76°39.7'	-58.6'	166.9°	75°41.2'	-58.8'	167.8°	1
2	80°30.9'	-57.2'	161.5°	79°33.7'	-57.7'	163.2°	78°36.1'	-58.1'	164.7°	77°38.0'	-58.4'	165.9°	76°39.7'	-58.6'	166.9°	75°41.2'	-58.8'	167.8°	74°42.4'	-58.9'	168.6°	2
3	79°33.7'	-57.7'	163.2°	78°36.0'	-58.1'	164.7°	77°38.0'	-58.4'	165.9°	76°39.7'	-58.6'	166.9°	75°41.1'	-58.8'	167.8°	74°42.4'	-58.9'	168.6°	73°43.5'	-59.1'	169.3°	3
4	78°36.0'	-58.1'	164.7°	77°37.9'	-58.3'	165.9°	76°39.6'	-58.6'	166.9°	75°41.0'	-58.8'	167.8°	74°42.3'	-58.9'	168.6°	73°43.5'	-59.0'	169.3°	72°44.5'	-59.2'	170.4°	4
5	77°37.9'	-58.3'	165.9°	76°39.6'	-58.6'	166.9°	75°41.0'	-58.8'	167.8°	74°42.3'	-58.9'	168.6°	73°43.4'	-59.0'	169.3°	72°44.4'	-59.1'	169.9°	71°45.3'	-59.2'	170.4°	5
6	76°39.6'	-58.6'	167.0°	75°41.0'	-58.8'	167.8°	74°42.3'	-58.9'	168.6°	73°43.4'	-59.0'	169.3°	72°44.4'	-59.1'	169.9°	71°45.3'	-59.2'	170.4°	70°46.1'	-59.3'	170.9°	6
7	75°41.0'	-58.7'	167.9°	74°42.3'	-58.9'	168.6°	73°43.4'	-59.0'	169.3°	72°44.4'	-59.1'	169.9°	71°45.2'	-59.2'	170.4°	70°46.0'	-59.3'	170.9°	69°46.7'	-59.4'	171.4°	7
8	74°42.3'	-58.9'	168.7°	73°43.4'	-59.0'	169.3°	72°44.4'	-59.1'	169.9°	71°45.2'	-59.2'	170.5°	70°46.0'	-59.3'	170.9°	69°46.7'	-59.4'	171.4°	68°47.4'	-59.4'	171.8°	8
9	73°43.4'	-59.0'	169.4°	72°44.4'	-59.1'	170.0°	71°45.2'	-59.2'	170.5°	70°46.0'	-59.3'	171.0°	69°46.7'	-59.4'	171.4°	68°47.4'	-59.4'	171.8°	67°47.9'	-59.5'	172.1°	9
10	72°44.4'	-59.1'	170.0°	71°45.2'	-59.2'	170.5°	70°46.0'	-59.3'	171.0°	69°46.7'	-59.4'	171.4°	68°47.4'	-59.4'	171.8°	67°47.9'	-59.5'	172.2°	66°48.5'	-59.5'	172.5°	10
11	71°45.2'	-59.2'	170.6°	70°46.0'	-59.3'	171.0°	69°46.7'	-59.4'	171.5°	68°47.4'	-59.4'	171.8°	67°47.9'	-59.5'	172.2°	66°48.5'	-59.5'	172.5°	65°49.0'	-59.6'	172.8°	11
12	70°46.0'	-59.3'	171.1°	69°46.7'	-59.4'	171.5°	68°47.4'	-59.4'	171.9°	67°47.9'	-59.5'	172.2°	66°48.5'	-59.5'	172.5°	65°49.0'	-59.5'	172.8°	64°49.4'	-59.6'	173.1°	12
13	69°46.7'	-59.3'	171.5°	68°47.4'	-59.4'	171.9°	67°47.9'	-59.5'	172.2°	66°48.5'	-59.5'	172.6°	65°49.0'	-59.5'	172.8°	64°49.4'	-59.6'	173.1°	63°49.8'	-59.6'	173.4°	13
14	68°47.4'	-59.4'	171.9°	67°48.0'	-59.5'	172.3°	66°48.5'	-59.5'	172.6°	65°49.0'	-59.5'	172.9°	64°49.4'	-59.6'	173.1°	63°49.8'	-59.6'	173.4°	62°50.2'	-59.6'	173.6°	14
15	67°48.0'	-59.5'	172.3°	66°48.5'	-59.5'	172.6°	65°49.0'	-59.5'	172.9°	64°49.5'	-59.6'	173.2°	63°49.8'	-59.6'	173.4°	62°50.2'	-59.6'	173.6°	61°50.6'	-59.7'	173.9°	15
16	66°48.5'	-59.5'	172.7°	65°49.0'	-59.5'	172.9°	64°49.5'	-59.6'	173.2°	63°49.9'	-59.6'	173.4°	62°50.2'	-59.6'	173.7°	61°50.6'	-59.7'	173.9°	60°50.9'	-59.7'	174.1°	16
17	65°49.0'	-59.5'	173.0°	64°49.5'	-59.6'	173.2°	63°49.9'	-59.6'	173.5°	62°50.3'	-59.6'	173.7°	61°50.6'	-59.7'	173.9°	60°50.9'	-59.7'	174.1°	59°51.2'	-59.7'	174.3°	17
18	64°49.5'	-59.6'	173.3°	63°49.9'	-59.6'	173.5°	62°50.3'	-59.6'	173.7°	61°50.6'	-59.7'	173.9°	60°50.9'	-59.7'	174.1°	59°51.3'	-59.7'	174.3°	58°51.5'	-59.7'	174.5°	18
19	63°49.9'	-59.6'	173.6°	62°50.3'	-59.6'	173.8°	61°50.7'	-59.7'	174.0°	60°51.0'	-59.7'	174.2°	59°51.3'	-59.7'	174.3°	58°51.6'	-59.7'	174.5°	57°51.8'	-59.7'	174.7°	19
20	62°50.3'	-59.6'	173.8°	61°50.7'	-59.6'	174.0°	60°51.0'	-59.7'	174.2°	59°51.3'	-59.7'	174.4°	58°51.6'	-59.7'	174.5°	57°51.8'	-59.7'	174.7°	56°52.1'	-59.7'	174.8°	20
21	61°50.7'	-59.6'	174.1°	60°51.0'	-59.7'	174.2°	59°51.3'	-59.7'	174.4°	58°51.6'	-59.7'	174.6°										

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

