IDENTIFICATION

PRODUCT NAME: AD8E,AM8E A-D CONVERTER AND
                 MULTIPLEXER DIAGNOSTIC

PRODUCT CODE: MAINDEC-08-DNADA-A-D

FORMERLY: MAINDEC-8E-D6BB-D-(D)

DATE REVISED: MARCH 1972

MAINTAINER: DIAGNOSTIC GROUP

AUTHOR: P.T. COYNE

READ THIS DOCUMENT PRIOR TO RUNNING PROGRAM:

1. ABSTRACT

This program performs basic tests on the Input/Output
control logic and multiplexer. The analog tests are
designed to provide a means of calibrating the converter and
checking conversion parameters.

2. REQUIREMENTS

2.1 Equipment

PDP-8/E with 4K core, ASR33 teletype, AD8E A-D Converter,
(AM8E Multiplexer optional), Adjustable High Quality Voltage
Source, EDC MODEL MV105C or equivalent.

> NOTE: To run MONOTINICITY   TEST,   a   function
> generator capable of .1 CPS, sine or ramp
> output must be used.

2.2 Storage

Maindec resides in locations 0000-4500.

2.3 Preliminary Programs

All basic CPU and teletype Maindecs must have been run
successfully.

> NOTE: If external enable utilizing the DK8-E REAL
> TIME CLOCK is to be run, the Maindec for the
> DK8-E must be successfully run first. In
> addition, VC8-E Control Tests must be run
> prior to special LAB-E SYSTEM CHECK routine.

3. LOADING PROCEDURE

The binary loader is used to load the program.

3.1 Control Switches

SW0 = Suppress error messages and "END LOGIC TEST"
MESSAGE
SW1 = HALT ON ERROR WITH PC displayed in AC,
SW2 = Scope loop override to exit from loop on
error and permit continuance of test. Also
halts with converted word in AC for EXTERNAL
ENABLE when there is no error.
SW3 = Enables halt during calibration routine.
Converted word is displayed in AC.
SW4 = Must be set to run EXTERNAL ENABLE test,
SW5 = Allows operator to explicitly select any one
of the logic routines,

4, USAGE PROCEDURE

SEE SPECIFICATIONS FOR MAXIMUM VOLTAGE INPUTS!!

INSURE THAT TELETYPE IS ON-LINE,

a. Control Logic Test

1, LOAD 200,

2, Press CLEAR then CONTINUE, HALT will occur,

3, Select options from switches 0, 1, 2, 3,

4, If SW5 is present (1), select test from SW6-11,

5, Press CONTINUE,

6, After each pass (12 sec) "END OF LOGIC TEST"
will be printed,

   NOTE: With SW5 down and SW2 up, any error will
   be reported once, then program will
   continue to next test,

b. IOT Scope Loop

1, LOAD 201,

2, Place low order six bits of IOT 33xx in SW6-11,

3, Press CLEAR, then CONTINUE,

   NOTE: IOT may be reselected while running,

c. Display Converted Value In AC.

   1. Apply voltage to A-D converter input or to multiplexer channel inputs.

   2. LOAD 202.

   3. If a HALT after conversion is desired, select SW3.

   4. Select MPX channel from SW8-11; Select channel 0 if no multiplexer is available.

   5. Press CLEAR, the CONTINUE; the converted value will be observed in the AC.

   6. When SW3 halt select is engaged, operator may change channels. If desired, then press CONTINUE to loop. SW3 may be deselected at this time.

d. External Enable with Real Time Clock (DK8EP or DK8ES)

   1. Apply voltage to A-D Converter input or preamplifiers, if desired.

   2. LOAD 203.

   3. Set SW4.

   4. Select switches 0 or 2 as desired.

   5. Select channel with SW 8-11.

   6. Press CLEAR, then CONTINUE.

   7. After each pass the TTY bell will ring.

     NOTE: Channel may be changed while running test.

e. Monoticity Test

     NOTE: Ramp Speed of function generator must be slower than slow rate of converter. See ENGINEERING SPECIFICATIONS. (.1 HZ is a good setting).

   1. Connect function generator to CHNL 3 or to AD8E input.

2. LOAD 204

3. Select SW2 if desired.

4. Press CLEAR, then CONTINUE.

5. Program will halt.

6. Select Stall time between tests iterations by selecting SW0-11. The larger the number in the switch register, the greater the stall time.

7. Press CONTINUE.

8. If error occurs, program will halt with word "N" in AC. Pressing CONTINUE will display "N+1" word in AC. Pressing CONTINUE again will restart test.

f. Resolution Accuracy Test

1. Apply a known voltage to A-D converter input.

2. LOAD 205.

3. Select SWS 0,1 if desired.

4. Select channel with SW8-11.

5. Press CLEAR, then CONTINUE.

6. If error occurs, program will typeout the two non-comparing words on TTY then continue with test.

7. If no error occurs, TTY bell will ring once then, program will recycle. One cycle being 500,000(10) conversions.

g. Successive Reads Test

1. Apply any voltage to A-D converter inputs at preamplifier.

2. LOAD 206.

3. Select SW0 if desired.

4. Select channel from SW8-11.

5. Press CLEAR, then CONTINUE.

6. If error occurs, program will halt with first read in AC. Press CONTINUE to get second read into AC.

7. To restart, press continue.

8. If no error occurs, TTY bell will ring once, then program will recycle.

h. Multiplexer noise test

1. LOAD 207.

2. Select channel in SW8-11 and apply voltage to that channel.

3. Select SW0 if desired.

4. Press CLEAR, then CONTINUE.

5. If error occurs, message will be typed on TTY, then routine will recycle.

i. LAB8-E System Test

The system must contain a DK8-EP option and a VC8-E option with a display.

1. Apply a voltage input to the A/D or multiplexer.

2. LOAD 210.

3. Depress CLEAR, CONTINUE.

4. Program will halt.

5. Select clock frequency via SW3-5, reference LAB8-E programming card for DK8-EP clock rate, (1MHZ=6, 100KHZ=5,...,100HZ=2).

6. Press CONTINUE then observe printout:
"SET SW5(AUTO-INC), NUMBER OF CHNLS IN SW8-11 OR SET SW8-11 (SINGLE CHNL)".

7. If all channels are to be displayed at the same time, set SW5, then set the number of channels contained within the system into SW8-11, I.E., IF SYSTEM CONTAINS ONE A232, SET THE SWITCH REGISTER TO 0110, IF ONLY CHNL FOUR IS TO BE OBSERVED SET THE SWITCH REGISTER TO 0004.

8. DEPRESS CONTINUE and observe the display scope. A horizontal line should be present for channel selected. By varying the input voltage the line should move up or down. 0V=mid-screen, +V=TOP, -V= bottom. A sweep of the scope is generated on each clock overflow. Thus it is a function of the clock rate set in (5).

5.   PROGRAM DESCRIPTION

5.1   Control Logic Tests

Consists of 14 separate checks to assure the control logic
is functioning properly.

TST0 -   Checks that A-D DONE and TIMING ERROR flags are
         cleared by Initialize.

TST1 -   Checks that A-D DONE flag can be set then
         cleared.

TST2 -   Checks that TIMEING ERROR flag can be set then
         cleared.

TST3 -   Test for unexpected interrupt request.

TST4 -   Tests to see if ADRB jam transfers to AC.

TST5 -   Tests to see if ADRS jam transfers to AC.

TST6 -   Tests to see if enable register can be loaded
         and read back.

TST7 -   Tests to see if A-D DONE will generate
         interrupt.

TST10-   Tests to see if TIMING ERROR will generate
         interrupt.

TST11-   Test that MPX Register can be loaded and read
         back.

TST12-   Tests that all channels can be loaded into MPX
         register and read back.

TST13-   Tests auto-increment mode of MPX register.

TST14-   Test to see if conversion can be made in
         specified time.

5.2   Miscellaneous Tests

A.   IOT Scope Loop Test - enables IOT to be repeated
      for troubleshooting.

B.   External Enable Test - utilizes DK8/E Real Time
      Clock to start conversion. NOTE: This test can be
      used only if DK8/E is present in system.

C. Display Converted Value in AC - used to calibrate
converter. (See setup procedure of AD8E).

D. LAB8-E SYSTEM CHECKS - assures reliability of
system as homogenous unit.

5.3 Analog Tests

A. Successive Reads Tests - checks for noise in A-D
buffer logic.

B. Monotinicity Test - checks that all specified
values can be converted.

C. Resolution Accuracy Test - samples a known voltage
64 times and checks that resolution is within
specification.

D. Multiplexer Noise Test - checks for noise in MPX,
ENABLE, and STATUS REGISTER.

6. ERROR REPORTS

6.1 Logic Errors

Message will be typed out once per error on teletype stating
test number and nature of failure.

6.2 Other Errors

Message will be typed out on teletypewriter stating nature
of failure.

7. LISTING

/MAINDEC-08-DHADA-A A/D CONVERTER, MULTIPLEXER DIAGNOSTIC
/AD8EA,AM8EA,AM8EB
/COPYRIGHT 1972, DIGITAL EQUIPMENT CORPORATION, MAYNARD, MASS, 91734
/DATE REVISED: 6 MAR 72
/REVISED BY: P. T. COYNE

```
          /IOT DEFINITIONS
  4520    ADCL=    JMS I   XADCL              /CLEAR ALL
  4521    ADLM=    JMS I   XADLM              /LOAD MPX REG FROM AC8-11 CLA
  4522    ADST=    JMS I   XADST              /CLEAR FLAGS, START CONVERSION
  4523    ADRB=    JMS I   XADRB              /CLEAR DONE, READ A-D BUFFER INTO AC
  4524    ADSK=    JMS I   XADSK              /SKIP ON A-D DONE, DO NOT CLEAR FLAG,
  4525    ADSE=    JMS I   XADSE              /SKIP ON TMG ERROR, DO NOT CLEAR FLAG,
  4526    ADLE=    JMS I   XADLE              /LOAD ENAB REG FROM AC 2-5, CLA,
  4527    ADRS=    JMS I   XADRS              /READ STATUS, ENAB, MPX REG INTO AC,
  4530    CLOE=    JMS I   XCLOE              /AC TO CLOCK ENABLE
  4531    CLSK=    JMS I   XCLSK              /SKIP ON CLOCK OVERFLOW
  4532    CL2E=    JMS I   XCL2E              /ONES IN AC CLEAR CLOCK ENABLE REGISTER
  4533    CLSA=    JMS I   XCLSA              /CLOCK STATUS TO AC, AC ONES CLEAR CLOCK STATUS REGISTER
  4534    CLED=    JMS I   XCLED              /CLOCK ENABLE TO AC
  4535    CLAB=    JMS I   XCLAB              /AC ONES TO CLOCK BUFFER
  4536    DISD=    JMS I   XDISD              /SKIP ON DISPLAY DONE
  4537    DILX=    JMS I   XDILX              /LOAD X
  4540    DILY=    JMS I   XDILY              /LOAD Y
  4541    DIXY=    JMS I   XDIXY              /INTENSIFY
  4542    DILE=    JMS I   XDILE              /LOAD DISPLAY ENABLE FROM AC

  6007    CAF=    6007
  7002    SSW=    7002
```

/MPX, ENABLE, STATUS REGISTER

```
/  0   AD DONE
/  1   TIMING ERROR
/  2   ENABLE INTERRUPT ON AD DONE
/  3   ENABLE INTERRUPT ON TIMING ERROR
/  4   ENABLE EXTERNAL AD START
/  5   AUTO-INCREMENT MODE
/  6,7  NOT USED
/  8-11  MPX CHANNEL 0-17 OCTAL
```

```
/STARTING ADDRESS        TEST
/
/200                     NORMAL START FOR CONTROL LOGIC TESTS
/201                     IOT SCOPE LOOP
/202                     DISPLAY CONVERTED VALUE IN AC
/203                     EXTERNAL ENABLE TEST
/204                     MONOTINICITY TEST
/205                     ACCURACY TEST
/206                     SUCCESSIVE READS TEST
/207                     MULTIPLEXER NOISE TEST
/210                     SYSTEM CHECK FOR LAB8E
```

```
                3000        *0
    0000        3000                    0
    7001        5402                    JMP I   ,+1
    0002        3000                    0
    7003        5404                    JMP I   ,+1
    0004        0000                    0
    0005        7402                    HLT


                0017        *17
    0017        0145        MSGPNT, ERMSG

                0020        *20
    0020        4000        SW0,        4000        /SWITCH REG 0 INHIBIT TYPEOUT
    0021        2000        SW1,        2000        /          1 HALT ON ERROR
    0022        1000        SW2,        1000        /          2 SCOPE LOOP OVERRIDE
    0023        0400        SW3,        0400        /          3 CALIBRATION TEST HALT
    0024        0200        SW4,        0200        /          4 EXTERNAL ENABLE
    0025        0100        SW5,        0100        /          5 SELECT TEST
    0026        0000        TEMP0,      0           /STORAGE BUFFER 0
    0027        0000        TEMPA,      0           /STORAGE BUFFER A
    0030        0000        TEMPB,      0           /              B
    0031        0000        TEMPC,      0           /              C
    0032        0000        TEMPD,      0           /              D
    0033        0000        CNTR1,      0           /MONOTONICITY COUNTER
    0034        0000        TALLY,      0
    0035        1226        ERR,        ERTYP       /ERROR REPORT ROUTINE
    0036        1000        XCONVY,     CONVY       /DISPLAY CONVERTED VALUE
    0037        1400        XINSTR,     INSTR       /IOT SCOPE LOOP
    0040        2000        XMONOT,     MONOT       /MONOTONICITY TEST
    0041        0207        K207,       207         /BELL CODE
    0042        0212        K212,       212         /LINE FEED
    0043        0215        K215,       215         /CARRIAGE RETURN
    0044        6500        K6500,      6500
    0045        7777        M1,         7777
    0046        7776        M2,         7776
    0047        7774        M4,         7774
    0050        1000        K1000,      1000
    0051        0077        K77,        0077
    0052        1200        XMOVE,      MOVE
    0053        1024        EXTBL,      EXTL
    0054        4377        XSTOR,      STORAG-1
    0055        2400        XCOMPR,     COMPAR
    0056        2200        XRESOL,     RESOL
    0057        2051        XNOISE,     NOISE
    0060        2103        XGLIT,      GLITCH
    0061        2600        XSYST,      SYST
    0062        7777        ERSWIT,     7777
    0063        0000        CHAN,       0
    0064        1600        TAL,        XTAL
    0065        1647        SELECT,     XSELEC
    0066        1552        SETUP,      XSETUP
                0077        *77
    0077        0000        CHNL,       0
```

```
    0100        0001                    1
    71          0002                    2
```

```
       0102   0003                    3
       0103   0004                    4
       0104   0005                    5
       0105   0006                    6
       0106   0007                    7
       0107   0010                   10
       0110   0011                   11
       0111   0012                   12
       0112   0013                   13
       0113   0014                   14
       0114   0015                   15
       0115   0016                   16
       0116   0017                   17
       0117   0000                    0


       0120          *120

                     /IOT LINKS

       0120   1410   XADCL,    XXADCL
       0121   1414   XADLM,    XXADLM
       0122   1420   XADST,    XXADST
       0123   1424   XADRB,    XXADRB
       0124   1430   XADSK,    XXADSK
       0125   1436   XADSE,    XXADSE
       0126   1444   XADLE,    XXADLE
       0127   1450   XADRS,    XXADRS
       0130   1454   XCLOE,    XXCLOE
       0131   1460   XCLSK,    XXCLSK
       0132   1466   XCLZE,    XXCLZE
       0133   1472   XCLSA,    XXCLSA
       0134   1476   XCLED,    XXCLED
       0135   1502   XCLAB,    XXCLAB
       0136   1506   XDISD,    XXDISD
       0137   1514   XDILX,    XXDILX
       0140   1520   XDILY,    XXDILY
       0141   1524   XDIXY,    XXDIXY
       0142   1530   XDILE,    XXDILE

       0145          *145

                     /ERROR MESSAGE LINKS

       0145   3200   ERMSG,    EMSG0
       0146   3244             EMSG1
       0147   3302             EMSG2
       0150   3344             EMSG3
       0151   3372             EMSG4
       0152   3422             EMSG5
       0153   3452             EMSG6
       0154   3503             EMSG7
       0155   3540             EMSG10
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       0156   3601             EMSG11
       0157   3637             EMSG12
       0160   3677             EMSG13
       0161   3744             EMSG14
```

```
                0200      *200
     0200  5211                JMP     START        /NORMAL START
     0201  5437                JMP I   XINSTR       /IOT SCOPE LOOP OPTION
     0202  5436                JMP I   XCONVT       /DISPLAY CONVERTED VALUE OPTION
     0203  5453                JMP I   EXTBL        /EXTERNAL ENABLE TEST
     0204  5440                JMP I   XMONCY       /MONOTINICITY TEST
     0205  5456                JMP I   XRESOL       /ACCURACY TEST
     0206  5457                JMP I   XNOISE       /SUCCESSIVE READS TEST
     0207  5460                JMP I   XGLIT        /MPX NOISE TEST
     0210  5461                JMP I   XSYST        /LAB8&E SYSTEM CHECK
     0211  7402       STARY,   HLT
     0212  7604                LAS
     0213  0025                AND     SW5          /SELECT SPECIFIC TEST?
     0214  7440                SZA                  /SKIP IF NO
     0215  4465                JMS I   SELECT       /YES

                       /HOUSEKEEPING
     0216  7300       INITL,   CLA CLL
     0217  4777/               JMS     MESAGE
     0220  4161                XLABEL
     0221  1376                TAD     (144
     0222  3017                DCA     MSGPNT       /INITIALIZE ERROR POINTER
     0223  4466                JMS I   SETUP
     0224  6007       TST0,    CAF
     0225  4524                ADSK                 /CHECK FOR DONE FLAG - SHOULD BE CLEARED BY INIT
     0226  5231                JMP     .+3
     0227  4435                JMS I   ERR          /DONE FLAG NOT CLEARED
     0230  0224                TST0
     0231  4525                ADSE                 /CHECK FOR TIMING ERROR FLAG - SHOULD BE CLEARED BY INIT
     0232  5237                JMP     .+3
     0233  4435                JMS I   ERR          /TIMING ERROR FLAG NOT CLEARED
     0234  0224                TST0
     0235  3240                JMP     TST1-1
     0236  5224                JMP     TST0
     0237  4464                JMS I   TAL

                       /CHECK TO SET DONE FLAG AND CLEAR DONE FLAG
     0240  4466                JMS I   SETUP
     0241  7200       TST1,    CLA
     0242  4522                ADST                 /CONVERT, RESULTS NOT NEEDED
     0243  1177                TAD     (-100
     0244  3026                DCA     TEMP0
     0245  2026                ISZ     TEMP0
     0246  5245                JMP     .-1
     0247  4524                ADSK
     0250  7410                SKP
     0251  5255                JMP     .+4
     0252  4435                JMS I   ERR          /FLAG NOT SET
     0253  0241                TST1
```

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     0254  5265                JMP     TST2-1
     0255  4520                ADCL                 /CLEAR FLAG
     0256  4524                ADSK                 /CHECK FOR FLAG
     0257  5264                JMP     .+5          /FLAG CLEARED
       60  4435                JMS I   ERR          /FLAG      CLEARED
     0261  2241                TST1
```

```
          2    5265              JMP     TST2*1
       0263    5241              JMP     TST1
       0264    4464              JMS I   TAL

                       /CHECK TO SET TIMING ERROR FLAG AND CLEAR TIMING ERROR FLAG
       0265    4466              JMS I   SETUP
       0266    7200      TST2,   CLA
       0267    4522              ADST                    /TWO A-D STARTS TO PRODUCE TIMING ERROR
       0270    4522              ADST
       0271    4525              ADSE                    /CHECK FOR TIMING ERROR FLAG
       0272    7410              SKP
       0273    5276              JMP     .+3
       0274    4435              JMS I   ERR             /FLAG NOT SET
       0275    0266              TST2
       0276    4520              ADCL                    /CLEAR FLAG
       0277    4525              ADSE                    /CHECK FLAG
       0300    5305              JMP     .+5
       0301    4435              JMS I   ERR             /FLAG NOT CLEARED
       0302    0266              TST2
       0303    5306              JMP     TST3*1
       0304    5266              JMP     TST2
       0305    4464              JMS I   TAL

                       /TEST FOR UNEXPECTED INTERRUPT REQUEST
       0306    4466              JMS I   SETUP
       0307    7200      TST3,   CLA
       0310    1176              TAD     CTST3S
       0311    3004              DCA     4
       0312    1317              TAD     .+5             /ERROR TRAP
       0313    3001              DCA     1
       0314    6001              ION                     /TURN INT ON
       0315    7000              NOP
       0316    5322              JMP     .+4
       0317    4435              JMS I   ERR             /UNEXPECTED INTERRUPT OCCURRED
       0320    0307              TST3
       0321    5326              JMP     TST4*1
       0322    6002      TST3S,  IOF                     /TURN INT OFF
       0323    7410              SKP
       0324    5307              JMP     TST3
       0325    4464              JMS I   TAL

                       /TEST THAT ADRB JAM TRANSFERS TO AC

       0326    4466              JMS I   SETUP
       0327    7240      TST4,   CLA CMA                 /AC=7777
       0330    4523              ADRB                    /SHOULD CLEAR AC
       0331    3027              DCA     TEMPA           /SAVE AC
       0332    7040              CMA
       0333    4523              ADRB                    /READ WITH AC=0
```

```
       0334    7041              CIA
       0335    1027              TAD     TEMPA
       0336    7440              SZA                     /EQUAL?
       0337    7410              SKP
       0340    5346              JMP     .+5
       0341    4435              JMS I   ERR             /NO-ERROR
       0342    0327              TST4
       0343    5346              JMP     TST5*1
```

```
0344   5527              JMP      TST4
0345   4464              JMS I    TAL

                /TEST THAT ADRS JAM TRANSFERS TO AC

0346   4466              JMS I    SETUP
0347   4520    TST5,     ADCL
0350   4521              ADLM
0351   4522              ADST
0352   4524              ADSK
0353   5352              JMP      .-1
0354   7340              CLA CMA CLL              /AC=7777
0355   4527              ADRS
0356   3027              DCA      TEMPA           /SAVE AC, SHOULD BE 4000
0357   1027              TAD      TEMPA
0360   7004              RAL
0361   7440              SZA                      /DID ADRS CLEAR AC?
0362   7410              SKP
0363   5370              JMP      .+5
0364   4435              JMS I    ERR             /NO
0365   0347              TST5
0366   5775/             JMP      TST6-1
0367   5347              JMP      TST5
0370   4464              JMS I    TAL
0371   5775/             JMP      TST6-1

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                /CHECKS THAT ENABLE REGISTER CAN BE LOADED AND READ BACK

0400   4466              JMS I    SETUP
0401   7300    TST6,     CLA CLL
0402   1175              TAD      C17             /GET BITS AND
0403   7002              BSW                      /PLACE IN AC 2-5
0404   4526              ADLE                     /LOAD
0405   7440              SZA
0406   7410              SKP
0407   5212              JMP      .+3
0410   4435              JMS I    ERR             /AC NOT CLEARED BY ADLE
0411   0401              TST6
0412   7040              CMA
0413   4527              ADRS                     /READ BACK
0414   7002              BSW
0415   1174              TAD      C7761           /CHECK FOR ONLY AC 2-5 SET
```

```
0416   7440              SZA
0417   7410              SKP
0420   5225              JMP      .+5
0421   4435              JMS I    ERR             /WRONG BITS
0422   0401              TST6
0423   5226              JMP      TST7-1
0424   5201              JMP      TST6
0425   4464              JMS I    TAL             /DONE?

                /GENERATE INTERRUPT WITH A-D DONE FLAG
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```
 .26   4466          JMS I    SETUP
0427   7200   TST7,  CLA
2430   4522          ADST              /CONVERT
0431   4524          ADSK              /DONE?
2432   5231          JMP      .-1      /WAIT
2433   1173          TAD      CDON1
2434   3002          DCA      2        /RETURN POINTER
0435   1050          TAD      K1000
2436   4526          ADLE              /LOAD INTERRUPT ENABLE
2437   6001          ION
0440   7000          NOP
0441   6002          IOF
2442   4435          JMS I    ERR      /DID NOT INTERRUPT
0443   0427          TST7
0444   5251          JMP      TST10-1
0445   4520   DON1,  ADCL              /CLEAR WORLD
0446   7410          SKP
0447   5227          JMP      TST7
0450   4464          JMS I    TAL

              /GENERATE INTERRUPT WITH TIMING ERROR FLAG
0451   4466          JMS I    SETUP
0452   7200   TST10, CLA
0453   1172          TAD      CTMG1
0454   3002          DCA      2
0455   4522          ADST              /CAUSE ERROR HERE
0456   4522          ADST
0457   4524          ADSK              /DONE?
0460   5257          JMP      .-1
0461   4525          ADSE              /TIMING ERROR?
0462   5261          JMP      .-1
0463   7300          CLA CLL
0464   1050          TAD      K1000
0465   7010          RAR
0466   4526          ADLE              /LOAD INTERRUPT ENABLE
0467   6001          ION               /INT ON
0470   7000          NOP
0471   6002          IOF               /INT OFF
0472   4435          JMS I    ERR      /DID NOT INTERRUPT
0473   0452          TST10
0474   5301          JMP      TST11-1
0475   4520   TMG1,  ADCL              /CLEAR WORLD
0476   7410          SKP
0477   5252          JMP      TST10
0500   4464          JMS I    TAL
```

/MAINDEC-08-DHADA-A A/D CONVERTER, MULTIPLEXER DIAGNOSTIC   PAL10   V141   21-MAR-72   15125   PAGE 2-8

```
              /LOAD AND READ MPX REG
0501   4466          JMS I    SETUP
0502   7240   TST11, CLA CMA
0503   4521          ADLM
0504   7450          SNA               /CHECK IF AC CLEARED
0505   5311          JMP      .+4
0506   4435          JMS I    ERR      /AC WAS NOT CLEARED BY ADLM
0507   0502          TST11
0510   7200          CLA
```

```
0511   4521          ADLM                      /LOAD MPX REG WITH 00
0512   4527          ADRS                      /READ MPX REG
0513   0175          AND       C17             /MASK FOR MPX REG
0514   7440          SZA
0515   7410          SKP
0516   5321          JMP       .+3
0517   4435          JMS I     ERR             /MPX REG NOT 0
0520   0502          TST11
0521   7040          CMA
0522   0175          AND       C17
0523   4521          ADLM                      /MPX REG SET TO 17
0524   4527          ADRS                      /READ MPX REG
0525   0175          AND       C17
0526   1171          TAD       C7760           /MASK
0527   7040          CMA
0530   7440          SZA
0531   7410          SKP
0532   5337          JMP       .+5
0533   4435          JMS I     ERR             /MPX REG NOT 17
0534   0502          TST11
0535   5777/         JMP       TST12+1
0536   5302          JMP       TST11
0537   4464          JMS I     TAL
0540   5777/         JMP       TST12+1

0577   0600
       0600          PAGE

                     /LOAD MPX REG WITH EACH CHANNEL
0600   4466          JMS I     SETUP
0601   7300  TST12,  CLA CLL
0602   3026          DCA       TEMP0
0603   1026          TAD       TEMP0           /CHANNEL INTO AC
0604   7040          CMA
0605   3027          DCA       TEMPA           /COMPLEMENTED CHANNEL
0606   1026          TAD       TEMP0
0607   4521          ADLM                      /LOAD IT
0610   4527          ADRS                      /READ MPX REG
0611   0175          AND       C17             /MASK 8-11
0612   3030          DCA       TEMPB           /STORE IT
0613   1027          TAD       TEMPA           /CHECK IT
0614   1030          TAD       TEMPB
0615   7001          IAC
```

/MAINDEC-08-DHADA-A A/D CONVERTER, MULTIPLEXER DIAGNOSTIC   PAL10   V1A1   21-MAR-72   13:25   PAGE 2-7

```
0616   7440          SZA
0617   7410          SKP
0620   5224          JMP       .+3
0621   4435          JMS I     ERR             /WRONG CHANNEL
0622   0601          TST12
0623   5236          JMP       TST13+1
0624   1171          TAD       C7760
0625   1026          TAD       TEMP0
0626   7001          IAC
0627   7440          SZA                       /DONE WITH ALL CHANNELS?
0630   7410          SKP                       /NO
0631   5235          JMP       .+4             /YES
0632   7300          CLA CLL
  53   2026          ISZ       TEMP0           /SET N  CHANNEL
```

```
         ,34   5203              JMP     TST12+2
        0635   4464              JMS I   TAL          /DONE WITH TEST?


                         /AUTO-INCREMENT MODE TEST
        0636   4466              JMS I   SETUP
        0637   7300     TST13,   CLA CLL
        0640   1170              TAD     C76
        0641   3010              DCA     10
        0642   4520              ADCL
        0643   7200     AUTO1,   CLA
        0644   1410              TAD I   10           /CHANNEL N
        0645   3027              DCA     TEMPA
        0646   1027              TAD     TEMPA
        0647   7040              CMA
        0650   3030              DCA     TEMPB
        0651   1025              TAD     SW5          /AUTO-INCREMENT BIT
        0652   4526              ADLE                 /LOAD ENABLE REG
        0653   1027              TAD     TEMPA        /CHANNEL N
        0654   4521              ADLM                 /LOAD MPX REG
        0655   4522              ADST                 /START CONVERSION
        0656   4524              ADSK                 /WAIT FOR
        0657   5256              JMP     .-1          /DONE FLAG
        0660   4527              ADRS                 /READ STATUS
        0661   0175              AND     C17          /MASK OUT ALL BUT MPX REG
        0662   3031              DCA     TEMPC
        0663   1027              TAD     TEMPA        /CHECK IF CHANNEL 17 INCREMENTED TO 0
        0664   1174              TAD     C7761
        0665   7640              SZA CLA              /IF CHANNEL 17 SKIP
        0666   5272              JMP     .+4
        0667   1410              TAD I   10
        0670   1031              TAD     TEMPC
        0671   5274              JMP     AUTO2        /AC SHOULD = 0
        0672   1031              TAD     TEMPC
        0673   1030              TAD     TEMPB        /CHECK FOR CHANNEL N+1
        0674   7440     AUTO2,   SZA
        0675   7410              SKP
        0676   5302              JMP     .+4
        0677   4435              JMS I   ERR          /WRONG CHANNEL
        0700   2637              TST13
        0701   5310              JMP     TST14+1
```

```
        0702   1031              TAD     TEMPC
        0703   7440              SZA                  /LAST CHANNEL?
        0704   5243              JMP     AUTO1        /NO
        0705   7410              SKP
        0706   5237              JMP     TST13
        0707   4464              JMS I   TAL


                         /ROUTINE TO CHECK THAT CONVERSION CAN BE MADE IN 20 MICROSECS
        0710   4466              JMS I   SETUP
        0711   7300     TST14,   CLA CLL
        0712   1377              TAD     C-6
        0713   3026              DCA     TEMP0
        0714   4520              ADCL
        0715   4522              ADST
        0716   2026              ISZ     TEMP0
```

```
0717  5316          JMP      .-1
0720  4524          ADSK
0721  7410          SKP
0722  5327          JMP      .+5
0723  4435          JMS I    ERR          /TIME OUT ERROR
0724  2711          TST14
0725  5330          JMP      FINIS
0726  5311          JMP      TST14
0727  4464          JMS I    TAL
0730  7604   FINIS, LAS
0731  0020          AND      SW0          /SWITCH SET TO DELETE
0732  7640          SZA CLA               /TYPEOUT OF END LOGIC TEST
0733  5337          JMP      .+4
0734  4776'         JMS      MESAGE
0735  4146          XEND
0736  7200          CLA
0737  1041          TAD      K207
0740  4775'         JMS      PRLP
0741  5774'         JMP      TST0-3       /RETURN TO BEGINNING OF LOGIC TESTS.


0774  0221
0775  1534
0776  1274
0777  7772
      1000          PAGE

                    /ROUTINE TO DISPLAY CONVERTED VALUE IN AC.
1000  4520   CONVT, ADCL                  /CLEAR WORLD
1001  3026          DCA      TEMP0
1002  7604          LAS                   /LOAD CHANNEL
1003  4521          ADLM                  /LOAD MPX REG
1004  4522          ADST                  /CONVERT
1005  4524          ADSK                  /DONE?
1006  5205          JMP      .-1          /WAIT
1007  4523          ADRB                  /READ A-D BUFFER
1010  2026          ISZ      TEMP0        /STALL TO DISPLAY
1011  5210          JMP      .-1          /CONVERTED VALUE
1012  2026          ISZ      TEMP0        /IN AC FOR
```

/MAINDEC-08-DHADA-A A/D CONVERTER, MULTIPLEXER DIAGNOSTIC   PAL10   V141   21-MAR-72   13:25   PAGE 2-9

```
1013  5212          JMP      .-1          /33 MILLISECONDS
1014  3031          DCA      TEMPC
1015  7604          LAS                   /CHECK IF HALT DESIRED
1016  0023          AND      SW3
1017  7650          SNA CLA
1020  5223          JMP      .+3
1021  1031          TAD      TEMPC
1022  7402          HLT                   /PRESS CONTINUE IF NOT DONE ADJUSTING
1023  5200          JMP      CONVT        /LOOP



                    /ROUTINE TO CHECK FOR EXTERNAL ENABLE FROM REAL TIME CLOCK

1024  4466   EXTL,  JMS I    SETUP
1025  4520          ADCL                  /CLEAR ALL
 26   7604          LAS
 7    0024          AND      SW4          /CHECK    EXT/L ENABLE SWITCH
```

```
1030   7450            SNA
1031   7402            HLT                    /SWITCH NOT SET, STOP!
1032   7604    EXT1,   LAS
1033   0024            AND     SW4
1034   4526            ADLE                   /LOAD EXTERNAL ENABLE INTO ADC
1035   7604            LAS
1036   0175            AND     C17
1037   4521            ADLM                   /LOAD CHANNEL FROM SW8-11
1040   1377            TAD     (4340          /LOAD CLOCK ENABLE REG
1041   4530            CLOE                   /TRIGGER FROM RTC
1042   7040            CMA
1043   4532            CLZE
1044   4531            CLSK                   /OCCURS ON OVERFLOW
1045   5244            JMP     .-1
1046   4533            CLSA                   /STOP CLOCK
1047   7240            CLA CMA
1050   4532            CLZE
1051   7200            CLA
1052   2026            ISZ     TEMP0          /TIME OUT
1053   5252            JMP     .-1
1054   4524            ADSK
1055   4776/           JMS     ERPT3          /CONVERSION NOT MADE
1056   4523            ADRB
1057   3027            DCA     TEMPA          /STORE CONVERSION
1060   7604            LAS
1061   0022            AND     SW2            /LOOP?
1062   7650            SNA CLA
1063   5266            JMP     EXTTE          /YES
1064   1027            TAD     TEMPA          /HALT WITH CONVERTED
1065   7402            HLT                    /VALUE IN AC!
1066   4466    EXTTE,  JMS I   SETUP
1067   4520            ADCL
1070   7604            LAS
1071   0024            AND     SW4
1072   4526            ADLE
1073   7240            CLA CMA
1074   4535            CLAB                   /CLOCK BUFFER = 7777
```

/MAINDEC-08-DHADA-A A/D CONVERTER, MULTIPLEXER DIAGNOSTIC   PAL10   V141   25-MAR-70   13124   PAGE 2-15

```
1075   7200            CLA
1076   1375            TAD     (1640          /TO GIVE TIMING ERROR ON NEXT CLOCK
1077   4530            CLOE
1100   7000            NOP
1101   4525            ADSE                   /TIMING ERROR SEEN HERE
1102   4776/           JMS     ERPT3          /DID NOT RAISE FLAG
1103   7240            CLA CMA
1104   4532            CLZE                   /CLEAR CLOCK ENABLE REG
1105   7200            CLA
1106   4520            ADCL
1107   1024            TAD     SW4
1110   4526            ADLE                   /LOAD EXT'G ENABLE INTO ADC
1111   7240            CLA CMA
1112   4535            CLAB                   /SET THEN CLEAR
1113   7200            CLA                    /CLOCK BUFFER TO CHECK
1114   4535            CLAB                   /FOR ERRONEOUS START PULSE
1115   1374            TAD     (-4
1116   3031            DCA     TEMPC
1117   2031            ISZ     TEMPC
1120   5317            JMP     .-1
```

```
1121  4524        ADSK        /IF FLAG FOUND
1122  5325        JMP     .+3     /REPORT
1123  4776/       JMS     ERPT3   /ERROR
1124  4520        ADCL
1125  7200        CLA
1126  1041        TAD     K207
1127  4773/       JMS     PRLP
1130  5232        JMP     EXT1


1173  1534
1174  7772
1175  1640
1176  1732
1177  4340
      1200    PAGE

              /SUBROUTINE TO MOVE VARIABLE LENGTH DATA FIELDS

1200  0000    MOVE,   0
1201  7300        CLA CLL
1202  1600        TAD I   MOVE        /GET "FROM ADDR" AND
1203  3223        DCA     FADDR       /STORE
1204  2200        ISZ     MOVE
1205  1600        TAD I   MOVE        /GET "TO ADDR" AND
1206  3224        DCA     TADDR       /STORE
1207  2200        ISZ     MOVE
1210  1600        TAD I   MOVE        /GET "MOVE COUNT" AND
1211  3225        DCA     MCTR        /STORE
1212  2200        ISZ     MOVE        /SETUP FOR EXIT
1213  7200    MOVEA,  CLA
1214  1623        TAD I   FADDR       /GET "FROM" WORD
1215  3624        DCA I   TADDR       /STORE AT "TO" LOCATION
1216  2223        ISZ     FADDR       /+1 TO "FROM" ADDR
```

```
1217  2224        ISZ     TADDR       /+1 TO "TO" ADDR
1220  2225        ISZ     MCTR        /ALL WORDS MOVED?
1221  5213        JMP     MOVEA       /NO, RETURN
1222  5600        JMP I   MOVE        /YES, EXIT
1223  0000    FADDR,  0
1224  0000    TADDR,  0
1225  0000    MCTR.   0



              /ERROR TYPEOUT ROUTINE

1226  0000    ERTYP,  0
1227  7200        CLA
1230  1346        TAD     IND
1231  7640        SZA CLA
1232  5243        JMP     EOUT+1      /TYPE ERROR MESSAGE ONE TIME ONLY
1233  7604        LAS
1234  0020        AND     SW0         /SUPPRESS TYPEOUT?
1235  7710        SPA CLA
1236  5247        JMP     EOUT+5      /YES
  37  1417        TAD I   MSGPNT      /GET POINTER FOR ERROR MESSAGE
```

```
  40   3242              DCA      EOUT
 1241   4274              JMS      MESAGE
 1242   7402     EOUT,    HLT
 1243   7200              CLA
 1244   1346              TAD      IND
 1245   7640              SZA CLA
 1246   5250              JMP      .+2
 1247   2346              ISZ      IND
 1250   7604              LAS
 1251   0021              AND      SW1          /HALT ON ERROR SWITCH ON?
 1252   7650              SNA CLA                /SKIP IF ON
 1253   5257              JMP      SCOPE
 1254   1226              TAD      ERTYP
 1255   1045              TAD      M1
 1256   7402              HLT                    /HALT WITH ERROR PIC. IN AC.
 1257   7604     SCOPE,   LAS
 1260   0022              AND      SW2          /OVERRIDE LOOP?
 1261   7640              SZA CLA
 1262   5272              JMP      .+10
 1263   1626              TAD I    ERTYP        /NO
 1264   3271              DCA      EXIT
 1265   1017              TAD      MSGPNT
 1266   1045              TAD      M1
 1267   3017              DCA      MSGPNT
 1270   5671              JMP I    EXIT
 1271   7402     EXIT,    HLT
 1272   2226              ISZ      ERTYP        /YES
 1273   5626              JMP I    ERTYP


         /MESSAGE ROUTINE FOR LOGIC ERRORS

 1274   0000     MESAGE,  0
```

/MAINDEC-08-DHADA-A A/D CONVERTER, MULTIPLEXER DIAGNOSTIC   PAL10   V141   21-MAR-72   13:25   PAGE 2-12

```
 1275   7240              CLA CMA
 1276   1674              TAD I    MESAGE
 1277   3010              DCA      10
 1300   2274              ISZ      MESAGE
 1301   1410              TAD I    10
 1302   3313              DCA      MSRGHT
 1303   1313              TAD      MSRGHT
 1304   7012              RTR
 1305   7012              RTR
 1306   7012              RTR
 1307   4314              JMS      TYPECH
 1310   1313              TAD      MSRGHT
 1311   4314              JMS      TYPECH
 1312   5301              JMP      MESAGE+5
 1313   0000     MSRGHT,  0
 1314   0000     TYPECH,  0
 1315   0051              AND      K77
 1316   7450              SNA
 1317   5674              JMP I    MESAGE
 1320   1377              TAD      (-40
 1321   7510              SPA
 1322   5325              JMP      .+3
 1323   1376              TAD      (240
 1324   5340              JMP      TYP
```

```
1325    7001            IAC
1326    7440            SZA
1327    5332            JMP         .+3
1330    1043            TAD         K215
1331    5340            JMP         MTP
1332    7001            IAC
1333    7440            SZA
1334    5337            JMP         .+3
1335    1042            TAD         K212
1336    5340            JMP         MTP
1337    1375            TAD         (336
1340    6046    MTP,    TLS
1341    6041            TSF
1342    5341            JMP         .-1
1343    6042            TCF
1344    7200            CLA
1345    5714            JMP I       TYPECH
1346    0000    IND,    0


1375    0336
1376    0240
1377    7740
        1400    PAGE
                /SCOPE LOOP FOR IOTS 65XX,
1400    7000    INSTR,  NOP
1401    7604            LAS                     /SELECT IOT FROM SR 6-11
1402    0051            AND         K77         /MASK OUT AC 0-5
1403    1044            TAD         K6500       /CREATE IOT
1404    3205            DCA         .+1
1405    7402            HLT                     /LOCATION OF IOT
```

```
1406    7000            NOP                     /POSSIBLE SKIP
1407    5201            JMP         INSTR+1     /LOOP


                /IOT SUBROUTINES

1410    0000    XXADCL, 0
1411    6530            6530                    /CLEAR ALL
1412    5610            JMP I       XXADCL
1413    7402            HLT

1414    0000    XXADLM, 0
1415    6531            6531                    /LOAD MPX REG
1416    5614            JMP I       XXADLM
1417    7402            HLT

1420    0000    XXADST, 0
1421    6532            6532                    /START CONVERSION
1422    5620            JMP I       XXADST
1423    7402            HLT

1424    0000    XXADRB, 0
1425    6533            6533                    /READ A-D BUFFER
1426    5624            JMP I       XXADRB
  27    7402            HLT
```

```
1430    0000    XXADSK,  0
1431    6534             6534                    /SKIP ON A@D DONE
1432    7410             SKP
1433    2230             ISZ     XXADSK
1434    5630             JMP I   XXADSK
1435    7402             HLT

1436    0000    XXADSE,  0
1437    6535             6535                    /SKIP ON TIMING ERROR
1440    7410             SKP
1441    2236             ISZ     XXADSE
1442    5636             JMP I   XXADSE
1443    7402             HLT

1444    0000    XXADLE,  0
1445    6536             6536                    /LOAD ENABLE REGISTER
1446    5644             JMP I   XXADLE
1447    7402             HLT

1450    0000    XXADRS,  0
1451    6537             6537                    /READ STATUS REGISTER
1452    5650             JMP I   XXADRS
1453    7402             HLT

1454    0000    XXCLOE,  0
1455    6132             6132                    /LOAD CLOCK ENABLE
1456    5654             JMP I   XXCLOE
1457    7402             HLT
```

/MAINDEC-08-DHADA-A A/D CONVERTER, MULTIPLEXER DIAGNOSTIC   PAL10   V141   21-MAR-72   13:25   PAGE 2-14

```
1460    0000    XXCLSK,  0
1461    6131             6131                    /SKIP ON CLOCK OVERFLOW
1462    7410             SKP
1463    2260             ISZ     XXCLSK
1464    5660             JMP I   XXCLSK
1465    7402             HLT

1466    0000    XXCL2E,  0
1467    6130             6130                    /ONES IN AC CLEAR CLOCK ENABLE REG
1470    5666             JMP I   XXCL2E
1471    7402             HLT

1472    0000    XXCLSA,  0
1473    6135             6135                    /CLOCK STATUS TO AC, AC ONES CLR CLK STATUS REG
1474    5672             JMP I   XXCLSA
1475    7402             HLT

1476    0000    XXCLED,  0
1477    6134             6134                    /CLOCK ENABLE TO AC
1500    5676             JMP I   XXCLED
1501    7402             HLT

1502    0000    XXCLAB,  0
1503    6133             6133                    /AC ONES TO CLOCK BUFFER
1504    5702             JMP I   XXCLAB
1505    7402             HLT
```

```
1536    0000    XXDISD,  0
1537    6052             6052                       /SKIP ON DISPLAY DONE
1510    7410             SKP
1511    2306             ISZ     XXDISD
1512    5706             JMP I   XXDISD
1513    7402             HLT

1514    0000    XXDILX,  0
1515    6053             6053                       /LOAD X
1516    5714             JMP I   XXDILX
1517    7402             HLT

1520    0000    XXDILY,  0
1521    6054             6054                       /LOAD Y
1522    5720             JMP I   XXDILY
1523    7402             HLT

1524    0000    XXDIXY,  0
1525    6055             6055                       /INTENSIFY
1526    5724             JMP I   XXDIXY
1527    7402             HLT

1530    0000    XXDILE,  0
1531    6056             6056                       /LOAD ENABLE FROM AC, CLEAR AC
1532    5730             JMP I   XXDILE
1533    7402             HLT
```

/MAINDEC-08-DHADA-A A/D CONVERTER, MULTIPLEXER DIAGNOSTIC   PAL10   V1A1   21-MAR-72   18)25   PAGE 2-15

```
                /PRINT ROUTINE
1534    0000    PRLP,    0
1535    6046             TLS                        /XMIT CHARACTER
1536    6041             TSF                        /WAIT FOR FLAG
1537    5336             JMP     .-1
1540    7200             CLA
1541    5734             JMP I   PRLP               /RETURN

                /CARRIAGE RETURN LINE FEED ROUTINE
1542    0000    CRLF,    0
1543    7240             CLA CMA
1544    0043             AND     K215               /CARRIAGE RETURN CODE
1545    4334             JMS     PRLP               /PRINT ROUTINE
1546    7240             CLA CMA
1547    0042             AND     K212               /LINE FEED CODE
1550    4334             JMS     PRLP               /PRINT ROUTINE
1551    5742             JMP I   CRLF               /RETURN

                /ROUTINE TO CLEAR WORKING BUFFERS PRIOR TO TEST
1552    0000    XSETUP,  0
1553    4452             JMS I   XMOVE              /CLEAR WORK AREA
1554    0026             TEMP3
1555    0027             TEMPA
1556    7773             -5
1557    6002             IOF
  )0    6007             CAF
```

2070	7520	SNL		CLEAR SHOULD BE SET
2071	4773	JMS	CRT	NOT ZERO
2072	7440	SZA		
2073	4776	JMS	EMPTY	ZERO EQUAL
2074	7200	CLA CLL		
2075	2026	ISZ	COUNT	CONTINUE
2076	5236	JMP	NOISEHO	STOP
2077	7200	CLA		
2100	1041	TAD	K207	
101	4775	JMS	PRLF	BRING BELL
12	5231	JMP	NOISH	ADD MORE GAIN

/ROUTINE TO CHECK FOR NOISE IN MULTIPLEXER

```
2103   7330   GLITCH,  CLA CLL
2104   1177            TAD    C-100
2105   3026            DCA    TEMP0
2106   7604            LAS                      /OPERATOR TO SELECT CHANNEL
2107   0175            AND    C17
2110   3031            DCA    TEMPC
2111   1031            TAD    TEMPC
2112   4521            ADLM
2113   4522            ADST
2114   4524            ADSK
2115   5314            JMP    .-1
2116   4523            ADRB
2117   3027            DCA    TEMPA
2120   4344   CHNL1,   JMS    RANCHN           /GET RANDOM CHANNEL
2121   1077            TAD    CHNL
```

```
2122   4521            ADLM
2123   4527            ADRS
2124   2026            ISZ    TEMP0
2125   5320            JMP    CHNL1
2126   7300            CLA CLL
2127   4523            ADRB
2130   3030            DCA    TEMPB
2131   1027            TAD    TEMPA
2132   7041            CIA
2133   1030            TAD    TEMPB
2134   7420            SNL
2135   4774/           JMS    ERPT5
2136   7440            SZA
2137   4774/           JMS    ERPT5
2140   7300            CLA CLL
2141   1041            TAD    K207
2142   4775/           JMS    PRLP
2143   5303            JMP    GLITCH

2144   1357   RANCHN,  TAD    FSTNO
2145   7006            RTL
2146   3357            DCA    FSTNO
2147   1357            TAD    FSTNO
2150   1360            TAD    SECNO
2151   7006            RTL
2152   1360            TAD    SECNO
2153   7012            RTR
2154   0175            AND    C17
2155   3077            DCA    CHNL
2156   5744            JMP I  RANCHN

2157   0437   FSTNO,   0437
2160   2525   SECNO,   2525
```

```
2174   1756
2175   1534
2176   1710
```

```
2177    1751
        2200        PAGE
                    /ROUTINE TO PERFORM 1000(10) CONVERSIONS OF ANY GIVEN VOLTAGE ON SELECTED CHANNEL

2200    4466    RESOL,  JMS I   SETJP
2201    1054            TAD     XSTOR
2202    3010            DCA     10
2203    3777'           DCA     STORAG
2204    4452            JMS I   XMOVE           /CLEAR WORK AREA
2205    4400            STORAG
2206    4401            STORAG+1
2207    6030            .-1750
2210    1165            TAD     C-1750
2211    3026            DCA     TEMPO
2212    4520            ADCL
2213    7604            LAS                     /GET CHANNEL
2214    0175            AND     C17
2215    3063            DCA     CHAN            /STORE CHANNEL
2216    1063            TAD     CHAN
2217    4521            ADLM                    /LOAD CHANNEL
2220    4522            ADST
2221    4524            ADSK
2222    5221            JMP     .-1
2223    4523            ADRB
2224    3410            DCA I   10              /PLACE IN TABLE
2225    2026            ISZ     TEMPO           /DONE?
2226    5220            JMP     .-6             /NO
2227    5455            JMP I   XCOMPR          /YES, NOW CHECK
2377    4400
        2400        PAGE


                    /ROUTINE TO COMPARE FOR GREATER THAN + OR - 1 LSB DIFFERENCE IN 1000(10) CONVERSIONS

2400    7300    COMPAR, CLA CLL
2401    1164            TAD     C-1747
2402    3026            DCA     TEMPO
2403    1054            TAD     XSTOR           /POINTER FOR FIRST WORD
2404    3010            DCA     10
2405    1410            TAD I   10
2406    3027            DCA     TEMPA
2407    7200    COMPR1, CLA
2410    1410            TAD I   10
2411    3030            DCA     TEMPB
2412    1027            TAD     TEMPA
2413    7041            CIA
```

```
2414    1030            TAD     TEMPB
2415    7440            SZA                     /SKIP HERE
2416    5222            JMP     .+6             /AND
2417    7420            SNL                     /HERE IF +
20      5222            JMP     .+2
21      5257            JMP     AOK
```

```
1561  1167          TAD     C5402
1562  3001          DCA     1
1563  7040          CMA
1564  3062          DCA     ERSWIT
1565  3767          DCA I   XIND
1566  5752          JMP I   XSETUP
1567  1346   XIND,  IND

      1600   PAGE

      /ROUTINE TO CHECK IF TEST COMPLETED ITERATION

1600  0000   XTAL,  0
1601  7604          LAS
1602  0022          AND     SW2        /LOOP OVERRIDE?
1603  7640          SZA CLA
1604  5230          JMP     XTAL1      /YES
1605  7604          LAS
1606  0025          AND     SW3        /TEST SELECTED?
1607  7640          SZA CLA
1610  5214          JMP     .+4
1611  2034          ISZ     TALLY      /DONE WITH TEST?
1612  7410          SKP                /NO
1613  5230          JMP     XTAL1      /YES
```

```
1614  1042          TAD     ERSWIT     /CHECK FOR ERROR
1615  7640          SZA CLA            /ERROR THIS PASS?
1616  5224          JMP     .+6        /NO
1617  1017          TAD     MSGPNT     /GET MESSAGE POINTER
1620  1045          TAD     M1         /DECREMENT POINTER
1621  3017          DCA     MSGPNT     /RESTORE POINTER
1622  1045          TAD     M1
1623  3062          DCA     ERSWIT     /RESTORE ERROR INDICATION
1624  1200          TAD     XTAL       /SET RETURN ADDRESS
1625  1046          TAD     M2
1626  3200          DCA     XTAL       /STORE RETURN ADDRESS
1627  5600          JMP I   XTAL
1630  2017   XTAL1, ISZ     MSGPNT
1631  5600          JMP I   XTAL
                    /POINTER FOR SELECTED TEST OPTION

1632  0223   XTEST, TST0-1
1633  0240          TST1-1
1634  0265          TST2-1
1635  0306          TST3-1
1636  0326          TST4-1
1637  0346          TST5-1
1640  0400          TST6-1
1641  0426          TST7-1
1642  0451          TST10-1
1643  0501          TST11-1
1644  0600          TST12-1
1645  0636          TST13-1
1646  0710          TST14-1
```

/ROUTINE TO SELECT SPECIFIC LOGIC TEST SUBROUTINE

```
1647  0000    XSELEC, 0
1650  7604            LAS                      /GET TEST
1651  3175            AND     C17
1652  3026            DCA     TEMP0            /STORE YES?
1653  1026            TAD     TEMP0
1654  1045            TAD     M1
1655  1166            TAD     C140
1656  3017            DCA     17               /MESSAGE POINTER SET NOW
1657  1026            TAD     TEMP0            /GET YES?
1660  1266            TAD     JMPLOC           /DEVELOP POINTER
1661  0051            AND     K77
1662  1267            TAD     JMPINS           /DEVELOP INSTRUCTION
1663  3264            DCA     JMPPTR
1664  7402    JMPPTR, HLT                      /DO IT!
1665  7402            HLT                      /TRAP
1666  1632    JMPLOC, XTEST
1667  5600    JMPINS, 5600


            /ERROR HANDLERS FOR OPEN LOOP TESTS

1670  0000    ERPT1,  0
```

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```
1671  7604            LAS
1672  0020            AND     SW0
1673  7710            SPA CLA
1674  5300            JMP     .+4
1675  4777/           JMS     MESAGE
1676  4003            EMSG20
1677  4776/           JMS     CRLF
1700  4775/           JMS     MESS
1701  4776/           JMS     CRLF
1702  7604            LAS
1703  0021            AND     SW1              /HALT ON ERROR?
1704  7650            SNA CLA                  /SKIP IF YES
1705  5774/           JMP     RESOL
1706  7402            HLT
1707  5774/           JMP     RESOL            /RETURN TO ROUTINE

1710  0000    ERPT2,  0
1711  7604            LAS
1712  0020            AND     SW0
1713  7710            SPA CLA
1714  5320            JMP     .+4
1715  4777/           JMS     MESAGE
1716  4034            EMSG21
1717  4776/           JMS     CRLF
1720  7604            LAS
1721  0021            AND     SW1              /HALT ON ERROR?
1722  7650            SNA CLA                  /SKIP IF YES
1723  5710            JMP I   ERPT2
1724  1027            TAD     TEMPA
1725  7402            HLT
1726  7200            CLA
1727  1030            TAD     TEMPB
1730  7402            HLT
 1   5773/           JMP     NOISE            /RETURN  ROUTINE
```

```
      22   7430              SZL
    2423   5230              JMP        .+5
    2424   7040              CMA
    2425   7440              SZA                    /SKIP HERE IF DIFFERENCE +1 LSB
    2426   7410              SKP
    2427   5257              JMP        AOK
    2430   7100              CLL
    2431   7010              RAR
    2432   7440              SZA                    /SKIP HERE
    2433   5237              JMP        .+4         /AND
    2434   7420              SNL                    /HERE IF DIFFERENCE +1 LSB
    2435   7410              SKP
    2436   5257              JMP        AOK
    2437   7300              CLA CLL                /CHECK FOR SPECIAL CASE OF 7777 AND 0
    2440   1027              TAD        TEMPA
    2441   7440              SZA                    /A=0?
    2442   7410              SKP                    /NO
    2443   5247              JMP        .+4         /YES
    2444   7040              CMA                    /A=7777?
    2445   7440              SZA                    /SKIP IF YES
    2446   4777/             JMS        ERPT1
    2447   1030              TAD        TEMPB       /A =7777 OR 0
    2450   7440              SZA                    /B=0?
    2451   5253              JMP        .+2         /NO
    2452   5257              JMP        AOK         /NO
    2453   7040              CMA                    /B=7777?
    2454   7440              SZA                    /SKIP IF YES
    2455   4777/             JMS        ERPT1
    2456   5257              JMP        AOK
    2457   7300    AOK,      CLA CLL
    2460   1030              TAD        TEMPB
    2461   3027              DCA        TEMPA
    2462   2026              ISZ        TEMP0       /DONE?
    2463   5207              JMP        COMPR1
    2464   2273              ISZ        FIVHUN
    2465   5776/             JMP        RESOL
    2466   1375              TAD        (-764       /COUNT OF 500(10);
    2467   3273              DCA        FIVHUN
    2470   1041              TAD        X207
    2471   4774/             JMS        PRLP
    2472   5776/             JMP        RESOL       /YES, REPEAT TEST
    2473   7014    FIVHUN,   -764

    2574   1534
    2575   7014
    2576   2200
    2577   1670
    2600              PAGE
```

```
                   /LAB8-E SYSTEM CHECK

    2600   0000    SYST,     0
    2601   4466              JMS I      SETUP
    2602   4520              ADCL
    2603   7402              HLT
    2604   7604              LAS
    2605   2377              AND        (700
```

```
2606    1376            TAD     (4046       /RATE AND ENABLE EST*L
2607    3031            DCA     TEMP0       /SAVE
2610    1031            TAD     TEMP0
2611    4530            CLOE                /START CLOCK
2612    7040            CMA
2613    4532            CLZE
2614    7200            CLA
2615    1024            TAD     SW4         /EXT START FOR A-D
2616    3026            DCA     TEMP0
2617    4775'           JMS     MESAGE      /TYPE OUT TEST INSTRUCTIONS
2620    4215            AUTMSG
2621    7402            HLT
2622    7604            LAS
2623    0025            AND     SW5
2624    7440            SZA                 /SKIP IF NOT AUTO-INCREMENT
2625    4321            JMS     LSTCHN      /CHECK FOR LAST CHANNEL
2626    7604            LAS
2627    0175            AND     (17
2630    4521            ADLM                /LOAD CHANNEL
2631    1026            TAD     TEMP0       /LOAD EXT ENABLE BIT IF PRESENT
2632    4526            ADLE
2633    1026            TAD     TEMP0
2634    7650            SNA CLA             /SKIP FOR EXTL ENABLE
2635    5245            JMP     .+10
2636    1374    CLKST,  TAD     (7001       /-X(MAX) TO RESET SWEEP
2637    3027            DCA     TEMPA       /AND START INITIAL CONVERSION
2640    4533            CLSA                /FROM REAL
2641    4531            CLSK                /TIME CLOCK
2642    5241            JMP     .-1
2643    7240            CLA CMA
2644    4532            CLZE                /STOP CLOCK
2645    7200            CLA
2646    7410            SKP
2647    4522    STCONV, ADST                /START CONVERSION HERE FOR ALL VALUES
2650    4524            ADSK                /OTHER THAN -X(MAX)
2651    5250            JMP     .-1
2652    4527            ADRS
2653    0175            AND     (17
2654    1030            TAD     TEMPB
2655    7001            IAC
2656    7440            SZA
2657    5261            JMP     .+2
2660    4521            ADLM
2661    4523            ADRB                /GET Y VALUE
2662    4540            DILY
2663    7200            CLA
2664    1027            TAD     TEMPA
```

/MAINDEC-08-DHADA-A A/D CONVERTER, MULTIPLEXER DIAGNOSTIC   PAL10   V131   21-MAR-72   13125   PAGE 3-3

```
2665    4537            DILX
2666    7001            IAC                 /GET NEXT X VALUE
2667    3027            DCA     TEMPA
2670    1027            TAD     TEMPA
2671    1374            TAD     (7001
2672    7640            SZA CLA             /SKIP IF -X(MAX)

2673    7410            SKP
2674    5305            JMP     RESTR
  75    4536            DISO
```

```
   6   5275              JMP    .-1
2677   4541       DIXY
2700   1047              TAD    M4             /TIME OUT TO ALLOW
2701   3340              DCA    TEMPX          /TRACE TO RETURN TO 1001(X)
2702   2340              ISZ    TEMPX          /AND SETTLE
2703   5302              JMP    .-1
2704   5247              JMP    STCONV
2705   1031       RESTR, TAD    TEMPC          /TO RESTART CLOCK
2706   4530              CLOE
2707   7040              CMA
2710   4532              CLZE
2711   7604              LAS
2712   0025              AND    SW5            /A-I MODE
2713   7640              SZA CLA               /SKIP IF NO
2714   5236              JMP    CLKST
2715   7604              LAS
2716   0175              AND    C17            /TO CHANGE CHANNEL
2717   4521              ADLM
2720   5236              JMP    CLKST          /GO
2721   0000       LSTCHN, 0                    /CHECK FOR LAST CHANNEL
2722   7604              LAS                   /IF AUTO INCREMENT MODE
2723   0175              AND    C17
2724   7040              CMA
2725   3030              DCA    TEMPB
2726   2321              ISZ    LSTCHN
2727   2321              ISZ    LSTCHN
2730   7604              LAS
2731   0025              AND    SW5
2732   7650              SNA CLA               /SKIP IF AUTO INCREMENT MODE
2733   5337              JMP    .+4
2734   1024              TAD    SW4
2735   1025              TAD    SW5
2736   3026              DCA    TEMP0
2737   5721              JMP I  LSTCHN
2740   0000       TEMPX, 0

2774   7001
2775   1274
2776   4040
2777   0700
       3000       PAGE

3000   0000       MESS,  0
3001   4777/             JMS    CRLF
3002   7300              CLA CLL
```

```
3003   1027              TAD    TEMPA
3004   0376              AND    (7000
3005   7002              BSW
3006   7012              RTR
3007   7010              RAR
3010   1375              TAD    (260
3011   4774/             JMS    PRLP
3012   7300              CLA CLL
3013   1027              TAD    TEMPA
3014   7006              RTL
3015   7004              RAL
3016   0376              AND    (7000
```

```
3017    7002            BSW
3020    7012            RTR
3021    7010            RAR
3022    1375            TAD     (260
3023    4774/           JMS     PRLP
3024    7200            CLA
3025    1027            TAD     TEMPA
3026    7012            RTR
3027    7010            RAR
3030    0373            AND     (7
3031    1375            TAD     (260
3032    4774/           JMS     PRLP
3033    7300            CLA CLL
3034    1027            TAD     TEMPA
3035    0373            AND     (7
3036    1375            TAD     (260
3037    4774/           JMS     PRLP
3040    7300            CLA CLL
3041    4777/           JMS     CRLF
3042    7300            CLA CLL
3043    1030            TAD     TEMPB
3044    0376            AND     (7000
3045    7002            BSW
3046    7010            RAR
3047    7012            RTR
3050    1375            TAD     (260
3051    4774/           JMS     PRLP
3052    7300            CLA CLL
3053    1030            TAD     TEMPB
3054    7006            RTL
3055    7004            RAL
3056    0376            AND     (7000
3057    7002            BSW
3060    7010            RAR
3061    7012            RTR
3062    1375            TAD     (260
3063    4774/           JMS     PRLP
3064    7300            CLA CLL
3065    1030            TAD     TEMPB
3066    7010            RAR
3067    7012            RTR
3070    0373            AND     (7
3071    1375            TAD     (260
```

/MAINDEC-08-DHADA-A A/D CONVERTER, MULTIPLEXER DIAGNOSTIC   PAL10   V141   21-MAR-72   13125   PAGE 3-5

```
3072    4774/           JMS     PRLP
3073    7300            CLA CLL
3074    1030            TAD     TEMPB
3075    0373            AND     (7
3076    1375            TAD     (260
3077    4774/           JMS     PRLP
3100    7300            CLA CLL
3101    4777/           JMS     CRLF
3102    4777/           JMS     CRLF
3103    7300            CLA CLL
3104    5600            JMP I   MESS

 173    0007
  74    1534
```

```
     /5  0260
   J176  7000
   3177  1542
         3200      PAGE
```

```
         3200      PAGE

                   /CONTROL LOGIC ERROR MESSAGES

   3200  3736      EMSG0,   TEXT     "**TEST 0 - DONE FLAG OR TIMING ERROR FLAG NOT CLEARED OR SKIP FAILURE**"
   3201  2405
   3202  2324
   3203  4060
   3204  4055
   3205  4004
   3206  1716
   3207  0540
   3210  0614
   3211  0107
   3212  4017
   3213  2240
   3214  2411
   3215  1511
   3216  1607
   3217  4005
   3220  2222
   3221  1722
   3222  4006
   3223  1401
   3224  0740
   3225  1617
   3226  2440
   3227  0314
   3230  0501
   3231  2205
   3232  0440
   3233  1722
   3234  4023
   3235  1311
   3236  2040
   3237  0601
   3240  1114
   3241  2522
   3242  0537
   3243  3600
   3244  3736      EMSG1,   TEXT     "**TEST 1 - DONE FLAG NOT SET THEN CLEARED OR SKIP FAILURE**"
   3245  2405
   3246  2324
   3247  4061
   3250  4055
   3251  4004
   3252  1716
   3253  0540
   3254  0614
```

```
3255    0107
3256    4016
3257    1724
3260    4023
```

```
3261    0524
3262    4024
3263    1005
3264    1640
3265    0314
3266    0501
3267    2205
3270    0440
3271    1722
3272    4023
3273    1311
3274    2040
3275    0601
3276    1114
3277    2522
3300    0537
3301    3600
3302    3736    EMSG2,   TEXT    "++TEST 2 - TIMING ERROR FLAG NOT SET THEN CLEARED OR SKIP FAILURE++"
3303    2405
3304    2324
3305    4062
3306    4055
3307    4024
3310    1115
3311    1116
3312    0740
3313    0522
3314    2217
3315    2240
3316    0614
3317    0107
3320    4016
3321    1724
3322    4023
3323    0524
3324    4024
3325    1005
3326    1640
3327    0314
3330    0501
3331    2205
3332    0440
3333    1722
3334    4023
3335    1311
3336    2040
3337    0601
3340    1114
3341    2522
3342    0537
3343    3600
3344    3736    EMSG3,   TEXT    "++TEST 3 - UNEXPECTED INTERRUPT OCCURRED++"
  45    2405
```

```
        46    2324
      3347    4063


      3350    4055
      3351    4025
      3352    1605
      3353    3020
      3354    0503
      3355    2405
      3356    0440
      3357    1116
      3360    2405
      3361    2222
      3362    2520
      3363    2440
      3364    1703
      3365    0325
      3366    2222
      3367    0504
      3370    3736
      3371    0000
      3372    3736    EMSG4,   TEXT    "==TEST 4 = ADR9 FAILED TO JAM TRANSFER TO AC=="
      3373    2405
      3374    2324
      3375    4064
      3376    4055
      3377    4001
      3400    0422
      3401    0240
      3402    0601
      3403    1114
      3404    0504
      3405    4024
      3406    1740
      3407    1201
      3410    1540
      3411    2422
      3412    0116
      3413    2306
      3414    0322
      3415    4024
      3416    1740
      3417    0103
      3420    3736
      3421    0000
      3422    3736    EMSG5,   TEXT    "==TEST 5 = ADR9 FAILED TO JAM TRANSFER TO AC=="
      3423    2405
      3424    2324
      3425    4065
      3426    4055
      3427    4001
      3430    0422
      3431    2340
      3432    0601
      3433    1114
      3434    0504
      3435    4024
      3436    1740
```

```
3457   1221
3440   1543
3441   2422
3442   2116
3443   2304
3444   0522
3445   4024
3446   1748
3447   0103
3450   3736
3451   0000
3452   3736        EMSG2,   TEXT      *=*TEST A = ENABLE REGISTER NOT PROPERLY LOADED=*
3453   2405
3454   2324
3455   4046
3456   4055
3457   4005
3460   1601
3461   0214
3462   0540
3463   2205
3464   0711
3465   2324
3466   0522
3467   4016
3470   1724
3471   4020
3472   2217
3473   2003
3474   2214
3475   3145
3476   1417
3477   0104
3500   0504
3501   3736
3502   0000
3503   3736        EMSG7,   TEXT      *=*TEST 7 = FAILED TO GENERATE INTERRUPT WITH DONE FLAG=*
3504   2405
3505   2324
3506   4007
3507   4055
3510   4006
3511   0111
3512   1405
3513   0445
3514   2417
3515   4007
3516   0516
3517   3522
3520   0124
3521   0540
3522   1116
3523   2405
3524   2222
3525   2520
```

```
3526    2440
3527    2711
3530    2410
3531    4004
3532    1716
3533    0540
3534    0614
3535    0107
3536    3736
3537    0000
3540    3736    EMSG10, TEXT    "**TEST 10 - FAILED TO GENERATE INTERRUPT WITH TIMING ERROR FLAG**"
3541    2405
3542    2324
3543    4061
3544    6040
3545    5540
3546    0601
3547    1114
3550    0504
3551    4024
3552    1740
3553    0705
3554    1605
3555    2201
3556    2405
3557    4011
3560    1624
3561    0522
3562    2225
3563    2024
3564    4027
3565    1124
3566    1040
3567    2411
3570    1511
3571    1607
3572    4005
3573    2222
3574    1722
3575    4006
3576    1401
3577    0737
3600    3600
3601    3736    EMSG11, TEXT    "**TEST 11 - FAILED TO LOAD AND READ MPX REG AND JCLAR AC**"
3602    2405
3603    2324
3604    4061
3605    6140
3606    5540
3607    0601
3610    1114
3611    0504
3612    4024
3613    1740
3614    1417
```

```
3615    0104
```

```
3616    4001
3617    1604
3620    4022
3621    0501
3622    0440
3623    1520
3624    3040
3625    2205
3626    0740
3627    0116
3630    0440
3631    0314
3632    0501
3633    2240
3634    0103
3635    3736
3636    0000
3637    3736        EMSG12, TEXT    "**TEST 12 - FAILED TO LOAD AND READ ALL CHANNELS INTO MPX REG**"
3640    2405
3641    2324
3642    4061
3643    6240
3644    5540
3645    0401
3646    1114
3647    0504
3650    4024
3651    1740
3652    1417
3653    0104
3654    4001
3655    1604
3656    4022
3657    0501
3660    0440
3661    0114
3662    1440
3663    0310
3664    0116
3665    1605
3666    1423
3667    4011
3670    1624
3671    1740
3672    1520
3673    3040
3674    2205
3675    0737
3676    3600
3677    3736        EMSG13, TEXT    "**TEST 13 - FAILED TO LOAD AND READ ALL CHANNELS IN AUTO-INCREMENT MODE**"
3700    2405
3701    2324
3702    4061
3703    6340
```

```
3704    5540
3705    3601
  06    1114
```

```
3707  0504
3710  4024
3711  1740
3712  1417
3713  2104
3714  4001
3715  1604
3716  4022
3717  0501
3720  0440
3721  0114
3722  1440
3723  0310
3724  0116
3725  1605
3726  1423
3727  4011
3730  1640
3731  0125
3732  2417
3733  5511
3734  1603
3735  2205
3736  1505
3737  1624
3740  4015
3741  1704
3742  0537
3743  3600
3744  3736      ZM0014, TEXT    "*>TEST 14 - FAILED TO COMPLETE CONVERSION IN SPECIFIED TIME<*"
3745  2405
3746  2324
3747  4061
3750  6440
3751  5540
3752  0601
3753  1114
3754  0504
3755  4024
3756  1740
3757  0317
3760  1520
3761  1405
3762  2405
3763  4003
3764  1716
3765  2605
3766  2223
3767  1117
3770  1640
3771  1116
3772  4023
```

```
3773  2005
3774  0311
3775  0611
3776  0504
```

```
4000    4445
4001    2337
4002    3600
4003    3736    EMSG20, TEXT    "**FAILED TO RESOLVE CONVERSIONS TO + OR - 1 LSB**"
4004    2401
4005    1114
4006    0504
4007    4024
4010    1740
4011    2205
4012    2317
4013    1426
4014    0540
4015    0317
4016    1626
4017    0522
4020    2311
4021    1716
4022    2340
4023    2417
4024    4053
4025    4017
4026    2240
4027    5540
4030    6140
4031    1423
4032    0237
4033    3600
4034    3736    EMSG21, TEXT    "**TWO SUCCESSIVE READS NOT EQUAL**"
4035    2427
4036    1740
4037    2325
4040    0303
4041    0523
4042    2311
4043    2605
4044    4022
4045    0501
4046    0423
4047    4016
4050    1724
4051    4005
4052    2125
4053    0114
4054    3736
4055    0000
4056    3736    EMSG22, TEXT    "**ERRONEOUS EXTERNAL ENABLE OR TIMING ERROR**"
4057    0522
4060    2217
4061    1603
```

```
4062    1725
4063    2340
4064    0530
4065    2405
4066    2216
4067    0114
  70    4005
```

```
 371   1601
4072   0214
4073   0540
4074   1722
4075   4024
4076   1115
4077   1116
4100   0740
4101   0522
4102   2217
4103   2237
4104   3600
4105   3736        EMSG23, TEXT      "**MONOTINICITY FAILURE**"
4106   1517
4107   1617
4110   2411
4111   1611
4112   0311
4113   2431
4114   4006
4115   0111
4116   1425
4117   2205
4120   3736
4121   0000
4122   3736        EMSG24, TEXT      "**NOISE IN MULTIPLEXER AND A=D BUFFER**"
4123   1617
4124   1123
4125   0540
4126   1116
4127   4015
4130   2014
4131   2411
4132   2014
4133   0530
4134   0522
4135   4001
4136   1604
4137   4001
4140   5504
4141   4002
4142   2506
4143   0605
4144   2237
4145   3600
                   /END OF LOGIC TEST TYPESTRING
4146   3736        XEND,  TEXT      "**END OF LOGIC TEST**"
4147   3516
```

```
4150   0440
4151   1706
4152   4014
4153   1727
4154   1103
4155   4024
4156   0523
4157   2437
4160   3600
```

```
4161    323A    HEADER MESSAGE
4162    2136    HLABEL, TEXT      "+HEADER A TO D CONVERTER, AND  MULTIPLEXER DIAGNOSTIC++"
4163    7005
4164    4001
4165    4024
4166    1740
4167    0440
4170    0317
4171    1626
4172    0522
4173    2405
4174    2254
4175    4001
4176    1570
4177    0540
4200    1525
4201    1424
4202    1120
4203    1405
4204    3005
4205    2240
4206    0411
4207    0107
4210    1617
4211    2324
4212    1103
4213    3736
4214    0000
4215    3736    AUTMSG, TEXT      "++SET SW5 (AUTO-INC), # OF CHANS IN SW8=11, OR SET SW8=11 (SINGLE CHAN)++"
4216    2305
4217    2440
4220    2327
4221    6540
4222    5001
4223    2324
4224    1755
4225    1116
4226    0351
4227    5440
4230    4340
4231    1706
4232    4003
4233    1001
4234    1623
4235    4011
```

```
4236    1640
4237    2327
4240    7055
4241    6161
4242    5440
4243    1722
4244    4023
4245    0524
4246    4023
4247    2770
 50     5561
```

```
 281  6140
4252  5023
4253  1116
4254  0714
4255  2540
4256  0310
4257  3116
4260  5137
4261  3600

      4400   >4400
             /TABLE OF CONVERSION VALUES/
4400  0000   STORAG, 0

                    $
0164  6031
0165  6030
0166  0140
0167  5402
0170  0076
0171  7700
0172  0475
0173  6445
0174  7701
0175  0017
0176  2322
0177  7700
```

```
4600
4700

5000
5100

5200
5300

5400
5500

5600
5700

6000
6100

6200
6300
```

6400
6500

6600
6700

7200
7100

7200
7300

7400
7500

7600
7700

ADCL	4520	EMSG6	8452	RESVR	2705	XBLOK	3151
ADLE	4526	EMSG7	2303	ROOPE	4297	ALLEL	6952
ADLP	4521	EOUT	1249	DROYD	2169	XMITR	5019

EMSG13		STNG				
EMSG14		HOBBY				
EMSG		HOME		SAGE		
EMSG20	4043	HOVGA		SAGER		
EMSG21	4034	RSSPNT		PALLP		
EMSG22	4036	ZEROD		XADSR		
EMSG23	4126	MTP		XADST		
EMSG24	4122	NOISE		XCLA3		
EMSG3	3344	OK	2343	XCLED		
EMSG4	3372	PRLP		XCLOC		
EMSG5	3422	RANCHN	2144	XCLSA		
		RESOL	2209			

/MAINDEC-08-DHADA-A A/D CONVERTER, MULTIPLEXER DIAGNOSTIC   PAL10   V1?1   2?-MAR-7?   1?:2?   PAGE 4-1?

ERRORS DETECTED: 0

LINKS GENERATED: 53

RUN-TIME: 11 SECONDS

3K CORE USED