PROGRAM SUBMITTAL

☒ New Program ☐ Revision to Program

Model No. ☐ 67 ☐ 97 ☒ 41C

Program Title HIGH RESOLUTION PLOTTER

No. of Steps/Lines 227 Category No. 900

Category Name OTHER

Abstract — 50 Word Maximum This program was derived from the PRPLOT program included with the printer. Instead of using the same printing character for each line printed, HIPLOT makes a new special character each time a line of the plot is printed. This special character matches the graph as closely as possible within the 7X7 dot matrix. The result is high resolution plots at a slower speed than PRPLOT. Requires at least one memory module and the printer

Necessary Accessories: At least 1 memory module and printer.

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Company

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If my program is accepted, my bonus choice is:

☐ FOUR PROGRAMS OR ☒ CREDIT FOR FOUR PROGRAMS*

* No partial credit will be given. Select all four programs at the same time.

Submittal Checklist: Please use the checklist below to insure submittal of all proper program documentation.

☑ Program Submittal ☒ Program Description II ☒ Program Listing(s) ☒ Registers, Status ...

☐ Program Description I ☒ User Instructions ☒ Magnetic Card(s) ☐ Keyboard, Card Labeling (optional)

Signature David Hayden Date 2/11/81

PROGRAM DESCRIPTION I

Program Title HIGH RESOLUTION PLOTTER

Contributor's Name David Hayden

Address 38 Washington Street

City Rocky Hill State New Jersey Zip Code 08553

Program Description, Equations, Variables This program was derived from the PRPLOT program included with the printer. All variables are inputted in the exact same order and manner as in PRPLOT. The printed output is identical to that of PRPLOT with the exception that HIPLOT produces a much higher resolution plot of the function. The function, which may be any real valued mathematically sound function, is entered into the calculator under any GLOBAL label (an ALPHA label other than the single letters A-J and a-e). This seperate function program must end with an END or a RTN statement. Also it should assume that the number it is to evaluate begins in the X-register when the program is executed. HIPLOT uses data registers 00-23, all other registers are at the disposal of the function program.

Necessary Accessories The printer and at least one memory module

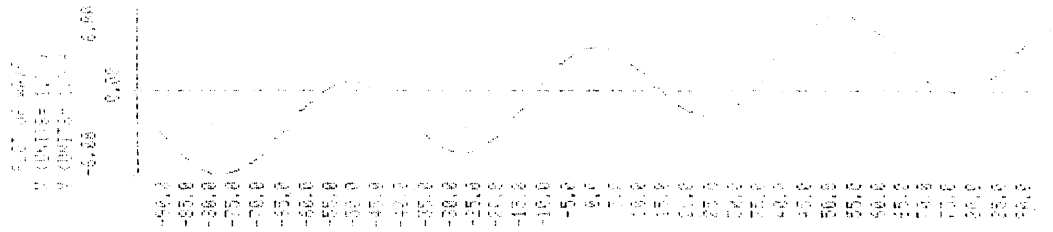
Operating Limits and Warnings The output can sometimes be deceiving. For this reason, the user should read the section on interpreting output (page 8).

Reference(s) The user should read the section on plotting in the Owners Handbook for the printer, pages 47-59.

PROGRAM DESCRIPTION II

Sample Problem (Sketch if Desired)

Plot the function Y=3sin(x)+3cos(7x)
from x=-90 degrees to x=90 degrees
with a plot increment of 5 degrees



SOLUTION:

Input	Function	Display	Comments
	GTO..		PREPARE TO ENTER FUNCTION
	PRGM		ENTER PROGRAM MODE
	LBL"WAVE"	01 LBL WAVE	KEY IN PROGRAM...
	SIN	02 SIN	
	LASTX	03 LASTX	
	7	04 7	
	*	05 *	
	COS	06 COS	
	+	07 +	
	3	08 3	
	*	09 *	
	GTO..	PACKING	PACK MEMORY
	PRGM		EXIT PROGRAM MODE.
	XEQ "HIPLOT"	NAME?	ENTER NAME OF FUNCTION TO BE PLOTTED.
"WAVE"	RUN	Y MIN?	INPUT MINIMUM Y VALUE .
-6	RUN	Y MAX?	INPUT MAXIMUM Y VALUE.
6	RUN	AXIS?	INPUT WHERE YOU WANT X AXIS PRINTED OR ANY ALPHA TO SUPPRESS PRINTING AN X AXIS
0	RUN	X MIN?	INPUT MINIMUM X VALUE.
-90	RUN	X MAX?	INPUT MAXIMUM X VALUE.
90	RUN	X INC?	INPUT PLOT INCREMENT.
5	RUN		"HIPLOT" NOW PRINTS THE ABOVE PLOT
			NOTE:
			To get the proper output, the calculator must be set to DEGREES MODE.

USER INSTRUCTIONS

SIZE: 24

STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
1.	Enter HIPLOT program			
2.	Enter function to be plotted			
3.	Plot the function			
	A. From a program			
	Store info. in registers as			
	follows and execute "HIPLOTP"			
	R00 Y MIN			
	R01 Y MAX			
	R04 AXIS (ALPHA=			
	NO AXIS)			
	R08 X MIN			
	R09 X MAX			
	R10 X INC			
	R11 NAME			
	B. From the keyboard			
	-START PROGRAM		XEQ "HIPLOT"	NAME ?
	-ENTER NAME OF PROGRAM TO BE			
	PLOTTED	NAME	RUN	Y MIN ?
	-ENTER MINIMUM Y VALUE	Y MIN	RUN	Y MAX ?
	-ENTER MAXIMUM Y VALUE	Y MAX	RUN	AXIS ?
	-ENTER WHERE YOU WANT THE X			
	AXIS OR ANY ALPHA TO SUPPRESS			
	PRINTING THIS AXIS	AXIS	RUN	X MIN ?
	-ENTER SMALLEST VALUE OF X TO			
	BE PLOTTED	X MIN	RUN	X MAX ?
	-ENTER LARGEST VALUE OF X TO			
	BE PLOTTED	X MAX	RUN	X INC ?
	-ENTER THE PLOTTING INCREMENT	X INC	RUN	

PROGRAM LISTING

☐ 67 ☐ 97 ☒ 41C

STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS
01	*LBL "HIP LOT"		
02	AON		
03	"NAME ?"		
04	PROMPT		
05	AOFF		
06	ASTO 11		
07	*LBL 11		
08	"Y MIN ?"		INPUT AND CHECK VARIABLES
09	PROMPT		
10	STO 00		
11	"Y MAX ?"		
12	PROMPT		
13	STO 01		
14	X<=Y?		
15	GTO 11		
16	*LBL 12		
17	"AXIS ?"		
18	CF 23		
19	PROMPT		
20	STO 04		
21	FS? 23		
22	ASTO 04		
23	RCL 01		
24	X<Y?		
25	GTO 12		
26	CLX		
27	RCL 00		
28	X>Y?		
29	GTO 12		
30	*LBL 13		
31	"X MIN ?"		
32	PROMPT		
33	STO 08		
34	"X MAX ?"		
35	PROMPT		
36	STO 09		
37	X<=Y?		
38	GTO 13		
39	"X INC ?"		
40	PROMPT		
41	STO 10		
42	*LBL "HIP LOTP"		
43	CF 12		
44	ADV		
45	6		
46	SKPCHR		
47	"PLOT OF "		PRINT HEADER
48	ARCL 11		
49	ACA		
50	PRBUF		
51	RCL 08		
52	RCL 09		
53	"X"		
54	XEQ 09		DETERMINE X UNIT AND PRINT IT
55	STO 07		
56	7		
57	ACCHR		
58	PRBUF		
59	130		
60	STO 02		PRINT AXIS
61	XROM "PR AXIS"		
62	RCL 10		INC. -INC= # STEPS
63	X>0?		
64	GTO 00		
65	RCL 09		
66	RCL 08		IF INC. IS NEG THEN CALCULATE ACTUAL INC.
67	-		
68	RCL 10		
69	ABS		
70	/		
71	STO 10		
72	*LBL 00		
73	RCL 09		
74	RCL 08		
75	ABS		
76	X<Y?		PRINT FORMAT FOR X LABELS
77	X<>Y		
78	RCL 07		
79	/		
80	LOG		
81	INT		
82	2		
83	-		
84	STO 05		
85	RCL 08		FIRST X=X MIN
86	STO 06		
87	RCL 01		
88	RCL 00		
89	-		
90	RCL 02		
91	ABS		

Note: Refer to "HP-41C OWNER'S HANDBOOK AND PROGRAMMING GUIDE" for specific information on keystrokes. Function index begins on page 262. Refer to Appendix E in 67 or 97 "OWNER'S HANDBOOK AND PROGRAMMING GUIDE" for exact keystrokes.

PROGRAM LISTING

☐ 67 ☐ 97 ☒ 41C

STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS
92	/		
93	STO 20		Y COLUMN LENGTH
94	RCL 10		
95	11		X COLUMN LENGTH
96	/		
97	STO 19		
98	12.018		
99	ENTER↑		
100	0		CLEAR REGISTERS 12-18
101	*LBL 04		
102	STO IND Y		
103	ISG Y		
104	GTO 04		
105	RCL 06		
106	*LBL 14		
107	FIX IND 05		SET PRINT FORMAT AND ACCUMULATE X LABEL
108	RCL 07		
109	/		
110	RND		
111	ACX		
112	3		
113	SKPCOL		
114	RCL 06		
115	XEQ IND 11		DETERMINES LOCATION OF PRINT CHARACTER
116	STO 21		
117	RCL 06		
118	RCL 19		
119	3		MIN VALUE ON X SUB-LOOP
120	*		
121	-		
122	STO 22		
123	.006		
124	STO 23		
125	*LBL 05		DETERMINES COLUMN # OF Y VALUE GENERATED ABOVE
126	RCL 22		
127	XEQ IND 11		
128	RCL 21		
129	-		
130	RCL 20		
131	/		
132	4		
133	+		
134	FIX 0		
135	RND		
136	1		
137	X<=Y?		
138	RDN		
139	7		
140	X>Y?		
141	RDN		
142	RCL X		
143	2		
144	RCL 23		ADDS APPROPRIATE NUMBER TO APPROPRIATE REGISTER SO THAT CORRECT DOT WILL BE PRINTED
145	INT		
146	Y↑X		
147	11		
148	ST+ Z		
149	RDN		
150	ST+ IND Y		
151	RCL 19		INCREMENT X IN SUB-LOOP AND CONTINUE
152	ST+ 22		
153	ISG 23		
154	GTO 05		
155	12.018		BUILDS SPECIAL CHARACTER FROM DATA STORED IN LINES 142-150
156	STO 23		
157	*LBL 06		
158	RCL IND 23		
159	BLDSPEC		
160	0		
161	STO IND 23		
162	RDN		
163	ISG 23		
164	GTO 06		
165	STO 03		PRINTS A LINE
166	RCL 21		
167	REGPLOT		
168	RCL 10		CONTINUE LOOP
169	STO 03		
170	ST+ 06		
171	RCL 09		
172	RCL 06		
173	X<=Y?		
174	GTO 14		
175	FIX 3		END PRINTING
176	RTN		
177	*LBL 09		DETERMINE AND PRINT X UNITS
178	"⊢ <UNITS="		
179	X<>Y		
180	ABS		
181	X<Y?		
182	X<>Y		
183	LOG		

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PROGRAM LISTING

☐ 67 ☐ 97 ☒ 41C

STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS
184	X<0?		
185	GTO 00		
186	INT		
187	2		
188	X<>Y		
189	X>Y?		
190	GTO 01		
191	−		
192	STO 05		
193	0		
194	GTO 02		
195	◆LBL 00		
196	FRC		
197	X≠0?		
198	1		
199	LASTX		
200	INT		
201	X<>Y		
202	−		
203	◆LBL 01		
204	"⊢ E"		
205	◆LBL 02		
206	4		
207	SKPCHR		
208	ACA		
209	FIX 0		
210	RDN		
211	X=0?		
212	GTO 00		
213	ACX		
214	10↑X		
215	2		
216	STO 05		
217	FIX 2		
218	RDN		
219	GTO 01		
220	◆LBL 00		
221	1		
222	ACX		
223	FIX IND 05		
224	◆LBL 01		
225	"> "		
226	ACA		
227	END		
50			

STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS
51			
60			
70			
80			
90			
00			

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REGISTERS, STATUS, FLAGS, ASSIGNMENTS

DATA REGISTERS

00	Y MIN	50	
	Y MAX		
	130 (WIDTH)		
	PRINT CHAR.		
	AXIS		
05	PRINT FORMAT	55	
	PRESENT X CENTER		
	USED		
	X MIN		
	X MAX		
10	X INCREMENT	60	
	NAME		
	USED		
	TO		
	MAKE		
15	THE	65	
	PRINT		
	CHARACTER		
	[illegible]		
	X COLUMN LENGTH		
20	Y COLUMN LENGTH	70	
	PRESENT Y CENTER		
	PRESENT X		
	X COUNTER		
25		75	
30		80	
35		85	
40		90	
45		95	

STATUS

SIZE 024 TOT. REG. 82 USER MODE

ENG ____ FIX ____ SCI ____ ON ____ OFF ____

DEG ____ RAD ____ GRAD ____

FLAGS

#	INIT S/C	SET INDICATES	CLEAR INDICATES
23	C	ALPHA INPUT	NO ALPHA INPUT
12	C	DOUBLE WIDE	NORMAL WIDTH

ASSIGNMENTS

FUNCTION	KEY	FUNCTION	KEY

INTERPRETING OUTPUT

HIPLOT has one obvious restriction. Because it uses a special character, the print character can only be 7 columns wide while the actual graph may be substantially wider. If this is the case then the special character will include the extreme right or left dots at that position(s). For example, a line of print that looks like this:

3.00

probably means that the graph really looks like this:

3.00

Compare the following plots of a sin wave.

Program:
```
01 LBL"SIN"
02 SIN
03 END
```