

00433C PROGRAM DESCRIPTION I

Page 1 of 10

Program Title STAR IDENTIFICATION
 Contributor's Name CROCKER WIGHT
 Address 415 WARREN ST
 City BROOKLINE, State MASS Zip Code 02146

Program Description, Equations, Variables GIVEN THE FOLLOWING, LATITUDE, LONGITUDE, VARIATION, HEIGHT OF EYE, GREENWICH HOUR ANGLE OF ARIES FOR THE EVEN HOUR BEFORE THE SIGHT, THE SEXTANT ALTITUDE, MAGNETIC BEARING AND MINUTES AND SECONDS AFTER THE EVEN HOUR, THE PROGRAM PRINTS OUT THE SIDEREAL HOUR ANGLE, DECLINATION, AND NAME OF THE STAR

$$H_0 = \frac{-.97 (\sqrt{1 + \tan^2 \delta_s})}{60}$$

$$\sin \text{DEC} = (\cos \text{LAT} \times \cos H_0 \times \cos \text{AZN}) + \sin \text{LAT} \times \sin H_0$$

$$\cos \text{LHA} = \frac{\sin H_0 - (\sin \text{LAT} \times \sin \text{DEC})}{\cos \text{LAT} \times \cos \text{DEC}}$$

$$\text{SHA} = \text{LHA} - (\text{LHA EXCLUDING SHA})$$

Necessary Accessories 82104A CARD READER, 82143 PRINTER, AND

Operating Limits and Warnings TWO MEMORY MODULES

IF THE BODY IS SUSPECTED OF BEING A PLANET, ENTER "0" FOR THE LHA AND THE DISPLAYED SHA IS THE GHA OF THE PLANET. DISREGARD THE STAR NAME DISPLAY.

OF THE 57 SO CALLED NAVIGATIONAL STARS, 53 ARE LISTED HEREIN. THOSE OMITTED ARE LESS BRIGHT THAN 2.8 MAGNITUDE.

This program has been verified only with respect to the numerical example given in Program Description II. User accepts and uses this program material AT HIS OWN RISK, in reliance solely upon his own inspection of the program material and without reliance upon any representation or description concerning the program material.

NEITHER HP NOR THE CONTRIBUTOR MAKES ANY EXPRESS OR IMPLIED WARRANTY OF ANY KIND WITH REGARD TO THIS PROGRAM MATERIAL, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. NEITHER HP NOR THE CONTRIBUTOR SHALL BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES, IN CONNECTION WITH OR ARISING OUT OF THE FURNISHING, USE OR PERFORMANCE OF THIS PROGRAM MATERIAL.

Page 32 of 1

GIVEN: ASSUMED LATITUDE OF $48^{\circ}30' \text{ N}$.
 ASSUMED LONGITUDE OF $87^{\circ}30' \text{ W}$.
 VARIATION OF 15° WEST
 HEIGHT OF EYE OF 12.5 FEET.
 GREENWICH HOUR ANGLE OF ARIES (EVEN HOUR) OF
 $328^{\circ}10.4$
 SEXTANT ALTITUDE OF $13^{\circ}08.9$
 MAGNETIC AZIMUTH OF 191°
 MIN. + SEC AFTER EVEN HOUR: 7 MIN, 22 SEC

[illegible]

.mmss = .0000 EXACTLY AT 8PM. EST
(ON 4/12/80)

Input	Function	Display	Comments
LAT	42.193 ***		
LON	71.085 ***		
VAR	15. ***		
H.E.	0.0 ***		
G.H.A.	0.000 ***		
HS	24.486 ***		
MAG AZ	293. ***		
.MMSS	0.0000 ***		
SHA IS	150. ***		
DEC IS	26. ***		
ALKAID 153 49			

NOTE: THIS BEING A PLANET, THE "SHA IS:" SHOULD READ "GHA IS:"

THE PRINT OUT OF THE STAR ALKAID IS TO BE DISREGARDED. REFER TO THE ALMANAC FOR THE HOUR DESIGNATED AND LOOK FOR THE GHA OF THE PLANET AND DECLINATION THAT IS NEAREST TO 150° GHA AND 26° DEC. THE ANSWER IS VENUS. GHA = 149°53.7, DEC = 25°27.4

				SIZE: 010
STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
1.	EXECUTE SIZE 010			
2.	PRESS USER BUTTON			
3.	KEY IN PROGRAM OR ENTER ALL 12 SIDES OF THE 6 MAGNETIC CARDS.			
4.	TURN ON THE PRINTER			
5.	ACTIVATE BY PUSHING "A" WHICH ASKS FOR LAT.	A		LAT
6.	ENTER LATITUDE (DD.MMM ^{MM})	48.300	R/S	48.300 ***
7.	ENTER LONGITUDE (HH.MM ^{MM})	87.300	R/S	LON 87.300 ***
8.	ENTER VARIATION (EHS IF EAST)	15	R/S	VAR 15. ***
9.	ENTER HEIGHT OF EYE ENTER 0 IF PUBLIC SEXTANT	12.5	R/S	HE 12.5 ***
10.	ENTER GHA ARIES FOR EVEN HOUR BEFORE SIGHT NOTE: IF THE BODY MAY BE A PLANET ENTER "0"	328.104	R/S	GHA 320.104 ***
11.	ENTER SEXTANT ALTITUDE	15.089	R/S	45 15.089 ***
12.	ENTER MAGNETIC BEARING OF BODY	191	R/S	MAG AZ 191 ***
13.	ENTER MINUTES AND SECONDS AFTER EVEN HOUR (MMSS) SAR IS DISPLAYED FOLLOWED BY DECLINATION AND NAME OF STAR. (NEG. DEC. IS SOUTH)	.0722	R/S	.MMSS SAR 15 113 DEC 15 -26 ANTARES 113 -26
	* ENTER AS NEGATIVE FIGURE IF SOUTH LAT. OR EAST LON.			

[illegible]

LJ67 LJ97 ✓41C

STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS	STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS
01	LBL "STAR"			51	ST+ 06		
02	LBL A		A	52	"MAG AZ"		MAGNETIC
03	"LAT"			53	AVIEW		BEARING
04	FIX 3			54	FIX 0		
05	AVIEW		LATITUDE	55	PROMPT		CONVERSION
06	PROMPT			56	PRX		TO TRUE
07	PRX			57	RCL 03		AZIMUTH
08	XEQ b			58	CHS		
09	STD 01			59	+		
10	"LON"			60	XEQ C		
11	AVIEW		LONGITUDE	61	STD 07		
12	PROMPT			62	"MMSS"		TIME OF
13	PRX			63	FIX 4		OBSERVATION
14	XEQ b			64	AVIEW		AFTER THE
15	STD 02			65	PROMPT		EVEN HOUR
16	"VAR"			66	PRX		IN MINUTES
17	AVIEW		VARIATION	67	HR		AND SECONDS
18	PROMPT			68	15.041		
19	FIX 0			69	*		
20	PRX			70	RCL 05		
21	STD 03			71	+		
22	"H.E."			72	RCL 02		
23	AVIEW		HEIGHT	73	-		
24	PROMPT		OF EYE	74	STD 08		
25	FIX 1			75	RCL 01		
26	PRX			76	SIN		
27	STD 04			77	RCL 06		
28	LBL B		B.	78	SIN		
29	"G.H.A."		GREENWICH	79	*		
30	AVIEW		HOUR ANGLE	80	RCL 01		
31	PROMPT		OF ARIES FOR	81	COS		
32	FIX 3		EVEN HOUR	82	RCL 06		
33	PRX		PRECEDING	83	COS		
34	XEQ b		OBSERVATION	84	*		
35	STD 05			85	RCL 07		
36	"HS"			86	COS		
37	AVIEW		SEXTANT	87	*		
38	PROMPT		ALTITUDE	88	+		
39	PRX			89	ASIN		
40	XEQ b			90	STD 00		
41	STD 06		CONVERSION	91	RCL 06		
42	TAN		TO	92	SIN		
43	1/X			93	RCL 01		
44	RCL 04		OBSERVED	94	SIN		
45	SQRT		ALTITUDE	95	RCL 00		
46	+			96	SIN		
47	-.97			97	*		
48	*			98	-		
49	60			99	RCL 01		
50	/			100	COS		

☐ 67 ☐ 97 ☒ 41C

STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS	STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS
101	RCL 00			151	/		
102	COS			152	HR		
103	*			153	RTH		
104	/			154	*LBL C		
105	ACOS			155	360		
106	STO 09			156	X<Y		
107	FIX 0			157	X>Y?		
108	RCL 07			158	GTO a		
109	SIN			159	0		
110	0			160	X<Y		
111	X<Y			161	X>Y?		
112	X=Y?			162	GTO a		
113	XEQ D			163	360		
114	RCL 09			164	+		
115	CHS			165	RTH		
116	360			166	*LBL a		
117	+			167	X<Y		
118	RCL 08			168	-		
119	-			169	RTH		
120	XEQ C			170	*LBL 01		
121	STO 08			171	*MARKAB 14 15"		
122	GTO E			172	AVIEW		
123	*LBL D			173	STOP		
124	RCL 08			174	*FOMALHAUT 16 -3"		
125	RCL 09			175	*+0"		
126	-			176	AVIEW		
127	360			177	STOP		
128	X<Y			178	*LBL 02		
129	-			179	*AL NAIR 28 -47"		
130	XEQ C			180	AVIEW		
131	STO 08			181	STOP		
132	*LBL E			182	*LBL 03		
133	*SHA 15"			183	*ENIF 34 10"		
134	AVIEW			184	AVIEW		
135	RCL 08			185	STOP		
136	PRX			186	*LBL 04		
137	*DEC 15"			187	*LBL 05		
138	AVIEW			188	*DEHEB 50 45"		
139	RCL 08			189	AVIEW		
140	PRX			190	STOP		
141	RCL 08			191	*PEACOCK 54 -57"		
142	10			192	AVIEW		
143	/			193	STOP		
144	STO 08			194	*LBL 06		
145	GTO IND 08			195	*ALTAIR 63 9"		
146	*LBL b			196	AVIEW		
147	1 E2			197	STOP		
148	*			198	*LBL 07		
149	HMS			199	*NUNKI 76 -26"		
150	1 E2			200	AVIEW		

DISPLAY OF
SIDEREAL
Hour Angle
of Star

DISPLAY OF
DECLINATION
of Star

LIST OF
53 STARS
WITH
SIDEREAL
Hour
ANGLE AND
DECLINATION

☐ 67 ☐ 97 ☒ 41C

STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS	STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS
201	STOP			251	*HADAR 149 -60*		
202	*LBL 08			252	AVIEW		
203	*VEGA 81 39*			253	STOP		
204	AVIEW			254	*LBL 15		
205	STOP			255	*ALKAD 153 49*		
206	*KAUS AUSTRALIS *			256	AVIEW		
207	*F84 -34*			257	STOP		
208	AVIEW			258	*SPICA 159 -11*		
209	STOP			259	AVIEW		
210	*LBL 09			260	STOP		
211	*ELTANIN 91 51*			261	*LBL 16		
212	AVIEW			262	*ALIOTH 167 56*		
213	STOP			263	AVIEW		
214	*RASALHAGUE 96 *			264	STOP		
215	*F13*			265	*LBL 17		
216	AVIEW			266	*GACRUX 172 -57*		
217	STOP			267	AVIEW		
218	*SHAULA 97 -37*			268	STOP		
219	AVIEW			269	*ACRUX 174 -63*		
220	STOP			270	AVIEW		
221	*LBL 10			271	STOP		
222	*SABIK 103 -16*			272	*LBL 18		
223	AVIEW			273	*DENEbola 183 15*		
224	STOP			274	AVIEW		
225	*ATRIA 108 -69*			275	STOP		
226	AVIEW			276	*LBL 19		
227	STOP			277	*DUBHE 194 62*		
228	*LBL 11			278	AVIEW		
229	*ANTARES 113 -26*			279	STOP		
230	AVIEW			280	*LBL 20		
231	STOP			281	*REGULUS 200 12*		
232	*LBL 12			282	AVIEW		
233	*ALPHECCA 127 27*			283	STOP		
234	AVIEW			284	*LBL 21		
235	STOP			285	*ALPHARD 218 -9*		
236	*LBL 13			286	AVIEW		
237	*KOCHAB 137 74*			287	STOP		
238	AVIEW			288	*LBL 22		
239	STOP			289	*MIAPLACIDUS 222*		
240	*LBL 14			290	*F -78*		
241	*RIGEL KENTAURUS*			291	AVIEW		
242	*F 140 -61*			292	STOP		
243	AVIEW			293	*SUHAIL 223 -43*		
244	STOP			294	AVIEW		
245	*ARCTURUS 146 19*			295	STOP		
246	AVIEW			296	*LBL 23		
247	STOP			297	*AVIOR 234 -59*		
248	*MENKENT 149 -36*			298	AVIEW		
249	AVIEW			299	STOP		
250	STOP			300	*LBL 24		

00433C

PROGRAM LISTING

Page 9 of 11

☐ 67 ☐ 97 ☒ 41C

STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS	STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS
301	*POLLUX 244 28"			351	AVIEW		
302	AVIEW			352	STOP		
303	STOP			353	*LBL 33		
304	*PROCYON 245 5"			354	*ACHERNA 336 -57"		
305	AVIEW			355	AVIEW		
306	STOP			356	STOP		
307	*LBL 25			357	*LBL 34		
308	*ADHARA 256 -29"			358	*DIPHDA 349 -18"		
309	AVIEW			359	AVIEW		
310	STOP			360	STOP		
311	*SIRIUS 259 -17"			361	*LBL 35		
312	AVIEW			362	*SCHEDAR 350 56"		
313	STOP			363	AVIEW		
314	*LBL 26			364	STOP		
315	*CANOPUS 264 -53"			365	*ANKAA 354 -42"		
316	AVIEW			366	AVIEW		
317	STOP			367	STOP		
318	*LBL 27			368	*ALPHERATZ 358 2"		
319	*BETELGEUSE 271 "			369	*F9"		
320	*F7"			370	AVIEW		
321	AVIEW			371	STOP		
322	STOP			372	.END.		
323	*ALNILAM 276 -1"						
324	AVIEW						
325	STOP						
326	*ELNATH 279 29"						
327	AVIEW						
328	STOP						
329	*BELLATRIX 279 6"						
330	AVIEW						
331	STOP			80			
332	*LBL 28						
333	*CAPELLA 281 46"						
334	AVIEW						
335	STOP						
336	*RIGEL 282 -8"						
337	AVIEW						
338	STOP						
339	*LBL 29						
340	*ALDEBARON 291 1"						
341	*F6"			90			
342	AVIEW						
343	STOP						
344	*LBL 30						
345	*MIRFAK 309 50"						
346	AVIEW						
347	STOP						
348	*LBL 31						
349	*LBL 32						
350	*HAMAL 328 23"			00			

REGISTERS, STATUS, FLAGS, ASSIGNMENTS 10

00433C

DATA REGISTERS				STATUS			
00	DECLINATION	50		SIZE	010	TOT. REG.	10
	LATITUDE			ENG		FIX	VAR. SCI
	LONGITUDE			DEG	✓	RAD	GRAD
	VARIATION						
	HEIGHT OF EYE						
05	G.H.A.	55		USER MODE ON ☒ OFF ☐			
	HS/HD			INIT S/C			
	TRUE AZ			SET INDICATES CLEAR INDICATES			
	LHA EXCH 5HA			21	5	PRINTER ON	
	USED CONAZ			26	5	TONE (NOT USED)	
10		60		27	5	USER MODE	
				28	5	2 NUMBER DISAB	
				29	5	CONTROL	
				40	5	FIX CONTROL	
				55	5	PRINTER EXISTS	
15		65					
20		70					
25		75					
30		80					
35		85					
				ASSIGNMENTS			
				FUNCTION		KEY	
40		90		NONE			
45		95					

ROW 1 (1 : 3)



ROW 2 (3 : 10)



ROW 3 (10 : 16)



ROW 4 (16 : 22)



ROW 5 (23 : 29)



ROW 6 (29 : 35)



ROW 7 (36 : 43)



ROW 8 (44 : 51)



ROW 9 (52 : 56)



ROW 10 (57 : 62)



ROW 11 (63 : 68)



ROW 12 (69 : 81)



ROW 13 (82 : 94)



ROW 14 (95 : 107)



ROW 15 (107 : 116)



ROW 16 (116 : 123)



ROW 17 (124 : 132)



ROW 18 (132 : 137)



ROW 19 (137 : 142)



ROW 20 (143 : 150)



ROW 21 (150 : 158)



ROW 22 (158 : 166)



ROW 23 (166 : 171)



ROW 24 (171 : 174)



ROW 25 (174 : 175)



ROW 26 (176 : 179)



ROW 27 (179 : 183)



ROW 28 (183 : 188)



ROW 29 (188 : 191)



ROW 30 (191 : 191)



ROW 31 (192 : 195)



ROW 32 (195 : 199)



ROW 33 (199 : 203)



ROW 34 (203 : 206)



ROW 35 (206 : 207)



ROW 36 (207 : 211)



ROW 37 (211 : 214)



ROW 38 (214 : 214)



ROW 39 (214 : 218)



ROW 40 (218 : 222)



ROW 41 (222 : 222)



ROW 42 (223 : 225)



ROW 43 (225 : 229)



ROW 44 (229 : 233)



ROW 45 (233 : 233)



ROW 46 (233 : 237)



ROW 47 (237 : 241)



ROW 48 (241 : 242)



ROW 49 (242 : 245)



ROW 50 (245 : 245)



ROW 51 (245 : 248)



ROW 52 (248 : 251)



ROW 53 (251 : 254)



ROW 54 (255 : 255)



ROW 55 (255 : 258)



ROW 56 (258 : 262)



ROW 57 (262 : 265)



ROW 58 (266 : 266)



ROW 59 (266 : 269)



ROW 60 (269 : 273)



ROW 61 (273 : 274)



ROW 62 (275 : 277)



ROW 63 (277 : 281)



ROW 64 (281 : 284)



ROW 65 (285 : 285)



ROW 66 (285 : 289)



ROW 67 (289 : 290)



ROW 68 (290 : 293)



ROW 69 (293 : 297)



ROW 70 (297 : 299)



ROW 71 (300 : 301)



ROW 72 (301 : 304)



ROW 73 (304 : 308)



ROW 74 (308 : 309)



ROW 75 (310 : 311)



ROW 76 (311 : 315)



ROW 77 (315 : 318)



ROW 78 (318 : 319)



ROW 79 (319 : 323)



ROW 80 (323 : 325)



ROW 81 (326 : 326)



ROW 82 (326 : 329)



ROW 83 (329 : 333)



ROW 84 (333 : 334)



ROW 85 (335 : 336)



ROW 86 (336 : 340)



ROW 87 (340 : 343)



ROW 88 (344 : 345)



ROW 89 (345 : 350)



ROW 90 (350 : 353)



ROW 91 (354 : 354)



ROW 92 (354 : 358)



ROW 93 (358 : 361)



ROW 94 (362 : 362)



ROW 95 (362 : 365)



ROW 96 (365 : 368)



ROW 97 (368 : 369)



ROW 98 (370 : 372)

