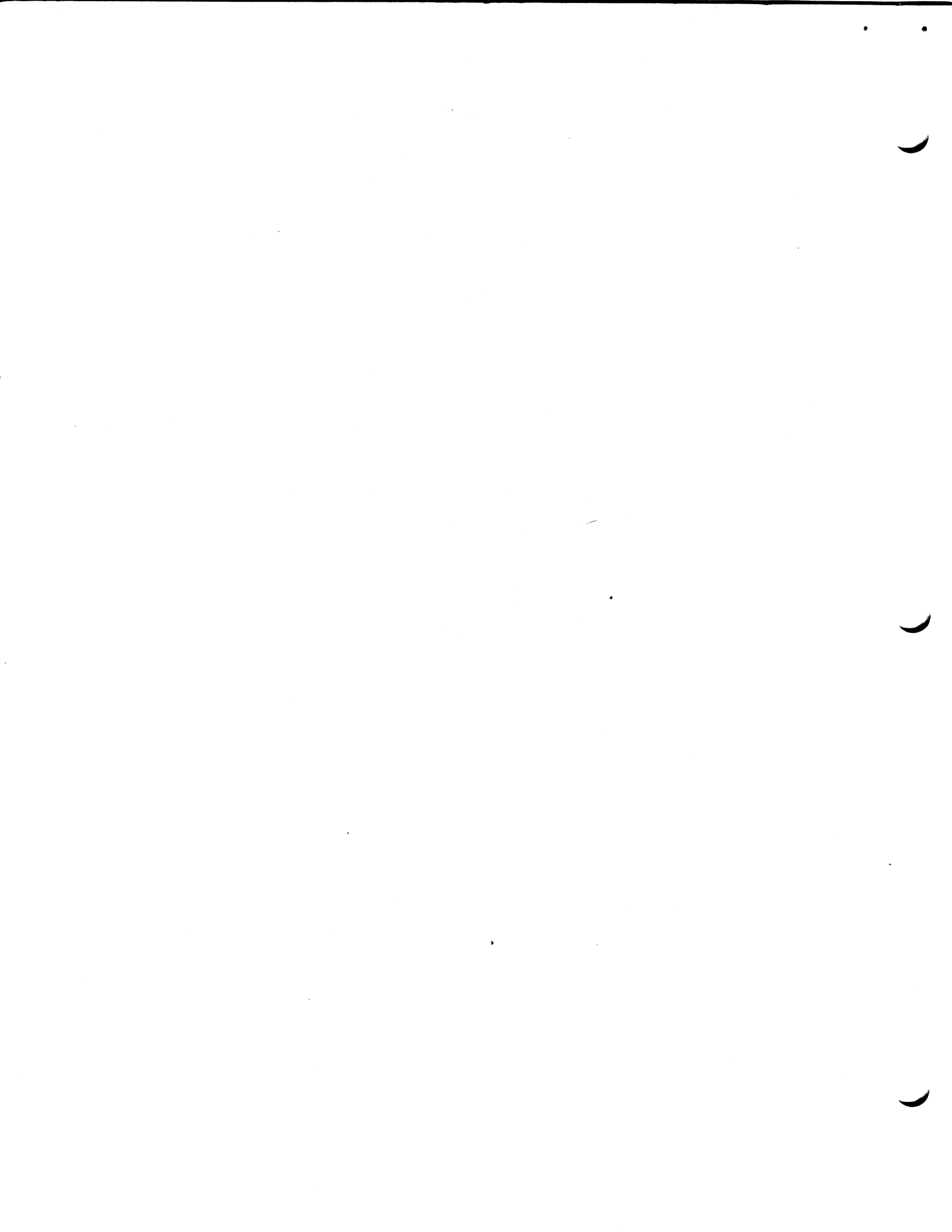


IDENTIFICATION

PRODUCT CODE	MAINDEC-08-DHVCA-A-D REPLACES: MAINDEC-8E-D6CB
PRODUCT NAME	VC-8E DISPLAY DIAGNOSTIC
DATE CREATED	MARCH 1, 1973
MAINTAINER	DIAGNOSTIC GROUP
AUTHOR	RAYMOND SHOOP

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## 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

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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, VR-20, VR03A, 611, 613 OR EQUIVALENT DISPLAY

#### STORAGE

\*\*\*\*\*

THE PROGRAM OCCUPIES MEMORY LOCATIONS 0000 TO 6000

### 3. LOADING PROCEDURE

LOAD PROGRAM VIA BINARY LOADER.

4. STARTING PROCEDURE

CONTROL SWITCH SETTING

SWITCH REGISTER	SET AS	ACTION ON PROGRAM
0	1 0	PROCEED TO NEXT CALIBRATE BIT.
1	1 0	Y AXIS X AXIS
2	1 0	VR03A VR14
3	1 0	VR14 CHANNEL 2 VR14 CHANNEL 1
4	1 0	EXIT SCOPE LOOP HANG IN SCOPE LOOP
5	1 0	(CONTROL LOGIC TEST) 611/613 CONNECTED 611/613 NOT CONNECTED
5	1 0	(DIAGONAL LINE TEST) PLOT UL TO LR DIAGONAL PLOT LL TO UR DIAGONAL
5	1 0	(VERTICAL OR HORIZONTAL BAR TEST) HALT LINE MOVEMENT CONTINUE LINE MOVEMENT
5	1 0	(COLOR/STORAGE LOGIC TEST) 611/613 NOT CONNECTED 611/613 CONNECTED
5	1 0	(store write-thru mode test) WRITE-THRU MODE STORE MODE
6	1 0	SELECT 615X IOT SELECT 605X IOT
7	1 0	PERFORM TEST SELECTED BY SWITCHES 8-11. RETURN/STAY IN DISPATCH ROUTINE.
8	CONTAINS NUMBER OF TEST	
9	TO BE EXECUTED;	
10	(REFER TO TEST SELECTION TABLE)	
11		

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 JUMPER. 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)	COLOR AND STORAGE LOGIC TEST (VR20,611,613)
1110 (16)	STORE AND WRITE-THRU MODE (611,613)
1111 (17)	COLOR ALIGNMENT TEST (VR-20)

5. ERRORS  
-----

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

AN ERROR OCCURRING 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  
-----

PROGRAM MAY BE RESTARTED FROM LOCATION 200 AT ANY TIME. ON THE VR20 THE REMOTE/RED/GREEN SWITCH MUST BE IN THE REMOTE POSITION.

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 D7A MODULE. REFER TO THE INDIVIDUAL TEST DESCRIPTION FOR MORE DETAILED INFORMATION ON EACH TEST.

ANY SYSTEM EQUIPPED WITH A VR-14/20 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-14/20 CHANNEL ONE OR TWO UNDER CONTROL OF SW3.

SW3=0, SELECTS CHANNEL 1.

SW3=1, SELECTS CHANNEL 2.

ANY SYSTEM EQUIPPED WITH A VR-20 DISPLAY SHOULD BE CHECKED IN THE REMOTE COLOR SWITCH POSITION.

## CONTROL LOGIC TEST

-----  
THIS TEST EXERCISES THE CONTROL LOGIC PORTION OF THE VC8E. IT IS DIVIDED UP INTO 15 SUB-TESTS. 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 (M869), 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. THERE IS ALSO A JUMPER (611/613 - VR14/20) FOR DELAY TIMING. THESE SWITCHES ARE SET IN THE FOLLOWING MANNER:

SWITCH NAME	POSITION	DISPLAY
Z	-	VR-14/20
	+	VR03A
	+	611/613
DELAY	L	VR-14/20
	L	611/613
	S	VR03A

SWITCH 2 SHOULD BE SET PRIOR TO ENTERING THE CONTROL LOGIC TEST TO SELECT EITHER A VR-14 OR VR03A MODE OF OPERATION.

SW2=0, SELECTS VR-14/20

SW2=1, SELECTS VR03A

SW5=1, SELECTS 611/613 STORAGE SCOPE

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.

## RAMP TEST

-----  
THIS TEST GENERATES A SAWTOOTH PATTERN AT THE X OR Y DAC OUTPUTS (DEPENDING ON THE SETTING OF SW1). TO OBSERVE THIS PATTERN IT IS NECESSARY TO HANG 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 SW8-11 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  
1777



#### 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 OF 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 OVERLAPPED 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

-----  
0000  
0001  
0003  
0007  
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,

#### VERTICAL 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 IT'S 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.

#### HORIZONTAL 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.

#### COLOR/STORAGE LOGIC TEST

-----  
THIS TEST EXERCISES THE COLOR/STORAGE LOGIC PORTION OF THE VCOE. IT IS DIVIDED UP INTO 8 SUB-TESTS AND IS SIMILAR TO THE CONTROL LOGIC TEST SEQUENCE. IN THIS TEST, SW5 IS USED TO INDICATE A STORAGE SCOPE (611/613) IS CONNECTED.

#### STORE AND WRITE-THRU MODE TEST (611/613)

-----  
THIS TEST AIDS IN THE ADJUSTMENT OF THE INTENSITY LEVELS ON THE 611/613 SCOPE. THE PROGRAM USES SW5 TO SELECT BETWEEN STORE AND WRITE-THRU MODE. WHEN SW5=0 INDICATES STORE MODE, THEREFORE INTENSITY LEVEL AND OPERATING LEVEL SHOULD BE ADJUSTED TO A LEVEL OF STORING THE DISPLAYED DATA. THEN PROPERLY ADJUSTED, THE TEST WILL ALSO SERVE AS A PHOSPHOR TEST FOR BURN SPOTS ON THE SCREEN. SW5=1 INDICATES WRITE-THRU MODE, THEREFORE WRITE-THRU LEVEL SHOULD BE ADJUSTED TO A LEVEL OF NOT STORING THE DISPLAY DATA.

#### COLOR ALIGNMENT TEST

-----  
THIS TEST AIDS IN THE ADJUSTMENT OF THE COMPENSATION GAIN AMPLIFIER IN THE VR20 SCOPE. THE PATTERN USED FOR THIS ADJUSTMENT IS A RECTANGLE WITH A 'X' IN THE CENTER OF THE SCREEN. THE TESTS PLOTS THIS PATTERN IN ALTERNATING RED AND GREEN COLORS. THE COMPENSATION GAIN AMPLIFIER SHOULD BE ADJUSTED FOR THE BEST FIT OF THE COLOR OVERLAY. WHEN PROPERLY ADJUSTED BOTH PATTERNS SHOULD OVERLAY AND PRODUCE A MIXTURE OF THE TWO COLORS (ORANGE DISPLAY PATTERN).

8.

#### LISTING

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/MAINDEC-08-DHVCA-A VC8E POINT PLOT DISPLAY DIAGNOSTIC  
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//INSTRUCTION EQUALITIES//

4125	DICL=JMS	XDICL	/CLEAR ENABLES, FLAGS, DELAYS.
4131	DICD=JMS	XDICD	/CLEAR DONE FLAG.
4135	DISD=JMS	XDISD	/SKIP ON DONE FLAG, DO NOT CLEAR FLAG.
4142	DILX=JMS	XDILX	/CLEAR DONE FLAG, LOAD X, WAIT FOR SETTLE, /SET DONE, DO NOT CLEAR AC.
4146	DILY=JMS	XDILY	/CLEAR DONE FLAG, LOAD Y, WAIT FOR SETTLE, /SET DONE, DO NOT CLEAR AC.
4152	DIXY=JMS	XDIXY	/CLEAR DONE FLAG, INTENSIFY, SET DONE.
4156	DILE=JMS	XDILE	/LOAD ENABLE REGISTER, CLEAR AC.
4162	DIRE=JMS	XDIRE	/TRANSFER ENABLE TO AC.
4025	SETUP=JMS	PRESET	
4076	ERROR=JMS	FAIL	
6007	CAF=6007		
7402	XX=7402		

```

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

0020 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 ERSHIT
0030 1177 TAD (5000
0031 3005 DCA TALLY
0032 4036 JMS CKSH7
0033 2035 ISB MSGPNT
0034 5425 JMP I PRESET

//ERROR MESSAGE POINTER//
0035 0037 MSGPNT, ERRMSG

//ROUTINE TO CHECK LOOP BIT, S'R,??
0036 0000 CKSH7, 0
0037 7604 LAS /GET S'R,
0040 0176 AND (20 /GET S'R,
0041 7650 SNA CLA /MASK BIT 9
0042 5420 JMP I DISRET /YES, RETURN TO DISPATCH
0043 5436 JMP I CKSH7 /NO, LOOP IN CURRENT TEST

//ROUTINE TO SELECT CHANNEL FOR VRI??
0044 0000 SELCHN, 0
0045 7604 LAS /GET S'R,
0046 0175 AND (0400 /MASK BIT 3
0047 7640 SZA CLA /SW 30
0050 1174 TAD (0002 /0, SELECT CHANNEL 1
0051 4136 DILE /1, SELECT CHANNEL 2
0052 5444 JMP I SELCHN

```

```

//SUBROUTINE CONTAINING IOT TO BE EXECUTED?
//
0053 0000 IOTT, 0
0054 7000 7000 /MODIFIED TO CONTAIN IOT
0055 7000 7000
0056 5493 JMP I IOTT

//ERROR MESSAGE LINKS//
0057 4340 ERRMSG, EMSG1
0060 4401 EMSG1A
0061 4431 EMSG1B
0062 4463 EMSG1C
0063 4513 EMSG2
0064 4542 EMSG3
0065 4572 EMSG4
0066 4622 EMSG5
0067 4643 EMSG6
0070 4667 EMSG7
0071 4722 EMSG8
0072 4750 EMSG9
0073 4775 EMSG10
0074 5030 EMSG11
0075 5052 EMSG12

//SUBROUTINE TO HANDLE ERROR-SCOPE LOOPING?
0076 0000 FAIL, 0
0077 7200 CLA
0100 1004 TAD ERSHIT
0101 7650 SNA CLA
0102 4117 JMS ERTYPE
0103 1173 TAD (7777
0104 3004 DCA ERSHIT
0105 1476 TAD I FAIL
0106 3023 DCA GETBAK
0107 2076 ISB FAIL
0110 1476 TAD I FAIL
0111 3022 DCA NXTST
0112 7604 LAS
0113 0172 AND (0200
0114 7650 SNA CLA
0115 5423 JMP I GETBAK
0116 5422 JMP I NXTST

//ERROR TYPEOUT SUBROUTINE?
0117 0000 ERTYPE, 0
0120 1435 TAD I MSGPNT
0121 3123 DCA EOUT
0122 4771 JMS MESSAGE
0123 7402 HLT
0124 5517 JMP I ERTYPE

```

```

//IOT SUBROUTINES//
//
0125 0000 XDICL, 0
0126 6050 RDICL, 6050 /CLEAR ENABLES, FLAGS, DELAYS;
0127 5525 JMP I XDICL
0130 7402 HLT

0131 0000 XDICD, 0
0132 6051 RDICD, 6051 /CLEAR DONE FLAG;
0133 5531 JMP I XDICD
0134 7402 HLT

0135 0000 XDISD, 0
0136 6052 RDISD, 6052 /SKIP ON DONE FLAG;
0137 7410 SKP
0140 2135 ISX XDISD
0141 5535 JMP I XDISD

0142 0000 XDILX, 0
0143 6053 RDILX, 6053 /LOAD X BUFFER;
0144 5542 JMP I XDILX
0145 7402 HLT
0146 0000 XDILY, 0
0147 6054 RDILY, 6054 /LOAD Y BUFFER;
0150 5546 JMP I XDILY
0151 7402 HLT

0152 0000 XDIXY, 0
0153 6055 RDIXY, 6055 /INTENSIFY;
0154 5552 JMP I XDIXY
0155 7402 HLT

0156 0000 XDILE, 0
0157 6056 RDILE, 6056 /LOAD ENABLE REGISTER;
0160 5556 JMP I XDILE
0161 7402 HLT

0162 0000 XDIRE, 0
0163 6057 RDIRE, 6057 /TRANSFER ENABLE TO AC;
0164 5562 JMP I XDIRE
0165 7402 HLT

0166 1703 SETSIZ, STSIZ
0167 5600 AMSAG, MESSAGE
    
```

```

0200 0200 *200
0201 6007 START, CAF
0202 2255 ISX TITLE
0203 5213 JMP DISMSG
0204 4777 JMS MESSAGE
0205 3600 MSG1
0206 4777 JMS MESSAGE
0207 3624 MSG2
0208 4777 JMS MESSAGE
0210 3640 MSG3
0211 4777 JMS MESSAGE
0212 3670 MSG4

0213 6007 DISMSG, CAF
0214 4777 JMS MESSAGE
0215 3724 MSG5

//MASTER DISPATCH ROUTINE FOR TEST SELECTION??
//
0216 7300 DISPATCH, CLA CLL
0217 7604 LAS /GET SWITCHES;
0220 0376 AND (0040 /MASK SW4
0221 7104 CLL RAL
0222 3321 DCA MIO? /SETUP IOT MODIFIER;
0223 4256 JMS SETIOT /GOTO IOT MODIFY ROUTINE;
0224 7604 LAS /GET SWITCHES;
0225 0375 AND (20 /MASK TO CHECK S,R,7
0226 7430 SNA /SW7=0?
0227 5230 JMP DISPATCH /YES, LOOP
0230 7604 LAS /NO, PICK UP TEST NUMBER
0231 0374 AND (1? /MASK FOR S,R,8=1
0232 1373 TAD (JMP I TEST+1 /SETUP TEST SELECTED;
0233 3234 DCA TEST

0234 0000 TEST, 0
0235 0213 DISMSG /S,R,00, NO TEST
0236 0600 CLTST /S,R,01, CONTROL LOGIC TEST
0237 0487 RHPTST /S,R,02, RAMP TEST
0240 2400 CALTST /S,R,03, DO CALIBRATION TEST
0241 2242 DISTST /S,R,04, DISPLAYED CALIBRATION TEST
0242 2400 CROTST /S,R,05, CROSSING DIAGONALS TEST
0243 1400 HORTST /S,R,06, HORIZONTAL PLYBACK TEST
0244 1434 VERTST /S,R,07, VERTICAL PLYBACK TEST
0245 1600 CORTST /S,R,08, CORNERS TEST
0246 2000 DBTST /S,R,09, DIAGONAL LINE TEST
0247 2023 VRBTST /S,R,10, VERTICAL BAR TEST
0250 2097 WRBTST /S,R,11, HORIZONTAL BAR TEST
0251 2200 PNTST /S,R,12, SINGLE POINT PLOT TEST
0252 3013 COLOR /S,R,13, COLOR/STORAGE LOGIC TEST
0253 3274 PHOER /S,R,14, STORE AND WRITE-THRU MODE TEST
0254 2740 ADJCOL /S,R,15, COLOR ALIGNMENT

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

```

//ROUTINE TO MODIFY ALL 107'S//
//
0256 0000 SETIOT, 0
0257 1126 TAD RDICL
0260 0320 AND K7077
0261 1321 TAD MIOT
0262 3126 DCA RDICL
0263 1132 TAD RDICD
0264 0320 AND K7077
0265 1321 TAD MIOT
0266 3132 DCA RDICD
0267 1136 TAD RDISD
0270 0320 AND K7077
0271 1321 TAD MIOT
0272 3136 DCA RDISD
0273 1143 TAD RDILX
0274 0320 AND K7077
0275 1321 TAD MIOT
0276 3143 DCA RDILX
0277 1147 TAD RDILY
0300 0320 AND K7077
0301 1321 TAD MIOT
0302 3147 DCA RDILY
0303 1193 TAD RDIXY
0304 0320 AND K7077
0305 1321 TAD MIOT
0306 3193 DCA RDIXY
0307 1197 TAD RDILE
0310 0320 AND K7077
0311 1321 TAD MIOT
0312 3197 DCA RDILE
0313 1143 TAD RDIRE
0314 0320 AND K7077
0315 1321 TAD MIOT
0316 3143 DCA RDIRE
0317 5656 JMP I SETIOT

0320 7077 K7077, 7077
0321 0000 MIOT, 0
0322 0000 SIZE, 0
0323 0001 RSIZE, 1
0324 7777 MSIZE, -1

0373 5635
0374 0017
0375 0020
0376 0040
0377 5600
0400

```

PAGE

```

//DC CALIBRATION ROUTINE//
//
0400 6007 CALTST, CAP
0401 4777 JMS MESSAGE
0402 3734 MSG6
0403 7200 CALIB, CLA
0404 1376 TAD (-00 /INITIALIZE
0405 3255 DCA CALCNT /COUNTER
0406 7604 LAS /GET S,R
0407 0375 AND (2000 /CHECK SW1
0410 7650 SNA CLA /TO DETERMINE X OR Y AXIS
0411 5215 JMP CALX /GOTO X AXIS SETUP
0412 1374 CALY, TAD (DLY /SETUP Y AXIS
0413 3054 DCA 1077+1 /SAVE Y IOT
0414 5217 JMP GETVAL /GOTO BEGIN OF CAL ROUTINE
0415 1373 CALX, TAD (DILX /SETUP X AXIS
0416 3054 DCA 1077+1 /SAVE X IOT
0417 1372 GETVAL, TAD (TABLE /INITIALIZE POINTER
0420 3256 DCA PNTR1 /FOR CALIBRATION PTRUP
0421 1656 UPDVAL, TAD I PNTR1 /PICKUP CAL VALUE
0422 3053 DCA SUM1 /SAVE IT
0423 4777 JMS CALSND /OUTPUT VALUE TO TTY
0424 1003 TAD SUM1 /GET CAL VALUE AGAIN
0425 4093 JMS IOT /SEND TO DIC
0426 7402 HLT /HALT AT PRESENT CAL VALUE
0427 4036 JMS CKSW? /CHECK TEST LOOP SWITCH
0430 2256 ISE PNTR1 /INCREMENT POINTER
0431 2255 ISE CALCNT /HAS PRESENT AXIS CAL'ED OUT?
0432 5221 JMP UPDVAL /NO, GET NEXT VALUE
0433 5203 JMP CALIB /YES, RETURN TO BEGIN OF 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 1777 1777

0454 0000 SWITCH, 0
0455 0000 CALCNT, 0
0456 0000 PNTR1, 0

```

```

//RAMP TEST//
//
0457 6007  RMPTST, CAP
0460 4777/ JMS MESSAGE
0461 3750  MSG7
0462 7300  RAMP, CLA CLL
0463 7604  LAS
0464 3375  AND (2000 /PICK UP S'R;
0465 7650  SNA CLA /CHECK SW1 TO DETERMINE
0466 5272  JMP XRAMP /X OR Y AXIS
0467 1374  TAD (DILY /GOTO X AXIS SETUP
0470 3054  DCA 1077+1 /SETUP Y AXIS
0471 5274  JMP RAMP-1 /IOT
0472 1373  XRAMP, TAD (DILX /GOTO RAMP ROUTINE
0473 3054  DCA 1077+1 /SETUP X AXIS
0474 1370  TAD (1000 /IOT
0475 4053  RAMP, JMS 1077 /RAMP ORIGIN
0476 1367  TAD (1 /SETUP DAC SELECTED
0477 3303  DCA SAVIT /INCREMENT RAMP
0500 4036  JMS CK0W? /CHECK TEST LOOP SWITCH
0501 1303  TAD SAVIT
0502 5275  JMP RAMP /CONTINUE RAMP

0503 0000  SAVIT, 0

0567 0001
0570 1000
0571 3447
0572 0434
0573 4142
0574 4146
0575 2000
0576 7740
0577 5600
0600 PAGE
    
```

```

//CONTROL LOGIC TEST//
//
0600 6007  CLTST, CAP
0601 4777/ JMS MESSAGE
0602 3757  MSG8
0603 7200  CLA
0604 1376  TAD (-300
0605 3021  DCA TALLYA
/
/CHECK DATA TRANSFERS, AC AND ENABLE REGISTERS;
/
0606 4025  SETUP
0607 1375  TAD (EARRMSO
0610 3035  DCA MS0PNT
0611 7340  CLT1, CLA CLL CHA /BRING AC TO ALL ONES;
0612 4196  DILE /TRANS. TO ENABLE IND CLR AC;
0613 7650  SNA CLA
0614 5220  JMP ,+2 /AC CLEAR, CONTINUE;
0615 4076  ERROR /DILE FAILED TO CLR AC;
0616 0611  CLT1 /ERROR-SCOPE LOOP ADDRESS;
0617 2622  CLT1A=1 /NEXT TEST;
0620 2005  ISE TALLY /TEST LOOP COUNT;
0621 5211  JMP CLT1 /RETURN;
/
0622 4025  SETUP
0623 7300  CLT1A, CLA CLL
0624 1374  TAD (0002
0625 4196  DILE /SET CHANNEL FFF = 1;
0626 4142  DIRE /READ ENABLE INTO IC;
0627 0374  AND (0002 /MASK TO CHECK FOR CHANNEL = 1;
0630 7640  SZA CLA
0631 5235  JMP ,+2 /CHANNEL SET AND READ BACK;
0632 4076  ERROR /FAILED, CONL NOT SET OR NOT READ BACK;
0633 0623  CLT1A /ERROR-SCOPE LOOP ADDRESS;
0634 0637  CLT1B=1 /NEXT TEST;
0635 2005  ISE TALLY /TEST LOOP COUNT;
0636 5223  JMP CLT1A /RETURN;
/
    
```



```

0637 4025      SETUP
0640 7300      CLT1B, CLA CLL
0641 1373      TAD          (0001
0642 4156      DILE          /SET INTERRUPT ENABLE;
0643 4162      DIRE          /READ ENABLE INTO AC;
0644 0373      AND          (0001      /MASK TO CHECK FOR INT, ENABLE;
0645 7640      SZA CLA
0646 5292      JMP          +4          /INT, SET AND READ BACK;
0647 4076      ERROR        /FAILED, INT, NOT SET OR READ BACK;
0650 0640      CLT1B      /ERROR-SCOPE LOOP ADDRESS;
0651 0694      CLT1C-1    /NEXT TEST;
0652 2005      ISE          TALLY  /TEST LOOP COUNT;
0653 5240      JMP          CLT1B  /RETURN;
/
0654 4025      SETUP
0655 7300      CLT1C, CLA CLL
0656 1374      TAD          (0002
0657 4156      DILE          /SET CHANNEL;
0660 4162      DIRE          /READ ENABLE INTO AC;
0661 0374      AND          (0002      /MASK TO CHECK FOR CHANNEL BIT;
0662 7640      SZA CLA
0663 5267      JMP          +4          /CHANNEL SET AND READ BACK;
0664 4076      ERROR        /FAILED, CHNL NOT SET OR READ BACK;
0665 0635      CLT1C      /ERROR-SCOPE LOOP ADDRESS;
0666 0671      CLT2-1    /NEXT TEST;
0667 2005      ISE          TALLY  /TEST LOOP COUNT;
0670 5255      JMP          CLT1C  /RETURN;
/
/ CHECK THAT DIDL WILL CLEAR ENABLES
/
0671 4025      SETUP
0672 7300      CLT2,  CLA CLL
0673 1372      TAD          (4003
0674 4156      DILE          /SET ENABLES
0675 4125      DIDL          /CLEAR ENABLES
0676 4162      DIRE          /READ ENABLE STATUS INTO AC;
0677 7630      SNA CLA
0678 5304      JMP          +4          /ENABLES CLEARED, CONTINUE;
0679 4076      ERROR        /FAILED, ENABLES NOT CLEARED;
0680 0672      CLT2      /ERROR-SCOPE LOOP ADDRESS;
0681 0706      CLT3-1    /NEXT TEST;
0682 2005      ISE          TALLY  /TEST LOOP COUNT;
0683 5272      JMP          CLT2  /RETURN;

```

```

/
/ CHECK THAT DILX WILL SET DONE AND NOT CLEAR AC.
/
0706 4025      SETUP
0707 7340      CLT3,  CLA CLL CH1
0710 3024      DCA          DELAY  /SETUP VALUE OF
0711 7604      LAS          /DELAY FOR VR03A SCOPE;
0712 0371      AND          (1000      /GET S;R;
0713 7640      SZA CLA      /CHECK BIT 2 FOR SCOPE SELECTION;
0714 5326      JMP          CLT3B    /SW 2 = 0, SETUP FOR VR14;
0715 7604      LAS          /SW 2 = 1, SETUP FOR VR03A;
0716 0370      AND          (100      /GET SWITCHES;
0717 7650      SNA CLA      /MASK
0720 5324      JMP          CLT3A    /IS IT SET ?
0721 1376      TAD          (-800      /NO, VR14/80
0722 3024      DCA          DELAY  /YES, 611/413
0723 5326      JMP          CLT3B    /
/
0724 1367      CLT3A,  TAD          /SETUP VALUE OF
0725 3024      DCA          DELAY  /DELAY FOR VR13;
0726 7240      CLT3B,  CLA CMA  /ALL 1/S TO AC;
0727 4131      DICD          /CLEAR DONE;
0730 4142      DILX          /LOAD X BUFFER;
0731 2024      ISE          DELAY
0732 5331      JMP          +4          /WAIT;
0733 4135      DISD          /SKIP ON DBNE;
0734 7410      SKP
0735 5341      JMP          +4          /DONE SET, CONTINUE;
0736 4076      ERROR        /FAILED, DONE WAS NOT SET;
0737 0707      CLT3      /ERROR-SCOPE LOOP ADDRESS;
0740 1000      CLT4-1    /NEXT TEST;
0741 7440      SZA          /WAS AC CLEARED?
0742 5346      JMP          +4          /NO, CONTINUE;
0743 4076      ERROR        /YES, FAILED;
0744 0707      CLT3      /ERROR-SCOPE LOOP ADDRESS;
0745 1000      CLT4-1    /NEXT TEST;
0746 2005      ISE          TALLY  /TEST LOOP COUNT;
0747 5307      JMP          CLT3  /RETURN;
0750 5771      JMP          CLT4-1 /NEXT TEST;
/
0767 7762
0770 0100
0771 1000
0772 4003
0773 0001
0774 0002
0775 0057
0776 7600
0777 5600
/
PAGE
1000

```

```

/
/CHECK THAT DILY WILL SET DONE AND NOT CLEAR AB:
/
1000 4025          SETUP
1001 7340          CLT4, CLA CLL CMA          /SETUP VALUE OF
1002 3024          DCA DELAY          /DELAY FOR VR05A SCOPE;
1003 7604          LAS                /GET S,R;
1004 0377          AND (1000          /CHECK BIT 2 FOR SCOPE SELECTION;
1005 7640          SZA CLA          /S,R, 2=0, SETUP FOR VR14;
1006 5220          JMP CLT4B          /S,R, 2=1, SETUP FOR VR05A;
1007 7604          LAS                /GET SWITCHES
1010 0376          AND (100          /MASK
1011 7650          SNA CLA          /IS IT SET ?
1012 5216          JMP CLT4A          /NO, VR14/00
1013 1375          TAD (=000          /YES, 611/615
1014 3024          DCA DELAY          /
1015 5220          JMP CLT4B          /
1016 1374          CLT4A, TAD (=16          /SETUP VALUE OF
1017 3024          DCA DELAY          /DELAY FOR VR14;
1020 7240          CLT4B, CLA CMA          /ALL 1'S TO AC;
1021 4131          DICD              /CLEAR DONE;
1022 4146          DILY              /LOAD Y BUFFER;
1023 2024          ISE DELAY          /
1024 5223          JMP              /-1
1025 4135          DISD              /SKIP ON DONE;
1026 7410          SKP              /
1027 5233          JMP              /+4
1030 4076          ERROR              /DONE SET, CONTINUE;
1031 1001          CLT4              /FAILED, DONE NOT SET;
1032 1042          CLT5-1            /ERROR-SCOPE LOOP ADDRESS;
1033 7440          SZA              /NEXT TEST;
1034 5240          JMP              /+4
1035 4076          ERROR              /WAS AC CLEARED?
1036 1001          CLT4              /NO, CONTINUE;
1037 1042          CLT5-1            /YES, FAILED;
1040 2005          ISE TALLY          /ERROR-SCOPE LOOP ADDRESS;
1041 5201          JMP CLT4          /NEXT TEST;
/                                     /TEST LOOP COUNT;
/                                     /RETURN;

```

```

/
/CHECK THAT DIXY WILL SET DONE;
/
1042 4025          SETUP
1043 7320          CLT5, CLA CLL          /CLEAR FLAGS;
1044 4125          DICL              /INTENSIFY AND SET DONE;
1045 4152          DIXY              /SKP ON DONE;
1046 4135          DISD              /
1047 7410          SKP              /
1050 5254          JMP              /+4
1051 4076          ERROR              /DONE SET, CONTINUE;
1052 1043          CLT5              /FAILED, DONE NOT SET;
1053 1056          CLT6-1            /ERROR-SCOPE LOOP ADDRESS;
1054 2005          ISE TALLY          /NEXT TEST;
1055 5243          JMP CLT5          /TEST LOOP COUNT;
/                                     /RETURN;
/
/CHECK THAT DIBD CLEARS DONE FLAG;
/
1056 4025          SETUP
1057 7300          CLT6, CLA CLL          /SET DONE;
1060 4152          DIXY              /CLEAR DONE;
1061 4131          DICD              /READ ENABLE STATUS INTO AC;
1062 4142          DIRE              /
1063 7650          SNA CLA          /
1064 5270          JMP              /+4
1065 4076          ERROR              /DONE CLEARED, CONTINUE;
1066 1057          CLT6              /FAILED, DONE NOT CLEARED;
1067 1072          CLT7-1            /ERROR-SCOPE LOOP ADDRESS;
1070 2005          ISE TALLY          /NEXT TEST;
1071 5257          JMP CLT6          /TEST LOOP COUNT;
/                                     /RETURN;

```

```

/
/CHECK THAT DISD WILL SKIP ON DONE FLAG AND NOT CLEAR FLAG:
/
1072 4025          SETUP
1073 7300          CLT7, CLA CLL
1074 4152          DIXY          /SET DONE;
1075 4135          DISD          /SKIP ON DONE;
1076 7610          SKP CLA
1077 5303          JMP          +4          /SKIP WORKPD, CONTINUE;
1100 4076          ERROR          /FAILED, DISD DID NOT CAUSE SKP ON DONE;
1101 1073          CLT7          /ERROR-SCOPE LOOP ADDRESS;
1102 1121          CLT8-1        /NEXT TEST;
1103 4162          DIRE          /READ ENABLE STATUS INTO AC;
1104 7640          SEA CLA          /DONE = 1?
1105 5311          JMP          +4          /YES, CONTINUE;
1106 4076          ERROR          /NO, FAILED;
1107 1073          CLT7          /ERROR-SCOPE LOOP ADDRESS;
1110 1121          CLT8-1        /NEXT TEST;
1111 4131          DIRD          /CLEAR DONE;
1112 4135          DISD          /SKIP ON DONE;
1113 5317          JMP          +4
1114 4076          ERROR          /FAILED, DISD SKIPPED ON DONE=0;
1115 1073          CLT7          /ERROR-SCOPE LOOP ADDRESS;
1116 1121          CLT8-1        /NEXT TEST;
1117 2005          ISZ          TALLY /TEST LOOP COUNT;
1120 5273          JMP          CLT7 /RETURN;
/
/CHECK THAT INTERRUPT ENABLE REGISTER ALONE WILL
/NOT CAUSE AN INTERRUPT.
1121 4025          SETUP
1122 7300          CLT8,  CLA CLL
1123 1373          TAD          /GET RETURN ADDRESS,
1124 3002          DCA          RETURN /SETUP RETURN ADDRESS;
1125 6007          CAF          /CLEAR ALL;
1126 7001          IAC          /SETUP AC TO
1127 4156          DILE          /ENABLE INTERRUPT REGISTER;
1130 6001          ION          /TURN INTERRUPT ON;
1131 7000          NOP          /WAIT;
1132 6002          IOF          /TURN INTERRUPT OFF;
1133 5337          JMP          +4          /NO INTERRUPT OCCURRED, CONTINUE;
1134 4076          ERROR,  ERROR /FAILED, INTERRUPT TOOK PLACE;
1135 1122          CLT8          /ERROR-SCOPE LOOP ADDRESS;
1136 1200          CLT9-1        /NEXT TEST;
1137 2005          ISZ          TALLY /TEST LOOP COUNT;
1140 5322          JMP          CLT8 /RETURN;
1141 5772          JMP          CLT9-1 /NEXT TEST;

1172 1200
1173 1134
1174 7762
1175 7600
1176 0100
1177 1000
1200          PAGE

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```

/
/CHECK THAT DONE REGISTER ALONE WILL NOT CAUSE
/AN INTERRUPT.
1200 4025          SETUP
1201 7300          CLT9,  CLA CLL
1202 1377          TAD          /GET RETURN ADDRESS,
1203 3002          DCA          RETURN /SETUP RETURN ADDRESS;
1204 6007          CAF          /CLEAR ALL;
1205 1376          TAD          (4000 /SETUP AC TO
1206 4156          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 4076          ERROR,  ERROR /FAILED, INTERRUPT TOOK PLACE;
1214 1201          CLT9          /ERROR-SCOPE LOOP ADDRESS;
1215 1220          CLT10-1       /NEXT TEST;
1216 2005          ISZ          TALLY /TEST LOOP COUNT;
1217 5201          JMP          CLT9 /RETURN;
/
/CHECK THAT DONE AND INTERRUPT ENABLE WILL CAUSE AN
/INTERRUPT.
1220 4025          SETUP
1221 7300          CLT10, CLA CLL
1222 1375          TAD          /GET RETURN ADDRESS,
1223 3002          DCA          RETURN /SETUP RETURN ADDRESS;
1224 7001          IAC          /SETUP AC TO
1225 4152          DIXY          /ENABLE DONE;
1226 4156          DILE          /AND INTERRUPT;
1227 6001          ION          /TURN INTERRUPT ON;
1230 7000          NOP          /WAIT;
1231 6002          IOF          /TURN INTERRUPT OFF;
1232 4076          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 COUNT;
1236 5221          JMP          CLT10 /RETURN;

```

```

/
/CHECK THAT DILX WILL CLEAR DONE:
/
1237 4025 SETUP
1240 7300 CLT11, CLA CLL
1241 1143 TAD RDILX /GET LOAD X IOT
1242 3250 DCA CLT11A /SAVE IT
1243 1163 TAD RDIRE /GET READ ENABLE IOT
1244 3251 DCA CLT11A+1 /SAVE IT
1245 4142 DILX /LOAD X
1246 4135 DISD /WAIT FOR DONE
1247 5246 JMP I=-I
1250 7402 CLT11A, XX /DONE IS SET, NOW EXECUTE A LOAD X
/ AND CLEAR DONE
1251 7402 XX /READ ENABLES
1252 0376 AND (4000 /MASK TO ONE
1253 7450 SNA /IS IT SET ?
1254 5260 JMP I+=I /NO, IT WAS CLEARED
1255 4076 ERROR /YES, IT WAS SET
1256 1240 CLT11 /DILX FAILED TO CLEAR DONE
1257 1262 CLT12=1 /NEXT TEST
1260 2005 ISE TALLY /TEST LOOP COUNTER
1261 5240 JMP CLT11 /RETURN
/

```

```

/CHECK THAT DILY WILL CLEAR DONE:
/
1262 4025 SETUP
1263 7300 CLT12, CLA CLL
1264 1147 TAD RDILY /GET LOAD Y IOT
1265 3273 DCA CLT12A /SAVE IT
1266 1163 TAD RDIRE /GET READ ENABLE
1267 3274 DCA CLT12A+1 /SAVE IT
1270 4146 DILY /LOAD Y
1271 4135 DISD /WAIT FOR DONE
1272 5271 JMP I=-I
1273 7402 CLT12A, XX /LOAD Y AND CLEAR DONE
1274 7402 XX /READ ENABLE
1275 0376 AND (4000 /MASK TO ONE
1276 7450 SNA /IS IT SET ?
1277 5303 JMP I+=I /NO, NEXT TEST
1300 4076 ERROR /DILY FAILED TO CLEAR DONE
/
1301 1263 CLT12 /NEXT TEST
1302 0606 CLT1=3 /TEST LOOP COUNTER
1303 2005 ISE TALLY /RETURN
1304 5263 JMP CLT12 /TEST PASS COUNTER
1305 2021 ISE TALLY /TEST PASS COUNTER
1306 5774 JMP CLT1=3 /RETURN
1307 5773 JMP CLTST /RETEST
/

```

1373 2600  
1374 0606  
1375 1235  
1376 4000  
1377 1213  
1400

PAGE

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//HORIZONTAL LINE SEGMENT TEST
//DISPLAY FOUR HORIZONTAL LINE SEGMENTS
//CHECK FOR FLYPBACK TRACE
1400 6007 HORTST, CAF
1401 4777 JMS MESSAGE
1402 4006 MSG10
1403 7300 CLA CLL
1404 4776 JMS SEHOR /SETUP FOR HORIZONTAL LINES:
1405 4044 HORFLY, SELCHN /CHECK FOR VR=14 CHANNEL:
1406 7200 CLA /DISPLAY HORIZONTAL LINE AT Y=4001 (RIGHT):
1407 1375 TAD (1001 /NON-VARIABLE AXIS ORIGIN (Y);
1408 4774 JMS PLINE /ROUTINE TO INCREMENT X AXIS;
1411 7377 -401 /PLOT COUNTER;
1412 1001 /ORIGIN OF X AXIS;
1413 7200 CLA /DISPLAY HORIZONTAL LINE AT Y=777(RIGHT):
1414 1375 TAD (0777 /NON-VARIABLE AXIS ORIGIN (Y);
1415 4774 JMS PLINE /ROUTINE TO INCREMENT X AXIS;
1416 7377 -401 /PLOT COUNTER;
1417 1001 /ORIGIN OF X AXIS;
1420 7200 CLA /DISPLAY HORIZONTAL LINE AT Y=1001 (LEFT):
1421 1375 TAD (1001 /NON-VARIABLE AXIS ORIGIN (Y);
1422 4772 JMS HLINE /ROUTINE TO INCREMENT X AXIS;
1423 7377 -401 /PLOT COUNTER;
1424 0777 /ORIGIN OF X AXIS;
1425 7200 CLA /DISPLAY HORIZONTAL LINE AT Y=777 (LEFT):
1426 1375 TAD (0777 /NON-VARIABLE AXIS ORIGIN (Y);
1427 4772 JMS HLINE /ROUTINE TO INCREMENT X AXIS;
1430 7377 -401 /PLOT COUNTER;
1431 0777 /ORIGIN OF X AXIS;
1432 4036 JMS CKSH7 /SUT0: RETURN TO DISPATCH;
1433 5205 JMP HORFLY /SUT0: CONTINUE IN CURRENT TEST;
/

```

```

//VERTICAL LINE SEGMENT TEST
//DISPLAY FOUR VERTICAL LINE SEGMENTS
//CHECK FOR FLVBACK TRACE
1434 0007 VERTST, CAF
1435 4777/ JMS MESSAGE
1436 3773 MSG9
1437 7300 CLA CLL
1440 4777/ JMS SETVER /SETUP FOR VERTICAL LINES;
1441 4044 VERTFLY, JMS SELCHN /CHECK FOR VR=14 CHANNEL;
1442 7300 CLA CLL /DISPLAY VERTICAL LINE AT X=1001 (UP);
1443 1375 TAD (1001 /NON-VARIABLE AXIS ORIGIN (X);
1444 4774/ JMS PLINE /ROUTINE TO INCREMENT Y AXIS;
1445 7377 -401 /PLOT COUNTER;
1446 1001 1001 /ORIGIN OF Y AXIS;
1447 7200 CLA /DISPLAY VERTICAL LINE AT X=0777 (UP);
1450 1373 TAD (0777 /NON-VARIABLE AXIS ORIGIN (X);
1451 4774/ JMS PLINE /ROUTINE TO INCREMENT Y AXIS;
1452 7377 -401 /PLOT COUNTER;
1453 1001 1001 /ORIGIN OF Y AXIS;
1454 7200 CLA /DISPLAY VERTICAL LINE AT X=1001 (DOWN);
1455 1375 TAD (1001 /NON-VARIABLE AXIS ORIGIN (X);
1456 4772/ JMS MLINE /ROUTINE TO DECREMENT Y AXIS;
1457 7377 -401 /PLOT COUNTER;
1460 0777 0777 /ORIGIN OF Y AXIS;
1461 7200 CLA /DISPLAY VERTICAL LINE AT X=0777 (DOWN);
1462 1373 TAD (0777 /NON-VARIABLE AXIS ORIGIN (X);
1463 4772/ JMS MLINE /ROUTINE TO DECREMENT Y AXIS;
1464 7377 -401 /PLOT COUNTER;
1465 0777 0777 /ORIGIN OF Y AXIS;
1466 4036 JMS CK0W7 /SW7=0, RETURN TO DISPATCH;
1467 5241 JMP VERTFLY /SW7=1, CONTINUE IN CURRENT TEST;

1571 2000
1572 2416
1573 0777
1574 2447
1575 1001
1576 2613
1577 5000
1600 PAGE
    
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```

//CORNERS - ROUTINE TO DISPLAY FOUR CORNERS
//WITH INTERSECTING DIAGONAL LINE SEGMENTS
//
1600 0007 CORNST, CAF
1601 4777/ JMS MESSAGE
1602 4022 MSG11
1603 7300 CLA CLL
1604 4044 CORNER, JMS SELCHN /CHECK FOR VR=14 CHANNEL;
1605 4776/ JMS SETVER /SETUP FOR VERTICAL LINES;
1606 7300 CLA CLL
1607 1375 TAD (1001 /X AXIS ORIGIN;
1610 4774/ JMS PLINE /PLOT A VERTICAL LINE AT X=1001(UP)
1611 7577 -201 /PLOT COUNTER;
1612 1001 1001 /Y AXIS ORIGIN;
1613 7200 CLA
1614 1373 TAD (0777
1615 4772/ JMS MLINE /PLOT A VERTICAL LINE AT X=0777(DOWN)
1616 7577 -201
1617 0777 0777
1620 7200 CLA
1621 1375 TAD (1001
1622 4772/ JMS MLINE /PLOT A VERTICAL LINE AT X=1001(DOWN)
1623 7577 -201
1624 0777 0777
1625 7200 CLA
1626 1373 TAD (0777
1627 4774/ JMS PLINE /PLOT A VERTICAL LINE AT X=0777(UP)
1630 7577 -201
1631 1001 1001
1632 4772/ JMS SETHOR /SETUP FOR HORIZONTAL LINES;
1633 7200 CLA
1634 1373 TAD (0777
1635 4774/ JMS PLINE /Y AXIS ORIGIN;
1636 7577 -201 /PLOT HORIZONTAL LINE AT Y=0777(RIGHT)
1637 1001 1001
1640 7200 CLA
1641 1375 TAD (1001
1642 4774/ JMS PLINE /PLOT HORIZONTAL LINE AT Y=1001(RIGHT)
1643 7577 -201
1644 1001 1001
    
```

```

1645 7202      CLA
1646 1373      TAD      (0777
1647 4772/     JMS      MLINE      /PLOT HORIZONTAL LINE AT Y=0777(LEFT)
1650 7577      =201
1651 0777      0777
1652 7202      CLA
1653 1375      TAD      (1001
1654 4772/     JMS      MLINE      /PLOT HORIZONTAL LINE AT Y=1001(LEFT)
1655 7577      =201
1656 0777      0777
1657 7202      CLA
1660 4770/     JMS      DIAG1     /PLOT DIAGONL LINE (LOWER LEFT)
1661 7577      =201
1662 1001      1001
1663 7202      CLA
1664 4770/     JMS      DIAG1     /PLOT DIAGONL LINE (UPPER RIGHT)
1665 7577      =201
1666 0577      0577
1667 7202      CLA
1670 4767/     JMS      DIAG2     /PLOT DIAGONL LINE (UPPER LEFT)
1671 7577      =201
1672 1001      1001
1673 0777      0777
1674 7202      CLA
1675 4767/     JMS      DIAG2     /PLOT DIAGONL LINE (LOWER RIGHT)
1676 7577      =201
1677 0577      0577
1700 1201      1201
1701 4036      JMS      CKSW7
1702 5204      JMP      CORNER
    
```

```

/SUBROUTINE TO SET INCREMENT SIZE
1703 0000      STSIZE, 0
1704 7300      CLA CLL
1705 1766/     TAD      SIZE
1706 7640      SZA CLA
1707 5315      JMP      STSIZE     /INCREMENT BY 10
1710 7001      IAC
1711 3765/     DCA      PSIZE     /NO INCREMENT BY 1
1712 7040      CMA
1713 3764/     DCA      MSIZE
1714 5703      JMP I      STSIZE

1715 1363      STSIZE, TAD      (10
1716 3765/     DCA      PSIZE     /SET UP INCREMENT
1717 1362      TAD      (=10
1720 3764/     DCA      MSIZE
1721 3766/     DCA      SIZE
1722 5703      JMP I      STSIZE

/WAIT SUBROUTINE FOR WRITE=THRU MODE TEST
1723 0000      WAIT, 0
1724 7300      CLA CLL
1725 1362      TAD      (=10
1726 3341      DCA      WAITA     /SET UP DELAY COUNTER
1727 3342      DCA      WAITB     /SET UP DELAY
1730 4036      WAIT1, JMS      CKSW7     /CHECK SW
1731 4102      DIXY
1732 4105      DISD
1733 5302      JMP      =1
1734 2342      ISE      WAITB     /DELAY
1735 5300      JMP      WAIT1
1736 2341      ISE      WAITA     /FINISHED
1737 5300      JMP      WAIT1
1740 5723      JMP I      WAIT     /EXIT

1741 7770      WAITA, =10
1742 0000      WAITB, 0
1762 7770
1763 0010
1764 0324
1765 0323
1766 0322
1767 2664
1770 2626
1771 2613
1772 2416
1773 0777
1774 2447
1775 1001
1776 2600
1777 5600
    PAGE
    2000
    
```

```

//ROUTINE TO DISPLAY DIAGONALS
//
2000 6007 DBTST, CAF
2001 4777/ JMS MESSAGE
2002 4235 MSG19
2003 7300 CLA CLL
2004 4044 JMS SEL'CHN /CHECK FOR VR=I4 CHANNEL;
2005 7604 LAS /GET S,R;
2006 0376 AND (0I00 /MASK TO CHECK SWS;
2007 7640 SEA CLA /SWS = 0, PLOT LL TO UR DIAGONAL;
2010 5215 JMP ,+5 /SWS = 1, PLOT UL TO LR DIAGONAL;
2011 4775/ 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 2777 0777
2021 4036 JMS CK9W7 /SW7=0, RETURN TO DISPATCH;
2022 5204 JMP DIABIS /SW7=1, CONTINUE PLOT;

//ROUTINE TO MOVE A VERTICAL BAR HORIZONTALLY;
//
2023 6007 VRBTST, CAF
2024 4777/ JMS MESSAGE
2025 4033 MSG12
2026 7300 CLA CLL
2027 4044 JMS SEL'CHN /CHECK FOR VR=I4 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 VRBAR, CLA
2037 1256 TAD XVERT /GET X COORDINATE;
2040 4770/ JMS PLINE /PLOT VERTICAL BAR;
2041 5777 -2001 /COUNT;
2042 1001 1001 /Y COORDINATE;
2043 7604 LAS /GET S,R;
2044 0376 AND (0I00 /MASK BIT 5
2045 7640 SEA CLA /S,R, 5 = 0 CONTINUE LINE MOVE;
2046 5236 JMP VERBAR /S,R, 5 = 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 CK9W7 /SW7=0, RETURN TO DISPATCH;
2054 5223 JMP VRBTST /SW7=1, CONTINUE IN CURRENT TEST;

HORCNT, 0
XVERT, 0
    
```

```

//ROUTINE TO MOVE A HORIZONTAL BAR VERTICALLY;
//
2057 6007 HRBTST, CAF
2060 4777/ JMS MESSAGE
2061 4046 MSG13
2062 7300 CLA CLL
2063 4044 JMS SEL'CHN /CHECK FOR VR=I4 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 OCA 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;
2080 0376 AND (0I00 /MASK BIT 5
2081 7640 SEA CLA /SW 5 = 0 CONTINUE LINE MOVE;
2082 5272 JMP HORBAR /SW 5 = 1 HALT LINE MOVEMENT;
2083 2312 ISZ YVERT /UPDATE Y COORDINATE;
2084 7000 NOP /UPDATE Y AXIS COUNTER;
2085 2311 ISZ VERCNT /IS PLOT COMPLETE?
2086 5272 JMP HORBAR /NO, CONTINUE;
2087 4036 JMS CK9W7 /SW7=0, RETURN TO DISPATCH;
2088 5257 JMP HRBTST /SW7=1, CONTINUE IN CURRENT TEST;

VERCNT, 0
YVERT, 0

2089 2613
2090 2447
2091 1001
2092 6000
2093 2600
2094 2664
2095 2626
2096 0100
2097 5000
2098 2200
    
```

```

//SINGLE POINT PLOT TEST
//ALL COORDINANTS FROM S,R;
//
2200 6007 PNTST, CAF
2201 4777 JMS MESSAGE
2202 4062 MSG14
2203 4777 JMS MESSAGE
2204 4100 MSG15
2205 7402 XX /HALT
2206 7604 LAS /GET X COORDINANT FROM SWITCHES,
2207 3240 DCA XPOINT /SAVE IT.
2210 4777 JMS MESSAGE
2211 4133 MSG16
2212 7402 XX /HALT
2213 7604 LAS /GET Y COORDINANT FROM SWITCHES,
2214 3241 DCA YPOINT /SAVE IT.
2215 4777 JMS MESSAGE
2216 4166 MSG17
2217 4777 JMS MESSAGE
2220 4204 MSG18
2221 7402 XX /HALT
2222 7200 SINPNT, CLA
2223 1240 TAD XPOINT /GET X COORDINANT;
2224 4142 DILX /LOAD X,
2225 4135 DISD /SKP ON DONE
2226 5225 JMP ,=I
2227 7200 CLA
2230 1241 TAD YPOINT /GET Y COORDINANT;
2231 4146 DILY /LOAD Y,
2232 4135 DISD /SKP ON DONE
2233 5232 JMP ,=I
2234 4192 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, CAF
2243 4777 JMS MESSAGE
2244 4260 MSG21
2245 7340 DISCAL, CLA CLL CH1 /INITIALIZE
2246 3776 DCA SWITCH /SWITCH LOCATION;
2247 1375 TAD (=I3 /INITIALIZE
2250 3774 DCA CALCNT /COUNT;
2251 7604 LAS /GET S,R;
2252 0373 AND (2000 /CHECK SW1
2253 7650 SNA CLA /TO DETERMINE X OR Y AXIS;
2254 5257 JMP ,=J
2255 4772 JMS SETVER /SW1=1, SETUP Y AXIS;
2256 7410 SKP
2257 4771 JMS SETHOR /SW1=0, SETUP X AXIS;
2260 1370 TAD (TABLEA /INITIALIZE POINTER;
2261 3326 DCA PNTR2 /FOR CALIBRATION PICKUP;
2262 1726 TAD I PNTR2 /PICKUP CAL VALUE;
2263 3003 DCA SUM1
2264 4767 JMS CALSND /OUTPUT LIMITS OF LINE TO TTY;
2265 1003 DISLOP, TAD SUM1
2266 7040 CHA /GET BIT
2267 1366 TAD (=I /TO DETERMINE
2270 3272 DCA VARYCT /LENGTH OF LINE;
2271 4765 JMS PLINE /SETUP PLOT COUNTER,
2272 7402 VARYCT, XX /PLOT LINE;
2273 0000 /MODIFIED TO PLOT COUNT;
2274 4036 JMS CKSW7 /ORIGIN OF LINE;
2275 4044 JMS SELCHN /CHECK TEST LOOP SWITCH;
2276 7704 LAS CLL /CHECK VR=I4 CHANNEL;
2277 7006 RTL /GET S,R;
2300 0364 AND (1 /CHECK SW0
2301 1776 TAD SWITCH /TO SEE IF IT HAS
2302 7640 SZA CLA /CHANGED SINCE
2303 5265 JMP DISLOP /LAST PASS;
2304 1776 TAD SWITCH /NO, CONTINUE IN PRESENT PLOT;
2305 7040 CHA /YES, RESET
2306 3776 DCA SWITCH /LOCATION
2307 2326 ISE PNTR2 /SWITCH,
2310 2774 ISE CALCNT /INCREMENT POINTER;
2311 5262 JMP DISLOP+3 /HAS PRESENT AXIS CALLED OUT?
2312 5247 JMP DISCAL+2 /NO, GET NEXT VALUE;
                /YES, RETURN TO BEGIN OF ROUTINE;
    
```



```

2313 0000 TABLE, 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 2447
2366 7777
2367 3447
2370 2313
2371 2613
2372 2600
2373 2000
2374 0455
2375 7765
2376 0454
2377 5600
2400
    
```

PAGE

```

//CROSSING DIAGONALS TEST
//
2400 6007 CROTST, CAF
2401 4777 JMS MESSAGE
2402 4244 MSG20
2403 7300 CLA CLL
2404 4044 XCROS, JMS SEL'CHN /CHECK FOR VR-I4 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 2000 MLINE, 0
2417 7402 DISP3, XX /MODIFIED TO DISPLAY IOT;
2420 4566 JMS I SEFSIZ /SET UP SIZE INCREMENT
2421 1136 TAD ROISD /SETUP
2422 3234 DCA DISP4=0
2423 1136 TAD ROISD /SETUP
2424 3237 DCA DISP4=2 /SKIP ON DONE IOT;
2425 1153 TAD ROIXY /SETUP
2426 3236 DCA DISP4=3 /INTENSIFY IOT;
2427 1616 TAD I MLINE /GET PLOT COUNT;
2430 3300 DCA PLOTCT /SAVE IT.
2431 2216 ISZ MLINE
2432 1616 TAD I MLINE
2433 5241 JMP DISP4
2434 6052 6052 /SKIP ON DONE;
2435 5234 JMP .-I /WAIT FOR DONE;
2436 6055 6055 /INTENSIFY
2437 6052 6052
2440 5237 JMP .-I
2441 7402 DISP4, XX /MODIFIED TO LOAD IOT;
2442 1774 TAD MSIZE /DECREMENT VARIABLE AXIS;
2443 2300 ISZ PLOTCT /IS PLOT COMPLETE?
2444 5234 JMP DISP4=9 /NO, CONTINUE PLOT;
2445 2216 ISZ MLINE /YES, SETUP RETURN;
2446 5616 JMP I MLINE /RETURN
    
```

```

//SUBROUTINE TO DISPLAY A LINE (PLUS INCREMENTS)
//HORIZONTAL OR VERTICAL
2447 0000 PLINE, 0
2450 7402 DISPI, XX /MODIFIED TO DISPLAY IOT,
2451 4566 JMS I SETSIZ /SETUP
2452 1136 TAD RDISD /SETUP
2453 3265 DCA DISP2-5 /SKIP ON DONE IOT,
2454 1136 TAD RDISD /SETUP
2455 3270 DCA DISP2-2 /SETUP
2456 1153 TAD ROIXY /INTENSIFY IOT,
2457 3267 DCA DISP2-3 /GET PLOT COUNT,
2460 1647 TAD I PLINE /SAVE IT,
2461 3300 DCA PLOTCT /GET ORIGIN OF VARIABLE AXIS,
2462 2247 ISZ PLINE
2463 1647 TAD I PLINE
2464 5272 JMP DISP2 /SKIP ON DONE,
2465 6052 6052 /WAIT FOR DONE,
2466 5265 JMP I,-I /INTENSIFY
2467 6055 6055
2470 6052 6052
2471 5270 JMP I,-I
2472 7402 DISP2, XX /MODIFIED TO LOAD IOT,
2473 1773 TAD PSIZE /INCREMENT VARIABLE AXIS,
2474 2300 ISZ PLOTCT /IS PLOT COMPLETE?,
2475 5265 JMP DISP2-5 /NO, CONTINUE PLOT,
2476 2247 ISZ PLINE /YES, SETUP RETURN,
2477 5647 JMP I PLINE /RETURN
2500 0000 PLOTCT, 0

```

//SUBROUTINE TO DISPLAY A BOX WITH A X IN THE CENTER  
 //// PINGUSHION TEST ////

```

2531 0000 COLADJ, 0
2502 4772 JMS SETHOR /SET-UP HORIZ,
2503 7240 CLA CMA /SET UP SIZE
2504 3771 DCA SIZE
2505 1370 TAD (1001 /DRAW LOWER LINE
2506 4247 JMS PLINE
2507 7577 =201
2510 1001 1001
2511 4767 JMS SETVER
2512 7240 CLA CMA
2513 3771 DCA SIZE
2514 1366 TAD (777 /DRAW RIGHT LINE
2515 4247 JMS PLINE
2516 7577 =201
2517 1000 1000
2520 4772 JMS SETHOR /SET-UP HORIZ,
2521 7240 CLA CMA
2522 3771 DCA SIZE /SET-UP SIZE

```

```

2523 1366 TAD (777
2524 4216 JMS MLINE /DRAW TOP LINE
2525 7577 =201
2526 0777 777
2527 4767 JMS SETVER
2530 7240 CLA CMA
2531 3771 DCA SIZE
2532 1370 TAD (1001 /DRAW LEFT LINE
2533 4216 JMS MLINE
2534 7577 =201
2535 0777 777
2536 7240 CLA CMA
2537 3771 DCA SIZE
2540 4776 JMS DIAG1 /PLOT LL TO UR LINE
2541 7700 =100
2542 1400 1400
2543 7240 CLA CMA
2544 3771 DCA SIZE
2545 4775 JMS DIAG2 /PLOT UL TO LR DIAG
2546 7700 =100
2547 1400 1400
2550 0400 400
2551 7000 NOP
2552 7000 NOP
2553 5701 JMP I COLADJ /EXIT
2566 0777
2567 2600
2570 1001
2571 0322
2572 2613
2573 0323
2574 0324
2575 2664
2576 2626
2577 5600 2600
PAGE
//SUBROUTINE TO SETUP DISPLAY IOT'S FOR VERTICAL PLOT//
2600 0000 SETVER, 0
2601 7200 CLA
2602 1143 TAD RDILY
2603 3777 DCA DISPI
2604 1147 TAD RDILY
2605 3776 DCA DISP2
2606 1143 TAD RDILY
2607 3775 DCA DISPI
2610 1147 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 1147  TAD RDILY
2616 3777  DCA DISP1
2617 1143  TAD RDILX
2620 3776  DCA DISP2
2621 1147  TAD RDILY
2622 3775  DCA DISP3
2623 1143  TAD RDILX
2624 3774  DCA DISP4
2625 5613  JMP I SETHOR

//SUBROUTINE TO DISPLAY A DIAGONAL LINE
//FROM LOWER LEFT TO UPPER RIGHT,
//
2626 0000  DIAG1, 0
2627 4566  JMS I SEFSIZ
2630 1136  TAD RDISD
2631 3247  DCA DIAC1A-5
2632 1136  TAD RDISD /SETUP
2633 3252  DCA DIAC1A-2 /SKIP ON DONE IOT.
2634 1153  TAD RDIXY /SETUP
2635 3251  DCA DIAC1A-3 /INTENSIFY IOT.
2636 1143  TAD RDILX /SETUP
2637 3254  DCA DIAC1A /LOAD X IOT.
2640 1147  TAD RDILY /SETUP
2641 3255  DCA DIAC1A+1 /LOAD Y IOT.
2642 1626  TAD I DIAC1 /SETUP COUNTER.
2643 3263  DCA DIACNT
2644 2226  ISE DIAC1
2645 1626  TAD I DIAC1
2646 5254  JMP DIAC1A
2647 6052  JMP /SKIP ON DONE.
2650 3247  JMP -I /WAIT FOR DONE.
2651 6055  /INTENSIFY
2652 6052  JMP
2653 5252  JMP -I
2654 6053  DIAG1A, 6053 /LOAD X
2655 6054  /LOAD Y
2656 1773  TAD PSIZE /INCREMENT COORDINANT.
2657 2263  ISE DIACNT /IS PLOT COMPLETE?
2660 5247  JMP DIAC1A-5 /NO, CONTINUE PLOT.
2661 2226  ISE DIAC1 /YES, SETUP RETURN.
2662 5626  JMP I DIAC1 /RETURN

2663 0000  DIACNT, 0
    
```

```

//SUBROUTINE TO DISPLAY A DIAGONAL LINE
//FROM UPPER LEFT TO LOWER RIGHT,
//
2664 0000  DIAG2, 0
2665 4566  JMS I SEFSIZ
2666 1136  TAD RDISD /SETUP
2667 3316  DCA DIAC2A-2 /SETUP
2670 1136  TAD RDISD /SETUP
2671 3334  DCA DIAC2B
2672 1136  TAD RDISD /SETUP
2673 3313  DCA DIAC2A-5 /SKIP ON DONE IOT.
2674 1153  TAD RDIXY /SETUP
2675 3315  DCA DIAC2A-3 /INTENSIFY IOT.
2676 1143  TAD RDILX /SETUP
2677 3321  DCA DIAC2A+1 /LOAD X IOT.
2678 1147  TAD RDILY /SETUP
2679 3324  DCA DIAC2A+4 /LOAD Y IOT.
2682 1664  TAD I DIAC2 /SETUP COUNTER.
2683 3263  DCA DIACNT
2684 2264  ISE DIAC2
2685 1664  TAD I DIAC2
2686 3772  DCA XPOINT
2687 2264  ISE DIAC2
2688 1664  TAD I DIAC2
2689 3771  DCA YPOINT
2692 5320  JMP DIAC2A
2693 6052  JMP /SKIP ON DONE.
2694 5313  JMP -I /WAIT FOR DONE.
2695 6055  /INTENSIFY
2696 6052  JMP
2697 5316  JMP -I
2698 1772  DIAG2A, TAD XPOINT /GET X COORDINANT.
2699 6053  /LOAD X
2700 7200  CLA
2701 1771  TAD YPOINT /GET Y COORDINANT.
2702 6054  /LOAD Y
2703 1770  TAD MSIZE /DECREMENT Y.
2704 3771  DCA YPOINT /SAVE Y.
2705 1772  TAD XPOINT /GET X COORDINANT.
2706 1773  TAD PSIZE /INCREMENT X.
2707 3772  DCA XPOINT /SAVE X.
2708 2263  ISE DIACNT /IS PLOT COMPLETE?
2709 5313  JMP DIAC2A-5 /NO, CONTINUE PLOT.
2710 6052  DIAG2B, 6052 /WAIT FOR LAST DONE
2711 5334  JMP -I
2712 2264  ISE DIAC2 /YES, SETUP RETURN.
2713 5664  JMP I DIAC2 /RETURN
    
```

```

/COLOR ADJUSTMENT TEST
2740 6007  ADJCOL, CAF      MESSAGE
2741 4767/   JMS      MSG24
2742 4343

2743 7300      CLA CLL
2744 7000      NOP
2745 3005      DCA      TALLY

2746 7300  ADJCLA, CLA CLL
2747 1366      TAD      (6
2750 4196      DILE
2751 4135      DISD
2752 5391      JMP      ;=1
2753 4745/     JMS      COLADJ
2754 7300      CLA CLL
2755 4196      DILE
2756 4135      DISD
2757 5396      JMP      ;=1
2760 4745/     JMS      COLADJ
2761 4036      JMS      CKSW7
2762 2005      ISZ      TALLY
2763 5346      JMP      ADJCLA
2764 5340      JMP      ADJCOL

2765 2501
2766 0006
2767 5600
2770 0324
2771 2241
2772 2240
2773 0323
2774 2441
2775 2477
2776 2472
2777 2450
3000
PAGE
    
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```

3000 5074  ERMSG,  EMSG20
3001 5125      EMSG21
3002 5154      EMSG22
3003 5203      EMSG23
3004 5240      EMSG24
3005 5274      EMSG25
3006 5330      EMSG26
3007 5363      EMSG27
3010 7000      NOP
3011 7000      NOP
3012 7000      NOP

/
/ COLOR AND STORAGE SCOPE LOGIC TEST
/
3013 6007  COLOR,  CAF      MESSAGE
3014 4777/   JMS      MSG22
3015 4300      CLA CLL
3016 7300      TAD      (=200
3017 1376      DCA      TALLYA
3020 3021
3021 7300  COLO,   CLA CLL
3022 1375      TAD      (=ERMSG=1
3023 3035      DCA      MSGPNT
3024 4025      SETUP
3025 7300  CLT20,  CLA CLL
3026 1374      TAD      (40
3027 4196      DILE
3030 4162      DIRE
3031 0374      AND      (40
3032 7640      SZA CLA
3033 9237      JMP      ;+4
3034 4076      ERROR
3035 3025      CLT20
3036 3041      CLT21=1
3037 2005      ISZ      TALLY
3040 9225      JMP      CLT20

3041 4025      SETUP
3042 7300  CLT21,  CLA CLL
3043 1373      TAD      (20
3044 4196      DILE
3045 4162      DIRE
3046 0373      AND      (20
3047 7640      SZA CLA
3050 5254      JMP      ;+4
3051 4076      ERROR
3052 3042      CLT21
3053 3056      CLT22=1
3054 2005      ISZ      TALLY
3055 5242      JMP      CLT21

/LOAD WRITE THRU
/ MODE BIT
/ READ ENABLE
/ MASK TO BIT 6
/ IS THE BIT SET ?
/ YES
/ NO, BIT 6 FAILED TO SET
/ THIS TEST
/ NEXT TEST
/ FINISHED ?
/ NO

/LOAD STORE
/ MODE BIT
/ READ ENABLE
/ MASK TO BIT 7
/ IS THE BIT SET ?
/ YES
/ NO, BIT 7 FAILED TO SET
/ THIS TEST
/ NEXT TEST
/ FINISHED ?
/ NO
    
```

```

3056 4025          SETUP
3057 7300          CLT22, CLA CLL
3060 1372          TAD          (4          /LOAD COLOR
3061 4196          DILE          / CHANGE
3062 4162          DIRE          /READ ENABLE
3063 0372          AND          (4          /MASK TO BIT 9
3064 7640          SEA CLA          /IS THE BIT SET ?
3065 5271          JMP          +4          /YES
3066 4076          ERROR          /NO, BIT 9 FAILED TO SET
3067 3097          CLT22          /THIS TEST
3070 3073          CLT23=1        /NEXT TEST
3071 2005          ISZ          TALLY  /FINISHED ?
3072 5257          JMP          CLT22 /NO

/
/
TEST THAT START CHANGING COLORS CLEARS DONE
/
/
3073 4025          SETUP
3074 7300          CLT23, CLA CLL
3075 6007          CAF
3076 7000          NOP
3077 7000          NOP
3100 7000          NOP
3101 7000          NOP
3102 1372          TAD          (4          /RED COLOR
3103 4196          DILE          /CHANGE COLOR
3104 4135          DISD          /DID DONE CLEAR ?
3105 5311          JMP          +4          /YES
3106 4076          ERROR          /CHANGING COLOR FAILED TO CLEAR DONE
3107 3074          CLT23
3110 3113          CLT24=3
3111 2005          ISZ          TALLY
3112 5274          JMP          CLT23
    
```

```

/
/
TEST COLOR CHANGE SETS DONE
GREEN TO RED <300 USEC;>
/
3113 4025          SETUP
3114 1371          TAD          (=10          /SET UP EXECUTION
3115 3005          DCA          TALLY  / COUNTER
3116 6007          CAF          /CLEAR
3117 7300          CLT24, CLA CLL
3120 1370          TAD          (=600          /SET UP A DELAY
3121 3024          DCA          DELAY  / COUNTER
3122 2024          ISZ          DELAY  / DELAY
3123 5322          JMP          =1          /
3124 6007          CAF          /CLEAR
3125 7300          CLA CLL
3126 1367          TAD          (=42          /SET UP A DELAY
3127 3024          DCA          DELAY  /COUNTER
3130 1372          TAD          (4          /GET RED COLOR BIT
3131 4196          DILE          /CHANGE TO RED
3132 4135          DISD          /WAIT FOR DONE
3133 7410          SKP          CLT24A /NOT SET
3134 5342          JMP          CLT24A /NEXT TEST
3135 2024          ISZ          DELAY  /WAIT
3136 5332          JMP          =4          /NOT FINISHED
3137 4076          ERROR          /CHANGE IN COLOR FAILED TO SET DONE
3140 3116          CLT24
3141 3200          CLT25=3
3142 2005          CLT24A, ISZ          TALLY  /NEXT TEST
3143 5316          JMP          CLT24  /FINISHED ?
3144 5745          JMP          +1          /NO
3145 3200          CLT25=3          /YES, NEXT TEST
3167 7716
3170 7200
3171 7770
3172 0004
3173 0020
3174 0040
3175 2777
3176 7600
3177 5000
PAGE 3200
    
```

```

/      TEST THAT CHANGING COLORS SETS DONE
/      RED TO GREEN < 1.6 MSEC.>
      SETUP
3200 4025      TAD      (-10      /SET UP EXECUTION
3201 1377      DCA      TALLY      /COUNTER
3202 3005      CLT25, CLA CLL      /
3203 7300      TAD      (-120     /SET UP DELAY
3204 1376      DCA      DELAY     /COUNTER
3205 3024      TAD      (4        /CHANGE TO RED
3206 1375      DILE
3207 4196      DISD
3210 4135      JMP      :-1       /WAIT FOR DONE
3211 5210      CLA CLL
3212 7300      DILE
3213 4196      DISD
3214 4135      SKP
3215 7410      JMP      CLT25B     /FLAG WAS SET
3216 5214      ISE      DELAY     /DELAY
3217 2024      JMP      ERROR     /TRY AGAIN
3220 5214      ERROR
3221 4076      CLT25
3222 3203      CLT25+1
3223 3226      CLT25
3224 2005      CLT25B, ISE      TALLY /TEST COUNTER
3225 5203      JMP      CLT25     /NO TRY AGAIN
    
```

```

/
/
/ERASE TEST
/      DOES DONE CLEAR AFTER ERASE COMMAND
      SETUP
3226 4025      CLT26, LAS
3227 7604      AND      (180      /READ SWITCHES
3230 0374      SEA CLA      /MASK TO BIT 5
3231 7640      JMP      CLT30     /IS IT SET ?
3232 5271      TAD      (30      /YES, BYPASS ERASE TESTS
3233 1373      DILE
3234 4196      DISD
3235 4135      JMP      :-1       /NO GET ERASE AND STORE MODE
3236 5242      ERROR
3237 4076      CLT26
3240 3227      CLT26+3
3241 3244      ISE      TALLY     /ERASE SCREEN
3242 2005      JMP      CLT26     /DID DONE SET/CLEAR
3243 5227      CLT26
3244 4025      /CLEARED
3245 7240      ERROR, ERASE FAILED TO CLEAR DONE
3246 3005      /THIS TEST
3247 7300      /NEXT TEST
3250 1372      /NEXT TEST
3251 3024      /TEST COUNTER
3252 3003      /TEST COUNTER
3253 1373      /TRY AGAIN
3254 4196      /
3255 4135      /DOES DONE SET AFTER ERASE COMMAND
3256 7410      /500 MSEC.
3257 5247      SETUP
3260 2003      CLA CMA
3261 5205      DCA      TALLY     /SET UP EXECUTION
3262 2024      CLT27, CLA CLL     /COUNTER
3263 5205      TAD      (-30      /SET UP A DELAY
3264 4076      DCA      DELAY     /COUNTER
3265 3247      DCA      SUM1      /CLEAR TEMP
3266 3271      TAD      (30      /GET ERASE
3267 2005      DILE
3268 5247      DISD
3269 5247      SKP
3270 2021      JMP      CLT27C     /EXECUTE ERASE
3271 2021      ISE      SUM1      /WAIT FOR DONE
3272 5771      JMP      CLT27A     /NO DONE FLAG
3273 5770      ISE      DELAY     /FLAG WAS SET
3274 5770      JMP      CLT27A     /DELAY
3275 5770      ISE      DELAY     /WAIT
3276 5770      JMP      CLT27A     /
3277 5770      /ERROR, ERASE FAILED TO SET DONE
3278 5770      /41/413 MUST BE POWERED ON
3279 5770      /NEXT TEST
3280 5770      /TEST COUNTER
3281 5770      CLT27C, ISE      TALLY /RETURN
3282 5770      JMP      CLT27     /TEST PASS COUNTER
3283 5770      CLT30, ISE      TALLY /RESTART
3284 5770      JMP      COLOR
3285 5770      JMP      COLOR
    
```

```

/STORE AND WRITE-THRU MODE TEST
/
3274 6007 PHOER, CAP
3275 4767 JMS MESSAGE /PRINT THE MESSAGE
3276 4321 MSG23
3277 7604 LAS
3300 0374 AND (100
3301 7640 SEA CLA
3302 5306 JMP WRTHU /USE WRITE THRU MODE
3303 4315 JMS PHOAR
3304 4315 JMS PHOAR
3305 5274 JMP PHOER

3306 4766 WRITU, JMS WRTHU
3307 4766 JMS WRTHU
3310 4766 JMS WRTHU
3311 4766 JMS WRTHU
3312 4766 JMS WRTHU
3313 4766 JMS WRTHU
3314 5274 JMP PHOER

3315 0000 PHOAR, 0
3316 7300 CLA CLL
3317 1373 TAD (30 /GET ERASE AND STORE BITS
3320 4156 DILE /ERASE THE SCREEN
3321 4135 DISD /WAIT FOR DONE
3322 5321 JMP ,=1
3323 4765 JMS SEYHOR
3324 1364 TAD (-2000 /SET UP VERTICAL COUNT
3325 3763 DCA VERCNT / LOCATION
3326 1362 TAD (1001 /SET UP VERTICIL
3327 3761 DCA YVERT /
3330 7300 PHOBR, CLA CLL
3331 1761 TAD YVERT /GET Y AXIS
3332 4760 JMS PLINE /DRAW A LINE
3333 9777 =2001
3334 1001 1001
3335 4036 JMS CKSW7
3336 2761 ISE YVERT /INCREMENT Y AXIS
3337 7000 NOP
3340 2763 ISE VERCNT /INCREMENT Y COUNT
3341 5330 JMP PHOBR /FINISH THE SCREEN
3342 7300 CLA CLL
3343 1357 TAD (-400 /SET UP A DELAY
3344 3763 DCA VERCNT / COUNTER
3345 3761 DCA YVERT
3346 4036 JMS CKSW7 /TEST SWITCH 7
3347 2761 ISE YVERT /DELAY
3350 5346 JMP ,=2
3351 2763 ISE VERCNT /DELAY
3352 5346 JMP ,=4
3353 5715 JMP 1 PHOAR
3357 7400
3360 2447
3361 2112
    
```

```

3362 1001
3363 2111
3364 6000
3365 2613
3366 3400
3367 5000
3370 3013
3371 3021
3372 7750
3373 0030
3374 0100
3375 0004
3376 7360
3377 7770
    
```

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/WRITE-THRU MODE SUBROUTINE FOR 611/613

```

3400 0000 WRTHU, 0
3401 7300 CLA CLL
3402 1377 TAD (30
3403 4156 DILE /ERASE THE DISPLAY
3404 4135 DISD /WAIT FOR 50NS
3405 5204 JMP ,=I
3406 4776 JMS SE7HOR /SET UP HORIE
3407 4775 JMS DIAG1 /PLOT A /X/
3410 5777 =2001
3411 1001 1001
3412 4774 JMS DIAG2
3413 6000 =2000
3414 1001 1001
3415 0777 777
3416 7300 CLA CLL
3417 1373 TAD (=I0
3420 3005 DCA TALLY /SET UP WIDTH BOUNT
3421 1372 TAD (1001 /SET UP X POSITION
3422 3771 DCA XPOINT / VALUE
3423 3770 DCA YPOINT /SET UP Y VALUE
3424 1367 TAD (60
3425 4156 DILE
3426 7300 WRTHUA, CLA CLL
3427 1771 TAD XPOINT /GET X POSITION
3430 4142 DILX
3431 4135 DISD /WAIT FOR 50NS
3432 5231 JMP ,=I
3433 7300 CLA CLL
3434 1770 TAD YPOINT /GET Y POSITION
3435 4146 DILE
3436 4135 DISD /WAIT FOR 50NS
3437 5236 JMP ,=I
3440 4766 JMS WAIT /INTENSIFY AND DELAY A LONG TIME
3441 1365 TAD (200 /UPDATE X POSITION
3442 1771 TAD XPOINT
3443 3771 DCA XPOINT /NEW X POSITION
3444 2005 ISZ TALLY /FINISHED HORIE, LINE 1
3445 5226 JMP WRTHUA /NO
3446 5600 JMP I WRTHU /EXIT
    
```

//SUBROUTINES TO HANDLE OUTPUTS TO tty??

```

3447 0000 CALSND, 0
3450 4263 JMS SIXTY
3451 0003 SUM1
3452 3455 OUT1
3453 4764 JMS MESSAGE
3454 3736 3736
3455 7777 OUT1, 7777
3456 7777 7777
3457 4040 4040
3460 0000 0000
3461 6001 ION
3462 5647 JMP I CALSND

3463 0000 SIXTY, 0
3464 7000 NOP
3465 7000 NOP
3466 7200 CLA
3467 1663 TAD I ,=4
3470 3272 DCA ,=8
3471 5673 JMP I ,=2
3472 0000 0
3473 3473 SIXTY*12
3474 5266 JMP SIXTY*3
3475 1672 TAD I SIXTY*7
3476 0363 AND (0007
3477 3340 DCA MASKA
3500 1672 TAD I SIXTY*9
3501 0362 AND (0070
3502 3341 DCA MASKB
3503 1672 TAD I SIXTY*9
3504 0361 AND (700
3505 3342 DCA MASKC
3506 1672 TAD I SIXTY*9
3507 0360 AND (7000
3510 3343 DCA MASKD
3511 1342 TAD RTR CLL
3512 7112 RAR
3513 7110 TAD TAD MASKD
3514 1343 RTR MASKD
3515 7012 RAR
3516 7010 TAD
3517 1344 TAD MASKD*I
3520 3342 DCA MASKC
3521 2263 ISZ SIXTY
3522 4273 JMS SIXTY*I0
3523 1342 TAD MASKC
3524 3672 DCA I SIXTY*9
3525 1341 TAD MASKB
3526 7004 RAL
3527 7006 RTL
    
```



3530	1340	TAD	MASKA
3531	1344	TAD	MASKD+I
3532	2272	ISZ	SIXTY+7
3533	3672	DCA I	SIXTY+7
3534	1357	TAD	(SIXTY+12
3535	3273	DCA	SIXTY+10
3536	2263	ISZ	SIXTY
3537	5663	JMP I	SIXTY
3540	0000	MASKA,	0
3541	0000	MASKB,	0
3542	0000	MASKC,	0
3543	0000	MASKD,	0
3544	6060		6060
3557	3475		
3560	7000		
3561	0700		
3562	0070		
3563	0007		
3564	5660		
3565	0200		
3566	1723		
3567	0060		
3570	2241		
3571	2240		
3572	1001		
3573	7770		
3574	2664		
3575	2626		
3576	2613		
3577	0030		
	3600		

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//MESSAGE LISTINGS//

3600	3736	MSG1,	TEXT	"*VCBE POINT PLOT DISPLAY DIAGNOSTIC**"
3601	2603			
3602	7005			
3603	4020			
3604	1711			
3605	1624			
3606	4020			
3607	1417			
3610	2440			
3611	0411			
3612	2320			
3613	1401			
3614	3140			
3615	0411			
3616	0107			
3617	1617			
3620	2324			
3621	1103			
3622	3736			
3623	0000			
3624	3736	MSG2,	TEXT	"*MAINDEC-08-DHVCA-A**"
3625	1501			
3626	1116			
3627	0405			
3630	0355			
3631	6070			
3632	5504			
3633	1026			
3634	0301			
3635	5501			
3636	3736			
3637	0000			
3640	3736	MSG3,	TEXT	"*S'R,7=1, PERFORM TEST SELECTED BY S'R, 0-11**"
3641	2356			
3642	2256			
3643	6775			
3644	6194			
3645	4020			
3646	0522			
3647	0617			
3650	2215			
3651	4024			
3652	0523			
3653	2440			
3654	2305			
3655	1405			
3656	0324			
3657	0504			
3660	4002			
3661	3140			

3662	2356		
3663	2256		
3664	4070		
3665	5501		
3666	6137		
3667	3600		
3670	2356	MSG4, TEXT	"S,R,7=0, RETURN TO DISPATCH ROUTINE TO GET NEXT TEST=0"
3671	2256		
3672	6775		
3673	6094		
3674	4022		
3675	0524		
3676	2522		
3677	1640		
3700	2417		
3701	4004		
3702	1123		
3703	2001		
3704	2403		
3705	1040		
3706	2217		
3707	2524		
3710	1116		
3711	0540		
3712	2417		
3713	4007		
3714	0524		
3715	4016		
3716	2530		
3717	2440		
3720	2405		
3721	2324		
3722	3736		
3723	0000		
3724	3736	MSG5, TEXT	"=SELECT TEST=0"
3725	2305		
3726	1405		
3727	2324		
3730	4024		
3731	0523		
3732	2437		
3733	3600		
3734	3736	MSG6, TEXT	"=DC CALIBRATION TEST=0"
3735	0403		
3736	4003		
3737	0114		
3740	1102		
3741	2201		
3742	2411		
3743	1716		
3744	4024		
3745	3523		

3746	2437		
3747	3600		
3750	3736	MSG7, TEXT	"=RAM TEST=0"
3751	2201		
3752	1520		
3753	4024		
3754	0523		
3755	2437		
3756	3600		
3757	3736	MSG8, TEXT	"=CONTROL LOGIC TEST=0"
3760	0317		
3761	1624		
3762	2217		
3763	1440		
3764	1417		
3765	0711		
3766	0340		
3767	2405		
3770	2324		
3771	3736		
3772	0000		
3773	3736	MSG9, TEXT	"=VERTICAL FLYBACK=0"
3774	2605		
3775	2224		
3776	1103		
3777	0114		
4000	4006		
4001	1431		
4002	0201		
4003	0313		
4004	3736		
4005	0000		
4006	3736	MSG10, TEXT	"=HORIZONTAL FLYBACK=0"
4007	1017		
4010	2211		
4011	3217		
4012	1624		
4013	0114		
4014	4006		
4015	1431		
4016	0201		
4017	0313		
4020	3736		
4021	0000		
4022	3736	MSG11, TEXT	"=CORNERS TEST=0"
4023	0317		
4024	2216		
4025	3522		
4026	2340		
4027	2425		
4030	2324		

4031 3736  
4032 0000  
  
4033 3736 MSG12, TEXT "++VERTICAL BAR TEST++"  
4034 2605  
4035 2224  
4036 1103  
4037 0114  
4040 4002  
4041 0122  
4042 4024  
4043 0523  
4044 2437  
4045 3600  
  
4046 3736 MSG13, TEXT "++HORIZONTAL BAR TEST++"  
4047 1017  
4050 2211  
4051 3217  
4052 1624  
4053 0114  
4054 4002  
4055 0122  
4056 4024  
4057 0523  
4060 2437  
4061 3600  
  
4062 3736 MSG14, TEXT "++SINGLE POINT PLOT TEST++"  
4063 2311  
4064 1607  
4065 1405  
4066 4020  
4067 1711  
4070 1624  
4071 4020  
4072 1417  
4073 2440  
4074 2405  
4075 2324  
4076 3736  
4077 0000  
  
4100 3736 MSG15, TEXT "++PUT DESIRED VALUE OF X IN S,R, AND PRESS CONTINUE++"  
4101 2025  
4102 2440  
4103 0405  
4104 2311  
4105 2205  
4106 2440  
4107 2601  
4110 1425  
4111 0540  
4112 1706  
4113 4030

4114 4011  
4115 1640  
4116 2396  
4117 2296  
4120 4001  
4121 1604  
4122 4020  
4123 2205  
4124 2323  
4125 4003  
4126 1716  
4127 2411  
4130 1625  
4131 0537  
4132 3600  
  
4133 3736 MSG16, TEXT "++PUT DESIRED VALUE OF Y IN S,R, AND PRESS CONTINUE++"  
4134 2025  
4135 2440  
4136 0405  
4137 2311  
4140 2205  
4141 0440  
4142 2601  
4143 1425  
4144 0540  
4145 1706  
4146 4031  
4147 4011  
4150 1640  
4151 2396  
4152 2296  
4153 4001  
4154 1604  
4155 4020  
4156 2205  
4157 2323  
4160 4003  
4161 1716  
4162 2411  
4163 1625  
4164 0537  
4165 3600  
  
4166 3736 MSG17, TEXT "++SET SH7=1 TO LOOP IN TEST"  
4167 2305  
4170 2440  
4171 2327  
4172 6775  
4173 6140  
4174 2417  
4175 4014  
4176 1717  
4177 2040  
4200 1116

4201 4024  
4202 0533  
4203 2400

4204 3736 MSG18, TEXT "++SET SW700 TO PLOT POINT ONCE, PRESS CONTINUE++"  
4205 2305  
4206 2440  
4207 2327  
4210 6775  
4211 6040  
4212 2417  
4213 4020  
4214 1417  
4215 2440  
4216 2017  
4217 1116  
4220 2440  
4221 1716  
4222 0305  
4223 5440  
4224 2022  
4225 0523  
4226 2340  
4227 0317  
4.30 1624  
4231 1116  
4232 0505  
4233 3736  
4234 0000

4235 3736 MSG19, TEXT "++DIAGONALS++"  
4236 0411  
4237 0107  
4240 1716  
4241 0114  
4242 2337  
4243 3600

4244 3736 MSG20, TEXT "++CROSSING DIAGONALS++"  
4245 0322  
4246 1723  
4247 2311  
4250 1607  
4251 4004  
4252 1101  
4253 0717  
4254 1601  
4255 1423  
4256 3736  
4257 0000

4260 3736 MSG21, TEXT "++DISPLAYED CALIBRATION TEST++"  
4261 0411  
4262 2320  
4263 1401

4264 3105  
4265 0440  
4266 0301  
4267 1411  
4270 0222  
4271 0124  
4272 1117  
4273 1640  
4274 2405  
4275 2324  
4276 3736  
4277 0000

4300 3736 MSG22, TEXT "++COLOR AND STORAGE LOGIC TEST++"  
4301 0317  
4302 1417  
4303 2240  
4304 2116  
4305 0440  
4306 2324  
4307 1722  
4310 0107  
4311 0540  
4312 1417  
4313 0711  
4314 0340  
4315 2405  
4316 2324  
4317 3736  
4320 0000

4321 3736 MSG23, TEXT "++STORE AND WRITE-THRU MODE TEST++"  
4322 2324  
4323 1722  
4324 0540  
4325 0116  
4326 0440  
4327 2722  
4330 1124  
4331 0555  
4332 2410  
4333 2225  
4334 4015  
4335 1704  
4336 0540  
4337 2405  
4340 2324  
4341 3736  
4342 0000

4343 3736 MSG24, TEXT "++COLOR ALIGNMENT TEST ++"  
4344 0317  
4345 1417  
4346 2240  
4347 0114  
4350 1107  
4351 1615

4352 0516  
4353 2440  
4354 2405  
4355 2324  
4356 4037  
4357 3600

//CONTROL LOGIC ERROR MESSAGES//

4360 3736 MSG1, TEXT "CLT1-DILE FAILED TO CLEAR AC"  
4361 0314  
4362 2461  
4363 5504  
4364 1114  
4365 0540  
4366 0601  
4367 1114  
4370 0504  
4371 4024  
4372 1740  
4373 0314  
4374 0501  
4375 2240  
4376 0103  
4377 3736  
4400 0000

4401 3736 MSG1A, TEXT "CLT1A-CHANNEL P/P NOT SET OR NOT READ BACK"  
4402 0314  
4403 2461  
4404 0155  
4405 0310  
4406 0116  
4407 1605  
4410 1440  
4411 0657  
4412 0640  
4413 1617  
4414 2440  
4415 2305  
4416 2440  
4417 1722  
4420 4016  
4421 1724  
4422 4022  
4423 0501  
4424 0440  
4425 0201  
4426 0313  
4427 3736  
4430 0000

4431 3736 MSG1B, TEXT "CLT1B-INTERRUPT ENABLE NOT SET OR NOT READ BACK"  
4432 0314  
4433 2461

4434 0255  
4435 1116  
4436 2405  
4437 2222  
4440 2520  
4441 2440  
4442 0516  
4443 0102  
4444 1405  
4445 4016  
4446 1724  
4447 4023  
4450 0524  
4451 4017  
4452 2240  
4453 1617  
4454 2440  
4455 2205  
4456 0104  
4457 4002  
4460 0103  
4461 1337  
4462 3600

4463 3736 MSG1C, TEXT "CLT1C-CHANNEL P/P NOT SET OR NOT READ BACK"  
4464 0314  
4465 2461  
4466 0355  
4467 0310  
4470 0116  
4471 1605  
4472 1440  
4473 0657  
4474 0640  
4475 1617  
4476 2440  
4477 2305  
4500 2440  
4501 1722  
4502 4016  
4503 1724  
4504 4022  
4505 0501  
4506 0440  
4507 0201  
4510 0313  
4511 3736  
4512 0000

4513 3736 MSG2, TEXT "CLT2-DILE FAILED TO CLEAR ENABLE REGISTER"  
4514 0314  
4515 2402  
4516 5504  
4517 1114  
4520 0540

4521 0601  
4522 1114  
4523 0504  
4524 4024  
4525 1740  
4526 0314  
4527 0501  
4530 2240  
4531 0516  
4532 0102  
4533 1405  
4534 4022  
4535 0507  
4536 1123  
4537 2405  
4540 2237  
4541 3600

MSG3, TEXT "CL13-DILX FAILED TO SET DONE OR CLEARED AC"

4542 3736  
4543 0314  
4544 2463  
4545 5504  
4546 1114  
4547 3040  
4550 0601  
4551 1114  
4552 0504  
4553 4024  
4554 1740  
4555 2305  
4556 2440  
4557 0417  
4560 1605  
4561 4017  
4562 2240  
4563 0314  
4564 0501  
4565 2205  
4566 0440  
4567 0103  
4570 3736  
4571 0000

MSG4, TEXT "CL14-DILY FAILED TO SET DONE OR CLEARED AC"

4572 3736  
4573 0314  
4574 2464  
4575 5504  
4576 1114  
4577 3140  
4600 0601  
4601 1114  
4602 0504  
4603 4024  
4604 1740  
4605 2305

4606 2440  
4607 0417  
4610 1605  
4611 4017  
4612 2240  
4613 0314  
4614 0501  
4615 2205  
4616 0440  
4617 0103  
4620 3736  
4621 0000

MSG5, TEXT "CL15-DIXY FAILED TO SET DONE"

4622 3736  
4623 0314  
4624 2465  
4625 5504  
4626 1130  
4627 3140  
4630 0601  
4631 1114  
4632 0504  
4633 4024  
4634 1740  
4635 2305  
4636 2440  
4637 0417  
4640 1605  
4641 3736  
4642 0000

MSG6, TEXT "CL16-DICD FAILED TO CLEAR DONE FLAG"

4643 3736  
4644 0314  
4645 2466  
4646 5504  
4647 1103  
4650 0440  
4651 0601  
4652 1114  
4653 0504  
4654 4024  
4655 1740  
4656 0314  
4657 0501  
4660 2240  
4661 0417  
4662 1605  
4663 4006  
4664 1401  
4665 0737  
4666 3600

MSG7, TEXT "CL17-DISD FAILED TO SKIP ON DONE FLAG OR CLRD FLG"

4667 3736  
4670 0314  
4671 2467

4672 5504  
4673 1123  
4674 0440  
4675 0001  
4676 1114  
4677 0504  
4700 4004  
4701 1720  
4702 2313  
4703 1120  
4704 4017  
4705 1640  
4706 0417  
4707 1605  
4710 4006  
4711 1401  
4712 0740  
4713 1722  
4714 4003  
4715 1422  
4716 0440  
4717 0614  
4720 0737  
4721 3600

MSG8, TEXT "CLT8-ILLEGAL INT, CAUSED BY INT, ENABLE"

4722 3736  
4723 0314  
4724 2470  
4725 5511  
4726 1414  
4727 0507  
4730 0114  
4731 4011  
4732 1624  
4733 5640  
4734 0301  
4735 2523  
4736 0504  
4737 4002  
4740 3140  
4741 1116  
4742 2456  
4743 4005  
4744 1601  
4745 0214  
4746 0537  
4747 3600

MSG9, TEXT "CLT9-ILLEGAL INT, CAUSED BY DONE FLIC"

4750 3736  
4751 0314  
4752 2471  
4753 5511  
4754 1414  
4755 0507  
4756 0114

4757 4011  
4760 1624  
4761 5640  
4762 0301  
4763 2523  
4764 0504  
4765 4002  
4766 3140  
4767 0417  
4770 1605  
4771 4006  
4772 1401  
4773 0737  
4774 3600

MSG10, TEXT "CLT10-INT, ENABLE AND DONE FLG DID NOT INTERRUPT"

4775 3736  
4776 0314  
4777 2461  
5000 6055  
5001 1116  
5002 2456  
5003 4005  
5004 1601  
5005 0214  
5006 0540  
5007 0116  
5010 0440  
5011 0417  
5012 1605  
5013 4006  
5014 1407  
5015 4004  
5016 1104  
5017 4016  
5020 1724  
5021 4011  
5022 1624  
5023 0522  
5024 2225  
5025 2024  
5026 3736  
5027 0000

MSG11, TEXT "CLT11-DILX FAILED TO CLEAR DONE"

5030 3736  
5031 0314  
5032 2461  
5033 6155  
5034 0411  
5035 1430  
5036 4006  
5037 0111  
5040 1405  
5041 0440  
5042 2417  
5043 4003

5044 1405  
5045 0122  
5046 4004  
5047 1716  
5050 0537  
5051 3600  
5052 3736  
5053 0314  
5054 2441  
5055 6295  
5056 0411  
5057 1431  
5060 4006  
5061 0111  
5062 1405  
5063 0440  
5064 2417  
5065 4003  
5066 1405  
5067 0122  
5070 4004  
5071 1716  
5072 0537  
5073 3600

EMSG12, TEXT "CLT12-DILY FAILED TO CLEAR DONE"

5074 3736  
5075 0314  
5076 2462  
5077 6055  
5100 2722  
5101 1124  
5102 0540  
5103 2410  
5104 2225  
5105 4006  
5106 5706  
5107 4016  
5110 1724  
5111 4023  
5112 0524  
5113 4017  
5114 2240  
5115 1617  
5116 2440  
5117 2205  
5120 0104  
5121 4002  
5122 0103  
5123 1337  
5124 3600  
5125 3736  
5126 0314  
5127 2462  
5130 6195  
5131 2324

EMSG20, TEXT "CLT20-WRITE THRU F/P NOT SET OR NOT READ BACK"

EMSG21, TEXT "CLT21-STORE F/P NOT SET OR NOT READ BACK"

5132 1722  
5133 0540  
5134 0657  
5135 0640  
5136 1617  
5137 2440  
5140 2305  
5141 2440  
5142 1722  
5143 4016  
5144 1724  
5145 4022  
5146 0501  
5147 0440  
5150 0201  
5151 0313  
5152 3736  
5153 0000  
5154 3736  
5155 0314  
5156 2462  
5157 6295  
5160 0317  
5161 1417  
5162 2240  
5163 0697  
5164 0640  
5165 1617  
5166 2440  
5167 2305  
5170 2440  
5171 1722  
5172 4016  
5173 1724  
5174 4022  
5175 0501  
5176 2440  
5177 0201  
5200 0313  
5201 3736  
5202 0000  
5203 3736  
5204 0314  
5205 2442  
5206 6355  
5207 2324  
5210 0122  
5211 2440  
5212 1706  
5213 4003  
5214 1714  
5215 1722  
5216 4003  
5217 1001  
5220 1637

EMSG22, TEXT "CLT22-COLOR F/P NOT SET OR NOT READ BACK"

EMSG23, TEXT "CLT23-START OF COLOR CHANGE FAILED TO CLEAR DONE FLAG"



5221 0540  
5222 0601  
5223 1114  
5224 0504  
5225 4024  
5226 1740  
5227 0314  
5230 0501  
5231 2240  
5232 0417  
5233 1605  
5234 4006  
5235 1401  
5236 0737  
5237 3600  
5240 3736  
5241 0314  
5242 2462  
5243 6455  
5244 0722  
5245 0505  
5246 1640  
5247 2417  
5250 4022  
5251 0504  
5252 4003  
5253 1714  
5254 1722  
5255 4003  
5256 1001  
5257 1607  
5260 0540  
5261 0601  
5262 1114  
5263 0504  
5264 4024  
5265 1740  
5266 2305  
5267 2440  
5270 0417  
5271 1605  
5272 3736  
5273 0000  
5274 3736  
5275 0314  
5276 2462  
5277 6555  
5300 2205  
5301 0440  
5302 2417  
5303 4007  
5304 2205  
5305 0516  
5306 4003  
5307 1714

MSG24, TEXT "CL124=GREEN TO RED COLOR CHANGE FAILED TO SET DONE"

MSG25, TEXT "CL125=RED TO GREEN COLOR CHANGE FAILED TO SET DONE"

5310 1722  
5311 4003  
5312 1001  
5313 1607  
5314 0540  
5315 0601  
5316 1114  
5317 0504  
5320 4024  
5321 1740  
5322 2305  
5323 2440  
5324 0417  
5325 1605  
5326 3736  
5327 0000  
5330 3736  
5331 0314  
5332 2462  
5333 6455  
5334 2324  
5335 0122  
5336 2440  
5337 1706  
5340 4005  
5341 2201  
5342 2305  
5343 4003  
5344 1715  
5345 1501  
5346 1604  
5347 4006  
5350 0111  
5351 1405  
5352 0440  
5353 2417  
5354 4003  
5355 1405  
5356 0122  
5357 4004  
5360 1716  
5361 0537  
5362 3600  
5363 3736  
5364 0314  
5365 2462  
5366 6755  
5367 0522  
5370 0133  
5371 0540  
5372 1116  
5373 4003  
5374 2417  
5375 2205  
5376 4015

MSG26, TEXT "CL126=START OF ERASE COMMAND FAILED TO CLEAR DONE"

MSG27, TEXT "CL127=ERASE IN STORE MODE FAILED TO SET DONE FLAG"

5377 1704  
 5400 0540  
 5401 0601  
 5402 1114  
 5403 0504  
 5404 4024  
 5405 1740  
 5406 2305  
 5407 2440  
 5410 0417  
 5411 1605  
 5412 4006  
 5413 1401  
 5414 0737  
 5415 3600

5600 PAGE

5600	0000	MESSAGE, 0		/MESSAGE TYPE-BUT ROUTINE
5601	7240	CLA CMA		
5602	1600	TAD I	MESSAGE	
5603	3010	DCA	10	
5604	2220	ISZ	MESSAGE	
5605	1410	TAD I	10	
5606	3217	DCA	MSRGHT	
5607	1217	TAD	MSRGHT	
5610	7012	RTR		
5611	7012	RTR		
5612	7012	RTR		
5613	4220	JMS	TYPECH	
5614	1217	TAD	MSRGHT	
5615	4220	JMS	TYPECH	
5616	5205	JMP	MESSAGE45	
5617	0000	MSRGHT, 0		
5620	0000	TYPECH, 0		
5621	0252	AND	MASK77	
5622	7450	SNA		
5623	5600	JMP I	MESSAGE	
5624	1253	TAD	M40	
5625	7510	SPA		
5626	5231	JMP	,-3	
5627	1254	TAD	C240	
5630	5244	JMP	MTP	
5631	7001	IAC		
5632	7440	SEA		
5633	5236	JMP	,-3	
5634	1255	TAD	C215	
5635	5244	JMP	MTP	
5636	7001	IAC		
5637	7440	SEA		
5640	5243	JMP	,-3	
5641	1256	TAD	C212	
5642	5244	JMP	MTP	
5643	1257	TAD	C336	
5644	6046	MTP, TLS		
5645	6041	TSF		
5646	5245	JMP	,-I	
5647	6042	TCF		
5650	7200	CLA		
5651	5620	JMP I	TYPECH	
5652	0077	MASK77, 77		
5653	7740	M40, -40		
5654	0240	C240, 240		
5655	0215	C215, 215		
5656	0212	C212, 212		
5657	0336	C336, 336		

```

//MESSAGE ROUTINE FOR CALIBRATION VALUES//
5660 0000 MASAGE, 0
5661 6002 10F
5662 7240 CLA CHA
5663 1260 TAO MASAGE
5664 3010 DCA 10
5665 1410 TAD I 10
5666 3277 DCA MSRG1
5667 1277 TAO MSRG1
5670 7012 RTR
5671 7012 RTR
5672 7012 RTR
5673 4300 JMS TYPEC
5674 1277 TAO MSRG1
5675 4300 JMS TYPEC
5676 5265 JMP MASAGE+5
5677 0000 MSRG1, 0
5700 0000 TYPEC, 0
5701 0232 AND MARK77
5702 7450 SNA
5703 5410 JMP I 10
5704 1253 TAO M40
5705 7510 SPA
5706 5311 JMP .+3
5707 1254 TAO C210
5710 5324 JMP MTPA
5711 7001 IAC
5712 7440 SEA
5713 5316 JMP .+3
5714 1255 TAO C215
5715 5324 JMP MTPA
5716 7001 IAC
5717 7440 SEA
5720 5323 JMP .+3
5721 1256 TAO C212
5722 5324 JMP MTPA
5723 1257 TAO C336
5724 6046 MTPA, TLS
5725 6041 TSP
5726 3325 JMP .-1
5727 6042 TCF
5730 7200 CLA
5731 5700 JMP I TYPEC

```

```

5
0171 5600
0172 0200
0173 7777
0174 0002
0175 0400
0176 0020
0177 5000

```

```

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 11111000 00000000 00000000 00000000 00000000 00011111
0400 11111111 11111111 11111111 11111111 11111111 11111111 11111111 11111111
0500 11110000 00000000 00000000 00000000 00000000 00000000 00000001 11111111
0600 11111111 11111111 11111111 11111111 11111111 11111111 11111111 11111111
0700 11111111 11111111 11111111 11111111 11111111 10000000 00000001 11111111
1000 11111111 11111111 11111111 11111111 11111111 11111111 11111111 11111111
1100 11111111 11111111 11111111 11111111 11000000 00000000 00000000 00111111
1200 11111111 11111111 11111111 11111111 11111111 11111111 11111111 11111111
1300 11111111 11111111 00000000 00000000 00000000 00000000 00000000 00011111
1400 11111111 11111111 11111111 11111111 11111111 11111111 11111111 00000000
1500 00000000 00000000 00000000 00000000 00000000 00000000 00000000 01111111
1600 11111111 11111111 11111111 11111111 11111111 11111111 11111111 11111111
1700 11111111 11111111 11111111 11111111 11100000 00000000 00111111 11111111
2000 11111111 11111111 11111111 11111111 11111111 11111111 11111111 11111111
2100 11111111 11100000 00000000 00000000 00000000 00000000 00000001 11111111
2200 11111111 11111111 11111111 11111111 11111111 11111111 11111111 11111111
2300 11111111 11111111 11111110 00000000 00000000 00000000 00001111 11111111
2400 11111111 11111111 11111111 11111111 11111111 11111111 11111111 11111111
2500 11111111 11111111 11111111 11111111 11111111 11110000 00000011 11111111
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 11111111 11111111 11111111 11111111 11111100 00000000 00000001 11111111
3200 11111111 11111111 11111111 11111111 11111111 11111111 11111111 11111111
3300 11111111 11111111 11111111 11111111 11111111 11110001 11111111 11111111
3400 11111111 11111111 11111111 11111111 11111111 11111111 11111111 11111111
3500 11111111 11111111 11111111 11111111 11110000 00000001 11111111 11111111
3600 11111111 11111111 11111111 11111111 11111111 11111111 11111111 11111111
3700 11111111 11111111 11111111 11111111 11111111 11111111 11111111 11111111

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4000 11111111 11111111 11111111 11111111 11111111 11111111 11111111 11111111
4100 11111111 11111111 11111111 11111111 11111111 11111111 11111111 11111111

4200 11111111 11111111 11111111 11111111 11111111 11111111 11111111 11111111
4300 11111111 11111111 11111111 11111111 11111111 11111111 11111111 11111111

4400 11111111 11111111 11111111 11111111 11111111 11111111 11111111 11111111
4500 11111111 11111111 11111111 11111111 11111111 11111111 11111111 11111111

4600 11111111 11111111 11111111 11111111 11111111 11111111 11111111 11111111
4700 11111111 11111111 11111111 11111111 11111111 11111111 11111111 11111111

5000 11111111 11111111 11111111 11111111 11111111 11111111 11111111 11111111
5100 11111111 11111111 11111111 11111111 11111111 11111111 11111111 11111111

5200 11111111 11111111 11111111 11111111 11111111 11111111 11111111 11111111
5300 11111111 11111111 11111111 11111111 11111111 11111111 11111111 11111111

5400 11111111 11111100 00000000 00000000 00000000 00000000 00000000 00000000
5500 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000

5600 11111111 11111111 11111111 11111111 11111111 11111111 11111111 11111111
5700 11111111 11111111 11111111 11000000 00000000 00000000 00000000 00000000

6000
6100

6200
6300

6400
6500

6600
6700

7000
7100

7200
7300

7400
7500

7600
7700
    
```

```

ADJCLA 2746 COLOR 3013 EM808 4722
ADJCOL 2740 CORNER 1684 EM809 4790
AMSAG 0167 CRTST 1600 EQUT 0123
C212 5696 CROTSY 2400 ERMSG 3000
C215 5695 DBTST 2000 ERNB 1134
C240 5654 DELAY 0024 ERNR 1213
C336 5657 DIABIS 2004 ERRMSG 0097
CAF 6007 DIACNT 2663 ERROR 4076
CALCNT 0495 DIAG1 2626 ER8WIT 0004
CALIB 0403 DIAG1A 2694 ERTYPE 0117
CALSDND 3447 DIAG2 2644 FAIL 0076
CALTST 0400 DIAG2A 2720 GETBAK 0023
CALX 0415 DIAG2B 2734 GETVAL 0417
CALY 0412 DICD 4131 HONBAR 2072
CKSW7 0036 DICL 4125 HONCNT 2055
CLT1 0611 DILE 4196 HORFLY 1405
CLT10 1221 DILX 4142 HORTST 1400
CLT11 1240 DILY 4146 HRBTST 2097
CLT11A 1250 DIRE 4142 IOTT 0093
CLT12 1263 DISCAL 2245 K7077 0320
CLT12A 1273 DISD 4135 M40 5693
CLT1A 0623 DISLOP 2245 MABAGE 5640
CLT1B 0640 DISMSG 0213 MABK77 5692
CLT1C 0655 DISP1 2490 MABKA 3520
CLT2 0672 DISP2 2472 MABKB 3521
CLT20 3025 DISP3 2417 MABKC 3522
CLT21 3042 DISP4 2441 MABKD 3523
CLT22 3057 DISPAT 0216 MESSAGE 5600
CLT23 3074 DISRET 0020 MIOT 0321
CLT24 3116 DISTST 2242 MLINE 2416
CLT24A 3142 DIXY 4192 MSG1 3600
CLT25 3203 EMSG1 4340 MS010 4006
CLT25B 3224 EMSG10 4775 MS011 4022
CLT26 3227 EMSG11 5030 MS012 4033
CLT27 3247 EMSG12 5092 MS013 4026
CLT27A 3255 EMSG1A 4401 MS014 4042
CLT27C 3267 EMSG1B 4431 MS015 4100
CLT3 0707 EMSG1C 4463 MS016 4133
CLT30 3271 EMSG2 4513 MS017 4146
CLT3A 0724 EMSG20 5074 MS018 4204
CLT3B 0726 EMSG21 5125 MS019 4235
CLT4 1001 EMSG22 5154 MS02 3624
CLT4A 1016 EMSG23 5203 MS020 4244
CLT4B 1020 EMSG24 5240 MS021 4240
CLT5 1043 EMSG25 5274 MS022 4300
CLT6 1057 EMSG26 5330 MS023 4321
CLT7 1073 EMSG27 5363 MS024 4343
CLT8 1122 EMSG3 4942 MS03 3640
CLT9 1201 EMSG4 4972 MS04 3670
CLTST 0600 EMSG5 4622 MS05 3724
COLADJ 2501 EMSG6 4643 MS06 3734
COLO 3021 EMSG7 4667 MS07 3790
    
```

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MS08 3797
MS09 3793
MS0PNT 0035
MSIZE 0324
MSRGHT 5617
MSRGT 5677
MYP 5644
MYPA 5724
NXTST 0022
OK10 1235
OUT1 3499
PHOAR 3315
PHOBR 3330
PHOER 3274
PLINE 2474
PLOTCT 2500
PNTR1 0456
PNTR2 2326
PNYST 2200
PRESET 0025
PSIZE 0323
RAMP 0462
RAMPA 0475
RDICD 0132
RDICL 0126
RDILC 0197
RDILX 0143
RDILY 0147
RDIRE 0163
RDISO 0136
RDIXY 0193
RETURN 0002
RHPTST 0457
SAVIT 0503
SELCHN 0044
SETHOR 2613
SETIOT 0256
SETSI 0166
SETUP 0025
SETPR 2600
SINPNT 2222
SIXTY 3463
SIRE 0022
STARE 0200
START 1715
STSIZE 1703
SUM1 0005
SWITCH 0454
TABLE 0434
TABLEA 2313
TALLY 0005
TALLYA 0021
    
```

TEST	0234
TITLE	0295
TYPEC	5700
TYPECH	5620
UPDVAL	0421
VARYCT	2272
VERBAR	2036
VERCNT	2111
VERFLY	1441
VERTST	1434
VRBTST	2023
WAIT	1723
WAIT1	1730
WAITA	1741
WAITB	1742
WRITU	3306
WRTHU	3400
WRTHUA	3426
XCROS	2404
XDICD	0131
XDICL	0125
XDILE	0156
XDILX	0142
XDILY	0146
XDIRE	0162
XDISO	0135
XDIXY	0152
XPOINT	2240
XRAHP	0472
XVERT	2056
XX	7492
YPOINT	2241
YVERT	2112

ERRORS DETECTED: 0  
LINKS GENERATED: 142  
RUN-TIME: 18 SECONDS  
3K CORE USED

