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# TABLES FOR THE PREDICTION OF DAYLIGHT STARS

G. G. Bennett

MONOGRAPH No. 3

**THE SCHOOL OF SURVEYING**

UNIVERSITY OF NEW SOUTH WALES  
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The table is self explanatory except that for the selection of the monthly constant there are two values for January and February which depend upon whether the year is either common (C) or leap (L). The following example will illustrate the use of that table.

EXAMPLE:

Find the local Sidereal Time ( $\lambda$   $E10^h 04^m 56^s$ ) corresponding to Standard Time  $8^h 55^m$  (Time Zone  $E10^h$ ) on the 14th February 1976

	h	m	s	
Standard Time	8	55		14th February
Time Zone	10			
GMT	22	55		13th February
Year	6	39	08	
Month	2	02	13	
Day		47	19	
Hour		3	37	
Minute			9	
GST	8	27	26	
Longitude	10	04	56	
LST	18	32	22	

The star tables may now be conveniently interpolated at  $LST = 18^h 30^m$  which corresponds to a standard time of  $8^h 52^m 38^s$ .

SUMMARY OF USEFUL FORMULAE:

Hour angle method:

$$\tan A = \frac{-\sin t}{\tan \delta \cos \phi - \sin \phi \cos t}$$

Altitude method:

$$\cos A = \frac{\sin \delta - \sin h \sin \phi}{\cos h \cos \phi}$$

Where:

- LATITUDE  $\phi$  positive in the northern hemisphere, negative in the southern hemisphere.
- AZIMUTH A clockwise angle measured from the North.
- DECLINATION  $\delta$  positive to the North, negative to the South.
- ALTITUDE h positive above the horizon.
- HOOR ANGLE t measured from the upper branch of the local meridian to the West.

G.G. Bennett  
1974

TABLES FOR THE PREDICTION  
OF DAYLIGHT STARS

FOR SOUTH LATITUDES  
 $0^{\circ}$  to  $50^{\circ}$   
AT INTERVALS OF  $5^{\circ}$

The altitudes and azimuths of five bright southern declination stars are given to the nearest  $0.1$  at every  $10$  minutes of Local Sidereal Time (LST). Altitudes are within the limits of  $10^{\circ}$  and  $50^{\circ}$ . The values of altitude and azimuth closest to elongation are underlined.

## EXAMPLE TO ILLUSTRATE A LATITUDE ERROR:

What is the effect on the mean calculated azimuth if the value of the station's latitude used in the computation is in error by 10" for the following observational circumstances? The observer's latitude is  $52^{\circ}5'$ .

	Altitude (h)	Azimuth (A)	Hour Angle (t)
West Star	$36^{\circ}7'$	$221^{\circ}7'$	$61^{\circ}6'$
East Star	$38.7$	$149.3$	$305.4$

Substituting the values in equations (1) and (2) gives  $\delta A = 0''4$  and  $\delta A = 0''9$  respectively, without regard to sign. In practice errors of this magnitude can be safely neglected.

The right ascension and declination of the stars will change slowly over the years and these co-ordinate changes will give rise to changes in the calculated altitudes and azimuths. To keep the effects of these changes small and thus extend the usefulness of these tables for a long period, the calculations have been made using mean places for the epoch 1980. The differences between the tabulated values of altitude and azimuth and those calculated at an epoch 20 years remote from that which the tables have been constructed do not exceed  $0.3'$  and on the average will be less than this value. A discrepancy of this magnitude should be quite acceptable when attempting to locate the star in the field of view of most theodolites. Apart from errors in the star co-ordinates there will also be errors arising from simple linear interpolation of the altitudes and azimuths over the  $5'$  range of latitude. These errors will never exceed  $0.1'$  and can therefore be neglected. The tabulated values of altitude and azimuth are given at intervals of 10 minutes of LST which are sufficiently close not to warrant the need for double interpolation.

The tables also contain a conversion table from which LST corresponding to any instant of Standard Time can be deduced with an accuracy of a few seconds.

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from elongation will not be very fast. This will still permit accurate values of azimuth to be obtained, although greater care should then be exercised in the control of systematic longitude and timing errors if the hour angle method of observation is used. Similar reasoning can be applied if the altitude method of observation is used, except that now systematic errors in the measured altitude are to be considered instead of timing errors.

The tabulated altitudes are within the limits of  $10^\circ$  and  $50^\circ$ . The reasons for adopting these limits are that the maximum comfortable altitude for most theodolites is about  $50^\circ$  and that below  $10^\circ$  the poor transparency of the atmosphere will seriously affect the visibility of the stars. It will be seen that for some latitudes, values of altitude are given which are outside the adopted limits. This has been done so that it will always be possible to interpolate values at the limits of the altitude range.

If the value of the station's latitude used in the computation of the azimuth is unreliable then it is preferable to make observations on two stars, one to the East and the other to the West. Because the selected stars have similar declinations the effect on the mean calculated azimuth will be minimised when these stars are observed at about the same altitude using either the altitude or hour angle method of observation. The formulae to consider are:-

For the hour angle method

$$\delta A = \frac{1}{2}(\tan h_w \sin A_w + \tan h_E \sin A_E) \delta \phi \quad (1)$$

and for the altitude method

$$\delta A = - \frac{\sec \phi}{2} (\cot t_w + \cot t_E) \delta \phi \quad (2)$$

## TABLE OF CONTENTS

	Page No.
Time Conversion Table	1
Star Tables	
Latitudes	
$0^\circ$ - $5^\circ$	2 - 5
$5^\circ$ - $10^\circ$	6 - 9
$10^\circ$ - $15^\circ$	10 - 13
$15^\circ$ - $20^\circ$	14 - 17
$20^\circ$ - $25^\circ$	18 - 21
$25^\circ$ - $30^\circ$	22 - 25
$30^\circ$ - $35^\circ$	26 - 29
$35^\circ$ - $40^\circ$	30 - 33
$40^\circ$ - $45^\circ$	34 - 37
$45^\circ$ - $50^\circ$	38 - 41
Explanation	42 - 45

# CONVERSION OF GREENWICH MEAN TIME TO GREENWICH SIDEREAL TIME:

## YEAR

1974	h	m	s	1983	h	m	s
1975	6	37	06	1984(L)	6	36	23
1976(L)	6	36	09	1985	6	38	23
1977	6	39	08	1986	6	39	25
1978	6	38	11	1987	6	37	28
1979	6	37	13	1988(L)	6	36	31
1980(L)	6	36	16	1989	6	39	30
1981	6	39	15	1990	6	38	33
1982	6	38	18	1991	6	37	35
	6	37	21	2000(L)	6	36	53
							52

(L) Denotes a leap year.

## MONTH

January	h	m	s	July	h	m	s
February	0	03	57	August	11	57	33
March	2	06	10	September	13	59	46
April	3	56	33	October	16	01	59
May	5	58	47	November	18	00	16
June	7	57	03	December	20	02	29
	9	59	16		22	00	46

(C) Denotes a common year (other than a leap year)

## DAY

1	h	m	s	11	h	m	s
2	0	00	00	12	0	39	26
3	0	03	57	13	0	43	22
4	0	07	53	14	0	47	19
5	0	11	50	15	0	51	15
6	0	15	46	16	0	55	12
7	0	19	43	17	0	59	08
8	0	23	39	18	1	03	05
9	0	27	36	19	1	07	01
10	0	31	32	20	1	10	58
	0	35	29	21	1	14	55
				22	1	18	51
				23	1	22	48
				24	1	26	44
				25	1	30	41
				26	1	34	37
				27	1	38	34
				28	1	42	30
				29	1	46	27
				30	1	50	24
				31	1	54	20
					1	58	17

## HOUR

## MINUTE

0	m	s	m	s	m	s
1	0	00	8	1	19	16
2	0	10	9	1	29	17
3	0	20	10	1	39	18
4	0	30	11	1	48	19
5	0	39	12	1	58	20
6	0	49	13	2	08	21
7	1	09	14	2	18	22
			15	2	28	23
				3	3	47
				27	5	59
				33		

## EXPLANATION:

These tables give the altitudes and azimuths of five bright southern declination stars to the nearest  $0^{\circ}.1$  at every 10 minutes of local Sidereal Time (LST) for latitudes from  $0^{\circ}$  to  $50^{\circ}$  at intervals of  $5^{\circ}$ .

For the surveyor who intends to make azimuth determinations from daylight star observations these tables will assist in the preparation of an observation programme in two ways. Firstly it may be seen at a glance what stars are available for observation and secondly from simple interpolation of the tabulated values the theodolite settings may be found which are necessary to locate the chosen star. It is assumed that an approximate azimuth of the survey line to which the observations are to be referred is known. If this azimuth is not known with sufficient accuracy to locate the star in the field of view, then the observer may be able to accomplish this from trial settings of the theodolite on either side of the best known azimuth setting for the star.

Some surveyors prefer to take observations when a star is near elongation because a systematic error in the value of the station's longitude used in the computation and in the timing have little effect on the calculated azimuth. To assist in selecting stars which are near their elongation position, those values of altitude and azimuth closest to elongation have been underlined. For the range of altitudes considered in these tables it will be found that for stations in the approximate latitude ranges of  $0^{\circ}$  to  $8^{\circ}$  and  $54^{\circ}$  to  $50^{\circ}$  the selected stars will not elongate.

In many situations it will not be found necessary or convenient to observe a star when it is near its elongation position. The stars which have been selected for these tables have declinations roughly in the range  $50^{\circ}$  to  $86^{\circ}$  and therefore their motion in azimuth even when remote









ALPHA CARINAE m=-0.9					ALPHA CENTAURI m=0.1					BETA CENTAURI m=0.9					ALPHA CRUCIS m=1.6					ALPHA ERIDANI m=0.6					LST		
LST		ALTITUDE			AZIMUTH			ALTITUDE			AZIMUTH			ALTITUDE			AZIMUTH			ALTITUDE			AZIMUTH			LST	
h	m	S 0	S 5	S 0	S 5	S 0	S 5	S 0	S 5	S 0	S 5	S 0	S 5	S 0	S 5	S 0	S 5	S 0	S 5	S 0	S 5	S 0	S 5	h	m		
18	0					18.1	22.7	203.4	204.1	14.6	19.1	206.2	206.8											18	0		
18	10					17.1	21.7	204.1	204.8	13.5	18.0	206.7	207.4											18	10		
18	20					16.1	20.6	204.8	205.5	12.4	16.8	207.2	207.8											18	20		
18	30					15.0	19.5	205.4	206.1	11.2	15.6	207.7	208.3											18	30		
18	40					13.9	18.4	206.0	206.6	10.0	14.4	208.1	208.6											18	40		
18	50					12.8	17.3	206.5	207.1	8.9	13.2	208.5	209.0											18	50		
19	0					11.7	16.2	207.0	207.6	7.7	12.0	208.8	209.2											19	0		
19	10					10.6	15.0	207.4	208.0	6.5	10.8	209.1	209.4											19	10		
19	20					9.4	13.8	207.8	208.3															19	20		
19	30					8.2	12.6	208.2	208.6															19	30		
19	40					7.1	11.4	208.5	208.9															19	40		
19	50					5.9	10.2	208.7	209.0															19	50		
20	0																							20	0		
20	10																							20	10		
20	20																							20	20		
20	30																							20	30		
20	40																							20	40		
20	50																							20	50		
21	0																							21	0		
21	10																							21	10		
21	20																							21	20		
21	30																							21	30		
21	40																							21	40		
21	50																							21	50		
22	0																							22	0		
22	10																							22	10		
22	20																							22	20		
22	30																							22	30		
22	40																							22	40		
22	50																							22	50		
23	0																							23	0		
23	10																							23	10		
23	20																							23	20		
23	30																							23	30		
23	40																							23	40		
23	50																							23	50		
24	0																							24	0		

(5)

ALPHA CARINAE m=-0.9						ALPHA CENTAURI m=0.1						BETA CENTAURI m=0.9						ALPHA CRUCIS m=1.6						ALPHA ERIDANI m=0.6						LST
LST		ALTITUDE			AZIMUTH			ALTITUDE			AZIMUTH			ALTITUDE			AZIMUTH			ALTITUDE			AZIMUTH			LST				
h	m	S45	S50	S45	S50	S45	S50	S45	S50	S45	S50	S45	S50	S45	S50	S45	S50	S45	S50	S45	S50	S45	S50	h	m					
0	0	31.2	34.7	135.2	132.8	20.5	25.2	199.4	200.1	18.2	23.0	195.4	195.9	18.1	23.1	183.0	183.1							0	0					
0	10	32.5	35.9	134.2	131.7	20.0	24.7	198.3	198.9	17.7	22.6	194.2	194.7	18.0	23.0	181.8	181.9							0	10					
0	20	33.8	37.1	133.2	130.5	19.4	24.2	197.1	197.7	17.3	22.2	193.0	193.4	18.0	23.0	180.7	180.7							0	20					
0	30	35.1	38.3	132.2	129.4	18.9	23.7	195.9	196.5	17.0	21.8	191.7	192.1	18.0	23.0	179.5	179.4							0	30					
0	40	36.4	39.6	131.3	128.3	18.4	23.3	194.7	195.2	16.6	21.5	190.5	190.8	18.0	23.0	178.3	178.2							0	40					
0	50	37.7	40.9	130.4	127.2	18.0	22.9	193.5	194.0	16.3	21.2	189.2	189.5	18.1	23.1	177.1	177.0							0	50					
1	0	39.1	42.1	129.6	126.2	17.6	22.5	192.3	192.7	16.0	21.0	188.0	188.2	18.2	23.2	175.9	175.7							1	0					
1	10	40.4	43.4	128.7	125.1	17.3	22.2	191.1	191.4	15.8	20.8	186.7	186.9	18.4	23.3	174.7	174.5							1	10					
1	20	41.8	44.8	127.9	124.1	16.9	21.9	189.8	190.2	15.6	20.6	185.4	185.6	18.5	23.5	173.5	173.3							1	20					
1	30	43.2	46.1	127.1	123.1	16.7	21.6	188.6	188.9	15.5	20.5	184.2	184.3	18.8	23.7	172.3	172.1							1	30					
1	40	44.6	47.5	126.4	122.1	16.4	21.4	187.4	187.6	15.4	20.4	182.9	183.0	19.0	23.9	171.2	170.9							1	40					
1	50	46.1	48.8	125.7	121.1	16.2	21.2	186.1	186.3	15.3	20.3	181.6	181.6	19.3	24.2	170.0	169.7							1	50					
2	0	47.5	50.2	125.0	120.1	16.0	21.0	184.8	185.0	15.3	20.3	180.3	180.3	19.6	24.5	168.9	168.5							2	0					
2	10	49.0	51.6	124.3	119.2	15.9	20.9	183.6	183.7	15.3	20.3	179.0	179.0	20.0	24.9	167.7	167.3							2	10					
2	20					15.8	20.8	182.3	182.4	15.3	20.3	177.7	177.7	20.4	25.2	166.6	166.1							2	20					
2	30					15.8	20.8	181.0	181.1	15.4	20.4	176.5	176.4	20.8	25.6	165.5	164.9							2	30					
2	40					15.8	20.8	179.8	179.8	15.6	20.5	175.2	175.0	21.3	26.1	164.3	163.7							2	40					
2	50					15.8	20.8	178.5	178.5	15.7	20.7	173.9	173.7	21.8	26.5	163.2	162.6							2	50					
3	0					15.8	20.8	177.2	177.2	15.9	20.9	172.6	172.4	22.3	27.0	162.2	161.4							3	0					
3	10					15.9	20.9	176.0	175.9	16.2	21.1	171.4	171.1	22.8	27.6	161.1	160.3							3	10					
3	20					16.1	21.1	174.7	174.6	16.5	21.4	170.1	169.8	23.4	28.1	160.0	159.2							3	20					
3	30					16.3	21.2	173.5	173.3	16.8	21.7	168.9	168.5	24.0	28.7	159.0	158.1							3	30					
3	40					16.5	21.4	172.2	172.0	17.1	22.0	167.6	167.2	24.7	29.3	158.0	157.0							3	40					
3	50					16.8	21.7	171.0	170.7	17.5	22.4	166.4	166.0	25.4	30.0	157.0	155.9							3	50					
4	0					17.0	22.0	169.7	169.4	18.0	22.8	165.2	164.7	26.1	30.6	156.0	154.9							4	0					
4	10					17.4	22.3	168.5	168.1	18.5	23.2	164.0	163.4	26.8	31.3	155.0	153.8							4	10					
4	20					17.8	22.6	167.3	166.9	19.0	23.7	162.8	162.2	27.6	32.0	154.1	152.8							4	20					
4	30					18.2	23.0	166.1	165.6	19.5	24.2	161.6	160.9	28.4	32.8	153.1	151.8							4	30					
4	40					18.6	23.4	164.9	164.3	20.1	24.8	160.4	159.7	29.2	33.6	152.2	150.8							4	40					
4	50					19.1	23.9	163.7	163.1	20.7	25.3	159.3	158.5	30.0	34.4	151.3	149.8							4	50					
5	0					19.6	24.4	162.5	161.9	21.3	26.0	158.1	157.3	30.9	35.2	150.5	148.8							5	0					
5	10					20.1	24.9	161.3	160.7	22.0	26.6	157.0	156.1	31.7	36.0	149.6	147.9							5	10					
5	20					20.7	25.4	160.2	159.5	22.7	27.3	155.9	154.9	32.6	36.9	148.8	147.0							5	20					
5	30					21.3	26.0	159.1	158.3	23.4	27.9	154.8	153.8	33.6	37.8	148.0	146.1							5	30					
5	40					22.0	26.6	157.9	157.1	24.2	28.7	153.8	152.6	34.5	38.7	147.3	145.2							5	40					
5	50					22.7	27.3	156.8	155.9	25.0	29.4	152.7	151.5	35.5	39.6	146.6	144.4							5	50					
6	0					23.4	27.9	155.8	154.8	25.8	30.2	151.7	150.4	36.5	40.5	145.9	143.6	48.8	51.9	228.3	233.0			6	0					



ALPHA CARINAE m=-0.9					ALPHA CENTAURI m=0.1					BETA CENTAURI m=0.9					ALPHA CRUCIS m=1.6					ALPHA ERIDANI m=0.6				
LST	ALTITUDE		AZIMUTH		ALTITUDE		AZIMUTH			ALTITUDE		AZIMUTH			ALTITUDE		AZIMUTH			ALTITUDE		AZIMUTH		LST
h m	S 5	S10	S 5	S10	S 5	S10	S 5	S10		S 5	S10	S 5	S10		S 5	S10	S 5	S10		S 5	S10	S 5	S10	h m
6 0	42.1	47.1	175.2	174.8																17.1	21.4	211.0	211.9	6 0
6 10	42.2	47.2	177.2	177.0																15.8	20.1	211.4	212.3	6 10
6 20	42.3	47.3	179.3	179.2																14.5	18.7	211.8	212.6	6 20
6 30	42.3	47.3	181.3	181.4																13.2	17.4	212.1	212.8	6 30
6 40	42.2	47.2	183.4	183.7											6.1	10.5	152.9	152.5		11.9	16.1	212.3	213.0	6 40
6 50	42.0	47.0	185.4	185.9											7.2	11.7	152.9	152.5		10.5	14.7	212.5	213.1	6 50
7 0	41.7	46.7	187.4	188.1											8.4	12.8	153.0	152.6		9.2	13.4	212.7	213.2	7 0
7 10	41.4	46.3	189.4	190.2											9.5	13.9	153.1	152.7		7.8	12.0	212.8	213.2	7 10
7 20	40.9	45.8	191.3	192.3											10.6	15.1	153.3	152.8		6.5	10.7	212.8	213.2	7 20
7 30	40.4	45.3	193.2	194.3											11.7	16.2	153.5	153.0						7 30
7 40	39.8	44.6	195.0	196.2											12.8	17.3	153.8	153.2						7 40
7 50	39.1	43.9	196.7	198.1											13.9	18.4	154.1	153.5						7 50
8 0	38.4	43.1	198.4	199.8											15.0	19.5	154.5	153.8						8 0
8 10	37.5	42.2	200.0	201.5											16.1	20.6	154.9	154.2						8 10
8 20	36.7	41.3	201.6	203.1						6.5	10.9	150.2	149.8		17.1	21.7	155.3	154.6						8 20
8 30	35.7	40.3	203.0	204.6						7.8	12.1	150.2	149.8		18.2	22.7	155.9	155.1						8 30
8 40	34.7	39.2	204.4	206.0						9.0	13.3	150.3	149.8		19.2	23.7	156.4	155.6						8 40
8 50	33.6	38.1	205.7	207.4	5.8	10.1	150.6	150.3		10.2	14.6	150.5	149.9		20.1	24.7	157.0	156.2						8 50
9 0	32.5	37.0	207.0	208.6	7.0	11.4	150.7	150.3		11.5	15.8	150.7	150.1		21.1	25.7	157.6	156.8						9 0
9 10	31.4	35.8	208.1	209.8	8.2	12.6	150.7	150.3		12.7	17.0	150.9	150.3		22.0	26.7	158.3	157.5						9 10
9 20	30.2	34.5	209.2	210.8	9.5	13.8	150.8	150.3		13.9	18.2	151.2	150.5		22.9	27.6	159.1	158.2						9 20
9 30	29.0	33.2	210.2	211.8	10.7	15.0	151.0	150.5		15.1	19.4	151.6	150.8		23.8	28.5	159.9	159.0						9 30
9 40	27.7	31.9	211.2	212.7	11.9	16.2	151.2	150.6		16.2	20.6	151.9	151.2		24.7	29.4	160.7	159.9						9 40
9 50	26.4	30.6	212.0	213.5	13.1	17.4	151.5	150.8		17.4	21.8	152.4	151.6		25.5	30.2	161.6	160.7						9 50
10 0	25.0	29.2	212.8	214.2	14.2	18.6	151.8	151.1		18.6	23.0	152.9	152.0		26.2	31.0	162.5	161.7						10 0
10 10	23.7	27.8	213.6	214.9	15.4	19.8	152.2	151.4		19.7	24.1	153.4	152.5		27.0	31.7	163.5	162.7						10 10
10 20	22.3	26.4	214.2	215.5	16.6	21.0	152.6	151.8		20.8	25.3	154.1	153.1		27.6	32.5	164.5	163.7						10 20
10 30	20.9	25.0	214.8	216.0	17.7	22.1	153.1	152.2		21.9	26.4	154.7	153.7		28.3	33.1	165.6	164.8						10 30
10 40	19.4	23.5	215.3	216.5	18.8	23.3	153.6	152.7		22.9	27.4	155.4	154.4		28.9	33.7	166.7	166.0						10 40
10 50	18.0	22.0	215.8	216.9	19.9	24.4	154.1	153.2		23.9	28.5	156.2	155.2		29.4	34.3	167.8	167.1						10 50
11 0	16.5	20.5	216.2	217.2	21.0	25.5	154.8	153.8		24.9	29.5	157.0	156.0		29.9	34.8	169.0	168.4						11 0
11 10	15.1	19.0	216.6	217.5	22.0	26.6	155.4	154.5		25.9	30.5	157.9	156.9		30.4	35.3	170.2	169.6						11 10
11 20	13.6	17.5	216.9	217.7	23.1	27.6	156.2	155.2		26.8	31.4	158.8	157.8		30.8	35.7	171.4	170.9						11 20
11 30	12.1	16.0	217.1	217.9	24.1	28.6	156.9	155.9		27.7	32.3	159.8	158.8		31.1	36.1	172.7	172.3						11 30
11 40	10.6	14.5	217.3	218.0	25.0	29.6	157.8	156.8		28.5	33.2	160.8	159.8		31.4	36.4	174.0	173.6						11 40
11 50	9.1	13.0	217.4	218.0	25.9	30.6	158.7	157.7		29.3	34.0	161.9	160.9		31.6	36.6	175.3	175.0						11 50
12 0	7.5	11.5	217.5	218.0	26.8	31.5	159.6	158.6		30.1	34.8	163.0	162.1		31.8	36.8	176.6	176.4						12 0

ALPHA CARINAE m=-0.9					ALPHA CENTAURI m=0.1					BETA CENTAURI m=0.9					ALPHA CRUCIS m=1.6					ALPHA ERIDANI m=0.6				
LST	ALTITUDE		AZIMUTH		ALTITUDE		AZIMUTH		ALTITUDE		AZIMUTH		ALTITUDE		AZIMUTH		ALTITUDE		AZIMUTH		LST			
h m	S40	S45	S40	S45	S40	S45	S40	S45	S40	S45	S40	S45	S40	S45	S40	S45	S40	S45	S40	S45	h m			
12 0	34.0	37.3	226.7	229.3																	12 0			
12 10	32.6	36.0	225.9	228.4																	12 10			
12 20	31.2	34.7	225.1	227.5																	12 20			
12 30	29.9	33.4	224.3	226.5																	12 30			
12 40	28.5	32.1	223.5	225.6																	12 40			
12 50	27.2	30.9	222.6	224.6																	12 50			
13 0	25.9	29.6	221.7	223.5																	13 0			
13 10	24.7	28.4	220.8	222.5																	13 10			
13 20	23.4	27.2	219.9	221.4																	13 20			
13 30	22.2	26.1	218.9	220.3																	13 30			
13 40	21.0	25.0	217.9	219.2																	13 40			
13 50	19.9	23.9	216.8	218.0																	13 50			
14 0	18.7	22.8	215.8	216.9																	14 0			
14 10	17.6	21.7	214.7	215.7																	14 10			
14 20	16.6	20.7	213.5	214.5																	14 20			
14 30	15.5	19.7	212.4	213.3																	14 30			
14 40	14.5	18.8	211.2	212.0																	14 40			
14 50	13.5	17.9	210.0	210.7																	14 50			
15 0	12.6	17.0	208.8	209.5																	15 0			
15 10	11.7	16.1	207.6	208.1																	15 10			
15 20	10.8	15.3	206.3	206.8																	15 20			
15 30	10.0	14.5	205.0	205.5																	15 30			
15 40	9.2	13.8	203.7	204.1																	15 40			
15 50	8.5	13.1	202.4	202.7																	15 50			
16 0	7.8	12.4	201.0	201.3																	16 0			
16 10	7.1	11.8	199.6	199.9																	16 10			
16 20	6.5	11.2	198.2	198.5																	16 20			
16 30	5.9	10.7	196.8	197.1																	16 30			
16 40	5.4	10.2	195.4	195.6																	16 40			
16 50																					16 50			
17 0																					17 0			
17 10																					17 10			
17 20																					17 20			
17 30																					17 30			
17 40																					17 40			
17 50																					17 50			
18 0																					18 0			



ALPHA CARINAE m=-0.9					ALPHA CENTAURI m=0.1					BETA CENTAURI m=0.9					ALPHA CRUCIS m=1.6					ALPHA ERIDANI m=0.6				
LST		ALTITUDE		AZIMUTH	ALTITUDE		AZIMUTH	ALTITUDE		AZIMUTH	ALTITUDE		AZIMUTH	ALTITUDE		AZIMUTH	ALTITUDE		AZIMUTH	LST				
h	m	S 5	S10	S 5	S10	S 5	S10	S 5	S10	S 5	S10	S 5	S10	S 5	S10	S 5	S10	S 5	S10	S 5	S10	h	m	
18	0					22.7	27.3	204.1	205.1	19.1	23.5	206.8	207.7	7.3	11.8	207.1	207.5					18	0	
18	10					21.7	26.2	204.8	205.8	18.0	22.4	207.4	208.2	6.2	10.7	207.1	207.5					18	10	
18	20					20.6	25.1	205.5	206.4	16.8	21.2	207.8	208.7									18	20	
18	30					19.5	24.0	206.1	207.0	15.6	20.0	208.3	209.0									18	30	
18	40					18.4	22.9	206.6	207.5	14.4	18.8	208.6	209.4									18	40	
18	50					17.3	21.7	207.1	207.9	13.2	17.6	209.0	209.6									18	50	
19	0					16.2	20.6	207.6	208.3	12.0	16.4	209.2	209.8									19	0	
19	10					15.0	19.4	208.0	208.7	10.8	15.2	209.4	210.0									19	10	
19	20					13.8	18.2	208.3	209.0	9.6	13.9	209.6	210.1									19	20	
19	30					12.6	17.0	208.6	209.2	8.4	12.7	209.7	210.2									19	30	
19	40					11.4	15.8	208.9	209.4	7.1	11.4	209.8	210.2									19	40	
19	50					10.2	14.6	209.0	209.6	5.9	10.2	209.8	210.2					6.0	10.2	147.2	146.8	19	50	
20	0					9.0	13.4	209.2	209.7									7.3	11.5	147.2	146.8	20	0	
20	10					7.8	12.2	209.3	209.7									8.7	12.9	147.3	146.8	20	10	
20	20					6.6	10.9	209.4	209.7									10.0	14.2	147.4	146.8	20	20	
20	30																	11.3	15.6	147.6	147.0	20	30	
20	40																	12.7	16.9	147.8	147.1	20	40	
20	50																	14.0	18.2	148.1	147.3	20	50	
21	0																	15.3	19.5	148.5	147.6	21	0	
21	10																	16.6	20.9	148.8	148.0	21	10	
21	20																	17.9	22.2	149.3	148.3	21	20	
21	30																	19.1	23.4	149.8	148.8	21	30	
21	40																	20.4	24.7	150.3	149.3	21	40	
21	50																	21.6	26.0	151.0	149.9	21	50	
22	0																	22.8	27.2	151.6	150.5	22	0	
22	10																	24.0	28.4	152.4	151.2	22	10	
22	20																	25.1	29.5	153.2	152.0	22	20	
22	30																	26.2	30.7	154.0	152.8	22	30	
22	40																	27.3	31.8	154.9	153.7	22	40	
22	50																	28.3	32.9	155.9	154.7	22	50	
23	0																	29.3	33.9	156.9	155.7	23	0	
23	10																	30.3	34.9	158.0	156.8	23	10	
23	20																	31.2	35.8	159.2	158.0	23	20	
23	30																	32.0	36.7	160.4	159.3	23	30	
23	40																	32.9	37.6	161.7	160.6	23	40	
23	50																	33.6	38.4	163.0	162.0	23	50	
24	0																	34.3	39.1	164.4	163.4	24	0	

ALPHA CARINAE m=-0.9					ALPHA CENTAURI m=0.1					BETA CENTAURI m=0.9					ALPHA CRUCIS m=1.6					ALPHA ERIDANI m=0.6				
LST	ALTITUDE		AZIMUTH		ALTITUDE		AZIMUTH		ALTITUDE		AZIMUTH		ALTITUDE		AZIMUTH		ALTITUDE		AZIMUTH		LST			
h m	S40	S45	S40	S45	S40	S45	S40	S45	S40	S45	S40	S45	S40	S45	S40	S45	S40	S45	S40	S45	h m			
0 0	27.6	31.2	137.1	135.2	15.8	20.5	198.9	199.4	13.4	18.2	195.0	195.4	13.1	18.1	183.0	183.0					0 0			
0 10	28.9	32.5	136.2	134.2	15.2	20.0	197.8	198.3	12.9	17.7	193.9	194.2	13.0	18.0	181.8	181.8					0 10			
0 20	30.3	33.8	135.4	133.2	14.6	19.4	196.6	197.1	12.5	17.3	192.7	193.0	13.0	18.0	180.6	180.7					0 20			
0 30	31.6	35.1	134.6	132.2	14.1	18.9	195.5	195.9	12.1	17.0	191.5	191.7	13.0	18.0	179.5	179.5					0 30			
0 40	33.0	36.4	133.9	131.3	13.6	18.4	194.4	194.7	11.7	16.6	190.3	190.5	13.0	18.0	178.3	178.3					0 40			
0 50	34.4	37.7	133.1	130.4	13.1	18.0	193.2	193.5	11.4	16.3	189.0	189.2	13.1	18.1	177.1	177.1					0 50			
1 0	35.8	39.1	132.4	129.6	12.7	17.6	192.0	192.3	11.1	16.0	187.8	188.0	13.2	18.2	176.0	175.9					1 0			
1 10	37.2	40.4	131.8	128.7	12.4	17.3	190.8	191.1	10.9	15.8	186.6	186.7	13.4	18.4	174.8	174.7					1 10			
1 20	38.6	41.8	131.2	127.9	12.0	16.9	189.6	189.8	10.7	15.6	185.3	185.4	13.6	18.5	173.7	173.5					1 20			
1 30	40.1	43.2	130.6	127.1	11.7	16.7	188.4	188.6	10.5	15.5	184.1	184.2	13.8	18.8	172.5	172.3					1 30			
1 40	41.6	44.6	130.1	126.4	11.5	16.4	187.2	187.4	10.4	15.4	182.8	182.9	14.1	19.0	171.4	171.2					1 40			
1 50	43.0	46.1	129.6	125.7	11.2	16.2	186.0	186.1	10.3	15.3	181.6	181.6	14.4	19.3	170.3	170.0					1 50			
2 0	44.5	47.5	129.1	125.0	11.1	16.0	184.7	184.8	10.3	15.3	180.3	180.3	14.7	19.6	169.2	168.9					2 0			
2 10	46.0	49.0	128.7	124.3	10.9	15.9	183.5	183.6	10.3	15.3	179.0	179.0	15.1	20.0	168.0	167.7					2 10			
2 20	47.5	50.4	128.4	123.7	10.8	15.8	182.3	182.3	10.3	15.3	177.8	177.7	15.5	20.4	166.9	166.6					2 20			
2 30	49.0	51.9	128.1	123.2	10.8	15.8	181.0	181.0	10.4	15.4	176.5	176.5	16.0	20.8	165.9	165.5					2 30			
2 40					10.8	15.8	179.8	179.8	10.6	15.6	175.3	175.2	16.4	21.3	164.8	164.3					2 40			
2 50					10.8	15.8	178.5	178.5	10.8	15.7	174.0	173.9	17.0	21.8	163.7	163.2					2 50			
3 0					10.8	15.8	177.3	177.2	11.0	15.9	172.8	172.6	17.5	22.3	162.7	162.2					3 0			
3 10					11.0	15.9	176.1	176.0	11.2	16.2	171.6	171.4	18.1	22.8	161.7	161.1					3 10			
3 20					11.1	16.1	174.8	174.7	11.5	16.5	170.3	170.1	18.7	23.4	160.7	160.0					3 20			
3 30					11.3	16.3	173.6	173.5	11.9	16.8	169.1	168.9	19.4	24.0	159.7	159.0					3 30			
3 40					11.5	16.5	172.4	172.2	12.3	17.1	167.9	167.6	20.0	24.7	158.7	158.0					3 40			
3 50					11.8	16.8	171.2	171.0	12.7	17.5	166.7	166.4	20.8	25.4	157.8	157.0					3 50			
4 0					12.1	17.0	169.9	169.7	13.1	18.0	165.5	165.2	21.5	26.1	156.9	156.0					4 0			
4 10					12.5	17.4	168.8	168.5	13.6	18.5	164.4	164.0	22.3	26.8	156.0	155.0					4 10			
4 20					12.9	17.8	167.6	167.3	14.2	19.0	163.2	162.8	23.1	27.6	155.1	154.1					4 20			
4 30					13.3	18.2	166.4	166.1	14.7	19.5	162.1	161.6	23.9	28.4	154.2	153.1					4 30			
4 40					13.8	18.6	165.2	164.9	15.4	20.1	161.0	160.4	24.7	29.2	153.4	152.2					4 40			
4 50					14.3	19.1	164.1	163.7	16.0	20.7	159.9	159.3	25.6	30.0	152.6	151.3					4 50			
5 0					14.8	19.6	163.0	162.5	16.7	21.3	158.8	158.1	26.5	30.9	151.8	150.5					5 0			
5 10					15.4	20.1	161.8	161.3	17.4	22.0	157.7	157.0	27.4	31.7	151.1	149.6					5 10			
5 20					16.0	20.7	160.7	160.2	18.1	22.7	156.7	155.9	28.3	32.6	150.3	148.8					5 20			
5 30					16.7	21.3	159.7	159.1	18.9	23.4	155.6	154.8	29.3	33.6	149.6	148.0					5 30			
5 40					17.3	22.0	158.6	157.9	19.7	24.2	154.6	153.8	30.3	34.5	149.0	147.3	49.3	52.8	224.8	229.3	5 40			
5 50					18.1	22.7	157.6	156.8	20.5	25.0	153.7	152.7	31.3	35.5	148.3	146.6	48.0	51.4	224.7	229.0	5 50			
6 0					18.8	23.4	156.5	155.8	21.4	25.8	152.7	151.7	32.3	36.5	147.7	145.9	46.6	50.1	224.6	228.7	6 0			

6	0	47.1	52.0	174.8	174.2
5	50	46.8	51.7	172.6	171.8
5	40	46.4	51.3	170.4	169.4
5	30	46.0	50.9	168.4	167.2
5	20	45.4	50.3	166.3	165.0
5	10	44.8	49.6	164.4	162.8
5	0	44.1	48.8	162.5	160.8
4	50	43.3	48.0	160.7	158.9
4	40	42.5	47.1	159.0	157.1
4	30	41.6	46.1	157.3	155.4
4	20	40.6	45.1	155.8	153.8
4	10	39.5	44.0	154.4	152.4
4	0	38.5	42.9	153.0	151.0
3	50	37.3	41.7	151.8	149.7
3	40	36.1	40.6	150.6	148.6
3	30	34.9	39.2	149.5	147.5
3	20	33.6	37.8	148.5	146.6
3	10	32.3	36.5	147.6	145.7
3	0	31.0	35.1	146.7	144.9
2	50	29.6	33.7	146.0	144.2
2	40	28.2	32.3	145.3	143.6
2	30	26.8	30.9	144.7	143.0
2	20	25.4	29.4	144.1	142.6
2	10	23.9	27.9	143.6	142.2
2	0	22.5	26.4	143.2	141.8
1	50	21.0	24.9	142.9	141.6
1	40	19.5	23.4	142.6	141.4
1	30	18.0	21.9	142.4	141.2
1	20	16.5	20.4	142.2	141.1
1	10	15.0	18.9	142.1	141.1
1	0	13.5	17.4	142.0	141.2
0	50	11.9	15.9	142.0	141.2
0	40	10.4	14.4	141.4	141.4
0	30	8.9	12.8	142.2	141.6
0	20	7.4	11.4	142.3	141.8
0	10				
0	0				
h	m	S10	S15	S10	S15
LST		ALTITUDE	AZIMUTH	ALTITUDE	AZIMUTH
ALPHA CARINAE m=-0.9					
BETA CENTAURI m=0.1					
BETA CENTAURI m=0.9					
ALPHA CRUCIS m=1.6					
ALPHA ERIDANI m=0.6					
6	0	21.4	25.6	152.9	152.7
5	50	22.7	26.9	151.5	151.2
5	40	23.9	28.2	150.0	149.7
5	30	25.2	29.5	148.5	147.2
5	20	26.4	30.7	146.9	145.6
5	10	27.7	32.0	145.4	144.1
5	0	28.8	33.2	143.8	142.5
4	50	30.0	34.4	142.2	140.9
4	40	31.1	35.6	140.6	139.3
4	30	32.2	36.7	139.0	137.7
4	20	33.3	37.8	137.4	136.1
4	10	34.3	38.8	135.8	134.5
4	0	35.3	39.9	134.2	132.9
3	50	36.2	40.8	132.6	131.3
3	40	37.1	41.7	131.0	129.7
3	30	37.9	42.6	129.4	128.1
3	20	38.7	43.4	127.8	126.5
3	10	39.4	44.2	126.2	124.9
3	0	40.0	44.9	124.6	123.3
2	50	40.6	45.5	123.0	121.7
2	40	41.1	46.0	121.4	120.1
2	30	41.6	46.5	119.8	118.5
2	20	41.9	46.9	118.2	116.9
2	10	42.2	47.2	116.6	115.3
2	0	42.5	47.4	115.0	113.7
1	50	42.6	47.6	113.4	112.1
1	40	42.7	47.7	111.8	110.5
1	30	42.6	47.6	110.2	108.9
1	20	42.5	47.5	108.6	107.3
1	10	42.4	47.4	107.0	105.7
1	0	42.1	47.1	105.4	104.1
0	50	41.8	46.7	103.8	102.5
0	40	41.4	46.3	102.2	101.1
0	30	40.9	45.8	100.6	99.5
0	20	40.4	45.2	99.0	98.1
0	10	39.8	44.6	97.4	96.7
0	0	39.1	43.9	95.8	95.3
h	m	S10	S15	S10	S15
LST		ALTITUDE	AZIMUTH	ALTITUDE	AZIMUTH

[illegible]







ALPHA CARINAE m=-0.9					ALPHA CENTAURI m=0.1					BETA CENTAURI m=0.9					ALPHA CRUCIS m=1.6					ALPHA ERIDANI m=0.6					LST	
ALTITUDE		AZIMUTH		S10	S15	ALTITUDE		AZIMUTH		S10	S15	ALTITUDE		AZIMUTH		S10	S15	ALTITUDE		AZIMUTH		S10	S15	h	m	
S10	S15	S10	S15			S10	S15	S10	S15			S10	S15	S10	S15			S10	S15	S10	S15					
18 0				27.3	31.8	205.1	206.3	23.5	27.9	207.7	208.9	11.8	16.2	207.5	208.0									18 0		
18 10				26.2	30.7	205.8	207.0	22.4	26.8	208.2	209.3	10.7	15.1	207.5	208.0									18 10		
18 20				25.1	29.6	206.4	207.6	21.2	25.6	208.7	209.7	9.5	14.0	207.4	207.9									18 20		
18 30				24.0	28.4	207.0	208.1	20.0	24.4	209.0	210.0	8.4	12.8	207.3	207.8									18 30		
18 40				22.9	27.3	207.5	208.6	18.8	23.2	209.4	210.3	7.3	11.7	207.2	207.6									18 40		
18 50				21.7	26.1	207.9	209.0	17.6	21.9	209.6	210.5	6.1	10.6	207.0	207.3									18 50		
19 0				20.6	25.0	208.3	209.4	16.4	20.7	209.8	210.7													19 0		
19 10				19.4	23.8	208.7	209.7	15.2	19.5	210.0	210.8													19 10		
19 20				18.2	22.6	209.0	209.9	13.9	18.2	210.1	210.9							6.1	10.3	147.2	146.8			19 20		
19 30				17.0	21.4	209.2	210.1	12.7	17.0	210.2	210.9							7.5	11.7	147.0	146.6			19 30		
19 40				15.8	20.1	209.4	210.2	11.4	15.8	210.2	210.8							8.8	13.0	146.9	146.4			19 40		
19 50				14.6	18.9	209.6	210.3	10.2	14.5	210.2	210.8							10.2	14.3	146.8	146.2			19 50		
20 0				13.4	17.7	209.7	210.4	9.0	13.3	210.1	210.6							11.5	15.7	146.8	146.1			20 0		
20 10				12.2	16.5	209.7	210.4	7.7	12.1	210.0	210.4							12.9	17.0	146.8	146.0			20 10		
20 20				10.9	15.3	209.7	210.3	6.5	10.8	209.8	210.2							14.2	18.4	146.8	146.0			20 20		
20 30				9.7	14.1	209.7	210.2											15.6	19.7	147.0	146.1			20 30		
20 40				8.5	12.8	209.6	210.1											16.9	21.1	147.1	146.2			20 40		
20 50				7.3	11.6	209.5	209.9											18.2	22.4	147.3	146.3			20 50		
21 0				6.1	10.4	209.3	209.6											19.5	23.7	147.6	146.5			21 0		
21 10																		20.9	25.1	148.0	146.8			21 10		
21 20																		22.2	26.4	148.3	147.1			21 20		
21 30																		23.4	27.7	148.8	147.5			21 30		
21 40																		24.7	29.0	149.3	148.0			21 40		
21 50																		26.0	30.3	149.9	148.5			21 50		
22 0																		27.2	31.5	150.5	149.1			22 0		
22 10																		28.4	32.7	151.2	149.8			22 10		
22 20																		29.5	33.9	152.0	150.5			22 20		
22 30																		30.7	35.1	152.8	151.3			22 30		
22 40																		31.8	36.3	153.7	152.2			22 40		
22 50																		32.9	37.4	154.7	153.1			22 50		
23 0																		33.9	38.4	155.7	154.2			23 0		
23 10																		34.9	39.5	156.8	155.3			23 10		
23 20																		35.8	40.5	158.0	156.5			23 20		
23 30																		36.7	41.4	159.3	157.8			23 30		
23 40																		37.6	42.3	160.6	159.1			23 40		
23 50																		38.4	43.1	162.0	160.6			23 50		
24 0																		39.1	43.9	163.4	162.1			24 0		

(1)

ALPHA CARINAE m=-0.9					ALPHA CENTAURI m=0.1					BETA CENTAURI m=0.9					ALPHA CRUCIS m=1.6					ALPHA ERIDANI m=0.6					LST
LST	ALTITUDE		AZIMUTH		ALTITUDE	AZIMUTH			ALTITUDE	AZIMUTH			ALTITUDE	AZIMUTH			ALTITUDE	AZIMUTH			LST				
h m	S35	S40	S35	S40	S35	S40	S35	S40	S35	S40	S35	S40	S35	S40	S35	S40	S35	S40	S35	S40	h m				
0 0	23.9	27.6	138.7	137.1	11.1	15.8	198.5	198.9	8.5	13.4	194.8	195.0	8.1	13.1	182.9	183.0					0 0				
0 10	25.3	28.9	138.0	136.2	10.4	15.2	197.4	197.8	8.0	12.9	193.6	193.9	8.0	13.0	181.8	181.8					0 10				
0 20	26.6	30.3	137.3	135.4	9.8	14.6	196.3	196.6	7.6	12.5	192.5	192.7	8.0	13.0	180.6	180.6					0 20				
0 30	28.0	31.6	136.6	134.6	9.3	14.1	195.2	195.5	7.2	12.1	191.3	191.5	8.0	13.0	179.5	179.5					0 30				
0 40	29.5	33.0	136.0	133.9	8.8	13.6	194.1	194.4	6.8	11.7	190.1	190.3	8.0	13.0	178.3	178.3					0 40				
0 50	30.9	34.4	135.4	133.1	8.3	13.1	193.0	193.2	6.4	11.4	188.9	189.0	8.1	13.1	177.2	177.1					0 50				
1 0	32.3	35.8	134.9	132.4	7.8	12.7	191.8	192.0	6.1	11.1	187.7	187.8	8.2	13.2	176.1	176.0					1 0				
1 10	33.8	37.2	134.4	131.8	7.4	12.4	190.7	190.8	5.9	10.9	186.5	186.6	8.4	13.4	174.9	174.8					1 10				
1 20	35.3	38.6	133.9	131.2	7.1	12.0	189.5	189.6	5.7	10.7	185.3	185.3	8.6	13.6	173.8	173.7					1 20				
1 30	36.7	40.1	133.5	130.6	6.8	11.7	188.3	188.4	5.5	10.5	184.0	184.1	8.8	13.8	172.7	172.5					1 30				
1 40	38.2	41.6	133.2	130.1	6.5	11.5	187.1	187.2	5.4	10.4	182.8	182.8	9.1	14.1	171.6	171.4					1 40				
1 50	39.7	43.0	132.9	129.6	6.3	11.2	185.9	186.0	5.3	10.3	181.5	181.6	9.4	14.4	170.4	170.3					1 50				
2 0	41.2	44.5	132.6	129.1	6.1	11.1	184.7	184.7	5.3	10.3	180.3	180.3	9.8	14.7	169.4	169.2					2 0				
2 10	42.7	46.0	132.4	128.7	5.9	10.9	183.5	183.5	5.3	10.3	179.1	179.0	10.2	15.1	168.3	168.0					2 10				
2 20	44.3	47.5	132.3	128.4	5.8	10.8	182.2	182.3	5.3	10.3	177.8	177.8	10.6	15.5	167.2	166.9					2 20				
2 30	45.8	49.0	132.3	128.1	5.8	10.8	181.0	181.0	5.4	10.4	176.6	176.5	11.1	16.0	166.2	165.9					2 30				
2 40	47.3	50.5	132.3	127.9	5.8	10.8	179.8	179.8	5.6	10.6	175.3	175.3	11.6	16.4	165.1	164.8					2 40				
2 50	48.8	52.0	132.4	127.7	5.8	10.8	178.6	178.5	5.8	10.8	174.1	174.0	12.2	17.0	164.1	163.7					2 50				
3 0					5.9	10.8	177.3	177.3	6.0	11.0	172.9	172.8	12.7	17.5	163.1	162.7					3 0				
3 10					6.0	11.0	176.1	176.1	6.3	11.2	171.7	171.6	13.3	18.1	162.1	161.7					3 10				
3 20					6.1	11.1	174.9	174.8	6.6	11.5	170.5	170.3	14.0	18.7	161.2	160.7					3 20				
3 30					6.3	11.3	173.7	173.6	7.0	11.9	169.3	169.1	14.7	19.4	160.2	159.7					3 30				
3 40					6.6	11.5	172.5	172.4	7.4	12.3	168.1	167.9	15.4	20.0	159.3	158.7					3 40				
3 50					6.9	11.8	171.3	171.2	7.8	12.7	166.9	166.7	16.1	20.8	158.4	157.8					3 50				
4 0					7.2	12.1	170.1	169.9	8.3	13.1	165.8	165.5	16.9	21.5	157.5	156.9					4 0				
4 10					7.6	12.5	168.9	168.8	8.8	13.6	164.6	164.4	17.7	22.3	156.7	156.0					4 10				
4 20					8.0	12.9	167.8	167.6	9.4	14.2	163.5	163.2	18.5	23.1	155.9	155.1					4 20				
4 30					8.4	13.3	166.6	166.4	10.0	14.7	162.4	162.1	19.4	23.9	155.1	154.2					4 30				
4 40					8.9	13.8	165.5	165.2	10.6	15.4	161.3	161.0	20.2	24.7	154.3	153.4					4 40				
4 50					9.5	14.3	164.4	164.1	11.3	16.0	160.3	159.9	21.1	25.6	153.6	152.6					4 50				
5 0					10.0	14.8	163.3	163.0	12.0	16.7	159.2	158.8	22.1	26.5	152.9	151.8	49.7	53.4	220.2	224.5	5 0				
5 10					10.6	15.4	162.2	161.8	12.7	17.4	158.2	157.7	23.0	27.4	152.2	151.1	48.4	52.0	220.6	224.7	5 10				
5 20					11.3	16.0	161.1	160.7	13.5	18.1	157.2	156.7	24.0	28.3	151.5	150.3	47.0	50.7	220.9	224.8	5 20				
5 30					12.0	16.7	160.1	159.7	14.3	18.9	156.3	155.6	25.0	29.3	150.9	149.6	45.7	49.3	221.1	224.8	5 30				
5 40					12.7	17.3	159.1	158.6	15.2	19.7	155.3	154.6	26.0	30.3	150.3	149.0	44.3	48.0	221.2	224.7	5 40				
5 50					13.4	18.1	158.1	157.6	16.0	20.5	154.4	153.7	27.0	31.3	149.8	148.3	43.0	46.6	221.2	224.6	5 50				
6 0					14.2	18.8	157.1	156.5	16.9	21.4	153.5	152.7	28.0	32.3	149.3	147.7	41.6	45.3	221.2	224.4	6 0				





18 0	17 50	17 40	17 30	17 20	17 10	17 0	16 0	16 10	16 20	16 30	16 40	16 50	15 0	15 10	15 20	15 30	15 40	15 50	16 0	16 10	16 20	16 30	16 40	16 50	15 0	15 10	15 20	15 30	15 40	15 50	14 0	14 10	14 20	14 30	14 40	14 50	13 0	13 10	13 20	13 30	13 40	13 50	12 0	12 10	12 20	12 30	12 40	12 50	11 0	11 10	11 20	11 30	11 40	11 50	10 0	10 10	10 20	10 30	10 40	10 50	9 0	9 10	9 20	9 30	9 40	9 50	8 0	8 10	8 20	8 30	8 40	8 50	7 0	7 10	7 20	7 30	7 40	7 50	6 0	6 10	6 20	6 30	6 40	6 50	5 0	5 10	5 20	5 30	5 40	5 50	4 0	4 10	4 20	4 30	4 40	4 50	3 0	3 10	3 20	3 30	3 40	3 50	2 0	2 10	2 20	2 30	2 40	2 50	1 0	1 10	1 20	1 30	1 40	1 50	0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0 30	0 40	0 50	0 0	0 10	0 20	0
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ALPHA CARINAE m=-0.9				ALPHA CENTAURI m=0.1				BETA CENTAURI m=0.9				ALPHA CRUCIS m=1.6				ALPHA ERIDANI m=0.6				LST	
ALTITUDE		AZIMUTH		ALTITUDE		AZIMUTH		ALTITUDE		AZIMUTH		ALTITUDE		AZIMUTH		ALTITUDE		AZIMUTH		LST	
S15	S20	S15	S20	S15	S20	S15	S20	S15	S20	S15	S20	S15	S20	S15	S20	S15	S20	S15	S20	h	m
18	0			31.8	36.2	206.3	207.8	27.9	32.3	208.9	210.3	16.2	20.6	208.0	208.8					18	0
18	10			30.7	35.1	207.0	208.5	26.8	31.1	209.3	210.7	15.1	19.5	208.0	208.7					18	10
18	20			29.6	34.0	207.6	209.0	25.6	29.9	209.7	211.0	14.0	18.4	207.9	208.6					18	20
18	30			28.4	32.8	208.1	209.5	24.4	28.7	210.0	211.3	12.8	17.2	207.8	208.4					18	30
18	40			27.3	31.7	208.6	210.0	23.2	27.4	210.3	211.5	11.7	16.1	207.6	208.2					18	40
18	50			26.1	30.5	209.0	210.3	21.9	26.2	210.5	211.7	10.6	15.0	207.3	207.9	6.4	10.6	147.9	147.5	18	50
19	0			25.0	29.3	209.4	210.6	20.7	25.0	210.7	211.8	9.5	13.9	207.1	207.6	7.7	11.9	147.5	147.0	19	0
19	10			23.8	28.1	209.7	210.9	19.5	23.7	210.8	211.8	8.4	12.8	206.8	207.2	9.0	13.2	147.1	146.6	19	10
19	20			22.6	26.9	209.9	211.1	18.2	22.5	210.9	211.8	7.3	11.8	206.4	206.8	10.3	14.5	146.8	146.2	19	20
19	30			21.4	25.7	210.1	211.2	17.0	21.3	210.9	211.8	6.2	10.7	206.0	206.4	11.7	15.8	146.6	145.9	19	30
19	40			20.1	24.4	210.2	211.3	15.8	20.0	210.8	211.7					13.0	17.1	146.4	145.6	19	40
19	50			18.9	23.2	210.3	211.3	14.5	18.8	210.8	211.5					14.3	18.5	146.2	145.4	19	50
20	0			17.7	22.0	210.4	211.3	13.3	17.6	210.6	211.3					15.7	19.8	146.1	145.2	20	0
20	10			16.5	20.8	210.4	211.2	12.1	16.4	210.4	211.1					17.0	21.1	146.0	145.1	20	10
20	20			15.3	19.6	210.3	211.1	10.8	15.1	210.2	210.8					18.4	22.5	146.0	145.0	20	20
20	30			14.1	18.4	210.2	211.0	9.6	13.9	209.9	210.5					19.7	23.8	146.1	145.0	20	30
20	40			12.8	17.2	210.1	210.8	8.4	12.8	209.6	210.1					21.1	25.2	146.2	145.0	20	40
20	50			11.6	16.0	209.9	210.5	7.2	11.6	209.3	209.7					22.4	26.5	146.3	145.1	20	50
21	0			10.4	14.8	209.6	210.2	6.1	10.4	208.9	209.2					23.7	27.9	146.5	145.2	21	0
21	10			9.2	13.6	209.4	209.9									25.1	29.2	146.8	145.4	21	10
21	20			8.1	12.4	209.0	209.5									26.4	30.6	147.1	145.6	21	20
21	30			6.9	11.3	208.7	209.1									27.7	31.9	147.5	146.0	21	30
21	40			5.7	10.1	208.3	208.6									29.0	33.2	148.0	146.4	21	40
21	50															30.3	34.5	146.5	146.8	21	50
22	0															31.5	35.8	149.1	147.3	22	0
22	10															32.7	37.0	149.8	148.0	22	10
22	20															33.9	38.2	150.5	148.6	22	20
22	30															35.1	39.5	151.3	149.4	22	30
22	40															36.3	40.6	152.2	150.3	22	40
22	50															37.4	41.8	153.1	151.2	22	50
23	0															38.4	42.9	154.2	152.2	23	0
23	10															39.5	44.0	155.3	153.3	23	10
23	20															40.5	45.0	156.5	154.6	23	20
23	30															41.4	46.0	157.8	155.9	23	30
23	40															42.3	46.9	159.1	157.3	23	40
23	50	6.9	10.9	142.8	142.4											43.1	47.8	160.6	158.8	23	50
24	0	8.4	12.3	142.4	141.9											43.9	48.6	162.1	160.4	24	0

(17)

ALPHA CARINAE m=-0.9					ALPHA CENTAURI m=0.1					BETA CENTAURI m=0.9					ALPHA CRUCIS m=1.6					ALPHA ERIDANI m=0.6					LST				
ALTITUDE		AZIMUTH			ALTITUDE		AZIMUTH			ALTITUDE		AZIMUTH			ALTITUDE		AZIMUTH			ALTITUDE		AZIMUTH			ALTITUDE		AZIMUTH		
S30	S35	S30	S35		S30	S35	S30	S35		S30	S35	S30	S35		S30	S35	S30	S35		S30	S35	S30	S35		S30	S35	S30	S35	
0	0	20.1	23.9	140.0	138.7	6.3	11.1	198.2	198.5																			0	0
0	10	21.5	25.3	139.4	138.0	5.7	10.4	197.2	197.4																			0	10
0	20	22.9	26.6	138.8	137.3																							0	20
0	30	24.4	28.0	138.3	136.6																							0	30
0	40	25.8	29.5	137.8	136.0																							0	40
0	50	27.3	30.9	137.4	135.4																							0	50
1	0	28.7	32.3	136.9	134.9																							1	0
1	10	30.2	33.8	136.6	134.4																							1	10
1	20	31.7	35.3	136.3	133.9																							1	20
1	30	33.2	36.7	136.0	133.5																							1	30
1	40	34.7	38.2	135.8	133.2																							1	40
1	50	36.2	39.7	135.7	132.9																							1	50
2	0	37.7	41.2	135.6	132.6																							2	0
2	10	39.3	42.7	135.6	132.4																							2	10
2	20	40.8	44.3	135.6	132.3																							2	20
2	30	42.3	45.8	135.7	132.3																							2	30
2	40	43.8	47.3	135.9	132.3																							2	40
2	50	45.3	48.8	136.2	132.4																							2	50
3	0	46.8	50.3	136.6	132.6																							3	0
3	10	48.3	51.8	137.1	132.9																							3	10
3	20	49.7	53.3	137.7	133.2																							3	20
3	30																											3	30
3	40																											3	40
3	50																											3	50
4	0																											4	0
4	10																											4	10
4	20																											4	20
4	30																											4	30
4	40																											4	40
4	50																											4	50
5	0					5.2	10.0	163.5	163.3	7.3	12.0	159.5	159.2	17.6	22.1	153.7	152.9	45.8	49.7	216.8	220.2	5	0					5	0
5	10					5.9	10.6	162.4	162.2	8.1	12.7	158.6	158.2	18.6	23.0	153.0	152.2	44.5	48.4	217.3	220.6	5	10					5	10
5	20					6.6	11.3	161.4	161.1	8.9	13.5	157.6	157.2	19.5	24.0	152.5	151.5	43.1	47.0	217.7	220.9	5	20					5	20
5	30					7.3	12.0	160.4	160.1	9.7	14.3	156.7	156.3	20.6	25.0	151.9	150.9	41.8	45.7	218.0	221.1	5	30					5	30
5	40					8.0	12.7	159.4	159.1	10.6	15.2	155.8	155.3	21.6	26.0	151.4	150.3	40.5	44.3	218.3	221.2	5	40					5	40
5	50					8.8	13.4	158.5	158.1	11.5	16.0	154.9	154.4	22.6	27.0	150.9	149.8	39.1	43.0	218.4	221.2	5	50					5	50
6	0					9.6	14.2	157.5	157.1	12.5	16.9	154.1	153.5	23.7	28.0	150.5	149.3	37.8	41.6	213.5	221.2	6	0					6	0



ALPHA CARINAE m=-0.9					ALPHA CENTAURI m=0.1					BETA CENTAURI m=0.9					ALPHA CRUCIS m=1.6					ALPHA ERIDANI m=0.6						
LST	ALTITUDE		AZIMUTH		LST	ALTITUDE		AZIMUTH		LST	ALTITUDE		AZIMUTH		LST	ALTITUDE		AZIMUTH		LST	ALTITUDE		AZIMUTH			
h m	S20	S25	S20	S25	h m	S20	S25	S20	S25	h m	S20	S25	S20	S25	h m	S20	S25	S20	S25	h m	S20	S25	S20	S25		
6 0																				6 0						
6 10																				6 10						
6 20																				6 20						
6 30																				6 30						
6 40																				6 40						
6 50																				6 50						
7 0																				7 0						
7 10																				7 10						
7 20																				7 20						
7 30																				7 30						
7 40																				7 40						
7 50																				7 50						
8 0																				8 0						
8 10																				8 10						
8 20																				8 20						
8 30	49.2	53.5	209.1	212.3																8 30						
8 40	48.0	52.3	210.6	213.8																8 40						
8 50	46.8	51.0	211.9	215.1																8 50						
9 0	45.6	49.7	213.1	216.2																						
9 10	44.3	48.3	214.2	217.3																						
9 20	42.9	46.9	215.2	218.2																						
9 30	41.6	45.5	216.1	219.0																						
9 40	40.2	44.1	216.9	219.7																						
9 50	38.7	42.6	217.5	220.2																						
10 0	37.3	41.2	218.1	220.7																						
10 10	35.8	39.7	218.6	221.1																						
10 20	34.4	38.2	219.1	221.4																						
10 30	32.9	36.7	219.4	221.9																						
10 40	31.4	35.2	219.7	221.9																						
10 50	29.9	33.7	219.9	222.0																						
11 0	28.4	32.1	220.1	222.0																						
11 10	26.8	30.6	220.2	222.0																						
11 20	25.3	29.1	220.2	221.9																						
11 30	23.8	27.6	220.1	221.7																						
11 40	22.3	26.1	220.1	221.5																						
11 50	20.8	24.6	219.9	221.3																						
12 0	19.3	23.1	219.7	221.0																						

ALPHA CARINAE m=-0.9					ALPHA CENTAURI m=0.1					BETA CENTAURI m=0.9					ALPHA CRUCIS m=1.6					ALPHA ERIDANI m=0.6				
LST	ALTITUDE		AZIMUTH		LST	ALTITUDE		AZIMUTH		LST	ALTITUDE		AZIMUTH		LST	ALTITUDE		AZIMUTH		LST	ALTITUDE		AZIMUTH	
h m	S25	S30	S25	S30	h m	S25	S30	S25	S30	h m	S25	S30	S25	S30	h m	S25	S30	S25	S30	h m	S25	S30	S25	S30
12 0	23.1	26.8	221.0	222.5	12 0	45.2	49.7	153.8	151.3	12 0	48.9	53.5	157.4	154.9	12 0					12 0				
12 10	21.6	25.4	220.6	222.1	12 10	46.2	50.7	154.8	152.3	12 10	49.8	54.4	158.8	156.4	12 10					12 10				
12 20	20.2	23.9	220.2	221.5	12 20	47.2	51.7	155.9	153.4	12 20					12 20					12 20				
12 30	18.7	22.5	219.8	221.0	12 30	48.1	52.6	157.2	154.7	12 30					12 30					12 30				
12 40	17.3	21.1	219.3	220.4	12 40	48.9	53.5	158.5	156.1	12 40					12 40					12 40				
12 50	15.8	19.7	218.8	219.8	12 50	49.7	54.4	159.9	157.6	12 50					12 50					12 50				
13 0	14.4	18.3	218.2	219.1						13 0					13 0					13 0				
13 10	13.0	17.0	217.6	218.4						13 10					13 10					13 10				
13 20	11.7	15.6	216.9	217.6						13 20					13 20					13 20				
13 30	10.3	14.3	216.2	216.8						13 30					13 30					13 30				
13 40	9.0	13.0	215.4	216.0						13 40					13 40					13 40				
13 50	7.7	11.8	214.7	215.2						13 50	49.5	54.3	194.6	196.3	13 50					13 50				
14 0	6.4	10.5	213.8	214.3						14 0	48.9	53.7	196.1	197.9	14 0					14 0				
14 10										14 10	48.2	53.0	197.5	199.4	14 10					14 10				
14 20										14 20	47.5	52.2	198.8	200.8	14 20					14 20				
14 30										14 30	46.8	51.5	200.1	202.1	14 30					14 30				
14 40										14 40	46.0	50.6	201.2	203.4	14 40					14 40				
14 50										14 50	45.2	49.7	202.3	204.5	14 50					14 50				
15 0										15 0	44.3	48.8	203.3	205.5	15 0					15 0				
15 10										15 10	43.4	47.9	204.3	206.4	15 10					15 10				
15 20										15 20	42.4	46.9	205.1	207.3	15 20					15 20				
15 30										15 30	41.4	45.9	205.9	208.1	15 30					15 30				
15 40										15 40	40.4	44.9	206.6	208.7	15 40					15 40				
15 50										15 50	39.4	43.8	207.2	209.3	15 50					15 50				
16 0										16 0	49.3	53.9	201.9	204.4	16 0					16 0				
16 10										16 10	48.5	53.0	203.3	205.8	16 10					16 10				
16 20										16 20	47.5	52.0	204.5	207.1	16 20					16 20				
16 30										16 30	46.6	51.0	205.7	208.3	16 30					16 30				
16 40										16 40	45.6	50.0	206.7	209.3	16 40					16 40				
16 50										16 50	44.5	48.9	207.7	210.3	16 50					16 50				
17 0										17 0	46.8	51.4	204.5	207.0	17 0					17 0				
17 10										17 10	45.9	50.4	205.6	208.1	17 10					17 10				
17 20										17 20	44.9	49.3	206.6	209.1	17 20					17 20				
17 30										17 30	43.9	48.2	207.5	210.0	17 30					17 30				
17 40										17 40	42.8	47.2	208.3	210.8	17 40					17 40				
17 50										17 50	41.7	46.0	209.1	211.5	17 50					17 50				
18 0										18 0	40.6	44.9	209.7	212.1	18 0					18 0				
											36.6	40.8	212.1	214.3										
											25.0	29.3	209.9	211.2										
											8.9	13.2	150.1	149.6										

(24)





ALPHA CARINAE m=-0.9					ALPHA CENTAURI m=0.1					BETA CENTAURI m=0.9					ALPHA CRUCIS m=1.6					ALPHA ERIDANI m=0.6					LST	
ALTITUDE		AZIMUTH		LST	ALTITUDE		AZIMUTH		LST	ALTITUDE		AZIMUTH		LST	ALTITUDE		AZIMUTH		LST	ALTITUDE		AZIMUTH				
h	m	S20	S25		S20	S25	S20	S25		S20	S25	S20	S25		S20	S25	S20	S25		S20	S25	S20	S25	h	m	
18	0					36.2	40.6	207.8	209.7	32.3	36.6	210.3	212.1	20.6	25.0	208.8	209.9			18	0					
18	10					35.1	39.5	208.5	210.3	31.1	35.4	210.7	212.4	19.5	23.8	208.7	209.7	5.7	10.1	149.7	149.4	18	10			
18	20					34.0	38.3	209.0	210.9	29.9	34.1	211.0	212.7	18.4	22.7	208.6	209.5	6.9	11.2	149.1	148.7	18	20			
18	30					32.8	37.1	209.5	211.3	28.7	32.9	211.3	212.9	17.2	21.6	208.4	209.2	8.2	12.4	148.5	148.1	18	30			
18	40					31.7	36.0	210.0	211.7	27.4	31.7	211.5	213.0	16.1	20.5	208.2	208.9	9.4	13.6	148.0	147.4	18	40			
18	50					30.5	34.8	210.3	212.0	26.2	30.4	211.7	213.1	15.0	19.4	207.9	208.6	10.6	14.8	147.5	146.9	18	50			
19	0					29.3	33.6	210.6	212.2	25.0	29.2	211.8	213.2	13.9	18.3	207.6	208.2	11.9	16.1	147.0	146.3	19	0			
19	10					28.1	32.3	210.9	212.4	23.7	28.0	211.8	213.1	12.8	17.3	207.2	207.8	13.2	17.4	146.6	145.8	19	10			
19	20					26.9	31.1	211.1	212.5	22.5	26.7	211.8	213.1	11.8	16.2	206.8	207.4	14.5	18.6	146.2	145.4	19	20			
19	30					25.7	29.9	211.2	212.6	21.3	25.5	211.8	212.9	10.7	15.2	206.4	206.9	15.8	19.9	145.9	145.0	19	30			
19	40					24.4	28.7	211.3	212.6	20.0	24.3	211.7	212.8	9.7	14.2	205.9	206.4	17.1	21.2	145.6	144.6	19	40			
19	50					23.2	27.5	211.3	212.6	18.8	23.0	211.5	212.5	8.7	13.2	205.4	205.8	18.5	22.6	145.4	144.3	19	50			
20	0					22.0	26.2	211.3	212.5	17.6	21.8	211.3	212.3	7.7	12.2	204.8	205.2	19.8	23.9	145.2	144.0	20	0			
20	10					20.8	25.0	211.2	212.4	16.4	20.6	211.1	212.0	6.7	11.3	204.2	204.6	21.1	25.2	145.1	143.8	20	10			
20	20					19.6	23.8	211.1	212.2	15.1	19.4	210.8	211.6	5.8	10.3	203.6	203.9	22.5	26.6	145.0	143.7	20	20			
20	30					18.4	22.6	211.0	211.9	13.9	18.2	210.5	211.2					23.8	27.9	145.0	143.5	20	30			
20	40					17.2	21.4	210.8	211.7	12.8	17.1	210.1	210.8					25.2	29.3	145.0	143.5	20	40			
20	50					16.0	20.2	210.5	211.3	11.6	15.9	209.7	210.3					26.5	30.6	145.1	143.5	20	50			
21	0					14.8	19.1	210.2	211.0	10.4	14.8	209.2	209.8					27.9	31.9	145.2	143.5	21	0			
21	10					13.6	17.9	209.9	210.6	9.3	13.7	208.7	209.2					29.2	33.3	145.4	143.6	21	10			
21	20					12.4	16.8	209.5	210.1	8.2	12.6	208.2	208.6					30.6	34.6	145.6	143.8	21	20			
21	30					11.3	15.6	209.1	209.6	7.1	11.5	207.6	208.0					31.9	36.0	146.0	144.0	21	30			
21	40					10.1	14.5	208.6	209.1	6.0	10.5	207.0	207.3					33.2	37.3	146.4	144.3	21	40			
21	50					9.0	13.4	208.1	208.6									34.5	38.6	146.8	144.7	21	50			
22	0					7.9	12.4	207.5	208.0									35.8	39.9	147.3	145.2	22	0			
22	10					6.9	11.3	207.0	207.3									37.0	41.2	148.0	145.7	22	10			
22	20					5.8	10.3	206.3	206.6									38.2	42.5	148.6	146.4	22	20			
22	30																	39.5	43.7	149.4	147.1	22	30			
22	40																	40.6	44.9	150.3	147.9	22	40			
22	50																	41.8	46.1	151.2	148.8	22	50			
23	0																	42.9	47.3	152.2	149.8	23	0			
23	10																	44.0	48.4	153.3	150.9	23	10			
23	20	6.7	10.7	144.0	143.6													45.0	49.5	154.6	152.1	23	20			
23	30	8.1	12.1	143.4	142.9													46.0	50.5	155.9	153.5	23	30			
23	40	9.5	13.4	142.9	142.3													46.9	51.5	157.3	154.9	23	40			
23	50	10.9	14.8	142.4	141.6													47.8	52.4	158.8	156.5	23	50			
24	0	12.3	16.2	141.9	141.1													48.6	53.3	160.4	158.2	24	0			

(21)

ALPHA CARINAE m=-0.9					ALPHA CENTAURI m=0.1					BETA CENTAURI m=0.9					ALPHA CRUCIS m=1.6					ALPHA ERIDANI m=0.6					LST h m
ALTITUDE		AZIMUTH		LST h m	ALTITUDE		AZIMUTH		LST h m	ALTITUDE		AZIMUTH		LST h m	ALTITUDE		AZIMUTH		LST h m						
S25	S30	S25	S30		S25	S30	S25	S30		S25	S30	S25	S30		S25	S30	S25	S30		S25	S30				
0 0	16.2	20.1	141.1	140.0																0 0					
0 10	17.7	21.5	140.6	139.4																0 10					
0 20	19.1	22.9	140.1	138.8																0 20					
0 30	20.6	24.4	139.7	138.3																0 30					
0 40	22.1	25.8	139.3	137.8																0 40					
0 50	23.5	27.3	138.9	137.4																	0 50				
1 0	25.0	28.7	138.6	136.9																	1 0				
1 10	26.5	30.2	138.4	136.6																	1 10				
1 20	28.0	31.7	138.2	136.3																	1 20				
1 30	29.6	33.2	138.1	136.0																	1 30				
1 40	31.1	34.7	138.0	135.8																	1 40				
1 50	32.6	36.2	138.0	135.7																	1 50				
2 0	34.1	37.7	138.1	135.6																	2 0				
2 10	35.6	39.3	138.2	135.6																	2 10				
2 20	37.1	40.8	138.4	135.6																	2 20				
2 30	38.6	42.3	138.6	135.7																	2 30				
2 40	40.1	43.8	139.0	135.9																	2 40				
2 50	41.6	45.3	139.4	136.2																	2 50				
3 0	43.1	46.8	139.9	136.6																	3 0				
3 10	44.5	48.3	140.5	137.1																	3 10				
3 20	45.9	49.7	141.3	137.7																	3 20				
3 30	47.3	51.2	142.1	138.4																	3 30				
3 40	48.7	52.6	143.0	139.2							6.0	10.7	160.0	159.7							3 40				
3 50											6.8	11.5	159.1	158.9	49.9	54.3	207.3	210.4			3 50				
4 0											7.6	12.3	158.4	158.0	48.8	53.1	208.6	211.7			4 0				
4 10											8.5	13.1	157.6	157.2	47.7	52.0	209.8	212.9			4 10				
4 20											9.3	13.9	156.9	156.5	46.6	50.8	210.8	213.9			4 20				
4 30											10.2	14.8	156.2	155.7	45.4	49.6	211.8	214.8			4 30				
4 40											11.2	15.7	155.5	155.0	44.2	48.3	212.6	215.6			4 40				
4 50											12.1	16.6	154.9	154.3	43.0	47.1	213.4	216.2			4 50				
5 0											13.1	17.6	154.3	153.7	41.7	45.8	214.0	216.8			5 0				
5 10											14.1	18.6	153.7	153.0	40.4	44.5	214.6	217.3			5 10				
5 20											15.1	19.5	153.2	152.5	39.1	43.1	215.1	217.7			5 20				
5 30											16.1	20.6	152.7	151.9	37.8	41.8	215.5	218.0			5 30				
5 40										6.1	10.6	156.1	155.8	17.2	21.6	152.2	151.4	36.5	40.5	215.9	218.3	5 40			
5 50										7.0	11.5	155.3	154.9	18.2	22.6	151.8	150.9	35.2	39.1	216.1	218.4	5 50			
6 0										7.9	12.5	154.5	154.1	19.3	23.7	151.4	150.5	33.8	37.8	216.3	218.5	6 0			

(22)