IDENTIFICATION

PRODUCT CODE:	MAINDEC-8E-D6CA-D
PRODUCT NAME:	VC-8E DISPLAY DIAGNOSTIC
DATE CREATED:	JUNE 21, 1971
MAINTAINER:	DIAGNOSTIC GROUP
AUTHOR:	PATRICK COYNE

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4. STARTING PROCEDURE

CONTROL SWITCH SETTING

SWITCH REGISTER	SET AS	ACTION ON PROGRAM
0	1	PROCEED TO NEXT
	0	CALIBRATE BIT.
1	1	Y AXIS
	0	X AXIS
2	1	VRØ3A
	0	VR14
3	1	VR14 CHANNEL 2
	Ø	VR14 CHANNEL 1
4	1	EXIT SCOPE LOOP
	0	HANG IN SCOPE LOOP
		(DIAGNAL LINE TEST)
5	1	PLOT UL TO LR DIAGONAL
	Ø	PLOT LL TO UR DIAGONAL
		(VERTICAL OR HORIZONTAL BAR TEST)
5	1	HALT LINE MOVEMENT
	Ø	CONTINUE LINE MOVEMENT
6	1	SELECT 639X IOT
	0	SELECT 608X IOT
7	1	PERFORM TEST SELECTED BY SWITCHES 8-11.
	Ø	RETURN/STAY IN DISPATCH ROUTINE.
8	CONTAINS NUMBER OF TEST	
9	TO BE EXECUTED.	
10	(REFER TO TEST SELECTION TABLE)	
11		

VC-8E DISPLAY DIAGNOSTIC

1. ABSTRACT

THE VC-8E DISPLAY DIAGNOSTIC IS A PROGRAM WHICH FACILITATES THE CALIBRATION CHECK-OUT, AND DIAGNOSIS OF A VC-8E DISPLAY. ALL ERRORS ARE VISUAL EXCEPT FOR THE CONTROL LOGIC TEST, WHICH PROVIDES ERROR TYPEOUT AND SCOPE LOOPS.

2. REQUIREMENTS

EQUIPMENT

PDP-8E COMPUTER, TTY OR HIGH SPEED READER
M869 QUAD MODULE (DISPLAY CONTROL)
M885 QUAD MODULE (D/A CONVERTER)
TEKTRONIX 453 SCOPE OR EQUIVALENT
VR-14,VR03A OR EQUIVALENT DISPLAY

STORAGE

THE PROGRAM OCCUPIES MEMORY LOCATIONS 0000 TO 4600

3. LOADING PROCEDURE

LOAD PROGRAM VIA BINARY LOADER.

5. ERRORS

EXCEPT FOR THE CONTROL LOGIC TEST ALL ERRORS ARE DETERMINED BY VISUAL INSPECTION.

AN ERROR OCCURING DURING THE CONTROL LOGIC TEST WILL CAUSE AN ERROR TYPEOUT GIVING THE NUMBER OF THE TEST AND AN IDENTIFICATION OF THE ERROR. THE PROGRAM WILL THEN ENTER A SCOPE LOOP, UNLESS SW4 HAS PREVIOUSLY BEEN SET TO A ONE. TO EXIT THE SCOPE LOOP SIMPLY PUT SW4 TO A ONE.

6. RESTRICTIONS

STARTING RESTRICTIONS

NONE. PROGRAM MAY BE RESTARTED FROM LOCATION 200 AT ANY TIME.

7. PROGRAM DESCRIPTION

THE MASTER DISPATCH ROUTINE FOR TRANSFERRING CONTROL TO A SPECIFIC TEST STARTS AT LOCATION 200. TO SELECT A PARTICULAR TEST, SET SW8-11 TO THE TEST NUMBER DESIRED AND THEN SET SW7 TO A ONE. RECOVERY TO THE DISPATCH ROUTINE CAN BE MADE FROM ANY TEST BY SETTING SW7 TO A ZERO.
IN ANY TEST WHICH THE OPERATOR HAS THE OPTION OF SELECTING THE X OR Y AXIS, IT IS NECESSARY TO DO SO BEFORE THE TEST IS ENTERED. WHEN THE OPERATOR DECIDES TO CHANGE THE AXIS IT IS NECESSARY TO EXIT THE TEST BY PUTTING SW7 TO A ZERO, CHANGE THE AXIS SELECT SWITCH (SW1) TO THE APPROPRIATE POSITION AND THEN RE-ENTER THE TEST BY PUTTING SW7 TO A ONE.
IT SHOULD BE NOTED THAT TWO OF THE TESTS IN THIS DIAGNOSTIC WERE INCLUDED TO COVER A MINIMUM CONFIGURATION SYSTEM WHICH MEANS THE USER MAY NOT HAVE A DISPLAY ON THE SYSTEM. IF A DISPLAY IS NOT AVAILABLE THE "RAMP TEST" AND "DC CALIBRATION TEST" MUST BE RUN TO FACILITATE THE CHECKOUT OF THE D/A MODULE. REFER TO THE INDIVIDUAL TEST DESCRIPTION FOR MORE DETAILED INFORMATION ON EACH TEST.
ANY SYSTEM EQUIPPED WITH A VR-14 DISPLAY SHOULD BE CHECKED FOR CHANNEL SELECTION ABILITY. ANY OF THE TESTS WHICH DISPLAYS A PATTERN ON THE SCREEN CAN BE MADE TO DISPLAY THE PATTERN ON VR-14 CHANNEL ONE OR TWO UNDER CONTROL OF SW3.
SW3=0, SELECTS CHANNEL 1.
SW3=1, SELECTS CHANNEL 2.

PROGRAM AND/OR OPERATOR ACTION

A. LOAD PROGRAM INTO MEMORY PER SECTION 3.

B. SET ADDRESS TO 200

C. LOAD ADDRESS

D. TEST THAT IS TO BE RUN MAY NOW BE SELECTED VIA SWITCHES 8-11. SW7 MUST BE SET TO A ONE TO PERFORM TEST. PROGRAM WILL TYPE

"SELECT TEST"

ANY TIME SW7 IS A ZERO AND WILL HANG IN DISPATCH ROUTINE UNTIL SW7 IS SET TO A ONE.

E. THE VC-8E CAN OPERATE WITH EITHER OF TWO SETS OF IOT INSTRUCTIONS, 605X AND 615X, THROUGH THE USE OF JUMPER CONNECTIONS ON THE M869 CONTROL BOARD. REFERENCE THE ENGINEERING SPECS FOR THE CONFIGURATION OF THESE JUMPERS. THESE IOT'S CAN BE CHANGED AT ANY TIME BY THE SETTING OF SW6 (REFER TO CONTROL SWITCH SETTING TABLE). IT IS NECESSARY THAT SW6 BE PUT IN THE DESIRED POSITION BEFORE ENTERING THE DISPATCH ROUTINE THAT IS BEFORE PUTTING SW7 TO A ZERO.

F. DEPRESS CLEAR, CONTINUE.

DISPLAY TEST SELECTION

SW8 TO 11	TEST SELECTED
0000 (0)	NO TEST
0001 (1)	CONTROL LOGIC TEST
0010 (2)	RAMP SLEWING
0011 (3)	DC CALIBRATION
0100 (4)	DISPLAYED CALIBRATION
0101 (5)	CROSSING DIAGONALS TEST
0110 (6)	HORIZONTAL FLYBACK TEST
0111 (7)	VERTICAL FLYBACK TEST
1000 (10)	CORNERS TEST
1001 (11)	DIAGONAL LINE TEST
1010 (12)	VERTICAL BAR TEST
1011 (13)	HORIZONTAL BAR TEST
1100 (14)	SINGLE POINT PLOT TEST
1101 (15)	NO TEST
1110 (16)	NO TEST
1111 (17)	NO TEST

RAMP TEST

THIS TEST GENERATES A SAWTOOTH PATTERN AT THE X OR Y DAC OUTPUTS (DEPENDING ON THE SETTING OF SW11). TO OBSERVE THIS PATTERN IT IS NECESSARY TO HAVE A SCOPE PROBE ON THE TEST POINTS LABELED X AND Y OF THE M885 D/A BOARD. THE WAVEFORM WILL START AT -5 VOLTS, RISE IN A RAMP TO +5 VOLTS AND DEFLECT FULL SCALE (10 VOLTS) BEFORE RISING AGAIN.
THE RAMP SHOULD BE A STRAIGHT UNBROKEN LINE, ANY BREAKS OR STEPS IN THE RAMP WOULD INDICATE THAT A BIT IS NOT SWITCHING OR IS NOT WEIGHTED CORRECTLY.
THIS TEST IS REPEATED AS LONG AS SW7 IS A ONE, AND SWB-11 INDICATE THIS TEST.

DC CALIBRATION TEST

THIS TEST AIDS IN THE CALIBRATION OF THE X AND Y D/A'S WHEN NO DISPLAY IS AVAILABLE. SW1 IS AGAIN USED TO SELECT THE X OR Y AXIS AND SHOULD BE SET PRIOR TO ENTERING THE ROUTINE. UPON ENTERING THIS TEST THE FIRST VALUE OF THE CALIBRATION TABLE IS LOADED INTO THE DAC SELECTED, AND OUTPUT TO THE TELETYPE. THE PROGRAM WILL THEN HALT, WHEN THE OPERATOR WISHES TO CONTINUE TO THE NEXT CALIBRATION VALUE HE SIMPLY DEPRESSES KEY CONTINUE. THE OPERATOR CAN GO THROUGH THE ENTIRE CALIBRATION TABLE IN THIS MANNER. THE USER CAN EXIT THE TEST AT ANY TIME BY PUTTING SW7 TO A ZERO BEFORE HE DEPRESSES KEY CONTINUE, OR BY RESTARTING THE PROGRAM AT LOCATION 200.
FOR THE VOLTAGE VALUES WHICH SHOULD BE OBSERVED FOR EACH OF THE VALUES OF THE CALIBRATION TABLE, AND FOR A STEP-BY-STEP PROCEDURE ON HOW TO IMPLEMENT THIS TEST REFER TO THE ENGINEERING SPECIFICATIONS.

DC CALIBRATION TABLE

```
0777
0776
0775
0773
0767
0757
0740
0737
0700
0677
0600
0577
0400
0377
0000
0777
1000
```

CONTROL LOGIC TEST

THIS TEST EXERCISES THE CONTROL LOGIC PORTION OF THE VC8E. IT IS DIVIDED UP INTO 12 SUB-TESTS. THIS IS THE ONLY TEST IN THIS DIAGNOSTIC WHICH CONTAINS SCOPE LOOPS AND ERROR TYPE-OUTS. WHEN AN ERROR IS ENCOUNTERED AN ERROR MESSAGE IS TYPED OUT GIVING A BRIEF DESCRIPTION OF THE ERROR AND THE PROGRAM WILL GO INTO A SCOPE LOOP ON THE ERROR. THE USER MAY EXIT THE SCOPE LOOP AT ANY TIME BY PUTTING SW4 TO A ONE. THE PROGRAM WILL THEN CONTINUE TO LOOP THROUGH THE TEST, TYPING OUT ALL ERRORS THAT ARE ENCOUNTERED BUT NOT ENTERING A SCOPE LOOP. IF SW4 IS THEN PUT BACK IN THE ZERO POSITION THE PROGRAM WILL ENTER A SCOPE LOOP ON THE NEXT ERROR IT ENCOUNTERS. THERE ARE TWO SWITCHES LOCATED ON THE CONTROL LOGIC MODULE (M669), ONE (Z) CONTROLLING THE POLARITY OF THE INTENSIFY PULSE AND ONE (DELAY) WHICH DETERMINES THE TIME DELAY IN SETTING THE DONE FLAG AFTER GIVING A LOAD X OR LOAD Y COMMAND.

THESE SWITCHES ARE SET IN THE FOLLOWING MANNER:

SWITCH NAME	POSITION	DISPLAY
Z	-	VR-14
	+	VRØ3A
DELAY	L	VR-14
	S	VRØ3A

SWITCH 2 SHOULD BE SET PRIOR TO ENTERING THE CONTROL LOGIC TEST TO SELECT EITHER A VR-14 OR VRØ3A MODE OF OPERATION.

SW2=Ø, SELECTS VR-14

SW2=1, SELECTS VRØ3A

THE MESSAGE "CONTROL LOGIC TEST" IS TYPED UPON ENTERING THE TEST AND AFTER EVERY COMPLETE PASS.

THIS TEST IS REPEATED AS LONG AS SW7 IS A ONE, AND SW8-11 INDICATE THIS TEST.

[illegible] FLYBACK TEST

THIS TEST IS IDENTICAL TO THE HORIZONTAL TEST EXCEPT THAT THE LINES ARE PLOTTED IN THE VERTICAL DIRECTION AT THE TOP AND BOTTOM EDGES OF THE DISPLAY.
THIS TEST IS REPEATED AS LONG AS SW7 IS A ONE, AND SW8-11 INDICATE THIS TEST.

CORNERS TEST

THIS TEST COMBINES THE PREVIOUS TWO TESTS, IN THAT THROUGH THE USE OF VERTICAL AND HORIZONTAL LINE SEGMENTS CORNERS ARE FORMED IN EACH OF THE FOUR CORNERS OF THE DISPLAY. AN ADDED FEATURE IS THE USE OF INTERSECTING DIAGONAL LINE SEGMENTS IN EACH OF THE FOUR CORNERS. AGAIN ALL LINES SHOULD BE STRAIGHT AND UNBROKEN AND THE DIAGONAL LINES SHOULD INTERSECT AT THE CENTER OF EACH CORNER.
THIS TEST IS REPEATED AS LONG AS SW7 IS A ONE, AND SW8-11 INDICATE THIS TEST.

DIAGONAL LINE TEST

THIS TEST DISPLAYS A FULL (1024 POINTS) DIAGONAL LINE. UPON ENTERING THE ROUTINE SW5 IS TESTED TO DETERMINE ITS POSITION. SW5=0 WILL CAUSE A DIAGONAL LINE TO BE DISPLAYED FROM THE LOWER LEFT CORNER TO THE UPPER RIGHT CORNER OF THE SCREEN. SW5=1 WILL CAUSE A DIAGONAL LINE TO BE DISPLAYED FROM THE UPPER LEFT CORNER TO THE LOWER RIGHT CORNER OF THE SCREEN.
THIS TEST IS REPEATED AS LONG AS SW7 IS A ONE, AND SW8-11 INDICATE THIS TEST.

VERTICAL BAR TEST

THIS TEST PLOTS A FULL VERTICAL BAR (1024 POINTS) MOVING HORIZONTALLY ACROSS THE DISPLAY. THE MOVEMENT OF THE BAR CAN BE CONTROLLED BY SW5. SW5=0 ALLOWS THE BAR TO MOVE ACROSS THE SCREEN, SW5=1 HALTS THE MOVEMENT OF THE BAR. THIS TEST ALLOWS THE USER TO EXAMINE THE CRT FOR SCOPE BURNS.
LIKE ALL THE TESTS IN THIS DIAGNOSTIC THIS TEST CAN BE EXITED BY PUTTING SW7 TO A ZERO. HOWEVER THIS TEST WILL ONLY EXIT AT THE COMPLETION OF A PASS OF THE BAR ACROSS THE SCREEN.
THIS TEST IS REPEATED AS LONG AS SW7 IS A ONE, AND SW8-11 INDICATE THIS TEST.

DISPLAYED CALIBRATION TEST

THIS TEST IS USED TO CALIBRATE THE D/A'S WHEN A VR-14 OR EQUIVALENT DISPLAY IS AVAILABLE.
UPON ENTERING THE TEST THE FIRST VALUE OF A CALIBRATION TABLE IS OUTPUT AT THE TELETYPE AND LOADED INTO THE X OR Y D/A SELECTED BY SW1. THE VALUE IS ALSO PLOTTED ON THE DISPLAY. FOR EACH CHANGE OF SW2 THE PROGRAM PROCEEDS TO THE NEXT CALIBRATION VALUE, AND THE LINE ON THE SCREEN WILL BECOME LARGER UNTIL A SOLID STRAIGHT LINE IS DISPLAYED ON THE SCREEN. AS THE LINE GROWS IT SHOULD BE OBSERVED FOR GAPS OR OVERLAYED DOTS. EITHER OF THESE CONDITIONS WILL NECESSITATE AN ADJUSTMENT OF ONE OF THE CONTROL POTS ON THE M885 D/A MODULE. REFER TO THE ENGINEERING SPECIFICATIONS FOR THE NAMES AND LOCATIONS OF THESE POTS.
THIS PROCEDURE MUST BE FOLLOWED FOR BOTH THE X AND Y AXIS.

DISPLAYED CALIBRATION TABLE

0020
0041
0023
0047
0017
0037
0077
0177
0377
0777
1777

CROSSING DIAGONALS TEST

THIS TEST DISPLAYS TWO DIAGONAL LINE SEGMENTS OF EQUAL LENGTH WHICH SHOULD CROSS IN THE CENTER OF THE SCREEN. THE LINES SHOULD BE STRAIGHT AND UNBROKEN WITH NO EVIDENCE OF ANY TRACE ON THE TRANSITION POINTS (ENDS) BETWEEN THE TWO LINES. THIS TEST IS REPEATED AS LONG AS SW7 IS A ONE, AND SW8-11 INDICATE THIS TEST.

HORIZONTAL FLYBACK TEST

THIS TEST DISPLAYS FOUR HORIZONTAL LINE SEGMENTS AT THE CORNERS OF THE DISPLAY. IT IS USED TO CHECK FOR ANY SIGNS OF FLYBACK TRACES AT THE ENDS OF THE LINES AND ALSO FOR HYSTERESIS INTERFERENCE ON MAGNETIC DEFLECTION DISPLAYS.
THE LINE SEGMENTS ARE PLOTTED IN THE FOLLOWING ORDER:
256 POINTS TO THE RIGHT AT THE LOWER LEFT HAND CORNER;
256 POINTS TO THE RIGHT AT THE UPPER LEFT HAND CORNER;
256 POINTS TO THE LEFT AT THE LOWER RIGHT HAND CORNER;
256 POINTS TO THE LEFT AT THE UPPER RIGHT HAND CORNER;
ALL LINE SEGMENTS SHOULD BE STRAIGHT WITH NO DISTORTION.
THIS TEST IS REPEATED AS LONG AS SW7 IS A ONE, AND SW8-11 INDICATE THIS TEST.

JRIZONTAL BAR TEST

THIS TEST IS IDENTICAL TO THE VERTICAL BAR TEST EXCEPT THAT A HORIZONTAL BAR IS MOVED IN THE VERTICAL DIRECTION.

SINGLE POINT PLOT TEST

THIS TEST DISPLAYS A POINT DETERMINED BY THE SETTING OF THE SWITCHES. UPON SELECTION OF THIS TEST THE COMPUTER WILL STOP TO ALLOW THE USER TO SET IN:

A. THE "X" COORDINATE.
B. THE "Y" COORDINATE.
C. RESET THE SWITCH OPTIONS.

8. LISTING

```
        /VCBE POINT PLOT DISPLAY DIAGNOSTIC
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                //INSTRUCTION EQUALITIES//

4130    DICL=JMS        XDICL   /CLEAR ENABLES, FLAGS, DELAYS.
4134    DICD=JMS        XDICD   /CLEAR DONE FLAG.
4140    DISD=JMS        XDISD   /SKIP ON DONE FLAG, DO NOT CLEAR FLAG.
4145    DILX=JMS        XDILX   /CLEAR DONE FLAG, LOAD X, WAIT FOR SETTLE,
                                /SET DONE, DO NOT CLEAR AC.
4151    DILY=JMS        XDILY   /CLEAR DONE FLAG, LOAD Y, WAIT FOR SETTLE,
                                /SET DONE, DO NOT CLEAR AC.
4155    DIXY=JMS        XDIXY   /CLEAR DONE FLAG, INTENSIFY, SET DONE.
4161    DILE=JMS        XDILE   /LOAD ENABLE REGISTER, CLEAR AC.
4165    DIRE=JMS        XDIRE   /TRANSFER ENABLE TO AC.

4025    SETUP=JMS       PRESET
4101    ERROR=JMS       FAIL
6007    CAF=6007
7402    XX=7402
```

```
        0001    *1
0001    5402            JMP I   RETURN
0002    0000    RETURN, 0
0003    0000    SUM1,   0
0004    0000    ERSWIT, 0
0005    0000    TALLY,  0

        0020    *20
0020    0213    DISRET, DISMSG                  /RETURN TO DISPATCH ROUTINE


0021    0000    TALLYA, 0
0022    0000    NXTST,  0
0023    0000    GETBAK, 0
0024    0000    DELAY,  0

                        //HOUSEKEEPING ROUTINE FOR CONTROL LOGIC TEST//
0025    0000    PRESET, 0
0026    7200            CLA
0027    3004            DCA     ERSWIT
0030    1177            TAD     (5000
0031    3005            DCA     TALLY
0032    4036            JMS     CKSW7
0033    2035            ISZ     MSGPNT
0034    5425            JMP I   PRESET

                        //ERROR MESSAGE POINTER//
0035    0062    MSGPNT, ERRMSG


                        //ROUTINE TO CHECK LOOP BIT, S,R,7//
0036    0000    CKSW7,  0                       /GET S,R,
0037    7604            LAS                     /GET S,R,
0040    0176            AND     (20             /MASK BIT 7
0041    7650            SNA CLA                 /S,R,7=0?
0042    5420            JMP I   DISRET          /YES, RETURN TO DISPATCH
0043    5436            JMP I   CKSW7           /NO, LOOP IN CURRENT TEST
```

```
                        //ROUTINE TO SELECT CHANNEL FOR VP1477
0044  0000   SELCHN,  0
0045  7604             LAS                    /GET S.R.
0046  0175             AND     (0420          /MASK BIT 3
0047  7640             SZA CLA                /BIT 3=
0050  5055             JMP     SEL1
0051  4151             DILE                   /0, SELECT CHANNEL 1
0052  5444             JMP I   SELCHN
0053  1174   SEL1,    TAD     (0002
0054  4161             DILE                   /1, SELECT CHANNEL 2
0055  5444             JMP I   SELCHN

                        //SUBROUTINE CONTAINING IOT TO BE EXECUTED/
                        //
0056  0000   IOTT,    0
0057  7000             7000                   /MODIFIED TO CONTAIN IOT
0060  7000             7000
0061  5456             JMP I   IOTT
```

```
                        //ERROR MESSAGE LINKS//
0062  3676    ERRMSG,   EMSG1
0063  3717              EMSG1A
0064  3747              EMSG1B
0065  4001              EMSG1C
0066  4031              EMSG2
0067  4060              EMSG3
0070  4110              EMSG4
0071  4140              EMSG5
0072  4161              EMSG6
0073  4205              EMSG7
0074  4240              EMSG8
0075  4266              EMSG9
0076  4313              EMSG10
0077  4346              EMSG11
0100  4370              EMSG12

                        //SUBROUTINE TO HANDLE ERROR-SLOPE LOOPING//
0101  0000    FAIL,     0
0102  7200              CLA
0103  1004              TAD       ERSWIT
0104  7650              SNA CLA
0105  4122              JMS       ERTYPE
0106  1173              TAD       (7777
0107  3004              DCA       ERSWIT
0110  1501              TAD I     FAIL
0111  3023              DCA       GETBAK
0112  2101              ISZ       FAIL
0113  1501              TAD I     FAIL
0114  3022              DCA       NXTST
0115  7604              LAS
0116  0172              AND       (0200
0117  7650              SNA CLA
0120  5423              JMP I     GETBAK
0121  5422              JMP I     NXTST

                        //ERROR TYPEOUT SUBROUTINE//
0122  0000    ERTYPE,   0
0123  1435              TAD I     MSGPNT
0124  3126              DCA       EOUT
0125  4771              JMS       MESAGE
0126  7402    EOUT,     HLT
0127  5522              JMP I     ERTYPE
```

```
                        //IOT SUBROUTINES//
                        //
0130  0000    XDICL,    0
0131  6050    RDICL,    6050            /CLEAR ENABLES, FLAGS, DELAYS,
0132  5530              JMP I   XDICL
0133  7402              HLT

0134  0000    XDICD,    0
0135  6051    RDICD,    6051            /CLEAR DONE FLAG,
0136  5534              JMP I   XDICD
0137  7402              HLT

0140  0000    XDISD,    0
0141  6052    RDISD,    6052            /SKIP ON DONE FLAG,
0142  7410              SKP
0143  2140              ISZ     XDISD
0144  5540              JMP I   XDISD

0145  0000    XDILX,    0
0146  6053    RDILX,    6053            /LOAD X BUFFER,
0147  5545              JMP I   XDILX
0150  7402              HLT
0151  0000    XDILY,    0
0152  6054    RDILY,    6054            /LOAD Y BUFFER,
0153  5551              JMP I   XDILY
0154  7402              HLT

0155  0000    XDIXY,    0
0156  6055    RDIXY,    6055            /INTENSITY,
0157  5555              JMP I   XDIXY
0160  7402              HLT

0161  0000    XDILE,    0
0162  6056    RDILE,    6056            /LOAD ENABLE REGISTER,
0163  5561              JMP I   XDILE
0164  7402              HLT

0165  0000    XDIRE,    0
0166  6057    RDIRE,    6057            /TRANSFER ENABLE TO AC,
0167  5565              JMP I   XDIRE
0170  7402              HLT
```

```
[illegible] POINT PLOT [illegible] DIAGNOST[illegible]     [illegible]

            [illegible]     [illegible]
[illegible] [illegible]  START, [illegible]
0201  [illegible]                [illegible]   TITLE
0202  [illegible]                [illegible]   DISMSG
0203  [illegible]                [illegible]   [illegible]
0204  [illegible]                [illegible]
0205  [illegible]                [illegible]   [illegible]
0206  [illegible]                [illegible]
0207  [illegible]                [illegible]   [illegible]
0210  [illegible]                [illegible]
0211  [illegible]                [illegible]   [illegible]
0212  [illegible]                [illegible]

0213  [illegible]    DISMSG, [illegible]
0214  [illegible]                [illegible]   [illegible]
0215  [illegible]                [illegible]

                                 [illegible]
[illegible] [illegible]  [illegible] [illegible]
[illegible] [illegible]          [illegible]                    [illegible]
[illegible] [illegible]          [illegible]   [illegible]      [illegible]
[illegible] [illegible]          [illegible]
[illegible] [illegible]          [illegible]   [illegible]      [illegible]
[illegible] [illegible]          [illegible]   [illegible]      [illegible]
[illegible] [illegible]          [illegible]                    [illegible]
[illegible] [illegible]          [illegible]   [illegible]      [illegible]
[illegible] [illegible]          [illegible]                    [illegible]
[illegible] [illegible]          [illegible]   [illegible]      [illegible]
[illegible] [illegible]          [illegible]                    [illegible]
[illegible] [illegible]          [illegible]   [illegible]      [illegible]
[illegible] [illegible]          [illegible]   [illegible]      [illegible]
[illegible] [illegible]          [illegible]   [illegible]

0234  0000    TEST,   0
0235  0213            DISMSG                   [illegible]
0236  [illegible]     [illegible]              [illegible]
0237  [illegible]     [illegible]              [illegible]
0240  [illegible]     [illegible]              [illegible]
0241  [illegible]     [illegible]              [illegible]
0242  [illegible]     [illegible]              [illegible]
0243  [illegible]     [illegible]              [illegible]
0244  [illegible]     [illegible]              [illegible]
0245  [illegible]     [illegible]              [illegible]
0246  [illegible]     [illegible]              [illegible]
0247  [illegible]     VHDTST                   [illegible] VERTICAL [illegible]
0250  [illegible]     HRDTST                   [illegible] HORIZONTAL [illegible]
0251  [illegible]     PNTST                    [illegible]
0252  0213            DISMSG                   [illegible] NO TEST
0253  0213            DISMSG                   [illegible] NO TEST
0254  0213            DISMSG                   [illegible] NO TEST

0255  7777    TITLE,  7777                     /TYPE OUT HEADER ONE TIME ONLY.
```

```
                        //ROUTINE TO MODIFY ALL IOT'S//
                        //
0256  0000    SETIOT, 0
0257  1131            TAD     RDICL
0260  0320            AND     K7077
0261  1321            TAD     MIOT
0262  3131            DCA     RDICL
0263  1135            TAD     RDICD
0264  0320            AND     K7077
0265  1321            TAD     MIOT
0266  3135            DCA     RDICD
0267  1141            TAD     RDISD
0270  0320            AND     K7077
0271  1321            TAD     MIOT
0272  3141            DCA     RDISD
0273  1145            TAD     RDILX
0274  0320            AND     K7077
0275  1321            TAD     MIOT
0276  3145            DCA     RDILX
0277  1152            TAD     RDILY
0300  0320            AND     K7077
0301  1321            TAD     MIOT
0302  3152            DCA     RDILY
0303  1156            TAD     RDIXY
0304  0320            AND     K7077
0305  1321            TAD     MIOT
0306  3156            DCA     RDIXY
0307  1162            TAD     RDILE
0310  0320            AND     K7077
0311  1321            TAD     MIOT
0312  3162            DCA     RDILE
0313  1166            TAD     RDIRE
0314  0320            AND     K7077
0315  1321            TAD     MIOT
0316  3166            DCA     RDIRE
0317  5656            JMP I   SETIOT

0320  7077    K7077,  7077
0321  0000    MIOT,   0
```

```
0373  5635
0374  0017
0375  0020
0376  0040
0377  4600
      0400          PAGE
```

```
                                 /ADC CALIBRATION ROUTINE/
                                 //
0400  4017   CALIBT,  TAD
0401  4777            JMS      MESAGL
0402  5032            MESS6
0403  7200   CALIBA,  CLA
0404  1376            TAD      [illegible]          /INITIALIZE
0405  3376            DCA      [illegible]          /[illegible]
0406  7604            LAS                           /[illegible]
0407  6373            ADC      [illegible]          /[illegible]
0410  7650            SNA CLA                       /IS [illegible] ZERO ? [illegible]
0411  5214            JMP      [illegible]          /[illegible]
0412  1375   CALIB,   TAD      [illegible]          /[illegible]
0413  3757            DCA      [illegible]          /[illegible]
0414  5017            JMP      CALIBT               /[illegible] [illegible] MESSAGE
0415  1373   CALX,    TAD      [illegible]          /[illegible]
0416  3357            DCA      [illegible]          /[illegible]
0417  1372   CALTAL,  TAD      [illegible]          /[illegible] [illegible]
0420  3357            DCA      [illegible]          /[illegible] [illegible] [illegible]
0421  1357   UPCTAL,  TAD I    [illegible]          /[illegible] [illegible]
0422  5333            DCA      SUMS                 /[illegible]
0423  4771            JMS      [illegible]          /[illegible] [illegible] TO TTY
0424  1333            TAD      SUMS                 /[illegible] [illegible] [illegible]
0425  4036            JMS      [illegible]          /[illegible]
0426  7452            MQL                           /[illegible] [illegible] [illegible]
0427  4036            JMS      [illegible]          /[illegible] [illegible] [illegible]
0430  3297            ISZ      PRINT                /[illegible] [illegible]
0431  5236            ISZ      CALCNT               /[illegible] [illegible] [illegible] (ALL DONE)
0432  5221            JMP      UPCTAL               /[illegible] [illegible] [illegible]
0433  5203            JMP      CALIB                /[illegible], RETURN TO [illegible] [illegible] ROUTINE)
```

```
                                //CALIBRATION TABLE//
0434  0777     TABLE,   0777
0435  0776              0776
0436  0775              0775
0437  0773              0773
0440  0767              0767
0441  0757              0757
0442  0740              0740
0443  0737              0737
0444  0700              0700
0445  0677              0677
0446  0600              0600
0447  0577              0577
0450  0400              0400
0451  0377              0377
0452  0000              0000
0453  0777              0777
0454  1000              1000

0455  0000     SWITCH,  0
0456  0000     CALCNT,  0
0457  0000     PNTRI,   0
```

0569	0000	
0570	0001	
0571	1020	
0572	3000	
0573	0434	
0574	4163	
0575	4151	
0576	2200	
0577	7737	
	4600	
	0600	PAGE

```
                        //CONTROL LOGIC TEST//
                        //
0600  6007    CLTST,    CAF
0601  4777'             JMS     MESAGE
0602  3355               MSG8
0603  7200               CLA
0604  1376               TAD     (-200
0605  3021               DCA     TALLYA
                        /
                        /CHECK DATA TRANSFERS, AC AND ENABLE REGISTERS'
                        /
0606  4025               SETUP
0607  1375               TAD     (ERRMSG
0610  3035               DCA     MSGPNT
0611  7300    CLT1,     CLA CLL
0612  1374               TAD     (7777           /BRING AC TO ALL ONES'
0613  4161               DILE                    /TRANS. TO ENABLE AND CLR AC'
0614  7650               SNA CLA
0615  5221               JMP     .+4             /AC CLEAR, CONTINUE'
0616  4101               ERROR                   /DILE FAILED TO CLR AC'
0617  0611               CLT1                    /ERROR-SCOPE LOOP ADDRESS'
0620  0623               CLT1A-1                 /NEXT TEST'
0621  2005               ISZ     TALLY           /TEST LOOP COUNT'
0622  5211               JMP     CLT1            /RETURN'
                        /
0623  4025               SETUP
0624  7300    CLT1A,    CLA CLL
0625  1373               TAD     (0002
0626  4161               DILE                    /SET CHANNEL F/F = 1
0627  4165               DIRE                    /READ ENABLE INTO AC'
0630  0373               AND     (0002           /MASK TO CHECK FOR CHANNEL = 1'
0631  7640               SZA CLA
0632  5236               JMP     .+4             /CHANNEL SET AND READ BACK'
0633  4101               ERROR                   /FAILED, CHNL NOT SET OR NOT READ BACK'
0634  0624               CLT1A                   /ERROR-SCOPE LOOP ADDRESS'
0635  0640               CLT1B-1                 /NEXT TEST'
0636  2005               ISZ     TALLY           /TEST LOOP COUNT'
0637  5224               JMP     CLT1A           /RETURN'
                        /
```

```
0640  4025            SETUP
0641  7300   CLT1B,   CLA CLL
0642  1372            TAD     (7700
0643  4161            DILE                    /SET INTERRUPT ENABLE,
0644  4165            DIRE                    /READ ENABLE INTO AC,
0645  0372            AND     (0101           /MASK TO CHECK FOR THIS BIT,
0646  7640            SZA CLA
0647  5253            JMP     .+4             /INT. SET AND READ BACK,
0650  4101            ERROR                   /FAILED, INT. NOT SET OR READ BACK,
0651  0641            CLT1B                   /ERROR-SCOPE LOOP ADDRESS,
0652  0655            CLT1C-1                 /NEXT TEST,
0653  2005            ISZ     TALLY           /TEST LOOP COUNT,
0654  5241            JMP     CLT1B           /RETURN,
                      /
0655  4025            SETUP
0656  7300   CLT1C,   CLA CLL
0657  1373            TAD     (0002
0660  4161            DILE                    /SET CHANNEL,
0661  4165            DIRE                    /READ ENABLE INTO AC,
0662  0373            AND     (0002           /MASK TO CHECK FOR CHANNEL BIT,
0663  7640            SZA CLA
0664  5270            JMP     .+4             /CHANNEL SET AND READ BACK,
0665  4101            ERROR                   /FAILED, CHNL NOT SET OR READ BACK,
0666  0656            CLT1C                   /ERROR-SCOPE LOOP ADDRESS,
0667  0672            CLT2-1                  /NEXT TEST,
0670  2005            ISZ     TALLY           /TEST LOOP COUNT,
0671  5256            JMP     CLT1C           /RETURN,
                      /
                      /CHECK THAT DICL WILL CLEAR ENABLES
                      /
0672  4025            SETUP
0673  7300   CLT2,    CLA CLL
0674  1371            TAD     (4003
0675  4161            DILE                    /SET ENABLES
0676  4130            DICL                    /CLEAR ENABLES
0677  4165            DIRE                    /READ ENABLE STATUS INTO AC,
0700  7650            SNA CLA
0701  5305            JMP     .+4             /ENABLES CLEARED, CONTINUE,
0702  4101            ERROR                   /FAILED, ENABLES NOT CLEARED,
0703  0673            CLT2                    /ERROR-SCOPE LOOP ADDRESS,
0704  0707            CLT3-1                  /NEXT TEST,
0705  2005            ISZ     TALLY           /TEST LOOP COUNT,
0706  5273            JMP     CLT2            /RETURN,
```

```
                        /
                        /CHECK THAT DILX WILL SET DONE AND NOT CLEAR AC'
                        /
0707  4025              SETUP
0710  7300    CLT3.     CLA CLL
0711  1374              TAD     (7777           /SETUP VALUE OF
0712  3024              DCA     DELAY           /DELAY FOR VR03A SCOPE'
0713  7604              LAS                     /GET S,R'
0714  0370              AND     (1000           /CHECK BIT 2 FOR SCOPE SELECTION'
0715  7640              SZA CLA                 /SW 2 = 0, SETUP FOR VR14'
0716  5321              JMP     .+3             /SW 2 = 1, SETUP FOR VR03A,
0717  1367              TAD     (-16            /SETUP VALUE OF
0720  3024              DCA     DELAY           /DELAY FOR VR14'
0721  1374              TAD     (7777           /ALL 1'S TO AC'
0722  4134              DICD                    /CLEAR DONE'
0723  4145              DILX                    /LOAD X BUFFER'
0724  2024              ISZ     DELAY
0725  5324              JMP     .-1             /WAIT,
0726  4140              DISD                    /SKIP ON DONE'
0727  7410              SKP
0730  5334              JMP     .+4             /DONE SET, CONTINUE'
0731  4101              ERROR                   /FAILED, DONE HAS NOT SET'
0732  0710              CLT3                    /ERROR-SCOPE LOOP ADDRESS'
0733  1000              CLT4-1                  /NEXT TEST'
0734  7440              SZA                     /WAS AC CLEARED?
0735  5341              JMP     .+4             /NO, CONTINUE'
0736  4101              ERROR                   /YES, FAILED'
0737  0710              CLT3                    /ERROR-SCOPE LOOP ADDRESS'
0740  1000              CLT4-1                  /NEXT TEST'
0741  2005              ISZ     TALLY           /TEST LOOP COUNT'
0742  5310              JMP     CLT3            /RETURN'
0743  5770'             JMP     CLT4-1          /NEXT TEST'

0767  7762
0770  1000
0771  4003
0772  0001
0773  0002
0774  7777
0775  0062
0776  7600
0777  4600
      1000              PAGE
```

```
                        /
                        /CHECK THAT SKIP WILL SET DONE AND NOT CLEAR AC
                        /
1020  4225              SETUP
1021  7600      CLT4,   CLA CLL
1022  1377              TAD     (7777           /SETUP VALUE OF
1023  3024              DCA     DELAY           /DELAY FOR VARIA SCOPE
1024  7604              LAS                     /GET S.W.
1025  0376              AND     (100B           /CLEAR BIT 2 FOR SCOPE ATTENTION
1026  7640              SZA CLA                 /S.W. 0=0, SETUP FOR VIEW.
1027  5212              JMP     .+3             /S.W. 1=1, SETUP FOR ALGA.
1010  1378              TAD     (-11            /SETUP VALUE OF
1011  3024              DCA     DELAY           /DELAY FOR VARIA
1012  1377              TAD     (7777           /SETUP FOR AC.
1013  4134              DICD                    /CLEAR DONE.
1014  4131              DILY                    /LOAD Y BUFFER.
1015  2024              ISZ     DELAY
1016  5215              JMP     .+1
1017  4140              DISD                    /SKIP ON DONE.
1020  7410              SKP
1021  5225              JMP     .+4             /DONE NOT, CONTINUE.
1022  4101              ERROR                   /FAILED, DONE HAS NOT SET.
1023  1001              CLT4                    /ERROR=SCOPE LOOP ADDRESS.
1024  1034              CLT5=1                  /NEXT TEST.
1025  7440              SZA                     /HAS AC CLEARED?
1026  5232              JMP     .+4             /NO, CONTINUE.
1027  4101              ERROR                   /YES, FAILED.
1030  1001              CLT4                    /ERROR=SCOPE LOOP ADDRESS.
1031  1034              CLT5=1                  /NEXT TEST.
1032  2005              ISZ     TALLY           /TEST LOOP COUNT.
1033  5201              JMP     CLT4            /RETURN.
```

```
                        /
                        /CHECK THAT DIXY WILL SET DONE.
                        /
1034  4025              SETUP
1035  7300      CLT5.   CLA CLL
1036  4130              DICL                    /CLEAR FLAGS.
1037  4155              DIXY                    /INTENSIFY AND SET DONE.
1040  4140              DISD                    /SKP ON DONE.
1041  7410              SKP
1042  5246              JMP     .+4             /DONE SET, CONTINUE.
1043  4101              ERROR                   /FAILED, DONE NOT SET.
1044  1035              CLT5                    /ERROR-SCOPE LOOP ADDRESS.
1045  1050              CLT6-1                  /NEXT TEST.
1046  2005              ISZ     TALLY           /TEST LOOP COUNT.
1047  5235              JMP     CLT5            /RETURN.
                        /
                        /CHECK THAT DICD CLEARS DONE FLAG.
                        /
1050  4025              SETUP
1051  7300      CLT6.   CLA CLL
1052  4155              DIXY                    /SET DONE.
1053  4134              DICD                    /CLEAR DONE.
1054  4165              DIRE                    /READ ENABLE STATUS INTO AC.
1055  7650              SNA CLA
1056  5262              JMP     .+4             /DONE CLEARED, CONTINUE.
1057  4101              ERROR                   /FAILED, DONE NOT CLEARED.
1060  1051              CLT6                    /ERROR-SCOPE LOOP ADDRESS.
1061  1064              CLT7-1                  /NEXT TEST.
1062  2005              ISZ     TALLY           /TEST LOOP COUNT.
1063  5251              JMP     CLT6            /RETURN.
```

```
                        /
                        /CHECK THAT DISD WILL SKIP ON DONE FLAG AND NOT CLEAR FLAG.
                        /
1064  4025              SETUP
1065  7300      CLT7,   CLA CLL
1066  4135              DISX                    /SET DONE.
1067  4140              DISD                    /SKP ON DONE.
1070  7610              SKP CLA
1071  5275              JMP     .+4             /SKIP WORKED, CONTINUE.
1072  4101              ERROR                   /FAILED, DISD DID NOT CAUSE SKIP ON DONE.
1073  1065              CLT7                    /ERROR-SCOPE LOOP ADDRESS.
1074  1113              CLT8-1                  /NEXT TEST.
1075  4165              DIRC                    /READ ENABLE STATUS TO AC.
1076  7640              SZA CLA                 /DONE = 1?
1077  5303              JMP     .+4             /YES, CONTINUE.
1100  4101              ERROR                   /NO, FAILED.
1101  1065              CLT7                    /ERROR-SCOPE LOOP ADDRESS.
1102  1113              CLT8-1                  /NEXT TEST.
1103  4134              DICD                    /CLEAR DONE.
1104  4140              DISD                    /SKP ON DONE.
1105  5311              JMP     .+4
1106  4101              ERROR                   /FAILED, DISD SKIPPED ON DONE=0.
1107  1065              CLT7                    /ERROR-SCOPE LOOPE ADDRESS.
1110  1113              CLT8-1                  /NEXT TEST.
1111  2005              ISZ     TALLY           /TEST LOOP COUNT.
1112  5265              JMP     CLT7            /RETURN.
                        /
                        /CHECK THAT INTERRUPT ENABLE REGISTER ALONE WILL
                        /NOT CAUSE AN INTERRUPT.
1113  4025              SETUP
1114  7300      CLT8,   CLA CLL
1115  1374              TAD     (ERR8           /GET RETURN ADDRESS.
1116  3002              DCA     RETURN          /SETUP RETURN ADDRESS.
1117  6007              CAF                     /CLEAR ALL.
1120  1373              TAD     (0001           /SETUP AC TO
1121  4161              DILE                    /ENABLE INTERRUPT REGISTER.
1122  6001              ION                     /TURN INTERRUPT ON.
1123  7000              NOP                     /WAIT.
1124  6002              IOF                     /TURN INTERRUPT OFF.
1125  5331              JMP     .+4             /NO INTERRUPT OCCURRED, CONTINUE.
1126  4101      ERR8,   ERROR                   /FAILED, INTERRUPT TOOK PLACE.
1127  1114              CLT8                    /ERROR-SCOPE LOOP ADDRESS.
1130  1200              CLT9-1                  /NEXT TEST.
1131  2005              ISZ     TALLY           /TEST LOOP COUNT.
1132  5314              JMP     CLT8            /RETURN.
1133  5772              JMP     CLT9-1          /NEXT TEST.

1172  1200
1173  0001
1174  1126
1175  7762
1176  1000
1177  7777
      1200              PAGE
```

```
                        /
                        /CHECK THAT DONE REGISTER ALONE WILL NOT CAUSE
                        /AN INTERRUPT.
1200  4025              SETUP
1201  7300    CLT9,     CLA CLL
1202  1377              TAD     (ERR9           /GET ERROR ADDRESS.
1203  3002              DCA     RETURN          /SETUP RETURN ADDRESS.
1204  6007              CAF                     /CLEAR ALL.
1205  1376              TAD     (4000           /SETUP AC TO
1206  4161              DILE                    /ENABLE DONE FLAG.
1207  6001              ION                     /TURN INTERRUPT ON.
1210  7000              NOP                     /WAIT.
1211  6002              IOF                     /TURN INTERRUPT OFF.
1212  5216              JMP     .+4             /NO INTERRUPT OCCURRED, CONTINUE.
1213  4101    ERR9,     ERROR                   /FAILED, INTERRUPT WAS SET.
1214  1201              CLT9                    /ERROR-SCOPE LOOP ADDRESS.
1215  1220              CLT10-1                 /NEXT TEST
1216  2003              ISZ     TALLY           /TEST LOOP COUNTER.
1217  5201              JMP     CLT9            /CONTINUE.
                        /
                        /CHECK THAT DONE AND INTERRUPT ENABLE WILL CAUSE AN
                        /INTERRUPT.
1220  4025              SETUP
1221  7300    CLT10,    CLA CLL
1222  1375              TAD     (OK10           /GET RETURN ADDRESS.
1223  3002              DCA     RETURN          /SETUP RETURN ADDRESS.
1224  1374              TAD     (0001           /SETUP AC TO
1225  4155              DIXY                    /ENABLE DONE
1226  4161              DILE                    /AND INTERRUPT.
1227  6001              ION                     /TURN INTERRUPT ON.
1230  7000              NOP                     /WAIT.
1231  6002              IOF                     /TURN INTERRUPT OFF.
1232  4101              ERROR                   /FAILED, INTERRUPT DID NOT TAKE PLACE.
1233  1221              CLT10                   /ERROR-SCOPE LOOP ADDRESS.
1234  1237              CLT11-1                 /NEXT TEST.
1235  2005    OK10,     ISZ     TALLY           /TEST LOOP COUNTER.
1236  5221              JMP     CLT10           /RETURN.
```

```
                        /
                        /CHECK THAT DILX WILL CLEAR DONE.
                        /
1237  4025              SETUP
1240  7300    CLT11,    CLA CLL
1241  1146              TAD     RDILX
1242  3250              DCA     CLT11A
1243  1166              TAD     RDIRE
1244  3251              DCA     CLT11A+1
1245  4145              DILX
1246  4140              DISD
1247  5246              JMP     .-1
1250  7402    CLT11A,   XX
1251  7402              XX
1252  0376              AND     (4000
1253  7450              SNA
1254  5260              JMP     .+4
1255  4101              ERROR
1256  1240              CLT11
1257  1262              CLT12-1
1260  2005              ISZ     TALLY
1261  5240              JMP     CLT11
                        /
                        /CHECK THAT DILY WILL CLEAR DONE.
                        /
1262  4025              SETUP
1263  7300    CLT12,    CLA CLL
1264  1152              TAD     RDILY
1265  3273              DCA     CLT12A
1266  1166              TAD     RDIRE
1267  3274              DCA     CLT12A+1
1270  4151              DILY
1271  4140              DISD
1272  5271              JMP     .-1
1273  7402    CLT12A,   XX
1274  7402              XX
1275  0376              AND     (4000
1276  7450              SNA
1277  5303              JMP     .+4
1300  4101              ERROR
1301  1263              CLT12
1302  0606              CLT1-3
1303  2005              ISZ     TALLY
1304  5263              JMP     CLT12
1305  2021              ISZ     TALLYA
1306  5773/              JMP     CLT1-3
1307  5772/              JMP     CLTST

1372  0600
1373  0606
1374  0001
1375  1235
1376  4000
1377  1213
      1400              PAGE
```

```
[illegible] POINT PLOT DISPLAY DIAGNOSTIC     PAL10   V141   [illegible]

                                    /HORIZONTAL LINE [illegible]
                                    /DISPLAY FOUR [illegible]
                                    /CHECK FOR [illegible]
          1400  6607     [illegible] DSF
          1401  4777                [illegible]
          1402  3404                [illegible]
          1403  7640                [illegible]
          [illegible]
          1411  [illegible]
          1412  [illegible]
          [illegible]
          1427  4777                [illegible]
          1430  2377                [illegible]
          1431  6777                [illegible]
          1432  4036                [illegible]   /[illegible] RETURN [illegible]
          1433  5205                [illegible]   /[illegible] CONTINUE [illegible]
```

```
                        //VERTICAL LINE SEGMENT TEST
                        //DISPLAY FOUR VERTICAL LINE SEGMENTS
                        //CHECK FOR FLYBACK TRACE
1435  6027    VERTCT,   CAF
1436  4777'              JMS     MESSGE
1437  3571                MSGP
1440  7300                CLA CLL
1441  4771'              JMS     ACTVCH          /SETUP FOR VERTICAL LINES.
1442  4044    VERFLY,   JMS     SELCHN          /CHECK FOR VR-14 CHANNEL.
1443  7300                CLA CLL                 /DISPLAY VERTICAL LINE AT X=1001 (UP).
1444  1375                TAD     (1001           /NOW-VARIABLE AXIS ORIGIN (X).
1445  4774'              JMS     PLINE           /ROUTINE TO INCREMENT Y AXIS.
1446  7377                -401                    /PLOT COUNTER.
1447  1001                1001                    /ORIGIN OF Y AXIS.
1450  7200                CLA                     /DISPLAY VERTICAL LINE AT X=0777 (UP).
1451  1373                TAD     (0777           /NOW-VARIABLE AXIS ORIGIN (X).
1452  4774'              JMS     PLINE           /ROUTINE TO INCREMENT Y AXIS.
1453  7377                -401                    /PLOT COUNTER.
1454  1001                1001                    /ORIGIN OF Y AXIS.
1455  7200                CLA                     /DISPLAY VERTICAL LINE AT X=1001 (DOWN).
1456  1375                TAD     (1001           /NOW-VARIABLE AXIS ORIGIN (X).
1457  4772'              JMS     MLINE           /ROUTINE TO DECREMENT Y AXIS.
1460  7377                -401                    /PLOT COUNTER.
1461  0777                0777                    /ORIGIN OF Y AXIS.
1462  7200                CLA                     /DISPLAY VERTICAL LINE AT X=0777 (DOWN)
1463  1373                TAD     (0777           /NOW-VARIABLE AXIS ORIGIN (X)
1464  4772'              JMS     MLINE           /ROUTINE TO DECREMENT Y AXIS.
1465  7377                -401                    /PLOT COUNTER
1466  0777                0777                    /ORIGIN OF Y AXIS.
1467  4036                JMS     CKSW7           /SW7=0, RETURN TO DISPATCH.
1470  5241                JMP     VERFLY          /SW7=1, CONTINUE IN CURRENT TEST.

1571  2600
1572  2416
1573  0777
1574  2443
1575  1001
1576  2613
1577  4600
      1600                PAGE
```

```
1633  7240           CLA
1634  1377           TAD     [illegible]
1635  4774           JMS     [illegible]          [illegible]
1636  7577           -201
1637  1001           1001
1640  7200           CLA
1641  1375           TAD     (0004
1642  4774           JMS     PLINE                /PLOT HORIZONTAL LINE AT [illegible]
1643  7577           -201
1644  1001           1001
1645  7200           CLA
1646  1373           TAD     (0777
1647  4772           JMS     HLINE                /PLOT HORIZONTAL LINE AT 0,777(LEFT)
1650  7577           -201
1651  0777           0777
```

```
1652  7200    CLA
1653  1375    TAD     1375
1654  4772/   JMS     PLINE       /PLOT HORIZONTAL LINE (PLANCHLEFT)
1655  7577    *201
1656  0777    0777
1657  7200    CLA
1660  4770/   JMS     DIAG1       /PLOT DIAGONAL LINE (LOWER LEFT)
1661  7577    *201
1662  1001    1001
1663  7200    CLA
1664  4770/   JMS     DIAG1       /PLOT DIAGNOL LINE (UPPER RIGHT)
1665  7577    *201
1666  0577    0577
1667  7200    CLA
1670  4767/   JMS     DIAG2       /PLOT DIAGNOL LINE (UPPER LEFT)
1671  7577    *201
1672  1001    1001                /X ORIGIN
1673  0777    0777                /Y ORIGIN
1674  7200    CLA
1675  4767/   JMS     DIAG2       /PLOT DIAGNOL LINE (LOWER RIGHT)
1676  7577    *201
1677  0577    0577
1700  1201    1201
1701  4036    JMS     CKSW7
1702  5204    JMP     CORNER

1767  2660
1770  2626
1771  2613
1772  2416
1773  0777
1774  2443
1775  1001
1776  2600
1777  4600
      2000    PAGE
```

```
                        /SUBROUTINE TO DISPLAY DIAGONALS
                        //
2000  6007    DRTST,    CAF
2001  4777'              JMS     MESAGE
2002  3633              MSG19
2003  7300              CLA CLL
2004  4044    DIABIS,   JMS     SELCHN          /CONSOL ,PV VARIA CHANNEL
2005  7504              LAS                     /GET S.R.
2006  0376              AND     (6100           /MASK TO CHECK SW8
2007  7640              SZA CLA                 /SW8 = 0, PLOT LL TO UR DIAGONAL
2010  5215              JMP     .+5             /SW8 = 1, PLOT UL TO LR DIAGONAL
2011  4773'              JMS     DIAG1           /PLOT LL TO UR DIAGONAL.
2012  5777              -2001
2013  1001              1001
2014  5221              JMP     .+5
2015  4774'              JMS     DIAG2           /PLOT UL TO LR DIAGONAL.
2016  6000              -2000
2017  1001              1001
2020  0777              0777
2021  4036              JMS     CKSW7           /SW7=0, RETURN TO DIRECTOR.
2022  5204              JMP     DIABIS          /SW7=1, CONTINUE PLOT.
```

```
                        //ROUTINE TO MOVE A VERTICAL BAR HORIZONTALLY.
                        //
2023  5087    VRBTST, CAF
2024  4777'           JMS     MESAGE
2025  3431            MSG12
2026  7300            CLA CLL
2027  4044            JMS     SELCHN          /CHECK FOR VR-18 CHANNEL.
2030  4773'           JMS     SETVER          /SETUP FOR VERTICAL LINES.
2031  7200            CLA
2032  1372            TAD     (-2000
2033  3255            DCA     HORCNT          /SET UP X AXIS COUNTER
2034  1371            TAD     (1001           /SET UP X ORIGIN.
2035  3256            DCA     XVERT
2036  7200    VERBAR, CLA
2037  1256            TAD     XVERT           /SET X COORDINATE.
2040  4770'           JMS     PLINE           /PLOT VERTICAL BAR.
2041  5777            *2001                   /DELAY.
2042  1001            1001                    /X COORDINATE.
2043  7604            LAS                     /GET S.R.
2044  0376            AND     (0100           /MASK OUT S
2045  7640            SZA CLA                 /S.R. S = 0 CONTINUE LINE MOVE.
2046  5236            JMP     VERBAR          /S.R. S = 1 HALT LINE MOVEMENT.
2047  2256            ISZ     XVERT           /UPDATE X COORDINATE.
2050  7000            NOP                     /UPDATE X AXIS COUNTER.

2051  2255            ISZ     HORCNT          /IS PLOT COMPLETE?
2052  5236            JMP     VERBAR          /NO, CONTINUE.
2053  4036            JMS     CKSW7           /SW7=0, RETURN TO DISPATCH.
2054  5223            JMP     VRBTST          /SW7=1, CONTINUE IN CURRENT TEST.
2055  0000    HORCNT, 0
2056  0000    XVERT,  0
```

```
                        //ROUTINE TO MOVE A HORIZONTAL BAR VERTICALLY.
                        //
2057  6007    HRBTST,   CAF
2060  4777'             JMS     MESAGE
2061  3444              MSG13
2062  7300              CLA CLL
2063  4044              JMS     SELCHN          /CHECK FOR VR-14 CHANNEL.
2064  4767'             JMS     SETHOR          /SETUP FOR HORIZONTAL LINES.
2065  7200              CLA
2066  1372              TAD     (-2000
2067  3311              DCA     VERCNT          /SETUP Y AXIS COUNTER.
2070  1371              TAD     (1001           /SETUP Y ORIGIN.
2071  3312              DCA     YVERT
2072  7200    HORBAR,   CLA
2073  1312              TAD     YVERT           /GET Y COORDINATE.
2074  4770'             JMS     PLINE           /PLOT HORIZONTAL BAR.
2075  5777              -2001                   /COUNT.
2076  1001              1001                    /X COORDINATE.
2077  7604              LAS                     /GET S,R.
2100  0376              AND     (0100           /MASK BIT 5
2101  7640              SZA CLA                 /SW 5 = 0 CONTINUE LINE MOVE.
2102  5272              JMP     HORBAR          /SW 5 = 1 HALT LINE MOVEMENT.
2103  2312              ISZ     YVERT           /UPDATE Y COORDINATE.
2104  7000              NOP                     /UPDATE Y AXIS COUNTER.
2105  2311              ISZ     VERCNT          /IS PLOT COMPLETE?
2106  5272              JMP     HORBAR          /NO, CONTINUE.
2107  4036              JMS     CKSW7           /SW7=0, RETURN TO DISPATCH.
2110  5257              JMP     HRBTST          /SW7=1, CONTINUE IN CURRENT TEST.
2111  0000    VERCNT,   0
2112  0000    YVERT,    0
2167  2613
2170  2443
2171  1001
2172  6000
2173  2600
2174  2660
2175  2626
2176  0100
2177  4600
      2200              PAGE
```

```
                        //SINGLE POINT PLOT TEST
                        //ALL COORDINATES FROM S.R.
                        //
2200  6007    PNTST,    CAF
2201  4777'             JMS     MESAGE
2202  3460              MSG14
2203  4777'             JMS     MESAGE
2204  3476              MSG15
2205  7402              XX                      /HALT
2206  7604              LAS                     /GET X COORDINANT FROM SWITCHES.
2207  3240              DCA     XPOINT          /SAVE IT.
2210  4777'             JMS     MESAGE
2211  3531              MSG16
2212  7402              XX                      /HALT
2213  7604              LAS                     /GET Y COORDINANT FROM SWITCHES.
2214  3241              DCA     YPOINT          /SAVE IT.
2215  4777'             JMS     MESAGE
2216  3564              MSG17
2217  4777'             JMS     MESAGE
2220  3602              MSG18
2221  7402              XX                      /HALT
2222  7200    SINPNT,   CLA
2223  1240              TAD     XPOINT          /GET X COORDINANT.
2224  4145              DILX                    /LOAD X.
2225  4140              DISD                    /SKP ON DONE
2226  5225              JMP     .-1
2227  7200              CLA
2230  1241              TAD     YPOINT          /GET Y COORDINANT.
2231  4151              DILY                    /LOAD Y.
2232  4140              DISD                    /SKP ON DONE
2233  5232              JMP     .-1
2234  4155              DIXY                    /INTENSIFY
2235  4044              JMS     SELCHN
2236  4036              JMS     CKSW7           /SW7=0, RETURN TO DISPATCH.
2237  5222              JMP     SINPNT          /SW7=1, CONTINUE IN CURRENT TEST.

2240  0000    XPOINT,   0
2241  0000    YPOINT,   0
```

```
                        //DISPLAYED CALIBRATION TEST
                        //
2242  6007    DISTST, CMF
2243  4777/            JMS     MESSAGE
2244  3656             MOCA1
2245  7310    DISCAL, CLA CLL CMA                 /[illegible]
2246  3776/            DCA     SWITCH              /[illegible] LOCATION
2247  1375             TAD     [illegible]         /[illegible]
2250  3774/            DCA     CALCNT              /[illegible]
2251  7024             CIA                         /[illegible]
2252  6372             KSF     [illegible]         /[illegible]
2253  7510             SNA CLA                     /[illegible]
2254  5237             JMP     [illegible]
2255  4777/            JMS     [illegible]         /[illegible]
2256  7402             HLT
2257  4777/            JMS     [illegible]         /[illegible]
2260  1375             TAD     [illegible]         /[illegible]
2261  3523             DCA     [illegible]         /[illegible],
2262  1776             TAD     [illegible]         /[illegible]
2263  3003             DCA     [illegible]         /[illegible]
2264  4777/            JMS     [illegible]         /[illegible]
2265  1003    DISLOP, TAD     [illegible]         /[illegible]
2266  7040             CMA                         /[illegible]
2267  1366             TAD     [illegible]         /[illegible]
2270  3272             DCA     [illegible]         /[illegible]
2271  4765/            JMS     [illegible]         /[illegible]
2272  7402    WAITST, HLT                         /[illegible]
2273  0000             0000                        /[illegible]
2274  4736             JMS     [illegible]         /[illegible]
2275  4014             JMS     [illegible]         /[illegible]
2276  7764             LAS CLA                     /[illegible]
2277  7506             SPL                         /[illegible]
2300  0364             AND     [illegible]         /[illegible]
2301  1776/            TAD     SWITCH              /[illegible]
2302  7640             SZA CLA                     /[illegible]
2303  5265             JMP     DISLOP              /[illegible]
2304  1776/            TAD     SWITCH              /[illegible]
2305  7040             CMA                         /[illegible]
2306  3776/            DCA     SWITCH              /SWITCH
2307  2326             ISZ     CNTR2               /[illegible]
2310  2774/            ISZ     CALCNT              /HAS PROGRAM BY A CALCD NUM
2311  5262             JMP     DISLOP+3            /NO,GET NEXT PLOT.
2312  5247             JMP     DISCAL+2            /YES, RETURN TO BEGIN OF ROUTINE.
```

```
2313  0000    TABLCA, 0000
2314  0001            0001
2315  0003            0003
2316  0007            0007
2317  0017            0017
2320  0037            0037
2321  0077            0077
2322  0177            0177
2323  0377            0377
2324  0777            0777
2325  1777            1777

2326  0000    PNTR2,  0


2364  0001
2365  2443
2366  7777
2367  3000
2370  2313
2371  2613
2372  2600
2373  2000
2374  0496
2375  7765
2376  0455
2377  4600
      2400            PAGE
```

```
                        //CROSSING DIAGONALS TEST
                        //
2400  6007    CROTST,   CAF
2401  4777'            JMS     MESAGE
2402  3642              MSG20
2403  7300              CLA CLL
2404  4044    XCROS,    JMS     SELCHN          /CHECK FOR VR-14 CHANNEL.
2405  4776'             JMS     DIAG1           /PLOT LL TO UR DIAGONAL.
2406  7000              -1000                   /COUNT.
2407  1400              1400                    /X AND Y ORIGINS.
2410  4775'             JMS     DIAG2           /PLOT UL TO LR DIAGONAL.
2411  6777              -1001                   /COUNT.
2412  1400              1400                    /X ORIGIN.
2413  0400              0400                    /Y ORIGIN.
2414  4036              JMS     CKSW7           /SW7=0, RETURN TO DISPATCH.
2415  5204              JMP     XCROS           /SW7=1, CONTINUE PLOT.
```

```
                        //SUBROUTINE TO DISPLAY A LINE (MINUS INCREMENTS)
                        //HORIZONTAL OR VERTICAL
                        //
2416  0000    MLINE,    0
2417  7402    DISP3,    XX                          /MODIFIED TO DISPLAY IOT,
2420  7200              CLA
2421  1141              TAD     RDISO               /SETUP
2422  3232              DCA     DISP4-3             /SKIP ON DONE IOT,
2423  1156              TAD     RDIXY               /SETUP
2424  3234              DCA     DISP4-1             /INTENSITY IOT,
2425  1616              TAD I   MLINE               /GET PLOT COUNT,
2426  3270              DCA     PLOTCT              /SAVE IT,
2427  2216              ISZ     MLINE
2430  1616              TAD I   MLINE
2431  5235              JMP     DISP4
2432  6052              6052                        /SKIP ON DONE,
2433  5232              JMP     .-1                 /WAIT FOR DONE,
2434  6055              6055                        /INTENSITY
2435  7402    DISP4,    XX                          /MODIFIED TO LOAD IOT,
2436  1374              TAD     .-1                 /DECREMENT VARIABLE AXIS,
2437  2270              ISZ     PLOTCT              /IS PLOT COMPLETE?
2440  5232              JMP     DISP4-3             /NO, CONTINUE PLOT,
2441  2216              ISZ     MLINE               /YES, SETUP RETURN,
2442  5616              JMP I   MLINE               /RETURN
```

```
                        //SUBROUTINE TO DISPLAY 2 LINE (PLUS INCREMENT),
                        //HORIZONTAL OR VERTICAL
2443  0000   PLINE:    0
2444  7402   DISP1,    XX                          /MODIFIED TO DISPLAY LOT,
2445  7200              CLA
2446  1141              TAD     RDISD               /SETUP
2447  3257              DCA     DISP2+3             /SKIP ON DONE LOT,
2450  1156              TAD     RDIXY               /SETUP
2451  3261              DCA     DISP2+6             /INTENSIFY LOT,
2452  1643              TAD I   PLINE               /GET PLOT COUNT,
2453  3270              DCA     PLOTCT              /SAVE IT,
2454  2243              ISZ     PLINE
2455  1643              TAD I   PLINE               /GET ORIGIN OF VARIABLE AXIS,
2456  5262              JMP     DISP2
2457  6052              6052                        /SKIP ON DONE,
2460  5257              JMP     .+2                 /WAIT FOR DONE,
2461  6055              6055                        /INTENSIFY
2462  7402   DISP2,    XX                          /MODIFIED TO LOAD LOT,
2463  7001              IAC                         /INCREMENT VARIABLE AXIS,
2464  2270              ISZ     PLOTCT              /IS PLOT COMPLETE?
2465  5257              JMP     DISP2+3             /NO, CONTINUE PLOT,
2466  2243              ISZ     PLINE               /YES, SETUP RETURN,
2467  5643              JMP I   PLINE               /RETURN

2470  0000   PLOTCT,    0
2574  7777
2575  2660
2576  2626
2577  4600
      2600              PAGE
```

```
                        //SUBROUTINE TO SETUP DISPLAY IOT'S FOR VERTICAL PLOT//
2600  0000    SETVER, 0
2601  7200            CLA
2602  1146            TAD     RDILX
2603  3777            DCA     DISP1
2604  1152            TAD     RDILY
2605  3776            DCA     DISP2
2606  1146            TAD     RDILX
2607  3775            DCA     DISP3
2610  1152            TAD     RDILY
2611  3774            DCA     DISP4
2612  5600            JMP I   SETVER

                        //SUBROUTINE TO SETUP DISPLAY IOT'S FOR HORIZONTAL PLOT//
2613  0000    SETHOR, 0
2614  7200            CLA
2615  1152            TAD     RDILY
2616  3777            DCA     DISP1
2617  1146            TAD     RDILX
2620  3776            DCA     DISP2
2621  1152            TAD     RDILY
2622  3775            DCA     DISP3
2623  1146            TAD     RDILX
2624  3774            DCA     DISP4
2625  5613            JMP I   SETHOR
```

```
                        //SUBROUTINE TO DISPLAY A DIAGNOSTIC LINE
                        //FROM LOCAL LEFT TO RIGHT [illegible]
                        //
2626  0000    DIAG1,    0
2627  7326              CLA CLL
2630  1141              TAD     WRING           /[illegible]
2631  3245              DCA     DIAGIA+3        /[illegible]
2632  1156              TAD     ROTX            /[illegible]
2633  3247              DCA     DIAGIA+5        /[illegible]
2634  1155              TAD     ROTY            /[illegible]
2635  3250              DCA     DIAGIA          /[illegible]
2636  1152              TAD     SCALY           /[illegible]
2637  3251              DCA     DIAGIA+1        /[illegible]
2640  1626              TAD I   DIAG1           /[illegible]
2641  3257              DCA     DIACNT
2642  2226              ISZ     DIAG1
2643  1626              TAD I   DIAG1
2644  5250              JMP     DIAGIA
2645  6052              6052                    /[illegible]
2646  5245              JMP     .-1             /[illegible]
2647  6055              6055                    /[illegible]
2650  6053    DIAGIA,   6053                    /[illegible]
2651  6054              6054                    /[illegible]
2652  7001              IAC                     /INCREMENT COUNTER,
2653  2257              ISZ     DIACNT          /IS PLOT COMPLETE?
2654  5245              JMP     DIAGIA+3        /NO, CONTINUE PLOT,
2655  2226              ISZ     DIAG1           /YES, SETUP RETURN,
2656  5626              JMP I   DIAG1           /RETURN

2657  0000    DIACNT, 0
```

```
                          //SUBROUTINE TO DISPLAY A DIAGNOL LINE
                          //FROM UPPER LEFT TO LOWER RIGHT
                          //
2660  0000    DIAG2,      0
2661  7300                CLA CLL
2662  1141                TAD     ROISD           /SETUP
2663  3333                DCA     DIAG2A+3        /SKIP ON DONE IOT,
2664  1156                TAD     ROIXY           /SETUP
2665  3305                DCA     DIAG2A+1        /INTENSIFY IOT
2666  1146                TAD     ROILX           /SETUP
2667  3307                DCA     DIAG2A+1        /LOAD X IOT,
2670  1152                TAD     ROILY           /SETUP
2671  3312                DCA     DIAG2A+4        /LOAD Y IOT,
2672  1660                TAD I   DIAG2           /SETUP COUNTER,
2673  3257                DCA     DIACNT
2674  2260                ISZ     DIAG2
2675  1660                TAD I   DIAG2
2676  3773'                DCA     XPOINT
2677  2260                ISZ     DIAG2
2700  1660                TAD I   DIAG2
2701  3772'                DCA     YPOINT
2702  5306                JMP     DIAG2A
2703  6052                6052                    /SKIP ON DONE,
2704  5303                JMP     .-1             /WAIT FOR DONE,
2705  6055                6055                    /INTENSIFY
2706  1773'    DIAG2A,    TAD     XPOINT          /GET X COORDINANT,
2707  6053                6053                    /LOAD X
2710  7200                CLA
2711  1772'                TAD     YPOINT          /GET Y COORDINANT,
2712  6054                6054                    /LOAD Y
2713  1371                TAD     (-1             /DECREMENT Y,
2714  3772'                DCA     YPOINT          /SAVE Y,
2715  1773'                TAD     XPOINT          /GET X COORDINANT,
2716  7001                IAC                     /INCREMENT X,
2717  3773'                DCA     XPOINT          /SAVE X,
2720  2257                ISZ     DIACNT          /IS PLOT COMPLETE?
2721  5303                JMP     DIAG2A-3        /NO, CONTINUE PLOT,
2722  2260                ISZ     DIAG2           /YES, SETUP RETURN,
2723  5660                JMP I   DIAG2           /RETURN

2771  7777
2772  2241
2773  2240
2774  2435
2775  2417
2776  2462
2777  2444
      3000                PAGE
```

```
[illegible]  [illegible]   [illegible]   [illegible]
[illegible]  [illegible]               [illegible]
[illegible]  [illegible]               [illegible]
[illegible]  [illegible]               [illegible]
[illegible]  [illegible]               [illegible]
[illegible]  [illegible]               [illegible]
[illegible]  [illegible]               [illegible]
[illegible]  [illegible]               [illegible]
[illegible]  [illegible]               [illegible]
[illegible]  [illegible]               [illegible]
[illegible]  [illegible]               [illegible]
[illegible]  [illegible]               [illegible]

[illegible]  [illegible]   [illegible]  [illegible]
[illegible]  [illegible]               RAR
[illegible]  [illegible]               RTA
[illegible]  [illegible]               CLA
[illegible]  [illegible]               TAD I   [illegible]
[illegible]  [illegible]               JMS     [illegible]
[illegible]  [illegible]               JMP     [illegible]
[illegible]  [illegible]               [illegible]
[illegible]  [illegible]               [illegible]
[illegible]  [illegible]               JMP     [illegible]
[illegible]  [illegible]               TAD     [illegible]
[illegible]  [illegible]               TAD (   [illegible]
[illegible]  [illegible]               ATS     [illegible]
[illegible]  [illegible]               DCA     [illegible]
[illegible]  [illegible]               TAD I   [illegible]
[illegible]  [illegible]               AND     [illegible]
[illegible]  [illegible]               CLA     [illegible]
[illegible]  [illegible]               TAD I   [illegible]
[illegible]  [illegible]               AND     [illegible]
[illegible]  [illegible]               DCA     [illegible]
3037  1023                             TAD I   [illegible]
[illegible]  [illegible]               APB     [illegible]
[illegible]  [illegible]               JSA     MASKB
[illegible]  [illegible]               TAD     [illegible]
3043  7112                             RTR CLL
3044  7310                             RAR
[illegible]  [illegible]               TAD     MASKD
3046  7012                             RTR
3047  7110                             RAR
[illegible]  [illegible]               TAD     [illegible]
3051  3273                             DCA     MASKC
3052  2214                             ISZ     SIZTY
3053  4224                             JMS     SIXTY+59
3054  1273                             TAD     MASKC
3055  3623                             DCA I   SIXTY+7
3056  1272                             TAD     MASKB
3057  7004                             RAL
3060  7006                             RTL
3061  1271                             TAD     MASKA
3062  1275                             TAD     MASKD+1
```

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3063  2223            ISZ     SIXTY+9
3064  3623            DCA I   SIXTY+7
3065  1372            TAD     (5)XTY+10
3066  3224            DCA     SIXTY+10
3067  2214            ISZ     SIXTY
3070  5614            JMP I   SIXTY
3071  0000    MASKA,  0
3072  0000    MASKB,  0
3073  0000    MASKC,  0
3074  0000    MASKD,  0
3075  6060            6060

3172  3026
3173  7000
3174  0700
3175  0070
3176  0007
3177  4660
      3200            PAGE
```

[illegible]

```
3262  4070
3263  3561
3264  6137
3265  3600

3266  2256    MSG4,   TEXT    "S,P,T=0, RETURN TO DISPATCH ROUTINE TO GET NEXT TEST**"
3267  2256
3270  6775
3271  6054
3272  4022
3273  0524
3274  2522
3275  1640
3276  2417
3277  4004
3300  1123
3301  2001
3302  2403
3303  1040
3304  2217
3305  2524
3306  1116
3307  0540
3310  2417
3311  4007
3312  0524
3313  4016
3314  0530
3315  2440
3316  2405
3317  2324
3320  3736
3321  0000

3322  3736    MSG5,   TEXT    "**SELECT TEST**"
3323  2305
3324  1405
3325  0324
3326  4024
3327  0523
3330  2437
3331  3600

3332  3736    MSG6,   TEXT    "**DC CALIBRATION TEST**"
3333  0403
3334  4003
3335  0114
3336  1102
3337  2201
3340  2411
3341  1716
3342  4024
3343  0523
3344  2437
3345  3600
```

```
3346  3736    MSG7,   TEXT    "++RAMP TEST++"
3347  2201
3350  1520
3351  4024
3352  0523
3353  2437
3354  3600

3355  3736    MSG8,   TEXT    "++CONTROL LOGIC TEST++"
3356  0317
3357  1624
3360  2217
3361  1440
3362  1417
3363  0711
3364  0340
3365  2405
3366  2324
3367  3736
3370  0000
3371  3736    MSG9,   TEXT    "++VERTICAL FLYBACK++"
3372  2605
3373  2224
3374  1103
3375  0114
3376  4006
3377  1431
3400  0201
3401  0313
3402  3736
3403  0000

3404  3736    MSG10,  TEXT    "++HORIZONTAL FLYBACK++"
3405  1017
3406  2211
3407  3217
3410  1624
3411  0114
3412  4006
3413  1431
3414  0201
3415  0313
3416  3736
3417  0000

3420  3736    MSG11,  TEXT    "++CORNERS TEST++"
3421  0317
3422  2216
3423  0522
3424  2340
3425  2405
3426  2324
3427  3736
3430  0000
```

```
3431  3736    MSG12,  TEXT    "**VERTICAL BAR TEST**"
3432  2605
3433  2224
3434  1133
3435  0114
3436  4002
3437  0122
3440  4024
3441  0523
3442  2437
3443  3600

3444  3736    MSG13,  TEXT    "**HORIZONTAL BAR TEST**"
3445  1017
3446  2211
3447  3217
3450  1624
3451  0114
3452  4002
3453  0122
3454  4024
3455  0523
3456  2437
3457  3600

3460  3736    MSG14,  TEXT    "**SINGLE POINT PLOT TEST**"
3461  2311
3462  1607
3463  1405
3464  4020
3465  1711
3466  1624
3467  4020
3470  1417
3471  2440
3472  2405
3473  2324
3474  3736
3475  0000

3476  3736    MSG15,  TEXT    "**PUT DESIRED VALUE OF X IN S,R, AND PRESS CONTINUE**"
3477  2025
3500  2440
3501  0405
3502  2311
3503  2205
3504  2440
3505  2601
3506  1425
3507  0540
3510  1706
3511  4030
3512  4011
3513  1640
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3514  2336
3515  2256
3516  4001
3517  1604
3520  4020
3521  2205
3522  2323
3523  4003
3524  1716
3525  2411
3526  1625
3527  0537
3530  3600

3531  3736     MSG14:  TEXT    "<<PUT CORRECT PATH OF FILE 5 IN JOB FILE>>"
3532  2025
3533  2440
3534  0405
3535  2311
3536  2203
3537  0440
3540  2601
3541  1425
3542  0540
3543  1706
3544  4031
3545  4011
3546  1640
3547  2336
3550  2256
3551  4001
3552  1604
3553  4020
3554  2205
3555  2323
3556  4003
3557  1716
3560  2411
3561  1625
3562  0537
3563  3600

3564  3736     MSG17:  TEXT    "<<SET SW7=1 TO LOOP IN TEST>>"
3565  2305
3566  2440
3567  2327
3570  6775
3571  6140
3572  2417
3573  4014
3574  1717
3575  2040
3576  1116
3577  4024
3600  0523
```

```
3601  2400

3602  3736    MSG18,  TEXT    "**SET SW7=0 TO PLOT POINT DATE, PRESS CONTINUE**"
3603  2305
3604  2440
3605  2327
3606  6775
3607  6040
3610  2417
3611  4020
3612  1417
3613  2440
3614  2017
3615  1116
3616  2440
3617  1716
3620  0305
3621  5440
3622  2022
3623  0523
3624  2340
3625  0317
3626  1624
3627  1116
3630  2505
3631  3736
3632  0000

3633  3736    MSG19,  TEXT    "**DIAGONALS**"
3634  0411
3635  2107
3636  1716
3637  0114
3640  2337
3641  3600

3642  3736    MSG20,  TEXT    "**CROSSING DIAGONALS**"
3643  0322
3644  1723
3645  2311
3646  1607
3647  4004
3650  1101
3651  0717
3652  1601
3653  1423
3654  3736
3655  0000

3656  3736    MSG21,  TEXT    "**DISPLAYED CALIBRATION TEST**"
3657  0411
3660  2320
3661  1401
3662  3105
3663  0440
```

```
3664  0301
3665  1411
3666  2222
3667  2124
3670  1117
3671  1640
3672  2405
3673  2324
3674  3736
3675  0000
```

```
                    //CONTROL LOGIC ERROR MESSAGES//

3676  3736    EMSG1,  TEXT    "**CLT1-DILE FAILED TO CLEAR AC**"
3677  0314
3700  2461
3701  5504
3702  1114
3703  0540
3704  0601
3705  1114
3706  0504
3707  4024
3710  1740
3711  0314
3712  0501
3713  2240
3714  0103
3715  3736
3716  0000

3717  3736    EMSG1A, TEXT    "**CLT1A-CHANNEL F/F NOT SET OR NOT READ BACK**"
3720  0314
3721  2461
3722  0155
3723  0310
3724  0116
3725  1605
3726  1440
3727  0657
3730  0640
3731  1617
3732  2440
3733  2305
3734  2440
3735  1722
3736  4016
3737  1724
3740  4022
3741  0501
3742  0440
3743  0201
3744  0313
3745  3736
3746  0000

3747  3736    EMSG1B, TEXT    "**CLT1B-INTERRUPT ENABLE NOT SET OR NOT READ BACK**"
3750  0314
3751  2461
3752  0255
3753  1116
3754  2405
3755  2222
3756  2520
3757  2440
```

```
3760  0516
3761  0102
3762  1405
3763  4016
3764  1724
3765  4023
3766  0524
3767  4017
3770  2240
3771  1617
3772  2440
3773  2205
3774  0104
3775  4002
3776  0103
3777  1337
4000  3600

4001  3736    EMSG1C, TEXT    "**CLT1C-CHANNEL F/F NOT SET OR NOT READ BACK**"
4002  0314
4003  2461
4004  0355
4005  0310
4006  0116
4007  1605
4010  1440
4011  0657
4012  0640
4013  1617
4014  2440
4015  2305
4016  2440
4017  1722
4020  4016
4021  1724
4022  4022
4023  0501
4024  0440
4025  0201
4026  0313
4027  3736
4030  0000

4031  3736    EMSG2,  TEXT    "**CLT2-DILE FAILED TO CLEAR ENABLE REGISTER**"
4032  0314
4033  2462
4034  5504
4035  1114
4036  0540
4037  0601
4040  1114
4041  0504
4042  4024
4043  1740
4044  0314
```

```
4045  0501
4046  2240
4047  0516
4050  0102
4051  1405
4052  4022
4053  0507
4054  1123
4055  2405
4056  2237
4057  3600

4060  3736    EMSG3,  TEXT    "-*CLT3-DILX FAILED TO SET DONE OR CLEARED AC-*"
4061  0314
4062  2463
4063  5504
4064  1114
4065  3040
4066  0501
4067  1114
4070  0504
4071  4024
4072  1740
4073  2305
4074  2440
4075  0417
4076  1605
4077  4017
4100  2240
4101  0314
4102  0501
4103  2205
4104  0440
4105  0103
4106  3736
4107  0000

4110  3736    EMSG4,  TEXT    "-*CLT4-DILY FAILED TO SET DONE OR CLEARED AC-*"
4111  0314
4112  2464
4113  5504
4114  1114
4115  3140
4116  0601
4117  1114
4120  0504
4121  4024
4122  1740
4123  2305
4124  2440
4125  0417
4126  1605
4127  4017
4130  2240
4131  0314
```

```
4132  0501
4133  2205
4134  0440
4135  0103
4136  3736
4137  0000

4140  3736    EMSG5,  TEXT    "**CLT5-DIXY FAILED TO SET DONE**"
4141  0314
4142  2465
4143  5504
4144  1130
4145  3140
4146  0601
4147  1114
4150  0504
4151  4024
4152  1740
4153  2305
4154  2440
4155  0417
4156  1605
4157  3736
4160  0000

4161  3736    EMSG6,  TEXT    "**CLT6-DICO FAILED TO CLEAR DONE FLAG**"
4162  0314
4163  2466
4164  5504
4165  1103
4166  0440
4167  0601
4170  1114
4171  0504
4172  4024
4173  1740
4174  0314
4175  0501
4176  2240
4177  0417
4200  1605
4201  4006
4202  1401
4203  0737
4204  3600

4205  3736    EMSG7,  TEXT    "**CLT7-DISD FAILED TO SKIP ON DONE FLAG OR CLRD FLAG**"
4206  0314
4207  2467
4210  5504
4211  1123
4212  0440
4213  0601
4214  1114
4215  0504
```

```
4216  4024
4217  1740
4220  2313
4221  1120
4222  4017
4223  1540
4224  0417
4225  1605
4226  4006
4227  1401
4230  0740
4231  1722
4232  4003
4233  1422
4234  0440
4235  0614
4236  0737
4237  3600

4240  3736    EMSG8,  TEXT    "**CLT8-ILLEGAL INT. CAUSED BY INT. ENABLE**"
4241  0314
4242  2470
4243  5511
4244  1414
4245  0507
4246  0114
4247  4011
4250  1624
4251  5640
4252  0301
4253  2523
4254  0504
4255  4002
4256  3140
4257  1116
4260  2456
4261  4005
4262  1631
4263  0214
4264  0537
4265  3600

4266  3736    EMSG9,  TEXT    "**CLT9-ILLEGAL INT. CAUSED BY DONE FLAG**"
4267  0314
4270  2471
4271  5511
4272  1414
4273  0507
4274  0114
4275  4011
4276  1624
4277  5640
4300  0301
4301  2523
4302  0504
```

```
4303  4002
4304  3140
4305  0417
4306  1605
4307  4006
4310  1401
4311  0737
4312  3600

4313  3736    EMSG10, TEXT    "**CLT10-INT, ENABLE AND DONE FLG DID NOT INTERRUPT**"
4314  0314
4315  2461
4316  6055
4317  1116
4320  2456
4321  4005
4322  1601
4323  0214
4324  0540
4325  0116
4326  0440
4327  0417
4330  1605
4331  4006
4332  1407
4333  4004
4334  1104
4335  4016
4336  1724
4337  4011
4340  1624
4341  0522
4342  2225
4343  2024
4344  3736
4345  0000

4346  3736    EMSG11, TEXT    "**CLT11-DILX FAILED TO CLEAR DONE**"
4347  0314
4350  2461
4351  6155
4352  0411
4353  1430
4354  4006
4355  0111
4356  1405
4357  0440
4360  2417
4361  4003
4362  1405
4363  0122
4364  4004
4365  1716
4366  0537
4367  3600
```

4370	3346	CHECK: TCPT ***VOLTI-VOLT FAILED TO CLEAR [illegible]
4371	3314	
4372	2451	
4373	6253	
4374	6411	
4375	1431	
4376	4006	
4377	0111	
4400	1402	
4401	0440	
4402	2417	
4403	4003	
4404	1402	
4405	0122	
4406	4004	
4407	1716	
4410	0537	
4411	3600	

4600 PAGE

```
4600  0000   MESAGE, 0                          /MESSAGE TYPE-OUT ROUTINE
4601  7240           CLA CMA
4602  1600           TAD I    MESAGE
4603  3010           DCA      10
4604  2200           ISZ      MESAGE
4605  1410           TAD I    10
4606  3217           DCA      MSRGHT
4607  1217           TAD      MSRGHT
4610  7012           RTR
4611  7012           RTR
4612  7012           RTR
4613  4220           JMS      TYPECH
4614  1217           TAD      MSRGHT
4615  4220           JMS      TYPECH
4616  5205           JMP      MESAGE+5
4617  0000   MSRGHT, 0
4620  0000   TYPECH, 0
4621  0252           AND      MASK77
4622  7450           SNA
4623  5600           JMP I    MESAGE
4624  1253           TAD      M40
4625  7510           SPA
4626  5231           JMP      .+3
4627  1254           TAD      C240
4630  5244           JMP      MTP
4631  7001           IAC
4632  7440           SZA
4633  5236           JMP      .+3
4634  1255           TAD      C215
4635  5244           JMP      MTP
4636  7001           IAC
4637  7440           SZA
4640  5243           JMP      .+3
4641  1256           TAD      C212
4642  5244           JMP      MTP
4643  1257           TAD      C336
4644  6046   MTP,    TLS
4645  6041           TSF
4646  5245           JMP      .-1
4647  6042           TCF
4650  7200           CLA
4651  5620           JMP I    TYPECH
4652  0077   MASK77, 77
4653  7740   M40,    -40
4654  0240   C240,   240
4655  0215   C215,   215
4656  0212   C212,   212
4657  0336   C336,   336
```

```
4662  0481     [illegible]  *
4663  0000                  *0
4664  7240                  CLA CMA
4665  1275                  TAD      MASKBC
4666  3010                  DCA      LP
4667  1410                  TAD I    LP
4668  3077                  DCA      MSRCT
4669  1377                  TAD      MSRCT
4670  7012                  RTR
4671  7012                  RTR
4672  7012                  RTR
4673  4300                  JMS      TYPEC
4674  1377                  TAD      MSRCT
4675  4300                  JMS      TYPEC
4676  5265                  JMP      MASACK
4677  0000     MSRCT,       0
4700  0000     TYPEC,       *
4701  0292                  AND      MASKT
4702  7450                  SNA
4703  5410                  JMP I    LP
4704  1293                  TAD      MAW
4705  7010                  SPA
4706  5311                  JMP      .+3
4707  1254                  TAD      S240
4710  5324                  JMP      MTPA
4711  7001                  IAC
4712  7440                  SZA
4713  5316                  JMP      .+3
4714  1255                  TAD      S215
4715  5324                  JMP      MTPA
4716  7001                  IAC
4717  7440                  SZA
4720  5323                  JMP      .+3
4721  1256                  TAD      S240
4722  5324                  JMP      MTPA
4723  1257                  TAD      S330
4724  6046     MTPA,        TLS
4725  6041                  TSF
4726  5325                  JMP      .-1
4727  6042                  TCF
4730  7200                  CLA
4731  5700                  JMP I    TYPEC

                            $

0171  4400
0172  0200
0173  7777
0174  0002
0175  0400
0176  0020
0177  5003
```

/VCBE PLANT PLOT DISPLAY DIAGNOSTIC PAL1M V141 17-AUG-78 9:10 PAGE 0001

0000	01111100	00000000	11111111	11111111	11111111	11111111	11111111	11111111
0100	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
0200	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
0300	11111111	11111111	00000000	00000000	00000000	00000000	00000000	00000000
0400	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
0500	11111000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
0600	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
0700	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
1000	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
1100	11111111	11111111	11111111	11111111	00000000	00000000	00000000	00000000
1200	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
1300	11111111	00000000	00000000	00000000	00000000	00000000	00000000	00000000
1400	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
1500	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
1600	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
1700	11111111	00000000	00000000	00000000	00000000	00000000	00000000	00000000
2000	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
2100	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
2200	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
2300	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
2400	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
2500	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
2600	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
2700	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
3000	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
3100	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
3200	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
3300	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
3400	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
3500	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
3600	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
3700	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111

5000
5100

5200
5300

5400
5500

5600
5700

5800
5900

6000
6100

6200
6300

6400
6500

6600
6700

7000
7100

7200
7300

7400
7500

7600
7700

C212	4654	DISP3	2462	MSG12	[illegible]
C215	4653	DISP5	2417	MSG14	[illegible]
C246	4664	DISP4	2435	MSG15	[illegible]
C338	4627	DISPAT	2216	MSG16	[illegible]
CAF	4407	DISRET	0408	[illegible]	[illegible]
CALCNT	0455	DISTST	[illegible]	[illegible]	[illegible]
CALIB	2403	DIXY	4109	[illegible]	[illegible]
CALSUM	3088	EMSG1	2075	[illegible]	[illegible]
CALTST	3188	EMSG10	4313	[illegible]	[illegible]
CALX	0415	EMSG11	4346	[illegible]	[illegible]
CALY	0412	EMSG12	4373	[illegible]	[illegible]
CRPAT	2636	EMSG13	[illegible]	[illegible]	[illegible]
CLT1	2011	EMSG18	2767	[illegible]	[illegible]
CLT1D	1221	EMSG16	[illegible]	[illegible]	[illegible]
CLT1I	1242	EMSG2	[illegible]	[illegible]	[illegible]
CLT11A	1250	EMSG3	1852	[illegible]	[illegible]
CLT12	1263	EMSG4	4114	[illegible]	[illegible]
CLT12A	1273	EMSG5	4140	[illegible]	[illegible]
CLT14	2624	EMSG6	3161	[illegible]	[illegible]
CLT18	0641	EMSGT	[illegible]	[illegible]	[illegible]
CLT1C	0656	EMSG9	4742	[illegible]	[illegible]
CLT2	2678	ENSG9	4266	[illegible]	[illegible]
CLT3	6713	ERRY	3125	[illegible]	[illegible]
CLT4	1001	[illegible]	[illegible]	[illegible]	[illegible]
CLT5	1035	[illegible]	[illegible]	[illegible]	[illegible]
CLT6	1531	[illegible]	[illegible]	[illegible]	[illegible]
CLT7	1365	[illegible]	[illegible]	[illegible]	[illegible]
CLT8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
CLT9	1241	[illegible]	[illegible]	[illegible]	[illegible]
CLTST	2668	[illegible]	[illegible]	[illegible]	[illegible]
COARSE6	1884	[illegible]	[illegible]	[illegible]	[illegible]
CORTXY	2688	[illegible]	[illegible]	[illegible]	[illegible]
CROTXT	2488	[illegible]	[illegible]	[illegible]	[illegible]
CRTXT	2808	MESCNT	2455	[illegible]	[illegible]
DELAY	2824	MORTLY	[illegible]	[illegible]	[illegible]
DIABIS	2994	MOHTST	[illegible]	[illegible]	[illegible]
DIACNT	2837	MORTSI	[illegible]	[illegible]	[illegible]
DIAG1	2888	[illegible]	[illegible]	[illegible]	[illegible]
DIAG1A	2898	[illegible]	[illegible]	[illegible]	[illegible]
DIAG2	2688	[illegible]	[illegible]	[illegible]	[illegible]
DIAG2A	2705	MASAGE	4663	[illegible]	[illegible]
DICO	4134	MASK77	4692	[illegible]	[illegible]
DICL	4138	MASKA	3071	[illegible]	[illegible]
DILS	4161	MASKB	3072	[illegible]	[illegible]
DILX	4145	MASKC	3073	[illegible]	[illegible]
DILY	4151	MASKD	3074	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
DISCAL	2245	MLOT	0321	SECHOR	[illegible]
DISD	4140	MLINE	2414	SETIST	[illegible]
DISLOP	2285	MSC1	3288	SETUP	[illegible]
DISMSG	0213	MSC10	3484	SETVER	2688
DISP1	2444	MSC11	3485	SINPAT	[illegible]

ERRORS DETECTED: 0

LINKS GENERATED: 85

RUN-TIME: 14 SECONDS

3K CORE USED