

ADVANCE COPY

IDENTIFICATION

PRODUCT CODE:	MAINDEC 08-D6CC-D (D)
PRODUCT NAME:	PDP-8 CALCOMP PLOTTER DIAGNOSTIC
DATE CREATED:	APRIL 1, 1969
MAINTAINER:	DIAGNOSTIC GROUP
AUTHOR:	ROBERT E. CHRISTOPHER

1. ABSTRACT

The PDP-8 Calcomp Plotter Diagnostic may be run using the PDP-8, 8I or 8L computers. It may be used to test the 12 inch 10 Mil, the 12 inch 5 Mil, the 31 inch 10 Mil, or the 31 inch 5 Mil Plotter. See Para. 9 for program description.

NOTE: The program must be reloaded each time the size or stepping rate of the plotter being tested is changed.

2. REQUIREMENTS

2.1 EQUIPMENT

- a. PDP-8 or PDP-8I or PDP-8L
- b. Calcomp Plotter type 350

3. LOADING PROCEDURE

Load the binary program in the normal manner.

5. OPERATING PROCEDURE

5.1 SWITCH REGISTER SETTINGS

- a. BIT 0
Set to halt program after next step when drawing patterns. (MA = 3033)
Press continue to go on.
- b. BIT 1
Set to retrace octagons or concentric squares
- c. BIT 2
Set to loop timing tests
- d. BIT 3
Set if 31 inch plotter
- e. BIT 5
Set if 5 Mil plotter
- f. BIT 11
Set for PDP-8L

5.2 OPERATOR ACTION

- a. Set switch register to 200
- b. Depress load address
- c. Set switch register (see para 5.1)
- d. Depress start
- e. Monitor computer for error halts (see para 6.)

6. PROGRAM HALTS

<u>TAG</u>	<u>MA</u>	<u>DESCRIPTION AND RECOVERY</u>
E1	203	PLSF skipped. Flag should have been cleared by initialize. Continue to repeat test T1.
E2	221	Plotter flag will not set. Two IOT's were used (pen up and drum down). Neither set the flag. Continue to repeat test T2.
E4	231	Plotter flag is still set after a PLCF was issued. Continue to repeat test T4.
E5	245	Program interrupt occurred after a PLCF. Continue to repeat test T5.
E5A	247	Program interrupt caused by some device other than the plotter. Continue to repeat test T5.
E6	263	No program interrupt from plotter flag. Continue to repeat test T6.
E7	275	Flag not set within 85 MS after a PLPU. Continue to repeat test T7.
E8	306	Flag not set within 85 MS after a PLPD. Continue to repeat test T8.
E9	316	Flag set sooner than 55 MS after a PLPU. Continue to repeat test T9.
E10	330	Flag set sooner than 55 MS after a PLPD. Continue to repeat test T10.
E11	416	Flag set sooner than 3.5 MS after a PLPR. Continue to repeat test T11.
E12	420	Flag not set within 5.5 MS after a PLPR. Continue to repeat test T11.
E13	436	Flag set sooner than 3.5 MS after a PLDU. Continue to repeat test T12.

<u>TAG</u>	<u>MA</u>	<u>DESCRIPTION AND RECOVERY</u>
E14	44Ø	Flag not set within 5.5 MS after a PLDU. Continue to repeat test T12.
E15	456	Flag set sooner than 3.5 MS after a PLDD. Continue to repeat test T13.
E16	46Ø	Flag not set within 5.5 MS after a PLDD. Continue to repeat test T13.
E17	476	Flag set sooner than 3.5 MS after a PLPL. Continue to repeat test T14.
E18	5ØØ	Flag not set within 5.5 MS after a PLPL. Continue to repeat test T14.
E19	516	Flag set sooner than 3.5 MS after a PLUD. Continue to repeat test T15.
E2Ø	52Ø	Flag not set within 5.5 MS after a PLUD. Continue to repeat test T15.

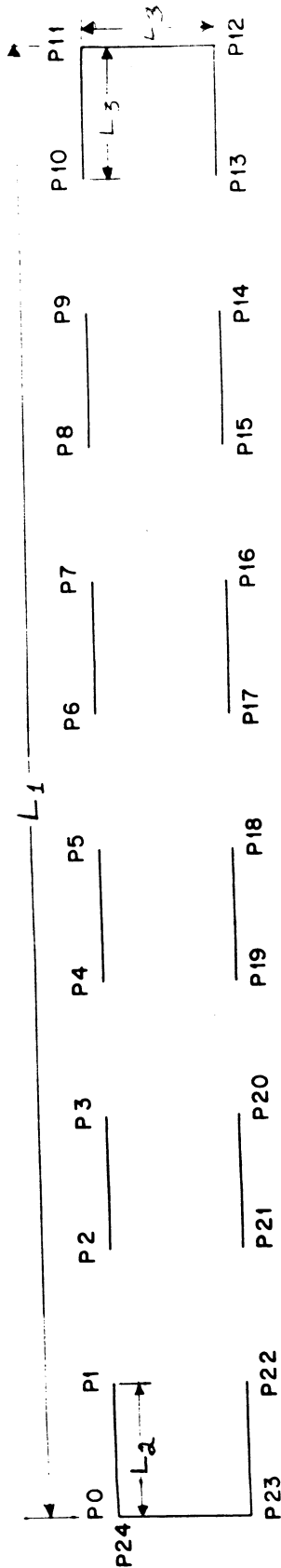
The following errors will occur if the specified plotter command did not cause a program interrupt. The computer will not halt, but instead hangs in a one instruction loop.

<u>TAG</u>	<u>MA</u>	<u>COMMAND</u>
E21	3Ø44	PLDD - DRUM DOWN
E22	3Ø51	PLDU - DRUM UP
E23	3Ø56	PLPL - PEN LEFT
E24	3Ø63	PLPR - PEN RIGHT
E25	3Ø7Ø	PLPD - PEN DOWN
E26	3Ø75	PLPU - PEN UP
E27	31Ø3	PLDD AND PLPL
E28	311Ø	DUPL - DRUM UP; PEN LEFT
E29	3115	DDPR - DRUM DOWN; PEN RIGHT
E3Ø	3122	DUPR - DRUM UP; PEN RIGHT

9. PROGRAM DESCRIPTION

The PDP-8 Calcomp Plotter Diagnostic runs a series of timing tests at the beginning of the program which may be looped using a switch register option. At the completion of the timing tests the three figures, illustrated in para. 10, are drawn. The octagons or concentric squares may be retraced using a switch register option. The patterns may be stopped at any point desired and then continued from that point using still another switch option. Options are described in para. 5.1.

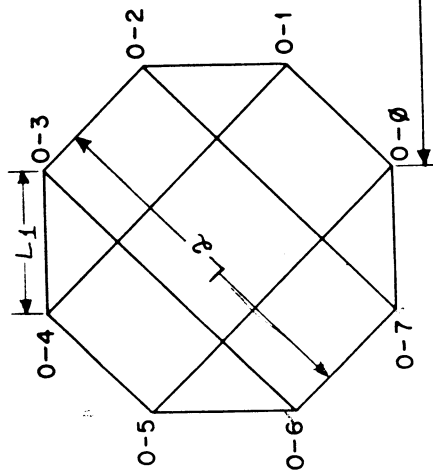
PARA 10.



Dimensions

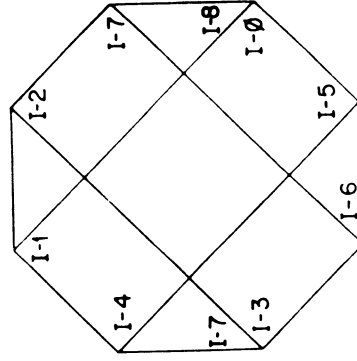
12 inch
 L1 = 11 inches
 L2 = 1 inch
 L3 = 1 inch
 31 inch
 L1 = 29.25 inches
 L2 = 1 inch
 L3 = 1.25 inches

Drawing 1 - The spaces and dashes were plotted in the order of P0-P24.



Dimensions

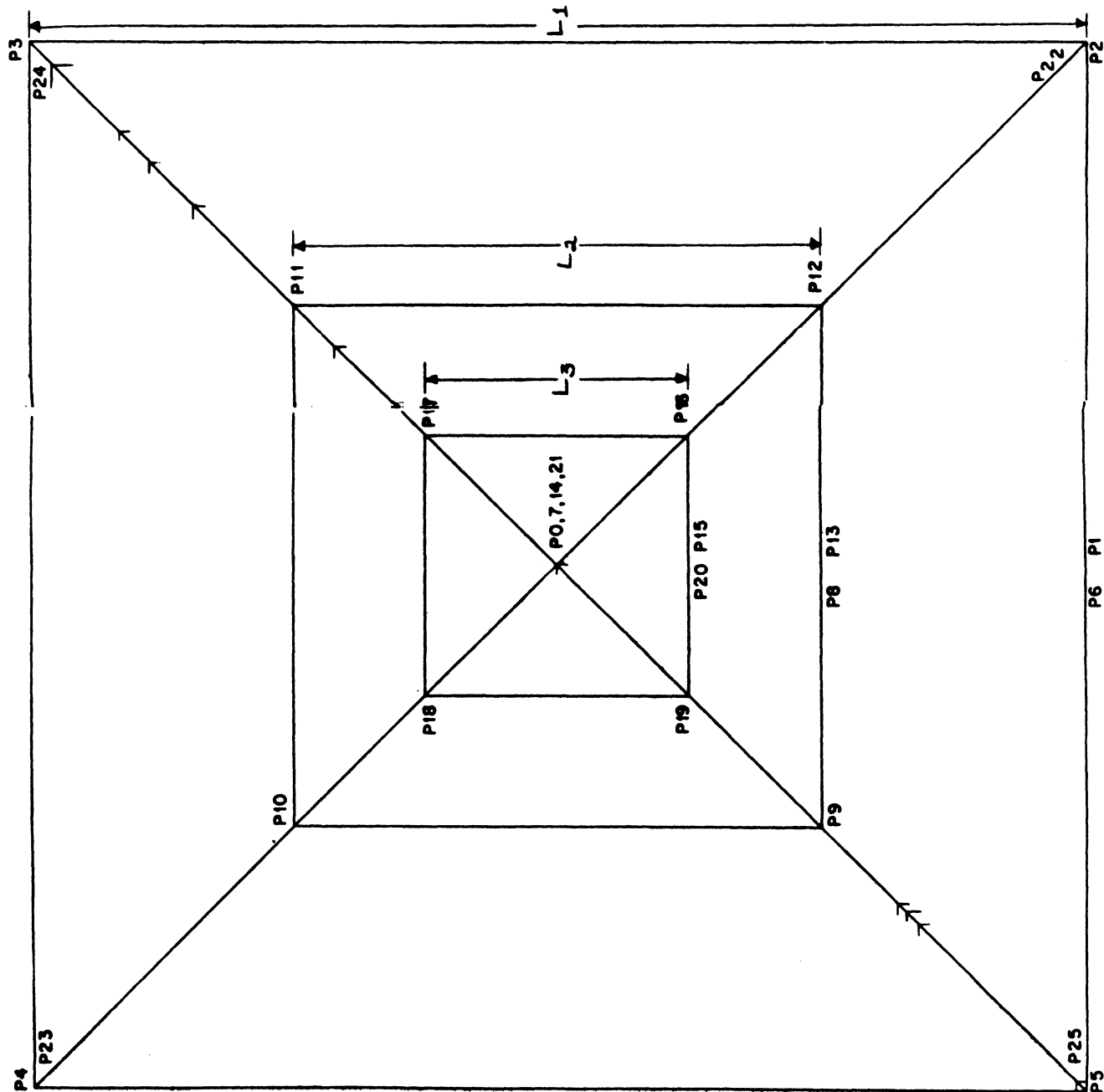
12 inch
 L1 = 1 inch
 L2 = 2.41 inches
 L3 = 4.25 inches
 31 inch
 L1 = 3.5 inches
 L2 = 8.46 inches
 L3 = 10.25 inches



Drawing 2 - The 3 intersected octagons are plotted in the following manner:

1. The outer octagons were plotted from left to right.
2. The intersecting lines were plotted from right to left.
(I-1, I-2) (I-3, I-4) (I-5, I-6) (I-7, I-8) are overlaid

PARA 10 (CONTD)



Drawing 3 - The intersected box is a square.
It is plotted from (center) P0-P25.

Dimensions

12 inch
L1 = 10 inches
L2 = 5 inches
L3 = 2.5 inches

31 inch
L1 = 28 inches
L2 = 14 inches
L3 = 7 inches

The angle brackets are drawn last, and begin at point P24 on the figure. For 12 inch plotters, 100 brackets intersect the diagonal between points P24 and P25. For 31 inch plotters, 106 brackets intersect the diagonal between points P24 and P17. The length of each side of the brackets is .1 inch.

```

/P P-8 ALUMP PLOTTER DIAGNOSTIC FOR TYPE 350,
/ MODELS 563 AND 565
/
/COPYRIGHT 1969 DIGITAL EQUIPMENT CORP.,
/MAYNARD, MASS.
/
/R, CHRISTOPHER
/
/IOT DEFINITIONS
/
6501 PLSF=6501 /SKIP IF FLAG IS SET
6502 PLCF=6502 /CLEAR FLAG
6504 PLPU=6504 /PEN UP
6511 LUD=6511 /E RIGHT
6512 PLUD=6512 /DRUM UP
6513 DUFR=6513 /DRUM UP; PEN RIGHT
6514 PLUD=6514 /DRUM DOWN
6515 DUFR=6515 /DRUM DOWN; PEN RIGHT
6521 PLPL=6521 /PEN LEFT
6522 PLUD=6522 /DRUM UP
6523 DUPL=6523 /DRUM UP; PEN LEFT
6524 PLPD=6524 /PEN DOWN
/
/START PROGRAM FROM LOCATION 200
/
/
/SWITCH REGISTER OPTIONS
/
/BIT 0
/SET TO HALT PROGRAM AFTER NEXT STEP WHEN DRAWING PATTERNS
/
/BIT 1
/SET TO RETRACE PRESENT PATTERN
/
/BIT 2
/SET TO LOOP TIMING TESTS
/
/BIT 3
/SET IF 31 INCH PLOTTER
/
/BIT 5
/SET IF 5 MIL PLOTTER
/
/BIT 11
/SET FOR PDP-8L

```

```

/
/CUNSTANTS AND STORAGE REGISTERS
/
0020 *20
/
0020 0000 CNTA, 0
0021 0000 CNIB, 0
0022 3030 CSIEP, STEP
0023 2713 FVTN, FORTN
0024 5451 JMI, JMP I KEP
0025 5452 JMC, JMP I KT/
0026 5462 JMS, JMP I SVC
0027 0100 K0100, 0100
0030 0400 K0400, 0400
0031 7470 K7470, 7470
0032 7526 K7526, 7526
0033 7621 K7621, 7621
0034 7623 K7623, 7623
0035 7630 K7630, 7630
0036 7713 K7713, 7713
0037 7716 K7716, 7716
0040 7743 K7743, 7743
0041 7764 K7764, 7764
0042 7765 K7765, 7765
0043 7770 K7770, 7770
0044 7772 K7772, 7772
0045 7773 K7773, 7773
0046 7774 K7774, 7774
0047 7775 K7775, 7775
0050 7776 K7776, 7776
0051 0242 KEP, E5=3
0052 0265 KT/, TZ
0053 1200 MVLFT, LLFT
0054 2070 P19A, T19A
0055 2307 PDUU, DDU
0056 0000 PNMV, 0
0057 3000 PRECT, RECT
0060 0000 SCNT, 0
0061 0000 SVAC, 0
0062 3200 SVC, PISVC
0063 0600 XTIM, TIMER
0064 3072 PNUP, PENUP
0065 3060 RTE, PN RTE
0066 3046 DRUU, DRMDU
0067 3117 DPPR, DMUPR
0070 3041 DRUN, DRMDN
0071 3112 DNPR, DM DPR
0072 3053 LEFT, PNLEFT
0073 3105 DPPL, DMUPL
0074 3065 PNUN, PNDWN
0075 3077 DNPL, DM DPL
0076 3060 PNRT, PN RTE
0077 3053 PNLT, PNLEFT
0100 2600 S2, C2
0101 2701 S10, C10

```

```

/PEN UP
/PEN RIGHT
/DRUM UP
/DRUM UP; PEN RIGHT
/DRUM DOWN
/DRUM DOWN; PEN RIGHT
/PEN LEFT
/DRUM UP; PEN LEFT
/PEN DOWN
/DRUM DOWN; PEN LEFT
/PEN RIGHT
/PEN LEFT

```

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0102	2605	S20,	C25
0103	2612	S50,	C50
0104	2617	S71,	C/1
0105	2624	S100,	C100
0106	2631	S1/5,	C175

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0107	2636	S17,	C177
0110	2643	S20,	C250
0111	2650	S30,	C350
0112	2655	S425,	C425
0113	2662	S500,	C500
0114	2674	S600,	C600
0115	2667	S604,	C604
0116	3212	S1231,	C1231
0117	2706	S1300,	C1300
0120	3221	WHICH,	CYCLE
0121	2331	XPLT,	PLT

0122	0122	/	
0123	0000	CNTS,	
0124	0000	TNTH,	0
0125	0000	QRT,	0
0126	0000	SVNT,	0
0127	0000	HALF,	0
0128	0000	ONE,	0
0130	0000	QRTS,	0
0131	0000	SVNTY,	0
0132	0000	TWY,	0
0133	0000	THY,	0
0134	0000	FQNT,	0
0135	0000	FVH,	0
0136	0000	SIX4,	0
0137	0000	SIXH,	0
0140	0000	TEN,	0
0141	0000	THMT,	0
0142	2515	XPNR,	RYTE
		/	

```

/
0200      *200
/
/TEST T1, PLOTTER FLAG SHOULD BE CLEAR,
/
0220 5520      JMP I WHICH
0221 6501      T1, PLSF          /SHOULDN'T SKIP
0222 5205      JMP T2          /OK
0223 7402      E1, HLT          /ERROR, PLSF SKIPPED, FLAG
                                /SHOULD HAVE BEEN CLEARED
                                /BY INITIALIZE,
0224 5201      JMP T1          /PRESS CONT, TO REPEAT
/
/TEST T2, USE PEN UP IOT 6504 TO SET FLAG, IF NO FLAG IN
/100 MSEC, DRUM DOWN IOT 6514 WILL BE TRIED, IF STILL NO
/FLAG, ERROR HALT AT E2, IF FLAG IS TRUE AFTER DRUM DOWN,
/NO ERROR HALT,
/
0225 1031      T2, TAD K7470    /100 MS CONSTANT
0226 6504      PLPU            /PEN UP
0227 4463      JMS I XTIM      /WAIT 100 MS
0228 6501      PLSF            /SHOULD SKIP
0229 7410      SKP             /TRY ANOTHER IOT
0230 5223      JMP T4          /NEXT TEST
0231 1031      TAD K7470      /100 MS CONSTANT
0232 6514      PLDD            /DRUM DOWN
0233 4463      JMS I XTIM      /WAIT 100 MS
0234 6501      PLSF            /MAY NOW BE SET
0235 7402      SKP             /ERROR PATH
0236 5223      JMP T4          /NEXT TEST
/
0221 7402      E2, HLT          /ERROR, PLOTTER FLAG WILL
                                /NOT SET, TWO IOT'S WERE
                                /USED (PEN UP AND DRUM
                                /DOWN), NEITHER SET THE
0222 5205      JMP T2          /FLAG, PRESS CONT TO REPEAT,
/
/TEST T4, SET FLAG WITH DRUM DOWN AND TEST THAT IOT 6502 (PLCF)
/CLEAR IT,
/
0223 1031      T4, TAD K7470    /100 MS CONSTANT
0224 6514      PLDD            /DRUM DOWN
0225 4463      JMS I XTIM      /WAIT 100 MS
0226 6502      PLCF            /CLEAR FLAG
0227 6501      PLSF            /SHOULD NOT SKIP
0228 5233      JMP T5          /NEXT TEST
0229 7402      E4, HLT          /ERROR, PLOTTER FLAG IS
                                /STILL SET AFTER A PLCF
                                /WAS ISSUED, PRESS CONT
0232 5223      JMP T4          /TO REPEAT TEST,

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```

/
/TEST T5, CLEAR PLOTTER FLAG AND ENABLE PROGRAM INTERRUPT,
/NO PI SHOULD OCCUR,
/
0233 6502 T5, PLCF /CLEAR FLAG
0234 1024 TAD JM1 /JM1=JMP I KES=3
0235 3001 DCA 1
0236 6001 ION /ENABLE PI
0237 1031 TAD K7470
0240 4463 JMS I XTIM /WAIT 100 MS
0241 5251 JMP T6 /NEXT TEST
/
0242 6002 IOF /PI OFF
0243 6501 PLSF /PLOTTER FLAG?
0244 5247 JMP ,+3 /NO
0245 7402 E5, HLT /ERROR, PI OCCURED AFTER
/ A PLCF, PRESS CONT TO
0246 5233 JMP T5 /REPEAT TEST,
/
0247 7402 E5A, HLT /ERROR, PI CAUSED BY
/ SOME DEVICE OTHER THAN
/ PLOTTER, PRESS CONT TO
0250 5233 JMP T5 /REPEAT TEST,
/
/TEST T6, SET PLOTTER FLAG WITH DRUM DOWN AND ENABLE
/PROGRAM INTERRUPT, A PI SHOULD OCCUR,
/
0251 6002 T6, IOF /PI OFF
0252 6502 PLCF /CLEAR FLAG
0253 1025 TAD JM2 /JM2=JMP I K7
0254 3001 DCA 1
0255 6514 PLDD /DRUM D W
0256 6501 PLSF /WAIT FOR FLAG
0257 5256 JMP ,=1
0260 6001 ION /ENABLE PI
0261 7000 NOP
0262 7000 NOP
0263 7402 E6, HLT /ERROR, NO PROGRAM
/ INTERRUPT FROM PLOTTER
/ FLAG, PRESS CONT TO
0264 5251 JMP T6 /REPEAT TEST,
/
/TEST T7, FIRST OF TIMING TESTS, PEN UP (IOT 6504) IS TESTED,
/FLAG SHOULD SET WITHIN 85 MS,
/
0265 6002 T7, IOF /PI OFF
0266 6502 PLCF /CLEAR FLAG
0267 1032 TAD K7520 /85 MS CONSTANT
0270 6504 PLPU /PEN UP
0271 4463 JMS I XTIM /WAIT 85 MS
0272 6501 PLSF /SHOULD SKIP
0273 7410 SKP
0274 5277 JMP T8 /NEXT TEST
/

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PAL10	V134	18-APR-69	16126	PAGE 5-1
0275	7402	E7,	HLT	/ERROR, FLAG NOT SET
				/WITHIN 85 MS AFTER
0276	5265		JMP T7	/PLPU, PRESS CONT TO
				/REPEAT TEST,

```

/
/TEST T8, PEN DOWN (IOT 6524) IS TESTED TO MAKE SURE
/FLAG SETS WITHIN 85 MS,
/
0277 6502      T8,      PLCF          /CLEAR FLAG
0300 1032      TAD K7526      /85 MS CONSTANT
0301 6524      PLPD          /PEN DOWN
0302 4463      JMS I XTIM     /WAIT 85 MS
0303 6501      PLSF          /SHOULD SKIP
0304 7410      SAK
0305 5310      JMP T9        /NEXT TEST
/
0306 7402      E8,      HLT          /ERROR, FLAG DID NOT SET
/                               /WITHIN 85 MS AFTER
/                               /L D (IOT 6524), PRESS
0307 5277      JMP T8        /CONT TO REPEAT TEST,
/
/TEST T9, USE PEN UP (IOT 6504) TO MAKE SURE FLAG DOES NOT
/SET SOONER THAN 55 MS,
/
0310 6502      T9,      PLCF          /CLEAR FLAG
0311 1034      TAD K7623      /54.5 MS CONSTANT
0312 6504      PLPU          /PEN UP
0313 4463      JMS I XTIM     /WAIT 54.5 MS
0314 6501      PLSF          /SHOULD NOT SKIP
0315 5320      JMP T10       /NEXT TEST
0316 7402      E9,      HLT 1      /ERROR, FLAG SET SOONER
/                               /THAN 55 MS AFTER A PLPU,
0317 5310      JMP T9        /PRESS CONT TO REPEAT TEST,
/
/TEST T10, USE PEN DOWN (IOT 6524) TO MAKE SURE FLAG SETS NO
/SOONER THAN 55 MS,
/
0320 1034      T10,     TAD K7623      /54.5 MS CONSTANT
0321 4463      JMS I XTIM     /WAIT FOR FLAG FROM TEST T9,
0322 6502      PLCF          /CLEAR FLAG
0323 1034      TAD K7623      /54.5 MS CONSTANT
0324 6524      PLPD          /PEN DOWN
0325 4463      JMS I XTIM     /WAIT 54.5 MS
0326 6501      PLSF          /SHOULD NOT SKIP
0327 5430      JMP I K0400     /NEXT TEST
0330 7402      E10,     HLT          /ERROR, FLAG SET SOONER
/                               /THAN 55 MS AFTER A
/                               /PLPD IOT, PRESS CONT TO
0331 5322      JMP T10+2      /REPEAT TEST,

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0400 *400
/TEST T11, TEST THAT FLAG DOES NOT SET SOONER THAN 3,5 MS
/NOR LATER THAN 5,5 MS WITH PLPR (IOT 6511),
/
0400 1034 T11, TAD K7625 /54,5 MS CONSTANT
0401 4463 JMS I XTIM /WAIT FOR FLAG FROM TEST T10,
0402 6502 PLCF /CLEAR FLAG
0403 1044 TAD K7772 /3 MS CONSTANT
0404 6511 PLPR /PEN RIGHT
0405 4463 JMS I XTIM /WAIT 3 MS
0406 6501 PLSF /SHOULD NOT SKIP
0407 7410 SKP
0410 5216 JMP E11 /ERROR PATH
0411 1045 TAD K7775 /2,5 MS CONSTANT
0412 4463 JMS I XTIM /WAIT TOTAL OF 5,5 MS
0413 6501 PLSF /SHOULD SKIP
0414 5220 JM E12 /ERROR PATH
0415 5222 JMP T12 /NEXT TEST
/
0416 7402 E11, HLT /ERROR, FLAG SET SOONER
/THAN 3,5 MS AFTER A
0417 5202 JMP T11+2 /PLPR, PRESS CONT TO REPEAT,
/
0420 7402 E12, HLT /ERROR, FLAG NOT SET WITHIN
/5,5 MS AFTER A PLPR,
0421 5202 JMP T11+2 /PRESS CONT TO REPEAT TEST,
/
/TEST T12 MAKE SURE FLAG DOES NOT SET SOONER THAN 3,5 MS NOT
/LATER THAN 5,5 MS WITH PLDU (IOT 6512),
/
0422 6502 T12, PLCF /CLEAR FLAG
0423 1044 TAD K7772 /3 MS CONSTANT
0424 6512 PLDU /DRUM UP
0425 4463 JMS I XTIM /WAIT 3 MS
0426 6501 PLSF /SHOULD NOT SKIP
0427 7410 SKP
0430 5236 JMP E13 /ERROR PATH
0431 1045 TAD K7775 /2,5 MS CONSTANT
0432 4463 JMS I XTIM /WAIT TOTAL OF 5,5 MS
0433 6501 PLSF /SHOULD SKIP
0434 5240 JMP E14 /ERROR PATH
0435 5242 JMP T13 /NEXT TEST
/
0436 7402 E13, HLT /ERROR, FLAG SET SOONER
/THAN 3,5 MS AFTER A PLDU,
0437 5222 JMP T12 /PRESS CONT TO REPEAT TEST,
/
0440 7402 E14, HLT /ERROR, FLAG NOT SET
/WITHIN 5,5 MS AFTER A
0441 5222 JMP T12 /PLDU, PRESS CONT TO REPEAT TEST,

```

/TEST T13, MAKE SURE FLAG DOES NOT SET SOONER THAN 3,5 MS NOR
/LATER THAN 5,5 MS WITH PLDD (IOT 6514),
/

0442	6502	T13,	PLCF	/CLEAR FLAG
0443	1044		TAD K7772	/3 MS CONSTANT
0444	6514		PLDD	/RUM DOWN
0445	4463		JMS I XTIM	/WAIT 3 MS
0446	6501		PLSF	/SHOULD NOT SKIP
0447	7410		SKP	
0450	5256		JMP E15	/ERROR PATH
0451	1045		TAD K7773	/2,5 MS CONSTANT
0452	4463		JMS I XTIM	/WAIT TOTAL OF 5,5 MS
0453	6501		PLSF	/SHOULD SKIP
0454	5260		JMP E16	/ERROR PATH
0455	5262		JMP T14	/NEXT TEST
/				
0456	7402	E15,	HLT	/ERROR, FLAG SET SOONER THAN
				/3,5 MS AFTER A PLDD, PRESS
0457	5242		JMP T13	/CONT TO REPEAT TEST,
/				
0460	7402	E16,	HLT	/ERROR, FLAG NOT SET WITHIN
				/5,5 MS AFTER A PLDD, PRESS
0461	5242		JMP T13	/CONT TO REPEAT TEST,

/TEST T14, MAKE SURE FLAG DOES NOT SET SOONER THAN 3,5 MS NOR
/LATER THAN 5,5 MS WITH PLPL (IOT 6521),
/

0462	6502	T14,	PLCF	/CLEAR FLAG
0463	1044		TAD K7772	/3 MS CONSTANT
0464	6521		PLPL	/PEN LEFT
0465	4463		JMS I XTIM	/WAIT 3 MS
0466	6501		PLSF	/SHOULD NOT SKIP
0467	7410		SKP	
0470	5276		JMP E17	/ERROR PATH
0471	1045		TAD K7773	/2,5 MS CONSTANT
0472	4463		JMS I XTIM	/WAIT TOTAL OF 5,5 MS
0473	6501		PLSF	/SHOULD SKIP
0474	5300		JMP E18	/ERROR PATH
0475	5302		JMP T15	/NEXT TEST
/				
0476	7402	E17,	HLT	/ERROR, FLAG SET SOONER
				/THAN 3,5 MS AFTER A PLPL,
0477	5262		JMP T14	/PRESS CONT TO REPEAT TEST,
/				
0500	7402	E18,	HLT	/ERROR, FLAG NOT SET WITHIN
				/5,5 MS AFTER A PLPL, PRESS
0501	5262		JMP T14	/CONT TO REPEAT TEST,

```

/
/TEST T15, MAKE SURE FLAG DOES NOT SET SOONER THAN 3.5 MS NOR
/LATER THAN 5.5 MS WITH A PLUD (IOT 6522),
/
0502 6502 T15, PLCF /CLEAR FLAG
0503 1044 TAD K7772 /3 MS CONSTANT
0504 6522 PLUD /DRUM UP
0505 4463 JMS I XTIM /WAIT 3 MS
0506 6501 PLSF /SHOULD NOT SKIP
0507 7410 SKP
0510 5316 JMP E19 /ERROR PATH
0511 1045 TAD K7773 /2.5 MS CONSTANT
0512 4463 JMS I XTIM /WAIT TOTAL OF 5.5 MS
0513 6501 PLSF /SHOULD SKIP
0514 5320 JMP E20 /ERROR PATH
0515 5322 JMP SR0 /NEXT TEST

/
0516 7402 E19, HLT /ERROR, FLAG SET SOONER THAN
/3.5 MS AFTER A PLUD,
0517 5302 JMP T15 /PRESS CONT TO REPEAT TEST,

/
0520 7402 E20, HLT /ERROR, FLAG NOT SET WITHIN
/5.5 MS AFTER A PLUD
0521 5302 JMP T15 /PRESS CONT TO REPEAT TEST,

/
0522 6502 SR0, PLCF /CLEAR FLAG
0523 7604 LAS /GET SWITCH REGISTER
0524 7006 RTL
0525 7700 SMA CLA
0526 5731 JMP I ,+3
0527 5730 JMP I ,+1 /LOOP TIMING TESTS
0530 0201 T1
0531 0611 PLOT

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```

/
0600 *600
/
/ ,5 MS TIMER MULTIPLIED TIMES CNTB FOR DESIRED DELAY
/
0600 0000 TIMER, 0
0601 3021 DCA CNTB /STORE MULTIPLIER
0602 1033 TAD K7621 / ,5 MS CONSTANT
0603 3020 DCA CNTA
0604 2020 ISZ CNTA /LOOP FOR ,5 MS
0605 5204 JMP , -1
0606 2021 ISZ CNTB /MULTIPLIER
0607 5202 JMP TIMEH+2 /RESTORE CNTA
0610 5600 JMP I TIMER /EXIT
/
0611 026 PLOT, TAD JM3 /JM3 = JMP I SVC
0612 3001 DCA 1 /PI RETURN JUMP
0613 4423 JMS I FVIN /CHECK FOR 5 OR 10 MIL
/
/12 AND 31 INCH PLOTTER DRAWINGS
/
/TEST T16, A DASHED LINE RECTANGLE IS DRAWN USING 1 INCH
/LINES, FROM MARGIN TO MARGIN, THE LAST HORIZONTAL
/LINES DRAWN AT THE RIGHT MARGIN ARE 1,25 INCHES
/LONG IF A 31 INCH PLOTTER IS USED
/
0614 4464 T16, JMS I PNUP /PEN UP
0615 1045 TAD K7773 / =5
0616 3020 DCA CNTA
0617 4505 JMS I S100 /SETUP 1 INCH COUNTER
0620 4470 JMS I DRUM /DRUM DOWN
0621 4422 JMS I CSTEP /COUNT 1 INCH
0622 5220 JMP , -2
0623 2020 ISZ CNTA /TOTAL OF 5 INCHES IF SKIP
0624 5217 JMP T16+3 /DRUM DOWN 1 MORE INCH
/
/MOVE PEN TO LEFT MARGIN
/
0625 4516 JMS I S1231 /CHECK FOR 12 OR 31 INCH
0626 5261 JMP T16 /31 INCH
0627 4501 JMS I S10 /12 INCH, SETUP FOR 10 INCHES
0630 4477 JMS I PNLT /PEN LEFT 10 INCHES
0631 4422 JMS I CSTEP
0632 5230 JMP , -2
0633 4505 JMS I S100 /SETUP FOR 1 INCH
0634 4477 JMS I PNLT /PEN LEFT 1 INCH FOR A
0635 4422 JMS I CSTEP /TOTAL OF 11 INCHES
0636 5234 JMP , -2

```

/PUT PEN DOWN; PEN RIGHT 1 INCH; PUT PEN UP; PEN RIGHT
/1 INCH, MAKE SIX 1 INCH DASHES; FIVE 1 INCH SPACES; DRUM
/UP 1 INCH AND PLOT SECOND LINE FROM RIGHT TO LEFT,
/

2637	1065	RT16,	TAD RITE	/MOVE RIGHT ROUTINE
2640	3056		DCA PNMV	/SAVE ADDRESS
2641	1042		TAD K7765	/-11 DECIMAL
2642	4457		JMS I PRECT	/DRAW DASHES TO RIGHT
2643	4505		JMS I S100	/SETUP FOR 1 INCH
2644	4466		JMS I DRDU	/DRUM UP 1 INCH
2645	4422		JMS I CSTEP	
2646	5244		JMP I=2	
2647	1072		TAD LEF	/MOVE LEFT ROUTINE
2650	3056		DCA PNMV	/SAVE ADDRESS
2651	1042		TAD K7765	/-11 DECIMAL
2652	4457		JMS I PRECT	/DRAW DASHES TO LEFT
2653	4505		JMS I S100	/SETUP FOR 1 INCH
2654	4470		JMS I DRDN	/DRUM DOWN 1 INCH
2655	4422		JMS I CSTEP	
2656	5254		JMP I=2	
2657	5660		JMP I=+1	
2660	1000		T17	/NEXT TEST

/

/TEST T16A, DRAW RECTANGLE FOR 31 INCH PLOTTER, MARGIN TO MARGIN
/LENGTH IS 29.25 INCHES, ALL LINES AND SPACES ARE 1 INCH EXCEPT
/THE LAST TWO LINES WHICH ARE 1.25 INCHES,
/

2661	1047	T16A,	TAD K7775	/-3
2662	3020		DCA CNTA	
2663	4501		JMS I S10	/SETUP FOR 10 INCHES
2664	4477		JMS I PNLT	/PEN LEFT 10 INCHES
2665	4422		JMS I CSTEP	
2666	5264		JMP I=2	
2667	2020		ISZ CNTA	/TOTAL OF 30 INCHES IF SKIP
2670	5263		JMP T16A+2	/MOVE ANOTHER 10

/

/DRAW 29.25 INCH DASHED RECTANGLE, READ COMMENTS ABOVE
/TEST T16 FOR 12 INCH PLOTTER,
/

2671	1065	R10A,	TAD RITE	/MOVE RIGHT ROUTINE
2672	3056		DCA PNMV	/SAVE ADDRESS

0673	1040	TAD K7743	/-29 DECIMAL
0674	4457	JMS I PRECT	/DRAW 15 1 INCH LINES;
			/14 1 INCH SPACES
0675	4502	JMS I S25	/SETUP FOR ,25 INCH
0676	4476	JMS I PNRT	/PEN RIGHT ,25 INCH
0677	4422	JMS I CSTEP	
0700	5276	JMP ,+2	
0701	4505	JMS I S100	/SETUP FOR 1 INCH
0702	4466	JMS I DRDU	/DRUM UP 1 INCH
0703	4422	JMS I CSTEP	
0704	5302	JMP ,+2	
0705	4502	JMS I S25	/SETUP FOR ,25 INCH
0706	4477	JMS I PNLT	/PEN LEFT ,25 INCH
0707	4422	JMS I CSTEP	
0710	5306	JMP ,+2	
0711	1072	TAD LEFT	/MOVE LEFT ROUTINE
0712	3056	DCA PNMV	/SAVE ADDRESS
0713	1040	TAD K7743	/-29 DECIMAL
0714	4457	JMS I PRECT	/DRAW DASHES TO LEFT
0715	4505	JMS I S100	/SETUP FOR 1 INCH
0716	4470	JMS I DRDN	/DRUM DOWN 1 INCH
0717	4422	JMS I CSTEP	
0720	5316	JMP ,+2	
0721	5722	JMP I ,+1	
0722	1000	T17	/NEXT TEST

```

/
1000 *1000
/
/TEST T17, DRAW 3 OCTAGONS ACROSS PAGE FROM LEFT TO RIGHT, TEST
/T17 IS FOR 12 INCH; T17A FOR 31 INCH,
/
1000 4464 T1/, JMS I PNUP /PEN UP
1001 4505 JMS I S100 /SETUP FOR 1 INCH
1002 4470 JMS I DRUM /DRUM DOWN 1 INCH
1003 4422 JMS I CSTEP
1004 5202 JMP ,-2
1005 4542 JMS I XPNR
1006 4516 JMS I S1231 /CHECK FOR 12 OR 31 INCH
1007 5675 JMP I P1/A /31 INCH
/
/BEGIN OCTAGON PLOT FOR 12 INCH
/
00 4225 RT 17, JMS OCT 12 /PLOT 1ST OCTAGON
1011 4510 JMS I S250 /SETUP FOR 2,5 INCHES
1012 4476 JMS I PNRT /PEN RIGHT 2,5 INCHES
1013 4422 JMS I CSTEP
1014 5212 JMP ,-2
1015 4225 JMS OCT12 /PLOT 2ND OCTAGON
1016 4510 JMS I S250
1017 4476 JMS I PNRT /PEN RIGHT 2,5 INCHES
1020 4422 JMS I CSTEP
1021 5217 JMP ,-2
1022 4225 JMS OCT12 /PLOT 3RD OCTAGON
1023 4464 JMS I PNUP /PEN UP
1024 5276 JMP T18 /FILL IN CENTERS
/
/OCTAGON SUBROUTINE
/
/PLOT RIGHT; PEN UP; 1,75 INCHES
/
1025 3000 OCT12, 0
1026 4506 CT1, JMS I S175 /SETUP FOR 1,75 INCHES
1027 4476 JMS I PNRT /MOVE RIGHT 1,75 INCHES
1030 4422 JMS I CSTEP
1031 5227 JMP ,-2
/
/PEN DOWN; DRUM DOWN; PEN RIGHT; 1 INCH
/
03 4474 CT2, JMS I PNDN /PEN DOWN
1033 4504 JMS I S71 /SET UP FOR ,71 DIAG
1034 4471 JMS I DNPR /DRUM DOWN; PEN RIGHT-
1035 4422 JMS I CSTEP /FOR 1 INCH DIAGONAL
1036 5234 JMP ,-2

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/
/DRUM DOWN 1 INCH
/
1037 4505 CT3, JMS I S100 /SETUP FOR 1 INCH
1040 4470 JMS I DRDN /DRUM DOWN 1 INCH
1041 4422 JMS I CSTEP
1042 5240 JMP ,=2
/
/DRUM DOWN; PEN LEFT; 1 INCH
/
1043 4504 CT4, JMS I S71 /SETUP FOR ,71 DIAGONAL
1044 4475 JMS I DNPL /DRUM DOWN; PEN LEFT
1045 4422 JMS I CSTEP
1046 5244 JMP ,=2
/
/PEN LEFT 1 INCH
/
1047 4505 CT5, JMS I S100 /SETUP FOR 1 INCH
1050 4477 JMS I PNLT /PEN LEFT 1 INCH
1051 4422 JMS I CSTEP
1052 5250 JMP ,=2
/
/DRUM UP; PEN LEFT; 1 INCH
/
1053 4504 CT6, JMS I S71 /SETUP FOR ,71 DIAGONAL
1054 4473 JMS I DPPL /DRUM UP; PEN LEFT
1055 4422 JMS I CSTEP
1056 5254 JMP ,=2
/
/DRUM UP 1 INCH
/
1057 4505 CT7, JMS I S100 /SETUP FOR 1 INCH
1060 4466 JMS I DRU /DRUM UP 1 INCH
1061 4422 JMS I CSTEP
1062 5260 JMP ,=2
/
/DRUM UP; PEN RIGHT; 1 INCH
/
1063 4504 CT8, JMS I S71 /SETUP FOR DIAGONAL
1064 4467 JMS I DPPR /DRUM UP; PEN RIGHT
1065 4422 JMS I CSTEP
1066 5264 JMP ,=2
/
/PEN RIGHT 1 INCH; FINISH
/
1067 4505 CT9, JMS I S100 /SETUP FOR 1 INCH
1070 4476 JMS I PNRT /PEN RIGHT 1 INCH
1071 4422 JMS I CSTEP
1072 5270 JMP ,=2
1073 4464 JMS I PNUP /PEN UP
1074 5625 JMP I OCT12 /EXIT

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1075 1217 P1/A, T17A
/
/T18, FILL IN OCTAGON CENTERS
/
1076 4326 T18, JMS F18 /DRAW DIAGONALS
1077 4453 JMS I MVLFT /MOVE TO MIDDLE OCTAGON
1100 4326 JMS F18 /DRAW DIAGONALS
1101 4453 JMS I MVLFT /MOVE TO LEFT OCTAGON
1102 4326 JMS F18 /DRAW DIAGONALS
1103 4505 JMS I S100
1104 4466 JMS I DRUU /DRUM UP
1105 4422 JMS I CSTEP
1106 5304 JMP ,=2
1107 4464 JMS I PNUP /PEN UP
1110 4504 JMS I S71
1111 4473 JMS I DPPL
1112 4422 JMS I CSTEP
1113 5311 JMP ,=2
1114 4506 JMS I S1/5
1115 4477 JMS I PNLT /PEN LEFT
1116 4422 JMS I CSTEP
1117 5315 JMP ,=2
1120 7604 LAS
1121 7004 RAL
1122 7710 SPA CLA /BIT "1" A "1" = RETRACE
1123 5210 JMP RT17 /RETRACE ALL 3
1124 5725 JMP I ,+1
1125 1423 T19 /NEXT TEST
/
/START DIAGONALS, DRUM DOWN ,71 INCH
/
1126 0000 F18, 0
1127 4504 CD1, JMS I S/1 /SETUP FOR ,71 INCH
1130 4470 JMS I DRDN /DRUM DOWN ,71 INCH
1131 4422 JMS I CSTEP
1132 5330 JMP ,=2
/
/MOVE PEN RIGHT ,71 INCH
/
1133 4504 CD2, JMS I S71 /SET UP FOR ,71
1134 4476 JMS I PNRT /PEN RIGHT ,71 INCH
1135 4422 JMS I CSTEP
1136 5334 JMP ,=2
/
/PEN DOWN; DRUM DOWN; PEN LEFT 2,5 INCHES
/
1137 4474 CDS, JMS I PNUN /PEN DOWN
1140 4507 JMS I S177 /SETUP FOR 2,5 INCH DIAG,
1141 4475 JMS I DNPL /DRUM DOWN; PEN LEFT
1142 4422 JMS I CSTEP
1143 5341 JMP ,=2

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/ PEN RIGHT 1 INCH
/
1144 4505 CD4, JMS I S100 /SETUP FOR 1 INCH
1145 4476 JMS I PNRT /PEN RIGHT 1 INCH
1146 4422 JMS I CSTEP
1147 5345 JMP ,-2
/
/DRUM UP; PEN LEFT 2,5 INCHES
/
1150 4507 CD2, JMS I S177 /SETUP FOR 2,5 INCHES
1151 4473 JMS I DPPL /DRUM UP; PEN LEFT
1152 4422 JMS I CSTEP
1153 5351 JMP ,-2
/
/DRUM DOWN 1 INCH
/
1154 4505 CD6, JMS I S100 /SETCOUNT FOR 1 INCH
1155 4470 JMS I DRDN /DRUM DOWN 1 INCH
1156 4422 JMS I CSTEP
1157 5355 JMP ,-2
/
/DRUM UP; PEN RIGHT 2,5 INCHES
/
1160 4507 CD7, JMS I S177 /SET COUNT FOR 2,5 INCHES
1161 4467 JMS I DPPR /DRUM UP; PEN RIGHT
1162 4422 JMS I CSTEP
1163 5361 JMP ,-2
/
/ PEN LEFT 1 INCH
/
1164 4505 CD8, JMS I S100 /SET COUNT FOR 1 INCH
1165 4477 JMS I PNLT /PEN LEFT 1 INCH
1166 4422 JMS I CSTEP
1167 5365 JMP ,-2
/
/DRUM DOWN; PEN RIGHT 2,5 INCHES
/
1170 4507 CD9, JMS I S177 /SET COUNT FOR 2,5 INCHES
1171 4471 JMS I DNPR /DRUM DOWN; PEN RIGHT
1172 4422 JMS I CSTEP
1173 5371 JMP ,-2
1174 5726 JMP I F18 /EXIT
/

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```

1200      1200
/
/ROUTINE TO MOVE PEN TO NEXT OCTAGON
/
/PEN UP; DRUM UP 1 INCH
/
LLFT, 0
1200 2000      JMS I S100      /SET COUNT FOR 1 INCH
1201 4505      JMS I DRUU      /DRUM UP 1 INCH
1202 4466      JMS I CSTEP
1203 4422      JMP ,=2
1204 5202      JMS I PNUP      /PEN UP
1205 4464      JMS I S71
1206 4504      JMS I DPPL      /DRUM UP; PEN LEFT
1207 4473      JMS I CSTEP
1210 4422      JMP ,=2
1211 5207
/
/MOVE PEN 4.25 INCHES LEFT
/
1212 4512      JMS I S425      /SET COUNT FOR 4.25 INCHES
1213 4477      JMS I PNLT      /PEN LEFT 4.25 INCHES
1214 4422      JMS I CSTEP
1215 5213      JMP ,=2
1216 5600      JMS I LLFT      /EXIT
/
/TEST T17A, DRAW 3 OCTAGONS FOR 31 INCH PLOTTER,
/
T17A, JMS OCT31      /PLOT 1ST OCTAGON
1217 4234      JMS I S425      /SET COUNT FOR 4.25 INCHES
1220 4512      JMS I PNRT      /PEN RIGHT 4.25 INCHES
1221 4476      JMS I CSTEP
1222 4422      JMP ,=2
1223 5221      JMS I PC12      /PLOT 2ND OCTAGON
1224 4675      JMS I S425
1225 4512      JMS I PNRT      /PEN RIGHT 4.25 INCHES
1226 4476      JMS I CSTEP
1227 4422      JMP ,=2
1230 5226      JMS I PC12      /PLOT 3RD OCTAGON
1231 4675      JMS I PNUP      /PEN UP
1232 4464      JMS I T18A      /FILL IN CENTERS
1233 5276
/
/31 INCH OCTAGON SUBROUTINE, THIS ROUTINE MODIFIES THE
/12 INCH OCTAGON ROUTINE TO DRAW LARGER OCTAGONS,
/
OCT31, 0
1234 0000      TAD JM4      /JM4=JMS I S600
1235 1261      DCA I PT1
1236 3664      TAD JM5      /JM5=JMS I S250
1237 1262      DCA I PT2
1240 3665      TAD JM6      /JM6=JMS I S350
1241 1263      DCA I PT3
1242 3666      TAD JM5      /JM5=JMS I S250
1243 1262      DCA I PT4
1244 3667

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1245	1263	TAD JM6	/JM6=JMS I S350
1246	3670	DCA I PT5	
1247	1262	TAD JM5	/JM5=JMS I S250
1250	3671	DCA I PT6	
1251	1263	TAD JM6	/JM6=JMS I S350
1252	3672	DCA I PT7	
1253	1262	TAD JM5	/JM5=JMS I S250

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1254 3673      DCA I PT8
1255 1263      AD JM6      /JM6=JM I S350
1256 3674      DCA I PT9
1257 4675      JMS I PC12   /DRAW AN OCTAGON
1260 5634      JMP I OCT31  /EXIT
/
1261 4514      JM4,      JMS I S600   /SET COUNT FOR 6 INCHES
1262 4510      JM5,      JMS I S250   /SET COUNT FOR 2.5 INCHES
1263 4511      JM6,      JMS I S350   /SET COUNT FOR 3.5 INCHES
1264 1026      PT1,      CT1
1265 1033      PT2,      CT2
1266 1037      PT3,      CT3
1267 1043      PT4,      CT4
1270 1047      PT5,      CT5
1271 1053      PT6,      CT6
1272 1057      PT7,      CT7
1273 1063      PT8,      CT8
1274 1067      PT9,      CT9
1275 1025      PC12,     OCT12
/
/T18A, FILL IN OCTAGON CENTERS, THE 12 INCH PLOTTER ROUTINE IS
/MODIFIED AND USED,
/
1276 4326      T18A,     JMS F18A      /DRAW DIAGONALS
1277 4766      JMS I LF31      /MOVE TO MID
1300 4765      JMS I PF18      /DRAW DIAGONALS
1301 4766      JMS I LF31      /MOVE TO LEFT OCTAGON
1302 4765      JMS I PF18      /DRAW DIAGONALS
1303 4511      JMS I S350
1304 4466      JMS I DRDU      /DRUM UP
1305 4422      JMS I CSTEP
1306 5304      JMP ,=2
1307 4464      JMS I PNUP      /PEN UP
1310 4510      JMS I S250
1311 4473      JMS I NPPL
1312 4422      JMS I CSTEP
1313 5311      JMP ,=2
1314 4514      JMS I S600
1315 4477      JMS I PNLT      /PEN LEFT
1316 4422      JMS I CSTEP
1317 5315      JMP ,=2
1320 7604      LAS
1321 7004      RAL
1322 7710      SPA CLA      /BIT "1" A "1" = RETRACE
1323 5217      JMP T17A      /RETRACE
1324 5725      JMP I ,+1
1325 1423      T19          /NEXT TEST

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1326 0000 /
1327 1262 F18A, 0
1330 3754 TAD JM5 /JM5=JMS I S250
1331 1262 DCA I PC1
1332 3755 TAD JM5
1333 1353 DCA I PC2
1334 3756 TAD JM7 /JM7=JMS I S604
1335 1263 DCA I PC3
1336 3757 TAD JM6 /JM6=JMS I S350
1337 1353 DCA I PC4
1340 3760 TAD JM7
1341 1263 DCA I PC5
1342 3761 TAD JM6
1343 1353 DCA I PC6
1344 3762 TAD JM7
1345 1263 DCA I PC7
1346 3763 TAD JM6
1347 1353 DCA I PC8
1350 3764 TAD JM7
1351 4765 DCA I PC9
1352 5726 JMS I PF18 /DRAW DIAGONALS
JMP I F18A /EXIT

1353 4515 /
1354 1127 JM/, JMS I S604 /SET COUNT FOR 8.5 INCHES
1355 1133 PC1, C01
1356 1140 PC2, C02
1357 1144 PC3, C03
1360 1150 PC4, C04
1361 1154 PC5, C05
1362 1160 PC6, C06
1363 1164 PC7, C07
1364 1170 PC8, C08
1365 1126 PC9, C09
1366 1400 PF18, F18
LF31, L31

```

```

1400      1400
/
/MOVE PEN TO NEXT OCTAGON
/
/PEN UP; DRUM UP 3,5 INCHES
/
1400 0000 L31, 0
1401 4511 JMS I S3>0 /SET COUNT FOR 3,5 INCHES
1402 4466 JMS I DRUJ /DRUM UP 3,5 INCHES
1403 4422 JMS I CSTEP
1404 5202 JMP ,=2
1405 4464 JMS I PNUP /PEN UP
1406 4510 JMS I S2>0
1407 4473 JMS I DPPL
1410 4422 JMS I CSTEP
1411 5207 JMP ,=2
/
/MOVE PEN 1,25 INCHES LEFT
/
1412 4501 JMS I S10 /SET COUNT FOR 10 INCHES
1413 4477 JMS I PNLT /PEN LEFT 10 INCHES
1414 4422 JMS I CSTEP
1415 5213 JMP ,=2
1416 4502 JMS I S2> /SET COUNT FOR ,25 INCH
1417 4477 JMS I PNLT /PEN LEFT ,25 INCH
1420 4422 JMS I CSTEP
1421 5217 JMP ,=2
1422 5600 JMP I L31 /EXIT
/
/TEST T19, DRAW CONCENTRIC SQUARES,
/
1423 4516 T19, JMS I S1231 /CHECK FOR 12 OR 31 INCH
1424 5454 JMP I P19A /31 INCH
/
/PEN UP; DRUM DOWN 5 INCHES
/
1425 4464 JMS I PNUP /PEN UP
1426 4513 JMS I S500 /SET COUNT TO 5 INCHES
1427 4470 JMS I DRDN /DRUM DOWN 5 INCHES
1430 4422 JMS I CSTEP
1431 5227 JMP ,=2

```

```

//BEGIN DRAWING SQUARE
1432 4505      JMS I S100      /SETUP FOR 1 INCH
1433 4477      JMS I PNLT      /PEN LEFT 1 INCH
1434 4422      JMS I CSTEP
1435 5233      JMP      ,=2
1436 4501      JMS I S10
1437 4477      JMS I PNLT      /PEN LEFT 10 INCHES
1440 4422      JMS I CSTEP
1441 5237      JMP      ,=2
/
/DRUM DOWN 5 INCHES (HALF SQUARE)
/
1442 4542      JMS I XPNR
1443 4503      JMS I S50      /SETUP FOR ,5 INCHES
1444 4476      JMS I PNRT      /DRUM DOWN ,5 INCHES
1445 4422      JMS I CSTEP
1446 5244      JMP      ,=2
/
/PEN RIGHT 5,5 INCHES (CENTER SQUARE)
/
R19, 1447 4513      JMS I S500
1450 4476      JMS I PNRT      /PEN RIGHT 5 INCHES
1451 4422      JMS I CSTEP
1452 5250      JMP      ,=2
1453 4513      JMS I S500
1454 4470      JMS I DRUN      /DRUM DOWN 5 INCHES
1455 4422      JMS I CSTEP
1456 5254      JMP      ,=2

```

```

/
/MAKE A DOT
/
1457 4474      JMS I PNUN      /PEN DOWN
1460 4464      JMS I PNUP      /PEN UP
/
/DRUM UP HALF SQUARE
/
1451 4513      JMS I S500
1462 4466      JMS I DRUU      /DRUM UP
1463 4422      JMS I CSTEP
1464 5262      JMP ,=2
/
/PEN DOWN; PEN RIGHT HALF SIDE
/
1455 4474      JMS I PNUN      /PEN DOWN
1456 4513      JMS I S500
1457 4476      JMS I PNRT      /PEN RIGHT
1470 4422      JMS I CSTEP
1471 5267      JMP ,=2
/
/DRUM DOWN FULL RIGHT SIDE
/
1472 4501      JMS I S10
1473 4470      JMS I DRDN      /DRUM DOWN
1474 4422      JMS I CSTEP
1475 5273      JMP ,=2
/
/PEN LEFT ALONG TOP
/
1476 4501      JMS I S10
1477 4477      JMS I PNLT      /PEN LEFT
1500 4422      JMS I CSTEP
1501 5277      JMP ,=2
/
/DRUM UP; FULL LEFT SIDE
/
1502 4501      JMS I S 0
1503 4466      JMS I DRUU      /DRUM UP
1504 4422      JMS I CSTEP
1505 5303      JMP ,=2
/
/PEN RIGHT; MEET 1ST POINT
/
1506 4513      JMS I S500
1507 4476      JMS I PNRT      /PEN RIGHT
1510 4422      JMS I CSTEP
1511 5307      JMP ,=2

```

```

/
/PEN UP; BACK TO CENTER
/
1512 4464      JMS I PNUP      /PEN UP
1513 4513      JMS I S500
1514 4470      JMS I DRUM      /DRUM DOWN
1515 4422      JMS I CSTEP
1516 5314      JMP , -2
/
/PEN DOWN; PEN UP
/
1517 4474      JMS I PNUN      /PEN DOWN
1520 4464      JMS I PNUP      /PEN UP
/
/MAKE 2ND SQUARE
/
1521 4510      JMS I S200
1522 4466      JMS I DRUM      /DRUM UP
1523 4422      JMS I CSTEP
1524 5322      JMP , -2
/
/PEN DOWN; PEN LEFT HALF SIDE
/
1525 4474      JMS I PNUN      /PEN DOWN
1526 4510      JMS I S200
1527 4477      JMS I PNLT      /PEN LEFT
1530 4422      JMS I CSTEP
1531 5327      JMP , -2
/
/DRUM DOWN LEFT SIDE
/
1532 4513      JMS I S500
1533 4470      JMS I DRUM      /DRUM DOWN
1534 4422      JMS I CSTEP
1535 5333      JMP , -2
/
/PEN RIGHT ALONG TOP
/
1536 4513      JMS I S500
1537 4476      JMS I PNRT
1540 4422      JMS I CSTEP
1541 5337      JMP , -2
/
/DRUM UP RIGHT SIDE
/
1542 4513      JMS I S500
1543 4466      JMS I DRUM      /DRUM UP
1544 4422      JMS I CSTEP
1545 5343      JMP , -2

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```

/ PEN LEFT; MEET 1ST POINT
/
1546 4510 JMS I S220
1547 4477 JMS I PNLT /PEN LEFT
1550 4422 JMS I CSTEP
1551 5347 JMP , -2
1552 5753 JMP I , +1
1553 1600 CSU
/
1600 *1000
/
/ PEN UP; BACK TO CENTER
/
1600 4464 CSU, JMS I PNUP /PEN UP
1601 4510 JMS I S220
1602 4470 JMS I DRDN /DRUM DOWN
1603 4422 JMS I CSTEP
1604 5202 JMP , -2
/
/ MAKE A DOT
/
1605 4474 JMS I PNUN /PEN DOWN
1606 4464 JMS I PNUP /PEN UP
/
/ MAKE THE CENTER SQUARE
/
1607 4505 JMS I S100
1610 4466 JMS I DRDU /DRUM UP
1611 4422 JMS I CSTEP
1612 5210 JMP , -2
1613 4502 JMS I S220
1614 4466 JMS I DRDU /DRUM UP
1615 4422 JMS I CSTEP
1616 5214 JMP , -2
/
/ PEN RIGHT; HALF SIDE
/
1617 4474 JMS I PNUN /PEN DOWN
1620 4505 JMS I S100
1621 4476 JMS I PNRT /PEN RIGHT
1622 4422 JMS I CSTEP
1623 5221 JMP , -2
1624 4502 JMS I S220
1625 4476 JMS I PNRT /PEN RIGHT
1626 4422 JMS I CSTEP
1627 5225 JMP , -2

```

```

/
/DRUM DOWN RIGHT SIDE
/
1630 4510 JMS I S250
1631 4470 JMS I DRDN /DRUM DOWN
1632 4422 JMS I CSTEP
1633 5231 JMP , -2
/
/PEN LEFT ALONG TOP
/
1634 4510 JMS I S250
1635 4477 JMS I PNLT /PEN LEFT
1636 4422 JMS I CSTEP
1637 5235 JMP , -2
/
/DRUM UP LEFT SIDE
/
1640 4510 JMS I S250
1641 4466 JMS I DRDU /DRUM UP
1642 4422 JMS I CSTEP
1643 5241 JMP , -2
/
/PEN RIGHT; MEET 1ST POINT
/
1644 4505 JMS I S100
1645 4476 JMS I PNRT /PEN RIGHT
1646 4422 JMS I CSTEP
1647 5245 JMP , -2
1650 4502 JMS I S25
1651 4476 JMS I PNRT /PEN RIGHT
1652 4422 JMS I CSTEP
1653 5251 JMP , -2
/
/PEN UP; MOVE BACK TO CENTER
/
1654 4464 JMS I PNUP /PEN UP
1655 4505 JMS I S100
1656 4470 JMS I DRDN /DRUM DOWN
1657 4422 JMS I CSTEP
1658 5256 JMP , -2
1661 4502 JMS I S25
1662 4470 JMS I DRDN /DRUM DOWN
1663 4422 JMS I CSTEP
1664 5262 JMP , -2
/
1665 4474 JMS I PNUN /PEN DOWN
1666 4464 JMS I PNUP /PEN UP
/
/START DIAGONALS
/
/DRUM UP; PEN RIGHT TO LOWER RIGHT CORNER
/
1667 4513 JMS I S500
1670 4467 JMS I DPPR /DRUM UP; PEN RIGHT
1671 4422 JMS I CSTEP

```

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1672 5270 JMP , -2

```

/
/DRUM DOWN; PEN LEFT; PEN DOWN
/
1673 4474      JMS I PNDN      /PEN DOWN
1674 4501      JMS I S10
1675 4475      JMS I DNPL      /DRUM DOWN; PEN LEFT
1676 4422      JMS I CSTEP
1677 5275      JMP      ,-2
/
/PEN UP; MOVE TO UPPER RIGHT HAND CORNER
/
1700 4464      JMS I PNUP      /PEN UP
1701 4501      JMS I S10
1702 4476      JMS I PNRT      /PEN RIGHT
1703 4422      JMS I CSTEP
1704 5302      JMP      ,-2
/
/PEN DOWN; DRUM UP; PEN LEFT
/
1705 4474      JMS I PNDN      /PEN DOWN
1706 4501      JMS I S10
1707 4473      JMS I DPPL      /DRUM UP; PEN LEFT
1710 4422      JMS I CSTEP
1711 5307      JMP      ,-2
1712 4464      JMS I PNUP      /PEN UP
/
/PEN RIGHT TO MARGIN
/
1713 4501      JMS I S10
1714 4476      JMS I PNRT      /PEN RIGHT
1715 4422      JMS I CSTEP
1716 5314      JMP      ,-2

```

```

/
/DRUM DOWN TO TOP OF SQUARE
/
1717 4501      JMS I S10
1720 4470      JMS I DRDN      /DRUM DOWN
1721 4422      JMS I CSTEP
1722 5320      JMP I , -2
1723 5724      JMP I , +1
1724 2000      LSR
/
/

```

2000		*2000	
		/	
2000	4500	LSUR,	JMS I S2
2001	4477		JMS I PNLT
2002	4422		JMS I CSTEP
2003	5201		JMP , -2
		/	
2004	137		TAD K7716
2005	3020		DCA CNTA
2006	4474	WRIT,	JMS I PNDN
2007	4240		JMS RTPN
2010	4246		JMS DUDR
2011	4464		JMS I PNUP
2012	4246		JMS DUDR
2013	4254		JMS LTPN
2014	4474		JMS I PNDN
2015	4262		JMS DNDR
2016	4254		JMS LTPN
2017	4464		JMS I PNUP
2020	4254		JMS LTPN
2021	4246		JMS DUDR
2022	2020		IS CNTA
2023	5206		JMP WRIT
2024	4240		JMS RTPN
2025	7604		LAS
2026	7004		RAL
2027	7710		SPA CLA
2030	5637		JMP I RT19
2031	4501		JMS I S10
2032	4470		JMS I DRDN
2033	4422		JMS I CSTEP
2034	5232		JMP , -2
2035	5636		JMP I , +1
2036	0614		T16

/PEN LEFT ,2 INCH

/_25

/PEN DOWN

/PEN RIGHT ,2 INCH

/DRUM UP ,2 INCH

/PEN UP

/DRUM UP ,2 INCH

/PEN LEFT ,2 INCH

/PEN DOWN

/DRUM DOWN ,2 INCH

/PEN LEFT ,2 INCH

/PEN UP

/PEN LEFT ,2 INCH

/DRUM UP ,2 INCH

/DONE WHEN SKIP

/RETRACE

/DRUM DOWN

2037	1447	/		
		RT19,	R19	
2040	0000	/		
2041	4500	RTPN,	0	
2042	4476		JMS I S2	
2043	4422		JMS I PNRT	/PEN RIGHT
2044	5242		JMS I CSTEP	
2045	5640		JMP , -2	
			JMP I RTPN	
2046	0000	/		
2047	4500	DUUR,	0	
2050	4466		JMS I S2	
2051	4422		JMS I DRUU	/DRUM UP
2052	5250		JMS I CSTEP	
2053	5646		JMP , -2	
			JMP I DUUR	
2054	0000	/		
2055	4500	LTPN,	0	
2056	4477		JMS I S2	
2057	4422		JMS I PNLT	/PEN LEFT
2060	5256		JMS I CSTEP	
2061	5654		JMP , -2	
			JMP I LTPN	
2062	0000	/		
2063	4500	DNUR,	0	
2064	4470		JMS I S2	
2065	4422		JMS I DRUN	/DRUM DOWN
2066	5264		JMS I CSTEP	
2067	5662		JMP , -2	
			JMP I DNUR	

```

/
/TEST T19A, CONCENTRIC SQUARES FOR 31 INCH PLOTTER
/
/PEN UP; DRUM DOWN FOR 20 INCHES
/
2070 4464 T19A, JMS I PNUP /PEN UP
2071 1050 TAD K7776
2072 3020 DCA CNTA
2073 4501 JMS I S10
2074 4470 JMS I DRDN /DRUM DOWN 20 INCHES
2075 4422 JMS I CSTEP
2076 5274 JMP , -2
2077 2020 ISZ CNTA
2100 5273 JMP T19A+3
/
/BEGIN 28 INCH SQUARE
/
2101 1041 R19A, TAD K7764
2102 3020 DCA CNTA
2103 4510 JMS I S200
2104 4477 JMS I PNLT /PEN LEFT 30 INCHES
2105 4422 JMS I CSTEP
/
2106 5304 JMP , -2
2107 2020 ISZ CNTA
2110 5303 JMP , -5
2111 4503 JMS I S50
2112 4476 JMS I PNRT /PEN RIGHT
2113 4422 JMS I CSTEP
2114 5312 JMP , -2
2115 5716 JMP I , +1
2116 2200 CP19
/

```

2200	2200		
2200	046	CP 19,	TAD K7774
2201	4276		JMS DDN
2202	1046		TAD K7774
2203	4320		JMS PRT
		/	/DRUM DOWN 14 INCHES
		/MAKE A DUT	/PEN RIGHT 14 INCHES
		/	
2204	4474		JMS I PNDN
2205	4464		/PEN DOWN
2206	1046		JMS I PNUP
2207	4307		/PEN UP
2210	4474		TAD K7774
2211	1046		JMS DDU
2212	4320		/DRUM UP 14 INCHES
2213	1043		JMS I PNDN
2214	4276		/PEN DOWN
2215	1043		TAD K7774
2216	4331		JMS PRT
2217	1043		/PEN RIGHT 14 INCHES
2220	4307		TAD K7770
2221	046		JMS DDN
2222	4320		/DRUM DOWN 28 INCHES
2223	4464		TAD K7770
2224	1046		JMS PLT
2225	4276		/PEN LEFT 28 INCHES
			TAD K7770
2226	4474		JMS DDU
2227	4464		/DRUM UP 28 INCHES
			TAD K7774
			JMS PRT
			/PEN RIGHT 14 INCHES
			JMS I PNUP
			/PEN UP
			TAD K7774
			JMS DDN
			/DRUM DOWN 14 INCHES
		/	
		JMS I PNDN	/PEN DOWN
		JMS I PNUP	/PEN UP
		/	
		/MAKE 2ND SQUARE	
		/	
2230	1050		TAD K7776
2231	4307		JMS DDU
2232	4474		/DRUM UP 7 INCHES
2233	1050		JMS I PNDN
2234	4331		/PEN DOWN
2235	1046		TAD K7776
2236	4276		JMS PLT
2237	1046		/PEN LEFT 7 INCHES
2240	4320		TAD K7774
2241	1046		JMS DDN
2242	4307		/DRUM DOWN 14 INCHES
2243	1050		TAD K7774
2244	4331		JMS PRT
2245	4464		/PEN RIGHT 14 INCHES
2246	1050		TAD K7774
2247	4276		JMS DDU
2250	4474		/DRUM UP 14 INCHES
2251	4464		TAD K7776
			JMS PLT
			/PEN LEFT 7 INCHES
			JMS I PNUP
			/PEN UP
			TAD K7776
			JMS DDN
			/DRUM DOWN 7 INCHES
			JMS I PNDN
			/PEN DOWN
			JMS I PNUP
			/PEN UP

/MAKE THE CENTER SQUARE
/

2252	7240	CLA CMA	
2253	4307	JMS DDU	/DRUM UP 3,5 INCHES
2254	4474	JMS I PNDN	/PEN DOWN
2255	7040	CMA	
2256	4320	JMS PRT	/PEN RIGHT 3,5 INCHES
2257	1050	TAD K7776	
2260	4276	JMS DDN	/DRUM DOWN 7 INCHES
2261	1050	TAD K7776	
2262	4331	JMS PLT	/PEN LEFT 7 INCHES
2263	1050	TAD K7776	
2264	4307	JMS DD	/DRUM UP 7 INCHES
2265	7040	CMA U	
2266	4320	JMS PRT	/PEN RIGHT 3,5 INCHES
2267	4464	JMS I PNUP	/PEN UP
2270	7040	CMA	
2271	4276	JMS DDN	/DRUM DOWN 3,5 INCHES
2272	4474	JMS I PNDN	/PEN DOWN
2273	4464	JMS I PNUP	/PEN UP
2274	5675	JMP I ,+1	/DRAW DIAGONALS
2275	2400	D19A	

2276	0000	/	
2277	3020	DDN,	0
2300	4511	DCA CNTA	
2301	4470	JMS I S3D0	
2302	4422	JMS I DRDN	/DRUM DOWN
2303	5301	JMS I CSTEP	
2304	2020	JMP ,+2	
2305	5300	ISZ CNTA	
2306	5676	JMP ,+5	
		JMP I DDN	/EXIT

2307	0000	DDU,	0	
2310	3020		DCA CNTA	
2311	4511		JMS I S300	
2312	4466		JMS I DRUU	/DRUM UP
2313	4422		JMS I CSTEP	
2314	5312		JMP ,=2	
2315	2020		ISZ CNTA	
2316	5311		JMP ,=5	
2317	5707		JMP I DDU	/EXIT
		/		
2320	0000	PRI,	0	
2321	3020		DCA CNTA	
2322	4511		JMS I S300	
2323	4476		JMS I PNR	/PEN RIGHT
2324	4422		JMS I CSTEP	
2325	5323		JMP ,=2	
2326	2020		ISZ CNTA	
2327	5322		JMP ,=5	
2330	5720		JMP I PRT	/EXIT
		/		
2331	0000	PLI,	0	
2332	3020		DCA CNTA	
2333	4511		JMS I S300	
2334	4477		JMS I PNL	/PEN LEFT
2335	4422		JMS I CSTEP	
2336	5334		JMP ,=2	
2337	2020		ISZ CNTA	
2340	5333		JMP ,=5	
2341	5731		JMP I PLT	/EXIT

```

/
2400 *2400
/
/DRAW DIAGONALS
/
019A, JMS I S1300
      JMS I DPPR /DRUM UP; PEN RIGHT
2402 4422 JMS I CSTEP
2403 5201 JMP , -2
2404 4474 JMS I PNDN /PEN DOWN
2405 1050 TAD K7776
2406 3020 DCA CNTA
2407 4517 JMS I S1300
2410 4475 JMS I DNPL /DRUM DOWN; PEN LEFT
2411 4422 JMS I CSTEP
2412 5210 JMP , -2
2413 2020 ISZ CNTA
2414 5207 JMP , -5
2415 1043 TAD K7776
2416 3020 DCA CNTA
2417 4511 JMS I S320
2420 4476 JMS I PNRT /PEN RIGHT 28 INCHES
2421 4422 JMS I CSTEP
2422 5220 JMP , -2
2423 2020 ISZ CNTA
2424 5217 JMP , -5

/
2425 1050 TAD K7776
2426 3020 DCA CNTA
2427 4517 JMS I S1300
2430 4473 JMS I DPPL /DRUM UP; PEN LEFT
2431 4422 JMS I CSTEP
2432 5230 JMP , -2
2433 2020 ISZ CNTA
2434 5227 JMP , -5

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/
/PEN RIGHT TO MARGIN
/
2435 1043      TAD K7770
2436 4464      JMS I PNUP      /PEN UP
2437 4714      JMS I PRIT      /PEN RIGHT 28 INCHES
/
/DRUM DOWN TO TOP OF SQUARE
/
2440 1043      TAD K7770
2441 4707      JMS I PDUN      /DRUM DOWN 28 INCHES
/
2442 4500      JMS I S2
2443 4477      JMS I PNLT      /PEN LEFT ,2 INCH
2444 4422      JMS I CSTEP
2445 5243      JMP ,=2
2446 1036      TAD K7713      /-53 DECIMAL
2447 3020      DCA CNTA
2450 4474      BRIT, JMS I PDUN      /PEN DOWN
                JMS I XPRT      /PEN RIGHT ,2 INCH
2451 4710      JMS I XDUD      /DRUM UP ,2 INCH
2452 4711      JMS I PNUP      /PEN UP
2453 4464      JMS I XDUD      /DRUM UP ,2 INCH
2454 4711      JMS I XDUD      /DRUM UP ,2 INCH
2455 4712      JMS I XLT      /PEN LEFT ,2 INCH
2456 4474      JMS I PDUN      /PEN DOWN
2457 4713      JMS I XUN      /DRUM DOWN ,2 INCH
2460 4712      JMS I XLT      /PEN LEFT ,2 INCH
2461 4464      JMS I PNUP      /PEN UP
2462 4712      JMS I XLT      /PEN LEFT ,2 INCH
2463 4711      JMS I XDUD      /DRUM UP ,2 INCH

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2464	2020	ISZ CNTA	/DONE WHEN SKIP
2465	5250	JMP BRIT	
2466	4464	JMS I PNUP	/PEN UP
2467	1045	TAD K777J	
2470	4521	JMS I XPLT	/PEN LEFT 17,5 INCHES
2471	1045	TAD K777J	
2472	4455	JMS I PDUU	/DRUM P 17,5 INCHES
2473	4713	JMS I XDNV	/BACK DOWN .1 INCH
2474	4710	JMS I XPRT	
2475	4710	JMS I XPRT	
2476	7604	LAS	
2477	7004	RAL	
2500	7710	SPA CLA	
2501	5706	JMP I DT19	/RETRACE
2502	1043	TAD K7770	
2503	4707	JMS I PUDN	
2504	5705	JMP I ,+1	
2505	0614	T16	/RERUN
/			
2506	2200	DT 9,	CP 9
2507	2276	PUDN,	DDN
2510	2040	XPRT,	RTPN
2511	2046	XDUU,	DUUR
2512	2054	XLT,	LTPN
2513	2062	XDN,	DNDR
2514	2320	PRIT,	PRT
/			
2515	0000	RYTE,	0
2516	4476	JMS I PNRT	/PEN RIGHT TENTH INCH
2517	4476	JMS I PNRT	
2520	4476	JMS I PNRT	
2521	4476	JMS I PNRT	
2522	4476	JMS I PNRT	
2523	5715	JMP I RYTE	

	2600	/		
		*2600		
2600	0000	/		
2601	7200	C2,	0	
2602	1123		CLA	
2603	3060		TAD INTN	/,1 INCH
2604	5600		DCA SCNT	
			JMP I C2	
		/		
2605	0000	C20,	0	
2606	7200		CLA	
2607	1124		TAD ORTH	/,25 INCH
2610	3060		DCA SCNT	
2611	5605		JMP I C20	
		/		
2612	0000	C50,	0	
2613	0000		CLA	
2614	1126		TAD HALF	/,5 INCH
2615	3060		DCA SCNT	
2616	5612		JMP I C50	
		/		
2617	0000	C71,	0	
2620	0000		CLA	
2621	1125		TAD SYNT	/,71 INCH
2622	3060		DCA SCNT	
2623	5617		JMP I C71	
		/		
2624	0000	C100,	0	
2625	0000		CLA	
2626	1127		TAD ONE	/1 INCH
2627	3060		DCA SCNT	
2630	5624		JMP I C100	
		/		
2631	0000	C175,	0	
2632	0000		CLA	
2633	1130		TAD ORTS	/1,75 INCH
2634	3060		DCA SCNT	
2635	5631		JMP I C175	
		/		
2636	0000	C177,	0	
2637	0000		CLA	
2640	1131		TAD SYNTY	
2641	3060		DCA SCNT	
2642	5636		JMP I C177	
		/		
2643	0000	C200,	0	
2644	0000		CLA	
2645	1132		TAD TWFY	/2,5 INCHES
2646	3060		DCA SCNT	
2647	5643		JMP I C200	
		/		
2650	0000	C300,	0	
2651	0000		CLA	
2652	1133		TAD THFY	/3,5 INCHES

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2653 3060
2654 5650

DCA SCNT
JMP I C3D0

/

2655	0000	C425,	0	
2656	7200		CLA	
2657	1134		TAD FQRT	/4,25 INCHES
2658	3060		DCA SCNT	
2659	5655		JMP I C425	
/				
2662	0000	C500,	0	
2663	7200		CLA	
2664	1135		TAD FVH	/5 INCHES
2665	3060		DCA SCNT	
2666	5662		JMP I C500	
/				
2667	0000	C604,	0	
2670	7200		CLA	
2671	1136		TAD SIX4	/6 INCHES
2672	3060		DCA SCNT	
2673	5667		JMP I C604	
/				
2674	0000	C600,	0	
2675	7200		CLA	
2676	1137		TAD SIXH	/6 INCHES
2677	3060		DCA SCNT	
2678	5674		JMP I C600	
/				
2701	0000	C10,	0	
2702	7200		CLA	
2703	1140		TAD TE	/10 INCHES
2704	3060		DCA CN	
2705	5701		JMP I C10	
/				
2706	0000	C1300,	0	
2707	7200		CLA	
2710	1141		TAD THRT	/19,6 INCHES
2711	3060		DCA SCNT	
2712	5706		JMP I C1300	
/				
/CHECK FOR 5 OR 10 MIL STEPS				
/				
2713	0000	FORTN,	0	
2714	7604		LAS	
2715	0027		AND 0100	
2716	7650		CLA	/SKI = 5 MIL
2717	5334		JMP TNML	/10 MIL
2720	1122		TAD CNTS	/POINTER
2721	3010		DCA 10	
2722	1347		TAD NUMS	/POINTER
2723	3011		DCA 11	
2724	1367		TAD K7761	/-15 DECIMAL
2725	3020		DCA CNTA	

2A.10	V134	18-APR-69	16126	PAGE 39
2726	1411	CNVT,	TAD I 11	/GET A NUMBER
2727	7104		CLL RAL	/MULTIPLY BY 2
2730	3410		DCA I 10	
2731	2020		ISZ CNTA	
2732	5326		JMP CNVT	
2733	5713		JMP I FORTN	/EXIT
/				
2734	1122	TNML,	TAD CNTS	
2735	3010		DCA 10	
2736	1347		TAD NUMS	
2737	3011		DCA 11	
2740	1367		TAD K7761	
2741	3020		DCA CNTA	
2742	1411		TAD I 11	
2743	3410		DCA I 10	
2744	2020		ISZ CNTA	
2745	5342		JMP , -3	
2746	5713		JMP I FORTN	/EXIT
/				
2747	2747	NUMS,	,	
2750	7766		7766	/-10
2751	7747		7747	/-25
2752	7671		7671	/-71
2753	7716		7716	/-50
2754	7634		7634	/-100
2755	7521		7521	/-175
2756	7525		7525	/-171
2757	7406		7406	/-250
2760	7242		7242	/-350
2761	7127		7127	/-425
2762	7014		7014	/-500
2763	6650		6650	/-600
2764	6650		6650	/-600
2765	6030		6030	/-1000
2766	5210		5210	/-1392
2767	7761	K7761,	7761	/

```

/
3000 *3000
/
/DASH SUBROUTINE
/
RECT, 0
3000 0000 DCA CNTA
3001 3020 JMS DASH
3002 4212 ISZ CNTA
3003 2020 SXP
3004 7410 JMP I RECT /EXIT
3005 5600 JMS SPC
3006 4221 ISZ CNTA
3007 2020 JMP RECT+2
3010 5202 JMP I RECT
3011 5600
/
DASH, 0
3012 0000 JMS I PNUN /PEN DOWN
3013 4474 JMS I S100
3014 4505 JMS I PNMV /PEN LEFT OR RIGHT
3015 4456 JMS I CSTEP
3016 4422 JMP I-2
3017 5215 JMP I DASH /EXIT
3020 5612
/
/
SPC, 0
3021 0000 JMS I PNUP /PEN UP
3022 4464 JMS I S100
3023 4505 JMS I PNMV /PEN LEFT OR RIGHT
3024 4456 JMS I CSTEP
3025 4422 JMP I-2
3026 5224 JMP I SPC /EXIT
3027 5621
/
/
STEP, 0
3030 0000 LAS
3031 7604 SPA CLA /CHECK FOR HALT
3032 7710 HLT /PRESS CONT TO GO ON
3033 7402 CLA
3034 7200 ISZ SCNT /STEP COUNTER
3035 2060 JMP I STEP
3036 5630 ISZ STEP
3037 2230 JMP I STEP /EXIT
3040 5630

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```

/ MOVE ROUTINES
/
/ DRUM DOWN
/
3041 0000 DRMDN, 0
3042 6001 ION /PI ON
3043 6514 PLDD /DRUM DOWN
3044 5244 E21, JMP
3045 5641 JMP I DRMDN
/
/ DRUM UP
/
3046 0000 DRMDU, 0
3047 6001 ION /PI ON
3050 6512 PLDU /DRUM UP
3051 5251 E22, JMP
3052 5646 JMP I DRMDU
/
/ PEN LEFT
/
3053 0000 PNLFT, 0
3054 6001 ION /PI ON
3055 6521 PLPL /PEN LEFT
3056 5256 E23, JMP
3057 5653 JMP I PNLFT
/
/ PEN RIGHT
/
3060 0000 PNRTL, 0
3061 6001 ION /PI ON
3062 6511 PLPR /PEN RIGHT
3063 5263 E24, JMP
3064 5660 JMP I PNRTL
/
/ PEN DOWN
/
3065 0000 PNDWN, 0
3066 6001 ION /PI ON
3067 6524 PLPD /PEN DOWN
3070 5270 E25, JMP
3071 5665 JMP I PNDWN
/
/ PEN UP
/
3072 0000 PENUP, 0
3073 6001 ION /PI ON
3074 6504 PLPU /PEN UP
3075 5275 E26, JMP
3076 5672 JMP I PENUP
/
/ DRUM LEFT
/
3077 0000 DMUPL, 0
3100 6001 ION /PI ON
3101 6514 PLDD /DRUM DOWN
3102 6521 PLPL /PEN LEFT

```

3103	5303	E2/,	JMP ,	
3104	5677	/	JMP I DMUPL	
3105		DMUPL,	Ø	
3106	ØØØØ		ION	/PI ON
3107	6523		DUPL	/DRUM UP; PEN LEFT
3110	531Ø	E2Ø,	JMP ,	
3111	5705	/	JMP I DMUPL	
3112	ØØØØ	DMUPR,	Ø	
3113	6ØØ1		ION	/PI ON
3114	6515		DUPR	/DRUM DOWN; PEN RIGHT
3115	5315	E2Ø,	JMP ,	
3116	5712		JMP I DMUPR	
3117	ØØØØ	/	DMUPR,	Ø
3120	6ØØ1		ION	/PI ON
3121	6513		DUPR	/DRUM UP; PEN RIGHT
3122	5322	E3Ø,	JMP ,	
3123	5717		JMP I DMUPR	

```

/
3200 *3200
/
/PROGRAM INTERRUPT SERVICE
/
3200 3061 PISVC, DCA SVAC /SAVE AC
3201 6036 KRB /CLEAR KEYBOARD
3202 6501 PLSF /CHECK PLOTTER FLAG
3203 5206 JMP ,+3
3204 6502 PLCF /CLEAR FLAG
3205 2000 ISZ 0 /RETURN +1
3206 7200 CLA
3207 1061 TAD SVAC /RESTORE AC
3210 6001 ION /PI ON
3211 5400 JMP I 0 /EXIT
/
/CHECK FOR 12 OR 31 INCH PLOTTER
/
3212 0000 C1231, 0
3213 7604 LAS
3214 0030 AND K0400 /MASK BIT 3
3215 7640 SZA CLA /NO SKIP = 31 INCH
3216 5612 JMP I C1231 /EXIT
3217 2212 ISZ C1231
3220 5612 JMP I C1231 /EXIT TO 12 INCH
/
3221 7604 CYCLE, LAS
3222 7010 RAR
3223 7620 SNA C A /SKIP IF 8
3224 5630 JMP I ,+4 /PDP-8 OR BI
3225 1035 TAD K7630
3226 3033 DCA K7621
3227 5630 JMP I ,+1
3230 0201 T1
/
$

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PAL13	V134	18-APR-69	16126	PAGE 43-1		
HRIT	2450	DNDR	2002	JM3	0026	PF18 1365
C10	2701	DNPL	0075	JM4	1261	PISVC 3200
C100	2624	DNPR	0071	JM5	1262	PLCF 6502
C1231	3212	DPPL	0073	JM6	1263	PLDU 6514
C1300	2706	DPPR	0067	JM7	1353	PLDU 6512
C175	2631	DRDN	0070	K0100	0027	PLDT 0611
C177	2636	DRDU	0066	K0400	0030	PLPD 6524
C2	2600	DRMUN	3041	K7470	0031	PLPL 6521
C25	2605	DRMDU	3046	K7526	0032	PLPR 6511
C250	2643	DT19	2506	K7621	0033	PLPU 6504
C350	2650	DUDR	2046	K7623	0034	PLSF 6501
C425	2655	DUPL	6523	K7630	0035	PLT 2331
C50	2612	DUPR	6513	K7713	0036	PLUD 6522
C500	2662	E1	0203	K7716	0037	PNDN 0074
C600	2674	E10	0330	K7743	0040	PNDWN 3065
C604	2667	E11	0416	K7761	2767	PNLFT 3053
C71	2617	E12	0420	K7764	0041	PNLT 0077
CD1	1127	E13	0436	K7765	0042	PNMV 0056
CD2	1133	E14	0440	K7770	0043	PNRT 0076
CD3	1140	E15	0456	K7772	0044	PNRTE 3060
CD4	1144	E16	0460	K7773	0045	PNUP 0064
CD5	1150	E17	0476	K7774	0046	PRECT 0057
CD6	1154	E18	0500	K7775	0047	PRIT 2514
CD7	1160	E19	0516	K7776	0050	PRT 2320
CD8	1164	E2	0221	KE5	0051	PT1 1264
CD9	1170	E20	0520	KT7	0052	PT2 1265
CNTA	0020	E21	3044	L31	1400	PT3 1266
CNTB	0021	E22	3051	LEFT	0072	PT4 1267
CNTS	0122	E23	3056	LF31	1366	PT5 1270
CNVT	2726	E24	3063	LLFT	1200	PT6 1271
CP19	2200	E25	3070	LSQR	2000	PT7 1272
CS3	1600	E26	3075	LTPN	2054	PT8 1273
CSTE3	0022	E27	3103	MVLFY	0053	PT9 1274
CT1	1026	E28	3110	NUMS	2747	QRTT 0124
CT2	1033	E29	3115	OCT12	1025	QRTS 0130
CT3	1037	E30	3122	OCT31	1234	R16A 0671
CT4	1043	E4	0231	ONE	0127	R19 1447
CT5	1047	E5	0245	P17A	1075	R19A 2101
CT6	1053	E5A	0247	P19A	0054	RECT 3000
CT7	1057	E6	0263	PC1	1354	RITE 0065
CT8	1063	E7	0275	PC12	1275	RT16 0637
CT9	1067	E8	0306	PC2	1355	RT17 1010
CYCLE	3221	E9	0316	PC3	1356	RT19 2037
J19A	2400	F18	1126	PC4	1357	RIPN 2040
JASH	3012	F18A	1326	PC5	1360	RYTE 2515
JUN	2276	FORTN	2713	PC6	1361	S10 0101
JUPR	6515	FQRT	0134	PC7	1362	S100 0105
JUJ	2307	FVH	0135	PC8	1363	S1231 0116
JMJP	3077	FVTN	0023	PC9	1364	S1300 0117
JMJP2	3112	HALF	0126	PUDN	2507	S175 0106
JMJP3	3105	JM1	0024	PDDU	0055	S177 0107
JMJP4	3117	JM2	0025	PENUP	3072	S2 0100

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S25	0102	XLT	2512
S250	0110	XPLT	0121
S350	0111	XPNR	0142
S425	0112	XPRT	2510
S50	0103	XTIM	0063
S500	0113		
S600	0114		
S604	0115		
S71	0104		
SCVT	0060		
SIX4	0136		
SIXH	0137		
SPC	3021		
SR0	0522		
STEP	3030		
SVAC	0061		
SVC	0062		
SVNT	0125		
SVNTY	0131		
T1	0201		
T10	0320		
T11	0400		
T12	0422		
T13	0442		
T14	0462		
T15	0502		
T16	0614		
T16A	0661		
T17	1000		
T17A	1217		
T18	1076		
T18A	1276		
T19	1423		
T19A	2070		
T2	0205		
T4	0223		
T5	0233		
T6	0251		
T7	0265		
T8	0277		
T9	0310		
TEV	0140		
THFY	0133		
THRT	0141		
TIMER	0600		
TNML	2734		
TNTH	0123		
TWFY	0132		
WHICH	0120		
WRIT	2006		
XUV	2513		
XUJD	2511		

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ERRORS DETECTED: 0

LINKS GENERATED: 0

RUN-TIME: 35 SECONDS

OK CORE USED

