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IDENTIFICATION

PRODUCT CODE:	MAINDEC Ø8-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

TAG	MA	DESCRIPTION AND RECOVERY
E1	2Ø3	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 occured 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. Continueto repeat test T7.
E8	3Ø6	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.
E1Ø	33Ø	Flag set sooner than 55 MS after a PLPD. Continue to repeat test T1Ø.
E11	416	Flag set sooner than 3.5 MS after a PLPR. Continue to repeat test T11.
E12	42Ø	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.

TAG	MA	DESCRIPTION AND RECOVERY
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.

TAG	MA	COMMAND
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

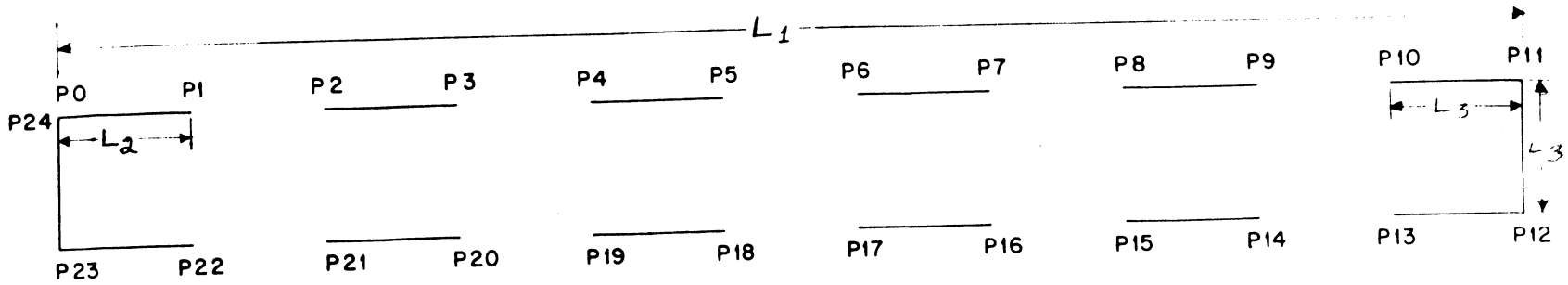
The PDP-8 Calcomp Plotter Diagnostic runs a series of timing tests at the beginning of the program which may be looped using a switch register option. At the completion of the timing tests the three figures, illustrated in para. 1Ø, are drawn. The octagons or concentric squares may be retraced using 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 1Ø.

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



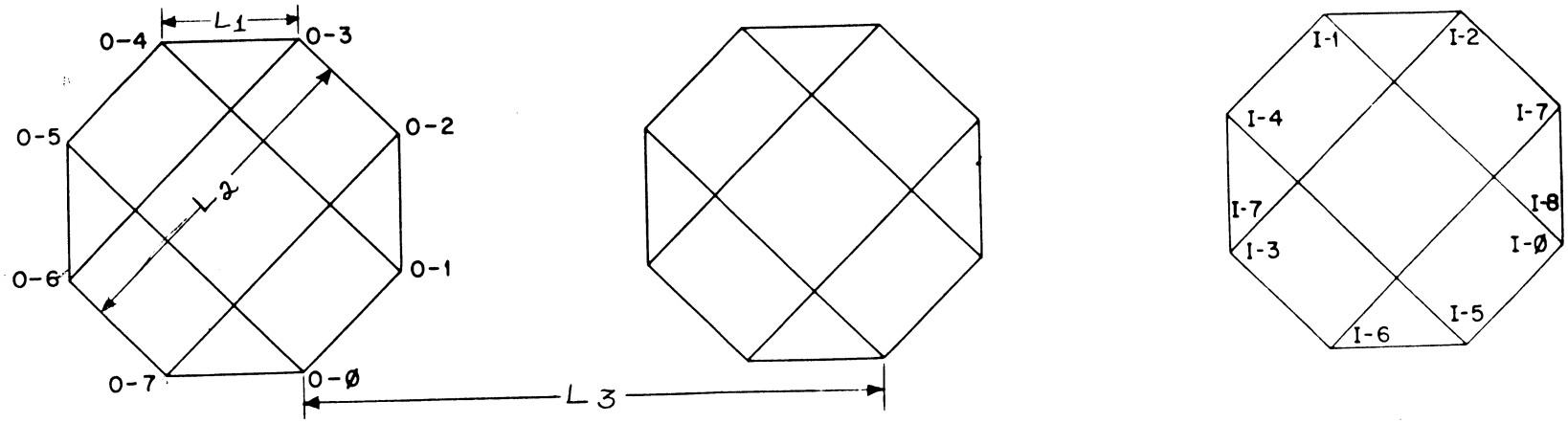
Drawing 1 - The spaces and dashes were plotted in the order of PO-P24.

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



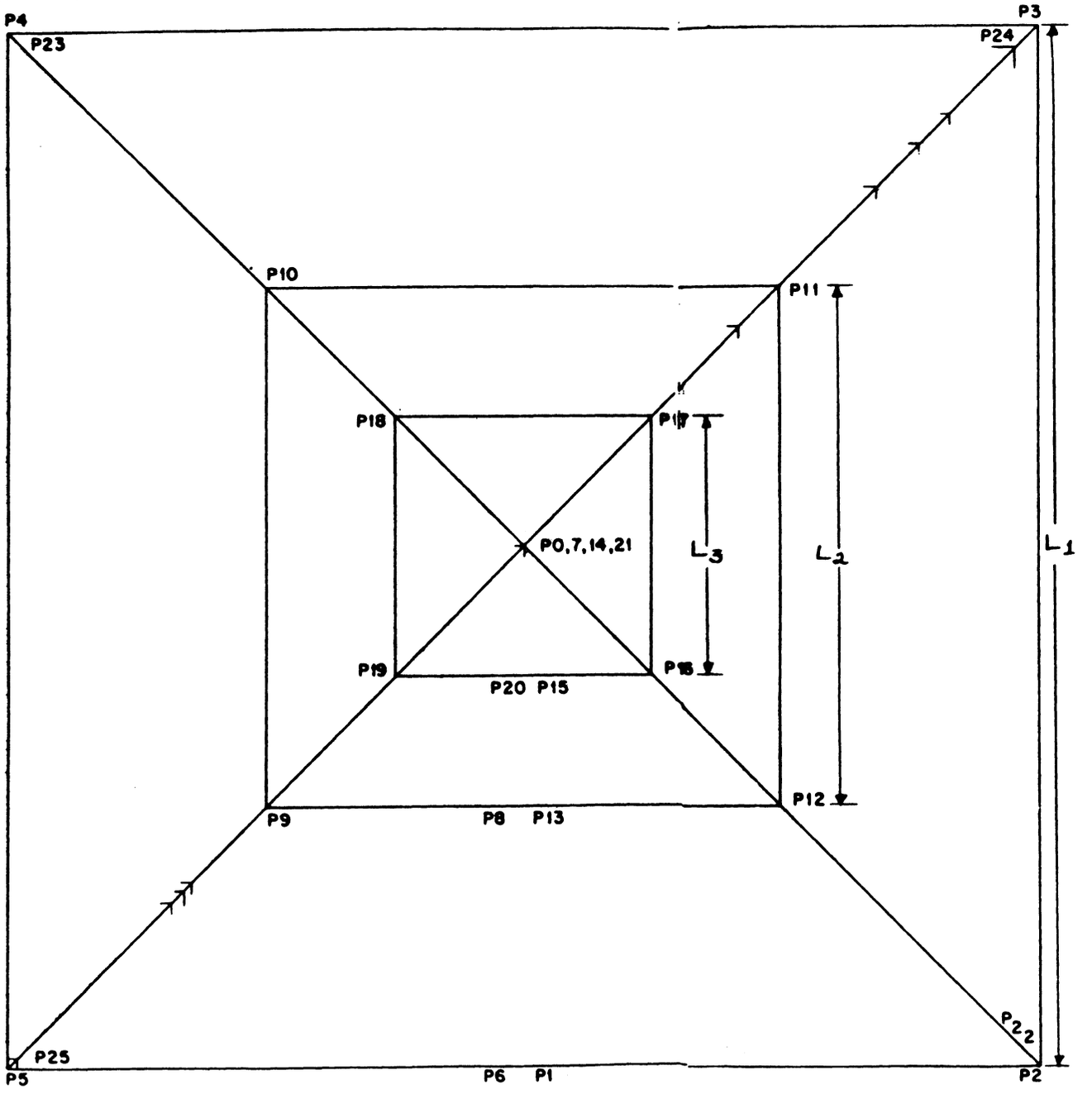
Drawing 2 - The 3 intersected octagons are plotted in the following manner:

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 overlayed

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.

```
                /PDP-8 CALCOMP 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            PLPR=6511                       /PEN RIGHT
6512            PLDU=6512                       /DRUM UP
6513            DUPR=6513                       /DRUM UP; PEN RIGHT
6514            PLDD=6514                       /DRUM DOWN
6515            DDPR=6515                       /DRUM DOWN; PEN RIGHT
6521            PLPL=6521                       /PEN LEFT
6522            PLDU=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
```

```
                        /
                        /CONSTANTS AND STORAGE REGISTERS
                        /
        0020            *20
                        /
0020    0000    CNTA,   0
0021    0000    CNTB,   0
0022    3030    CSTEP,  STEP
0023    2713    FVTN,   FORTN
0024    5451    JM1,    JMP I KE2
0025    5452    JM2,    JMP I KT/
0026    5462    JM3,    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    KE2,    E5-3
0052    0265    KT/     T7
0053    1200    MVLFT,  LEFT
0054    2070    P19A,   T19A
0055    2307    PDDU,   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           /PEN UP
0065    3060    RITE,   PNRTE           /PEN RIGHT
0066    3046    DRUU,   DRMDU           /DRUM UP
0067    3117    DPPR,   DMUPR           /DRUM UP; PEN RIGHT
0070    3041    DRUN,   DRMDN           /DRUM DOWN
0071    3112    DNPR,   DMDPR           /DRUM DOWN;PEN RIGHT
0072    3053    LEFT,   PNLFT           /PEN LEFT
0073    3105    DPPL,   DMUPL           /DRUM UP; PEN LEFT
0074    3065    PNDN,   PNDWN           /PEN DOWN
0075    3077    DNPL,   DMDPL           /DRUM DOWN; PEN LEFT
0076    3060    PNRT,   PNRTE           /PEN RIGHT
0077    3053    PNLT    PNLFT           /PEN LEFT
0100    2600    S2,     C2
0101    2701    S10,    C10
```

```
0102  2605    S25,    C25
0103  2612    S50,    C50
0104  2617    S71,    C/1
0105  2624    S100,   C100
0106  2631    S175,   C175
```

```
0107  2636    S177,   C177
0110  2643    S250,   C250
0111  2650    S350,   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    CNTS,
0123  0000    TNTH,   0
0124  0000    QRTR,   0
0125  0000    SVNT,   0
0126  0000    HALF,   0
0127  0000    ONE,    0
0130  0000    QRTS,   0
0131  0000    SVNTY,  0
0132  0000    TWNTY,  0
0133  0000    THRTY,  0
0134  0000    FQRT,   0
0135  0000    FVH,    0
0136  0000    SIX4,   0
0137  0000    SIXH,   0
0140  0000    TEN,    0
0141  0000    THRT,   0
0142  2515    XPNR,   RYTE
                /
```

```
                    /
          0200      *200
                    /
                    /TEST T1, PLOTTER FLAG SHOULD BE CLEAR,
                    /
0200  5520                  JMP I WHICH
0201  6501          T1,     PLSF                /SHOULDN'T SKIP
0202  5205                  JMP T2              /OK
0203  7402          E1,     HLT                 /ERROR, PLSF SKIPPED, FLAG
                                                /SHOULD HAVE BEEN CLEARED
                                                /BY INITIALIZE,
0204  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,
                    /
0205  1031          T2,     TAD K7470           /100 MS CONSTANT
0206  6504                  PLPU                /PEN UP
0207  4463                  JMS I XTIM          /WAIT 100 MS
0210  6501                  PLSF                /SHOULD SKIP
0211  7410                  SKP                 /TRY ANOTHER IOT
0212  5223                  JMP T4              /NEXT TEST
0213  1031                  TAD K7470           /100 MS CONSTANT
0214  6514                  PLDD                /DRUM DOWN
0215  4463                  JMS I XTIM          /WAIT 100 MS
0216  6501                  PLSF                /MAY NOW BE SET
0217  7410                  SKP                 /ERROR PATH
0220  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)
                    /CLEARS 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
0230  5233                  JMP T5              /NEXT TEST
0231  7402          E4,     HLT                 /ERROR, PLOTTER FLAG IS
                                                /STILL SET AFTER A PLCF
                                                /WAS ISSUED, PRESS CONT
0232  5223                  JMP T4              /TO REPEAT TEST,
```

```
                    /
                    /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 KE5-3
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 KT7
0254  3001          DCA 1
0255  6514          PLDD              /DRUM DOWN
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
                                      /INTERRUP 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 K7526         /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
                    /
```

```
0275  7402  E7,   HLT          /ERROR, FLAG NOT SET
                               /WITHIN 85 MS AFTER
                               /PLPU, PRESS CONT TO
0276  5265        JMP T7       /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          SKP
0305  5310          JMP T9            /NEXT TEST
                    /
0306  7402    E8,   HLT               /ERROR, FLAG DID NOT SET
                                      /WITHIN 85 MS AFTER
                                      /PLPD (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               /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,
```

```
                    *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 K7773           /2,5 MS CONSTANT
0412  4463          JMS I XTIM          /WAIT TOTAL OF 5,5 MS
0413  6501          PLSF                /SHOULD SKIP
0414  5220          JMP 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 K7773           /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              /DRUM 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 K7775         /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 K7775         /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
```

```
                    /
          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 TIMER+2       /RESTORE CNTA
  0610  5600                JMP I TIMER       /EXIT
                    /
  0611  0026       PLOT,   TAD JM3           /JM3 = JMP I SVC
  0612  3001                DCA 1             /PI RETURN JUMP
  0613  4423                JMS I FVTN        /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 K7775         /-5
  0616  3020               DCA CNTA
  0617  4505               JMS I S100        /SETUP 1 INCH COUNTER
  0620  4470               JMS I DRDN        /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.
                        /
0637  1065    RT16,     TAD RITE          /MOVE RIGHT ROUTINE
0640  3056              DCA PNMV          /SAVE ADDRESS
0641  1042              TAD K7765         /-11 DECIMAL
0642  4457              JMS I PRECT       /DRAW DASHES TO RIGHT
0643  4505              JMS I S100        /SETUP FOR 1 INCH
0644  4466              JMS I DRDU        /DRUM UP 1 INCH
0645  4422              JMS I CSTEP
0646  5244              JMP .-2
0647  1072              TAD LEF           /MOVE LEF ROUTINE
0650  3056              DCA PNMV          /SAVE ADDRESS
0651  1042              TAD K7765         /-11 DECIMAL
0652  4457              JMS I PRECT       /DRAW DASHES TO LEFT
0653  4505              JMS I S100        /SETUP FOR 1 INCH
0654  4470              JMS I DRDN        /DRUM DOWN 1 INCH
0655  4422              JMS I CSTEP
0656  5254              JMP .-2
0657  5660              JMP I .+1
0660  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,
                        /
0661  1047    T16A,     TAD K7775         /-3
0662  3020              DCA CNTA
0663  4501              JMS I S10         /SETUP FOR 10 INCHES
0664  4477              JMS I PNLT        /PEN LEFT 10 INCHES
0665  4422              JMS I CSTEP
0666  5264              JMP .-2
0667  2020              ISZ CNTA          /TOTAL OF 30 INCHES IF SKIP
0670  5263              JMP T16A+2        /MOVE ANOTHER 10
                        /
                        /DRAW 29,25 INCH DASHED RECTANGLE, READ COMMENTS ABOVE
                        /TEST T16 FOR 12 INCH PLOTTER,
                        /
0671  1065    R16A,     TAD RITE          /MOVE RIGHT ROUTINE
0672  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    T17,    JMS I PNUP      /PEN UP
1001    4505            JMS I S100      /SETUP FOR 1 INCH
1002    4470            JMS I DRUN      /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 P17A      /31 INCH
                /
                /BEGIN OCTAGON PLOT FOR 12 INCH
                /
0010    4225    RT17,   JMS OCT12       /PLOT 1ST OCTAGON
0011    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    0000    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
                /
0032    4474            JMS I PNDN      /PEN DOWN
1033    4504    CT2,    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
```

```
                    /
                    /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 DRUP      /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
```

```
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 DRDU       /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 S175
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 S71        /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            JMS I PNDN       /PEN DOWN
1140  4507    CD3,    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
```

```
                    /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  CD5,    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 DRUN      /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
                    /
```

```
                1200    *1200
                        /
                        /ROUTINE TO MOVE PEN TO NEXT OCTAGON
                        /
                        /PEN UP; DRUM UP 1 INCH
                        /
1200  0000      LLFT,   0
1201  4505              JMS I S100        /SET COUNT FOR 1 INCH
1202  4466              JMS I DRUU        /DRUM UP 1 INCH
1203  4422              JMS I CSTEP
1204  5202              JMP .-2
1205  4464              JMS I PNUP        /PEN UP
1206  4504              JMS I S71
1207  4473              JMS I DPPL        /DRUM UP; PEN LEFT
1210  4422              JMS I CSTEP
1211  5207              JMP .-2
                        /
                        /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              JMP I LLFT        /EXIT
                        /
                        /TEST T17A, DRAW 3 OCTAGONS FOR 31 INCH PLOTTER,
                        /
1217  4234      T17A,   JMS OCT31         /PLOT 1ST OCTAGON
1220  4512              JMS I S425        /SET COUNT FOR 4,25 INCHES
1221  4476              JMS I PNRT        /PEN RIGHT 4,25 INCHES
1222  4422              JMS I CSTEP
1223  5221              JMP .-2
1224  4675              JMS I PC12        /PLOT 2ND OCTAGON
1225  4512              JMS I S425
1226  4476              JMS I PNRT        /PEN RIGHT 4,25 INCHES
1227  4422              JMS I CSTEP
1230  5226              JMP .-2
1231  4675              JMS I PC12        /PLOT 3RD OCTAGON
1232  4464              JMS I PNUP        /PEN UP
1233  5276              JMP T18A          /FILL IN CENTERS
                        /
                        /31 INCH OCTAGON SUBROUTINE, THIS ROUTINE MODIFIES THE
                        /12 INCH OCTAGON ROUTINE TO DRAW LARGER OCTAGONS,
                        /
1234  0000      OC131,  0
1235  1261              TAD JM4           /JM4=JMS I S600
1236  3664              DCA I PT1
1237  1262              TAD JM5           /JM5=JMS I S250
1240  3665              DCA I PT2
1241  1263              TAD JM6           /JM6=JMS I S350
1242  3666              DCA I PT3
1243  1262              TAD JM5           /JM5=JMS I S250
1244  3667              DCA I PT4
```

```
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
```

```
1254  3673            DCA I PT8
1255  1263            TAD JM6         /JM6=JMS 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 DPPL
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
```

```
                    /
1326  0000  F18A,  0
1327  1262         TAD JM5          /JM5=JMS I S250
1330  3754         DCA I PC1
1331  1262         TAD JM5
1332  3755         DCA I PC2
1333  1353         TAD JM7          /JM7=JMS I S604
1334  3756         DCA I PC3
1335  1263         TAD JM6          /JM6=JMS I S350
1336  3757         DCA I PC4
1337  1353         TAD JM7
1340  3760         DCA I PC5
1341  1263         TAD JM6
1342  3761         DCA I PC6
1343  1353         TAD JM7
1344  3762         DCA I PC7
1345  1263         TAD JM6
1346  3763         DCA I PC8
1347  1353         TAD JM7
1350  3764         DCA I PC9
1351  4765         JMS I PF18       /DRAW DIAGONALS
1352  5726         JMP I F18A       /EXIT
                    /
1353  4515  JM7,   JMS I S604       /SET COUNT FOR 8.5 INCHES
1354  1127  PC1,   CD1
1355  1133  PC2,   CD2
1356  1140  PC3,   CD3
1357  1144  PC4,   CD4
1360  1150  PC5,   CD5
1361  1154  PC6,   CD6
1362  1160  PC7,   CD7
1363  1164  PC8,   CD8
1364  1170  PC9,   CD9
1365  1126  PF18,  F18
1366  1400  LF31,  L31
```

```
        1400    *1400
                /
                /MOVE PEN TO NEXT OCTAGON
                /
                /PEN UP; DRUM UP 3.5 INCHES
                /
  1400  0000    L31,    0
  1401  4511            JMS I S350      /SET COUNT FOR 3.5 INCHES
  1402  4466            JMS I DRUU      /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 S250
  1407  4473            JMS I DPPL
  1410  4422            JMS I CSTEP
  1411  5207            JMP .-2
                /
                /MOVE PEN 10.25 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 S25       /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)
                        /
1447  4513  R19,         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 PNDN        /PEN DOWN
1460  4464                  JMS I PNUP        /PEN UP
                    /
                    /DRUM UP HALF SQUARE
                    /
1461  4513                  JMS I S500
1462  4466                  JMS I DRDU        /DRUM UP
1463  4422                  JMS I CSTEP
1464  5262                  JMP   .-2
                    /
                    /PEN DOWN, PEN RIGHT HALF SIDE
                    /
1465  4474                  JMS I PNDN        /PEN DOWN
1466  4513                  JMS I S500
1467  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  4500                  JMS I S0
1503  4466                  JMS I DRDU        /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 DRDN        /DRUM DOWN
1515  4422                      JMS I CSTEP
1516  5314                      JMP   .-2
                        /
                        /PEN DOWN; PEN UP
                        /
1517  4474                      JMS I PNDN        /PEN DOWN
1520  4464                      JMS I PNUP        /PEN UP
                        /
                        /MAKE 2ND SQUARE
                        /
1521  4510                      JMS I S250
1522  4466                      JMS I DRUU        /DRUM UP
1523  4422                      JMS I CSTEP
1524  5322                      JMP   .-2
                        /
                        /PEN DOWN; PEN LEFT HALF SIDE
                        /
1525  4474                      JMS I PNDN        /PEN DOWN
1526  4510                      JMS I S250
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 DRDN        /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 DRUU        /DRUM UP
1544  4422                      JMS I CSTEP
1545  5343                      JMP   .-2
```

```
                        /
                        /PEN LEFT; MELT 1ST POINT
                        /
1546  4510              JMS I S200
1547  4477              JMS I PNLT        /PEN LEFT
1550  4422              JMS I CSTEP
1551  5347              JMP   ,-2
1552  5753              JMP I ,+1
1553  1600              CSW
                        /
      1600              *1600
                        /
                        /PEN UP; BACK TO CENTER
                        /
1600  4464              CSW,    JMS I PNUP        /PEN UP
1601  4510              JMS I S200
1602  4470              JMS I DRDN        /DRUM DOWN
1603  4422              JMS I CSTEP
1604  5202              JMP   ,-2
                        /
                        /MAKE A DOT
                        /
1605  4474              JMS I PNDN        /PEN DOWN
1606  4464              JMS I PNUP        /PEN UP
                        /
                        /MAKE THE CENTER SQUARE
                        /
1607  4505              JMS I S100
1610  4466              JMS I DRUU        /DRUM UP
1611  4422              JMS I CSTEP
1612  5210              JMP   ,-2
1613  4502              JMS I S25
1614  4466              JMS I DRUU        /DRUM UP
1615  4422              JMS I CSTEP
1616  5214              JMP   ,-2
                        /
                        /PEN RIGHT; HALF SIDE
                        /
1617  4474              JMS I PNDN        /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 S25
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
1660  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 PNDN        /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
```

```
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 S1Ø
1720  4470          JMS I DRUN        /DRUM DOWN
1721  4422          JMS I CSTEP
1722  5320          JMP .-2
1723  5724          JMP I .+1
1724  2000          LSQR
                    /
                    /
```

```
        2000    *2000
                /
2000    4500    LSQR,   JMS I S2
2001    4477            JMS I PNLT      /PEN LEFT ,2 INCH
2002    4422            JMS I CSTEP
2003    5201            JMP .-2
                /
2004    1437            TAD K7716       /-25
2005    3020            DCA CNTA
2006    4474    WRIT,   JMS I PNDN      /PEN DOWN
2007    4240            JMS RTPN        /PEN RIGHT ,2 INCH
2010    4246            JMS DUDR        /DRUM UP ,2 INCH
2011    4464            JMS I PNUP      /PEN UP
2012    4246            JMS DUDR        /DRUM UP ,2 INCH
2013    4254            JMS LTPN        /PEN LEFT ,2 INCH
2014    4474            JMS I PNDN      /PEN DOWN
2015    4262            JMS DNDR        /DRUM DOWN ,2 INCH
2016    4254            JMS LTPN        /PEN LEFT ,2 INCH
2017    4464            JMS I PNUP      /PEN UP
2020    4254            JMS LTPN        /PEN LEFT ,2 INCH
2021    4246            JMS DUDR        /DRUM UP ,2 INCH
2022    2020            ISZ CNTA        /DONE WHEN SKIP
2023    5206            JMP WRIT
2024    4240            JMS RTPN
2025    7604            LAS
2026    7004            RAL
2027    7710            SPA CLA
2030    5637            JMP I RT19      /RETRACE
2031    4501            JMS I S10
2032    4470            JMS I DRDN      /DRUM DOWN
2033    4422            JMS I CSTEP
2034    5232            JMP .-2
2035    5636            JMP I .+1
2036    0614            T16
```

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

```
                    /
                    /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 S250
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        /REN RIGHT
2113  4422          JMS I CSTEP
2114  5312          JMP .-2
2115  5716          JMP I .+1
2116  2200          CP19
                    /
```

```
                2200        *2200
                            /
2200  1046      CP19,       TAD K7774
2201  4276                  JMS DDN         /DRUM DOWN 14 INCHES
2202  1046                  TAD K7774
2203  4320                  JMS PRT         /PEN RIGHT 14 INCHES
                            /
                            /MAKE A DOT
                            /
2204  4474                  JMS I PNDN      /PEN DOWN
2205  4464                  JMS I PNUP      /PEN UP
2206  1046                  TAD K7774
2207  4307                  JMS DDU         /DRUM UP 14 INCHES
2210  4474                  JMS I PNDN      /PEN DOWN
2211  1046                  TAD K7774
2212  4320                  JMS PRT         /PEN RIGHT 14 INCHES
2213  1043                  TAD K7770
2214  4276                  JMS DDN         /DRUM DOWN 28 INCHES
2215  1043                  TAD K7770
2216  4331                  JMS PLT         /PEN LEFT 28 INCHES
2217  1043                  TAD K7770
2220  4307                  JMS DDU         /DRUM UP 28 INCHES
2221  1046                  TAD K7774
2222  4320                  JMS PRT         /PEN RIGHT 14 INCHES
2223  4464                  JMS I PNUP      /PEN UP
2224  1046                  TAD K7774
2225  4276                  JMS DDN         /DRUM DOWN 14 INCHES
                            /
2226  4474                  JMS I PNDN      /PEN DOWN
2227  4464                  JMS I PNUP      /PEN UP
                            /
                            /MAKE 2ND SQUARE
                            /
2230  1050                  TAD K7776
2231  4307                  JMS DDU         /DRUM UP 7 INCHES
2232  4474                  JMS I PNDN      /PEN DOWN
2233  1050                  TAD K7776
2234  4331                  JMS PLT         /PEN LEFT 7 INCHES
2235  1046                  TAD K7774
2236  4276                  JMS DDN         /DRUM DOWN 14 INCHES
2237  1046                  TAD K7774
2240  4320                  JMS PRT         /PEN RIGHT 14 INCHES
2241  1046                  TAD K7774
2242  4307                  JMS DDU         /DRUM UP 14 INCHES
2243  1050                  TAD K7776
2244  4331                  JMS PLT         /PEN LEFT 7 INCHES
2245  4464                  JMS I PNUP      /PEN UP
2246  1050                  TAD K7776
2247  4276                  JMS DDN         /DRUM DOWN 7 INCHES
2250  4474                  JMS I PNDN      /PEN DOWN
2251  4464                  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 DDU           /DRUM UP 7 INCHES
2265  7040          CMA
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    DDN,  0
2277  3020          DCA CNTA
2300  4511          JMS I S350
2301  4470          JMS I DRDN        /DRUM DOWN
2302  4422          JMS I CSTEP
2303  5301          JMP .-2
2304  2020          ISZ CNTA
2305  5300          JMP .-5
2306  5676          JMP I DDN         /EXIT
                    /
```

```
2307  0000  DDU,   0
2310  3020         DCA CNTA
2311  4511         JMS I S3D0
2312  4466         JMS I DRDU      /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  PRT,   0
2321  3020         DCA CNTA
2322  4511         JMS I S3D0
2323  4476         JMS I PNRT      /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  PLT,   0
2332  3020         DCA CNTA
2333  4511         JMS I S3D0
2334  4477         JMS I PNLT      /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
                    /
  2400    4517      D19A,   JMS I S1500
  2401    4467              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 S1500
  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 K7770
  2416    3020              DCA CNTA
  2417    4511              JMS I S3D0
  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 S1500
  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
```

```
                    /
                    /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 PDDN        /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 K7715         /-53 DECIMAL
2447  3020              DCA CNTA
2450  4474  BRIT,       JMS I PNDN        /PEN DOWN
2451  4710              JMS I XPRT        /PEN RIGHT ,2 INCH
2452  4711              JMS I XDUD        /DRUM UP ,2 INCH
2453  4464              JMS I PNUP        /PEN UP
2454  4711              JMS I XDUD        /DRUM UP ,2 INCH
2455  4712              JMS I XLT         /PEN LEFT ,2 INCH
2456  4474              JMS I PNDN        /PEN DOWN
2457  4713              JMS I XDN         /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
```

```
2464  2020            ISZ CNTA        /DONE WHEN SKIP
2465  5250            JMP BRIT
2466  4464            JMS I PNUP      /PEN UP
2467  1045            TAD K7773
2470  4521            JMS I XPLT      /PEN LEFT 17,5 INCHES
2471  1045            TAD K7773
2472  4455            JMS I PDU       /DRUM UP 17,5 INCHES
2473  4713            JMS I XDN       /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 PDDN
2504  5705            JMP I .+1
2505  0614            T16             /RERUN
                /
2506  2200    DT19,   CP 9
2507  2276    PDDN,   DDR
2510  2040    XPRT,   RTPN
2511  2046    XDUD,   DUDR
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      C2,       0
2601      7200                CLA
2602      1123                TAD TNTH                /.1 INCH
2603      3060                DCA SCNT          /
2604      5600                JMP I C2
                    /
2605      0000      C25,      0
2606      7200                CLA
2607      1124                TAD QRTR          /.25 INCH
2610      3060                DCA SCNT
2611      5605                JMP I C25
                    /
2612                C50,      0
2613      7200                CLA
2614      1126                TAD HALF          /.5 INCH
2615      3060                DCA SCNT
2616      5612                JMP I C50
                    /
2617                C71,      0
2620      7200                CLA
2621      1125                TAD SVNT          /.71 INCH
2622      3060                DCA SCNT
2623      5617                JMP I C71
                    /
2624                C100,     0
2625      7200                CLA
2626      1127                TAD ONE           /1 INCH
2627      3060                DCA SCNT
2630      5624                JMP I C100
                    /
2631                C175,     0
2632      7200                CLA
2633      1130                TAD QRTS          /1.75 INCH
2634      3060                DCA SCNT
2635      5631                JMP I C175
                    /
2636                C177,     0
2637      7200                CLA
2640      1131                TAD SVNTY
2641      3060                DCA SCNT
2642      5636                JMP I C177
                    /
2643                C250,     0
2644      7200                CLA
2645      1132                TAD TWFY          /2.5 INCHES
2646      3060                DCA SCNT
2647      5643                JMP I C250
                    /
2650      0000      C350,     0
2651      7200                CLA
2652      1133                TAD THFY          /3.5 INCHES
```

```
2653  3060          DCA SCNT
2654  5650          JMP I C350
/
```

```
2655  0000  C425,   0
2656  7200          CLA
2657  1134          TAD FQRT        /4,25 INCHES
2660  3060          DCA SCNT
2661  5655          JMP I C425
                    /
2662                C500,
2663  7200          CLA
2664  1135          TAD FVH         /5 INCHES
2665  3060          DCA SCNT
2666  5662          JMP I C500
                    /
2667                C604,
2670  7200          CLA
2671  1136          TAD SIX4        /6 INCHES
2672  3060          DCA SCNT
2673  5667          JMP I C604
                    /
2674                C600,
2675  7200          CLA
2676  1137          TAD SIXH        /6 INCHES
2677  3060          DCA SCNT
2700  5674          JMP I C600
                    /
2701                C10,
2702  7200          CLA
2703  1140          TAD TE          /10 INCHES
2704  3060          DCA SCNT
2705  5701          JMP I C10
                    /
2706                C1500,
2707  7200          CLA
2710  1141          TAD THRT        /19,6 INCHES
2711  3060          DCA SCNT
2712  5706          JMP I C1500
                    /
                    /CHECK FOR 5 OR 10 MIL STEPS
                    /
2713  0000  FORTN,  0
2714  7604          LAS
2715  0027          AND K0100
2716  7650          SNA CLA         /SKIP = 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
```

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

```
                    /
                    /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
                    /
3060  0000  PNRTE,  0
3061  6001          ION             /PI ON
3062  6511          PLPR            /PEN RIGHT
3063  5263  E24,    JMP .
3064  5660          JMP I PNRTE
                    /
3065  0000  PNDWN,  0
3066  6001          ION             /PI ON
3067  6524          PLPD            /PEN DOWN
3070  5270  E25,    JMP .
3071  5665          JMP I PNDWN
                    /
3072  0000  PENUP,  0
3073  6001          ION             /PI ON
3074  6504          PLPU            /PEN UP
3075  5275  E26,    JMP .
3076  5672          JMP I PENUP
                    /
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  0000  DMUPL,  0
3106  6001          ION             /PI ON
3107  6523          DUPL            /DRUM UP; PEN LEFT

3110  5310  E28,    JMP .
3111  5705          JMP I DMUPL
                    /
3112  0000  DMUPR,  0
3113  6001          ION             /PI ON
3114  6515          DUPR            /DRUM DOWN; PEN RIGHT
3115  5315  E29,    JMP .
3116  5712          JMP I DMUPR

                    /
3117  0000  DMUPR,  0
3120  6001          ION             /PI ON
3121  6513          DUPR            /DRUM UP; PEN RIGHT

3122  5322  E30,    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              SNL CLA           /SKIP IF 8
  3224    5630              JMP I .+4         /PDP-8 OR 8I
  3225    1035              TAD K7630
  3226    3033              DCA K7621
  3227    5630              JMP I .+1
  3230    0201              T1
                    /
                    $
```

```
BRIT   2450      DNDR   2062      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      PLDD   6514
C1300  2706      DPPR   0067      JM7    1353      PLDU   6512
C175   2631      DRDN   0070      K0100  0027      PLOT   0611
C177   2636      DRDU   0066      K0400  0030      PLPD   6524
C2     2600      DRMDN  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
CSQ    1600      E26    3075      LTPN   2054      PT8    1273
CSTEP  0022      E27    3103      MVLFT  0053      PT9    1274
CT1    1026      E28    3110      NUMS   2747      QRTR   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      RTPN   2040
JASH   3012      F18A   1326      PC5    1360      RYTE   2515
JDN    2276      FORTN  2713      PC6    1361      S10    0101
JDPR   6515      FQRT   0134      PC7    1362      S100   0105
JDJ    2307      FVH    0135      PC8    1363      S1231  0116
JMJPL  3077      FVTN   0023      PC9    1364      S1300  0117
JMJPR  3112      HALF   0126      PDDN   2507      S175   0106
JMJPL  3105      JM1    0024      PDDU   0055      S177   0107
JMJPR  3117      JM2    0025      PENUP  3072      S2     0100
```

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		
SCNT	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		
TEN	0140		
THFY	0133		
THRT	0141		
TIMER	0600		
TNML	2734		
TNTH	0123		
TWFY	0132		
WHICH	0120		
WRIT	2006		
XDN	2513		
XDJD	2511		

ERRORS DETECTED: 0

LINKS GENERATED: 0

RUN-TIME: 35 SECONDS

9K CORE USED