LES TABLES AMERICAINES

-

HO 249 / HO 229

1- Introduction

2- Principes et applications

- 1 -
Introduction

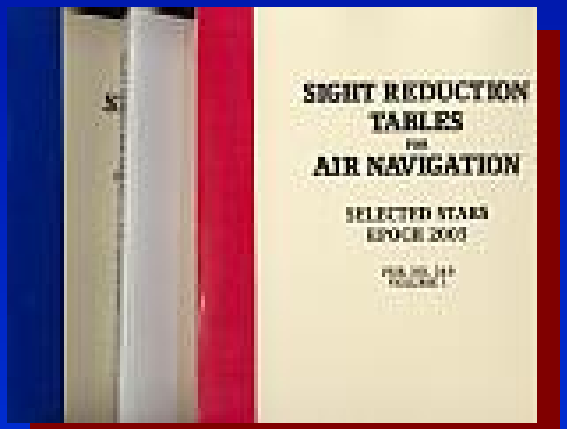
1- Introduction

Notations françaises et américaines

Angle Horaire à l'origine	AHao	GHA	Greenwich Hour Angle
Angle Horaire local	AHag	LHA	Local Hour Angle
Déclinaison	D		Déclination
Angle Horaire sidéral ou Temps Sidéral	AHso	SHA	Sideral Hour Angle
		LHA	
Hauteur estimée	He	Hc	Height calculated
Relèvement	Z		Relevement
Hauteur vraie	Hv	Ho	Observed altitude

1- Introduction

HO 249/229 : Sight reductions tables for air/marine navigation



Tables 249
=> pour les aéro
Tables plus limitées et moins précises

Tables 229
=> pour les marins
Tables plus précises mais plus encombrantes

1- Introduction

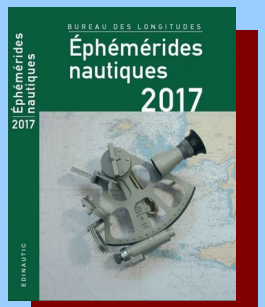
La droite de hauteur via les calculs

Les données

Heure | **Position estimée** | **(Hi, Z)** | **ε et c**

Tcf_1 | **(φ_e , G_e)** | **Astre relevé** | **Erreurs sextant**

Ho



AHag

D

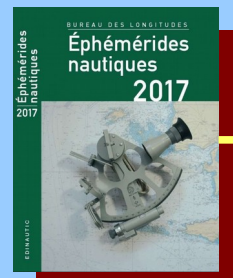
Coordonnées de l'astre

CALCULS ASTRO

$$\sin h_e = \sin \varphi_e \sin D + \cos \varphi_e \cos D \cos AHag$$

$$\cos Az_e = \frac{\sin D - \sin \varphi_e \sin h_e}{\cos \varphi_e \cos h_e}$$

He ,Ze



D
P
1/2
δ

Corrections

Hv

L'intercept
i =(Hv, He), Ze

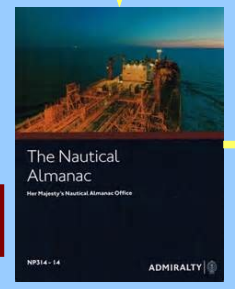
1- Introduction

Principe de la droite de hauteur via tables américaines

Les données

Heure | **Position estimée** | **Tcf_1** | **(φ_e , G_e)**

(hs, Z) | **Index correction** | **Astre relevé** | **Erreurs sextant**



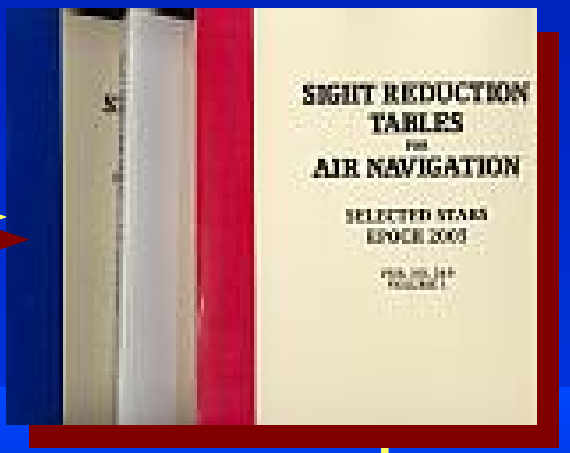
ha → **ho**

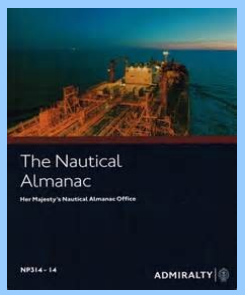
Corrections

Position approchée

(φ_a , G_a)

LHA





GHA

D

Coordonnées de l'astre

Hv

Hc, Zc

L'intercept
i =(Hv- Hc), Zc

1- Introduction

2- Principes

3- Application

- 2 -
Principes

2- Principe et application

Les données d'entrées

Latitude
(approchée au degré)

LHA
(rond => longitude approchée définie pour avoir un LHA au degré)

LATITUDE CONTRARY NAME TO DECLINATION L.H.A. 68°, 292°

Dec.	15° Hc	d	Z	16° Hc	d	Z	17° Hc	d	Z	18° Hc	d	Z	19° Hc	d	Z	20° Hc	d	Z	21° Hc	d	Z	22° Hc	d	Z	Dec.
0	21 12.8	−16.8	96.0	21 06.4	−17.9	96.4	20 59.5	−18.9	96.7	20 52.[illegible]	−20.0	97.1	20 44.7	−21.1	97.5	20 36.6	−22.1	97.9	20 28.2	−23.1	98.2	20 19.4	−24.1	98.6	0
1	20 56.0	−17.3	97.0	20 48.5	−18.3	97.4	20 40.6	−19.4	97.8	20 32.[illegible]	−20.4	98.1	20 23.6	−21.4	98.5	20 14.5	−22.4	98.9	20 05.1	−23.4	99.2	19 55.3	−24.4	99.6	1
2	20 38.7	−17.5	98.0	20 30.2	−18.6	98.4	20 21.2	−19.6	98.8	20 11.9	−20.7	99.1	20 02.2	−21.7	99.5	19 52.1	−22.7	99.8	19 41.7	−23.8	100.2	19 30.9	−24.8	100.6	2
3	20 21.2	−18.0	99.0	20 11.6	−19.0	99.4	20 01.6	−20.1	99.8	19 51.2	−21.0	100.1	19 40.5	−22.1	100.5	19 29.4	−23.1	100.8	19 17.9	−24.1	101.2	19 06.1	−25.0	101.5	3
4	20 03.2	−18.2	100.1	19 52.6	−19.3	100.4	19 41.5	−20.3	100.8	19 30.2	−21.4	101.1	19 18.4	−22.4	101.5	19 06.3	−23.4	101.8	18 53.8	−24.3	102.1	18 41.1	−25.4	102.5	4
5	19 45.0	−18.6	101.1	19 33.3	−19.7	101.4	19 21.2	−20.7	101.8	19 08.8	−21.7	102.1	18 56.0	−22.7	102.4	18 42.9	−23.7	102.8	18 29.5	−24.7	103.1	18 15.7	−25.6	103.4	5
6	19 26.4	−19.0	102.1	19 13.6	−20.0	102.4	19 00.5	−21.0	102.8	18 47.1	−22.0	103.1	18 33.3	−22.9	103.4	18 19.2	−23.9	103.8	18 04.8	−24.9	104.1	17 50.1	−25.9	104.4	6
7	19 07.4	−19.3	103.1	18 53.6	−20.2	103.4	18 39.5	−21.3	103.8	18 25.1	−22.3	104.1	18 10.4	−23.3	104.4	17 55.3	−24.3	104.7	17 39.9	−25.2	105.0	17 24.2	−26.2	105.3	7
8	18 48.1	−19.6	104.1	18 33.4	−20.6	104.4	18 18.2	−21.5	104.7	18 02.8	−22.6	105.1	17 47.1	−23.6	105.4	17 31.0	−24.5	105.7	17 14.7	−25.5	106.0	16 58.0	−26.4	106.3	8
9	18 28.5	−19.9	105.1	18 12.8	−21.0	105.4	17 56.7	−21.9	105.7	17 40.2	−22.8	106.0	17 23.5	−23.8	106.3	17 06.5	−24.8	106.6	16 49.2	−25.8	106.9	16 31.6	−26.7	107.2	9
10	18 08.6	−20.2	106.1	17 51.8	−21.2	106.4	17 34.8	−22.2	106.7	17 17.4	−23.2	107.0	16 59.7	−24.1	107.3	16 41.7	−25.1	107.6	16 23.4	−26.0	107.9	16 04.9	−26.9	108.1	10
11	17 48.4	−20.5	107.1	17 30.6	−21.4	107.4	17 12.6	−22.5	107.7	16 54.2	−23.4	108.0	16 35.6	−24.4	108.3	16 16.6	−25.3	108.5	15 57.4	−26.2	108.8	15 38.0	−27.2	109.1	11
12	17 27.9	−20.8	108.1	17 09.2	−21.8	108.4	16 50.1	−22.7	108.6	16 30.8	−23.7	108.9	16 11.2	−24.6	109.2	15 51.3	−25.5	109.5	15 31.2	−26.5	109.7	15 10.8	−27.4	110.0	12
13	17 07.1	−21.1	109.0	16 47.4	−22.1	109.3	16 27.4	−23.0	109.6	16 07.1	−23.[illegible]	109.9	15 46.6	−24.9	110.2	15 25.8	−25.8	110.4	15 04.7	−26.7	110.7	14 43.4	−27.6	110.9	13
14	16 46.0	−21.3	110.0	16 25.3	−22.3	110.3	16 04.4	−23.3	110.6	15 43.2	−24.[illegible]	110.8	15 21.7	−25.1	111.1	15 00.0	−26.0	111.3	14 38.0	−26.9	111.6	14 15.8	−27.8	111.8	14
15	16 24.7	−21.7	111.0	16 03.0	−22.5	111.3	15 41.1	−23.5	111.5	15 19.0	−24.4	111.8	14 56.6	−25.3	112.0	14 34.0	−26.3	112.3	14 11.1	−27.1	112.5	13 48.0	−28.0	112.7	15
16	16 03.0	−21.9	112.0	15 40.5	−22.9	112.2	15 17.6	−23.7	112.5	14 54.6	−24.7	112.7	14 31.3	−25.6	113.0	14 07.7	−26.4	113.2	13 44.0	−27.4	113.4	13 20.0	−28.2	113.7	16
17	15 41.1	−22.1	112.9	15 17.6	−23.0	113.2	14 53.9	−24.0	113.4	14 29.9	−24.9	113.7	14 05.7	−25.8	113.9	13 41.3	−26.7	114.1	13 16.6	−27.5	114.4	12 51.8	−28.4	114.6	17
18	15 19.0	−22.4	113.9	14 54.6	−23.3	114.1	14 29.9	−24.2	114.4	14 05.0	−25.1	114.6	13 39.9	−25.9	114.8	13 14.6	−26.8	115.1	12 49.1	−27.7	115.3	12 23.4	−28.5	115.5	18
19	14 56.6	−22.6	114.9	14 31.3	−23.6	115.1	14 05.7	−24.4	115.3	13 39.9	−25.3	115.5	13 14.0	−26.2	115.8	12 47.8	−27.1	116.0	12 21.4	−27.9	116.2	11 54.9	−28.8	116.4	19
20	14 34.0	−22.9	115.8	14 07.7	−23.7	116.0	13 41.3	−24.7	116.3	13 14.6	−25.5	116.5	12 47.8	−26.4	116.7	12 20.7	−27.2	116.9	11 53.5	−28.1	117.1	11 26.1	−28.9	117.3	20
21	14 11.1	−23.1	116.8	13 44.0	−24.0	117.0	13 16.6	−24.8	117.2	12 49.1	−25.7	117.4	12 21.4	−26.5	117.6	11 53.5	−27.4	117.8	11 25.4	−28.2	118.0	10 57.2	−29.0	118.2	21
22	13 48.0	−23.3	117.7	13 20.0	−24.2	117.9	12 51.8	−25.0	118.1	12 23.4	−25.9	118.3	11 54.9	−26.8	118.5	11 26.1	−27.6	118.7	10 57.2	−28.4	118.9	10 28.2	−29.2	119.0	22
23	13 24.7	−23.5	118.7	12 55.8	−24.4	118.9	12 26.8	−25.3	119.1	11 57.5	−26.0	119.3	11 28.1	−26.9	119.4	10 58.5	−27.7	119.6	10 28.8	−28.5	119.8	9 59.0	−29.4	119.9	23

Declination

Signe de la déclinaison et de la latitude

2- Principe et application

Principe de la droite de hauteur et tables américaines

1- Mesurer la hauteur de l'astre à t_0 avec le sextant

Heure de l'observation (t_0)

Longitude de l'observateur

Longitude approchée
(afin que LHA soit de valeur ronde)

Latitude de l'observateur

Latitude approchée
Latitude de l'observateur au degré près

Avec le Nautical Almanach

2 - Déterminer (GHA, D) de l'astre

3- Déterminer (LHA, D) de l'astre

LHA = GHA - Ga

Avec les tables HO229

4- Déterminer (Hc, Zc)
la hauteur et le relèvement Calculé de l'astre
vu depuis e la position approchéé

Sur la carte

5-Tracer sur la carte le relèvement Zc
à partir du point approché

6- Tracer la droite d'intercept

1- Introduction

2- Principes et applications

3- Application

- 3 -
Application

3- Application

Exemple

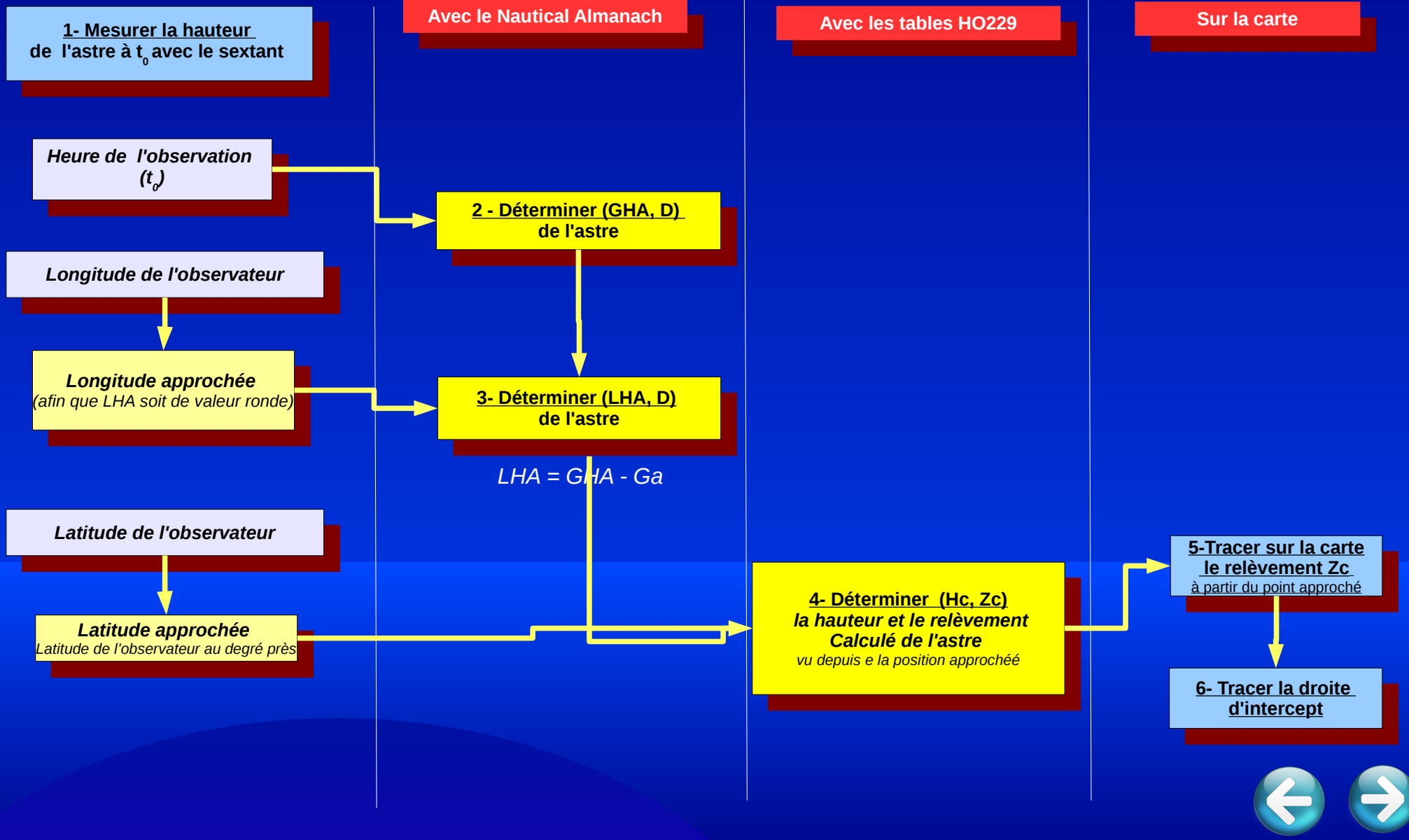
Le 16 mai 1995, on relève au sextant la hauteur des étoiles suivantes

	Hauteur instrumentale	*Heure d'observation (heure fuseau)*	*Position estimée lors de l'observation*
Kochab	47°19,1'	*20h 07m 43s*	*39° 05,1 'N, 157° 08,0' W*
Spica	32°34,8	*20h 11m 26s*	*39° 06 ,3 N, 157° 10,0' W*
	Sextant Altitude	*Observation Time (zone time)*	*estimated position*

La hauteur de l'œil est de 14,6 m (48 pieds) et l'erreur du sextant est de +2 ,1'.
Déterminer l'intercepte et le relèvement des deux étoiles.

3- Application

Exemple



3- Application

Exemple

1995 MAY 16, 17, 18 (TUES., WED., THURS.)

UT (GMT)	ARIES	VENUS −3.9		MARS +0.7		JUPITER −2.5		SATURN +1.3	
	G.H.A.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.	G.H.A.	Dec.
d h	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
16 00	233 14.4	205 51.6	N 9 30.5	84 34.3	N14 31.2	342 02.6	S21 28.7	239 13.9	S 4 40.8
01	248 16.9	220 51.2	31.6	99 35.8	30.8	357 05.3	28.7	254 16.2	40.7
02	263 19.4	235 50.8	32.7	114 37.3	30.3	12 08.1	28.7	269 18.5	40.6
03	278 21.8	250 50.4	·· 33.8	129 38.8	·· 29.9	27 10.9	·· 28.6	284 20.7	·· 40.6
04	293 24.3	265 50.0	34.9	144 40.3	29.5	42 13.7	28.6	299 23.0	40.5
05	308 26.8	280 49.6	36.0	159 41.7	29.1	57 16.4	28.5	314 25.3	40.4
06	323 29.2	295 49.2	N 9 37.1	174 43.2	N14 28.7	72 19.2	S21 28.5	329 27.6	S 4 40.4
07	338 31.7	310 48.8	38.2	189 44.7	28.3	87 22.0	28.5	344 29.9	40.3
T 08	353 34.2	325 48.4	39.2	204 46.2	27.9	102 24.7	28.4	359 32.1	40.2
U 09	8 36.6	340 48.0	·· 40.3	219 47.7	·· 27.5	117 27.5	·· 28.4	14 34.4	·· 40.2
E 10	23 39.1	355 47.6	41.4	234 49.2	27.1	132 30.3	28.4	29 36.7	40.1
S 11	38 41.5	10 47.1	42.5	249 50.6	26.6	147 33.1	28.3	44 39.0	40.0
D 12	53 44.0	25 46.7	N 9 43.6	264 52.1	N14 26.2	162 35.8	S21 28.3	59 41.3	S 4 40.0
A 13	68 46.5	40 46.3	44.7	279 53.6	25.8	177 38.6	28.3	74 43.6	39.9
Y 14	83 48.9	55 45.9	45.8	294 55.1	25.4	192 41.4	28.2	89 45.8	39.8
15	98 51.4	70 45.5	·· 46.9	309 56.6	·· 25.0	207 44.2	·· 28.2	104 48.1	·· 39.8
16	113 53.9	85 45.1	47.9	324 58.0	24.6	222 46.9	28.2	119 50.4	39.7
17	128 56.3	100 44.7	49.0	339 59.5	24.2	237 49.7	28.1	134 52.7	39.6
18	143 58.8	115 44.3	N 9 50.1	355 01.0	N14 23.8	252 52.5	S21 28.1	149 55.0	S 4 39.6
19	159 01.3	130 43.9	51.2	10 02.5	23.3	267 55.3	28.1	164 57.3	39.5
20	174 03.7	145 43.5	52.3	25 03.9	22.9	282 58.0	28.0	179 59.5	39.4
21	189 06.2	160 43.1	·· 53.4	40 05.4	·· 22.5	298 00.8	·· 28.0	195 01.8	·· 39.4
22	204 08.7	175 42.7	54.5	55 06.9	22.1	313 03.6	28.0	210 04.1	39.3
23	219 11.1	190 42.3	55.5	70 08.4	21.7	328 06.3	27.9	225 06.4	39.2
17 00	234 13.6	205 41.9	N 9 56.6	85 09.8	N14 21.3	343 09.1	S21 27.9	240 08.7	S 4 39.1
01	249 16.0	220 41.5	57.7	100 11.3	20.9	358 11.9	27.8	255 11.0	39.1
02	264 18.5	235 41.1	58.8	115 12.8	20.5	13 14.7	27.8	270 13.2	39.0
03	279 21.0	250 40.7	9 59.9	130 14.3	·· 20.0	28 17.4	·· 27.8	285 15.5	·· 38.9
04	294 23.4	265 40.3	10 01.0	145 15.7	19.6	43 20.2	27.7	300 17.8	38.9
05	309 25.9	280 39.8	02.0	160 17.2	19.2	58 23.0	27.7	315 20.1	38.8
06	324 28.4	295 39.4	N10 03.1	175 18.7	N14 18.8	73 25.8	S21 27.7	330 22.4	S 4 38.7
W 07	339 30.8	310 39.0	04.2	190 20.2	18.4	88 28.6	27.6	345 24.7	38.7
E 08	354 33.3	325 38.6	05.3	205 21.6	18.0	103 31.3	27.6	0 26.9	38.6
D 09	9 35.8	340 38.2	·· 06.4	220 23.1	·· 17.5	118 34.1	·· 27.6	15 29.2	·· 38.5
N 10	24 38.2	355 37.8	07.4	235 24.6	17.1	133 36.9	27.5	30 31.5	38.5
E 11	39 40.7	10 37.4	08.5	250 26.0	16.7	148 39.7	27.5	45 33.8	38.4
S 12	54 43.1	25 37.0	N10 09.6	265 27.5	N14 16.3	163 42.4	S21 27.5	60 36.1	S 4 38.3
D 13	69 45.6	40 36.6	10.7	280 29.0	15.9	178 45.2	27.4	75 38.4	38.3
A 14	84 48.1	55 36.2	11.8	295 30.5	15.5	193 48.0	27.4	90 40.7	38.2
Y 15	99 50.5	70 35.7	·· 12.8	310 31.9	·· 15.0	208 50.8	·· 27.4	105 42.9	·· 38.1
16	114 53.0	85 35.3	13.9	325 33.4	14.6	223 53.5	27.3	120 45.2	38.1
17	129 55.5	100 34.9	15.0	340 34.9	14.2	238 56.3	27.3	135 47.5	38.0
18	144 57.9	115 34.5	N10 16.1	355 36.3	N14 13.8	253 59.1	S21 27.2	150 49.8	S 4 37.9
19	160 00.4	130 34.1	17.2	10 37.8	13.4	269 01.9	27.2	165 52.1	37.9
20	175 02.9	145 33.7	18.2	25 39.3	13.0	284 04.6	27.2	180 54.4	37.8
21	190 05.3	160 33.3	·· 19.3	40 40.7	·· 12.5	299 07.4	·· 27.1	195 56.7	·· 37.7
22	205 07.8	175 32.8	20.4	55 42.2	12.1	314 10.2	27.1	210 58.9	37.7
23	220 10.3	190 32.4	21.5	70 43.7	11.7	329 13.0	27.1	226 01.2	37.6

STARS		
Name	S.H.A.	Dec.
	° ′	° ′
Acamar	315 29.1	S40 19.4
Achernar	335 37.4	S57 15.5
Acrux	173 24.0	S63 04.7
Adhara	255 23.5	S28 58.3
Aldebaran	291 05.3	N16 29.9
Alioth	166 32.3	N55 59.2
Alkaid	153 09.2	N49 20.3
Al Na'ir	28 00.8	S46 58.7
Alnilam	276 00.5	S 1 12.5
Alphard	218 09.5	S 8 38.6
Alphecca	126 22.2	N26 43.8
Alpheratz	357 57.8	N29 03.8
Altair	62 21.3	N 8 51.4
Ankaa	353 29.4	S42 19.7
Antares	112 42.6	S26 25.3
Arcturus	146 07.8	N19 12.4
Atria	107 56.1	S69 01.0
Avior	234 23.8	S59 30.1
Bellatrix	278 46.9	N 6 20.6
Betelgeuse	271 16.3	N 7 24.2
Canopus	264 02.6	S52 41.9
Capella	280 55.0	N45 59.5
Deneb	49 40.6	N45 15.7
Denebola	182 47.4	N14 35.8
Diphda	349 09.8	S18 00.7
Dubhe	194 08.2	N61 46.7
Elnath	278 30.2	N28 36.1
Eltanin	90 52.0	N51 29.3
Enif	34 00.5	N 9 51.2
Fomalhaut	15 39.1	S29 38.6
Gacrux	172 15.6	S57 05.5
Gienah	176 06.1	S17 31.2
Hadar	149 06.6	S60 21.2
Hamal	328 16.4	N23 26.3
Kaus Aust.	84 01.5	S34 23.0
Kochab	137 18.5	N74 10.6
Markab	13 52.0	N15 10.8
Menkar	314 29.6	N 4 04.2
Menkent	148 23.3	S36 21.0
Miaplacidus	221 42.6	S69 42.4
Mirfak	309 00.4	N49 50.6
Nunki	76 14.9	S26 18.0
Peacock	53 40.4	S56 44.7
Pollux	243 44.6	N28 02.2
Procyon	245 14.1	N 5 14.0
Rasalhague	96 18.8	N12 33.8
Regulus	207 58.0	N11 59.3
Rigel	281 25.5	S 8 12.6
Rigil Kent.	140 09.6	S60 49.0
Sabik	102 27.6	S15 43.1
Schedar	349 56.4	N56 30.5
Shaula	96 40.0	S37 05.9
Sirius	258 45.9	S16 42.8
Spica	158 45.3	S11 08.4
Suhail	223 02.5	S43 25.2
Vega	80 47.8	N38 46.7
Zuben'ubi	137 20.2	S16 01.4

	S.H.A.	Mer. Pass.
	° ′	h m
Venus	331 28.3	10 17
Mars	210 56.3	18 18
Jupiter	108 55.5	1 07
Saturn	5 56.1	7 58