AAV11

DIAGNOSTIC TEST

MD-11-DVAAA-A

EP-DVAAA-A-DL-A

FICHE 1 OF 1

NOV 1976

MADE IN U.S.A

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IDENTIFICATION

PRODUCT CODE: MAINDEC-11-DVAAA-A
PRODUCT NAME: AAV11 DIAGNOSTIC TEST
DATE: OCTOBER 1976
MAINTAINER: DIAGNOSTIC ENGINEERING

TABLE OF CONTENTS

1.0 ABSTRACT

THE AAV11 DIAGNOSTIC PROGRAM IS A SERIES OF TESTS DESIGNED
TO TEST ALL LOGIC FUNCTIONS AND DATA PATHS ACCESSIBLE.
TOTAL PROGRAM CONTROL IS ACCOMPLISHED THRU THE CONSOLE TERMINAL
VIA THE ODT/CONSOLE MICROCODE AND THE PROVISIONS OF SECTION 5.

2.0 REQUIREMENTS

2.1 EQUIPMENT

1. PDP11/03 COMPUTER OR LSI-11 PROCESSOR
2. DLV11 WITH I/O TYPE TERMINAL
3. AAV11 DAC OPTION

2.2 STORAGE

THE PROGRAM USES THE LOWER 4K OF MEMORY.

3.0 LOADING PROCEDURE

1. ASSURE THAT THE LSI-11 IS IN THE ODT MICROCODE STATE.
2. LOAD THE LOW OR HIGH SPEED READER WITH THE ABSOLUTE LOADER TAPE.
3. TYPE THE READER'S CSR ADDRESS (177560-LOW OR 177550-HIGH)
   AND CHARACTER 'L'.
4. AFTER TAPE IS LOADED, LOAD THE AAV11 BINARY TAPE INTO THE
   READER AND TYPE THE CHARACTER 'P'.
5. IF THE ABSOLUTE LOADER HAS ALREADY BEEN LOADED (STEPS 2 & 3),
   THEN ONLY THE STARTING ADDRESS OF THE ABSOLUTE LOADER AND
   THE CHARACTER 'C' NEED BE TYPED (WITH THE AAV11 BINARY TAPE
   IN THE APPROPRIATE READER).

4.0 STARTING PROCEDURE

1. MAKE SURE THE DEVICE BUS ADDRESS AGREE WITH THE
   DEFAULT VALUES DEFINED IN SECTION 7.1. IF NOT, CHANGE
   LOCATION(S) AS DESIRED VIA THE 'ADDRESS/' ODT COMMAND.
2. INSURE THAT THE HALT SWITCH IS DISABLED (IF ANY).
4. TYPE THE STARTING ADDRESS OF 200 AND THE CHARACTER G.
5. THE PROGRAM WILL RESPOND BY TYPING THE PROGRAM TITLE.

4.1 PROGRAM START

200	STARTING ADDRESS OF THE LOGIC TEST (WITH UP TO FOUR AAV1
204	STARTING ADDRESS OF THE RAMP LOOP
210	STARTING ADDRESS OF THE STATIC CALIBRATION
214	STARTING ADDRESS OF THE DYNAMIC CALIBRATION
230	STARTING ADDRESS OF THE LOGIC TEST (WITH UP TO SIXTEEN A
240	STARTING ADDRESS FOR THE OPTION TESTER.

5.0 SOFTWARE SWITCH REGISTER

5.1 OPTIONS

SWITCH	OCTAL	FUNCTION
SW15=1	100000	HALT ON ERROR
SW14=1	040000	LOOP ON TEST
SW13=1	020000	INHIBIT ERROR TYPECUTS
SW11=1	004000	INHIBIT ITERATIONS
SW10=1	002000	BELL ON ERROR
SW09=1	001000	LOOP ON ERROR
SW08=1	0004XX	LOOP ON TEST IN SWR <7-0>

5.2 CONTROL

1. THE SOFTWARE SWITCH REGISTER 'SWREG' (LOC. 176) CAN BE CHANGED BY USING THE ODT FACILITIES.
2. THE SOFTWARE SWITCH REGISTER CAN BE CHANGED UNDER PROGRAM CONTROL BY TYPING THE 'CONTROL & G' KEYS. THIS KEYBOARD OPERATION WILL PRINT OUT THE CURRENT CONTENTS AND ACCEPT NEW OCTAL SWITCH REGISTER DATA TERMINATED WITH A CARRIAGE RETURN.
3. ONCE THE ODT MODE HAS BEEN ENTERED BECAUSE OF AN ERROR CONDITION WITH BIT15 SET (HALT ON ERROR), STEP #2 ABOVE IS OF NO VALUE, SO RESORT TO STEP #1 TO ALTER THE SOFTWARE SWITCH REGISTER IF DESIRED BEFORE TYPING 'P' (CONTINUE).
4. IF THE PROGRAM IS PERFORMING RESET INSTRUCTIONS, SEVERAL 'CONTROL & G' COMMANDS MAY BE NECESSARY TO BE ACKNOWLEDGE BY THE PROGRAM.

6.0 ERROR REPORTING

6.1 ERROR COMMENT

ALL ERRORS ARE ACCOMPANIED WITH AN ENGLISH LANGUAGE DESCRIPTIVE COMMENT AS TO THE TYPE OF FAILURE. FURTHER QUALIFICATION OF THE ERROR CAN BE OBTAINED IF NEEDED FROM THE COMMENT AT THE ERROR PC OR FROM THE TEST ITSELF.

6.2 ERROR DATA

#ERRPC	LISTING ADDRESS WHERE THE ERROR WAS DETECTED
#BUSADR	AAV11 BUS REG ADDRESS OF CONCERNED OPERATION
EXPCT	DATA THAT WAS EXPECTED
RCVD	DATA THAT WAS RECEIVED

#ALWAYS REPORTED

7.0 MISCELLANEOUS

7.1 AAV11 BUS ADDRESS MODIFICATION

MODIFY LOCATION 'SBASE' (LOC. 1250) IF BASE BUS ADDRESS IS NOT 170440.

*NOTE: USE THE LSI-11 ODT FACILITIES TO MODIFY THIS LOCATIONS AFTER PROGRAM LOAD.

7.2 XXDP/APT NOTES

THIS DIAGNOSTIC IS CHAINABLE UNDER XXDP (REQUIRES 8K OR MORE).
THIS DIAGNOSTIC DOES SUPPORT "APT" BUT HAS NOT BEEN RUN UNDER IT.

7.3 POWER FAIL

A POWER FAILURE WILL CAUSE A RESTART MESSAGE ON POWER UP AT WHICH TIME THE PROGRAM IS RESTARTED (ONLY ON SYSTEMS WITH NON-VOLATILE MEMORY AND WITH APPROPRIATE HARDWARE).

7.4 MULTIPLE AAV11 INTERFACE TESTING

THIS PROGRAM DOES "AUTO-SIZE" THE NUMBER OF AAV11'S CONNECTED.
THIS DIAGNOSTIC WILL TEST SEQUENTIALLY UP TO 4 AAV11 INTERFACES, WHEN STARTED AT 200 AND 16. WHEN STARTED AT ADDRESS 230, WITH CONTIGUOUS BUS ADDRESSES. THE "AUTO-SIZE" CAN BE INHIBITED BY THE OPERATOR SETTING BIT 15 OF LOCATION 'SENV (LOC. 1214) AND LOADING LOCATION 'SBASE' WITH THE ADDRESS OF THE ONE UNIT TO BE TESTED.

7.5 RESTRICTIONS

NONE

8.0 EXECUTION TIME

EXECUTION TIME RANGES FROM ABOUT 5 SECONDS WITH NO ITERATIONS TO ABOUT 20 SECONDS WITH ITERATIONS ENABLED WITH ONE AAV11 CONNECTED.
AN END PASS MESSAGE INDICATES ALL TESTS HAVE COMPLETED ON ALL SELECTED UNITS.
END OF PASS WILL ALSO REPORT TOTAL ERROR COUNT AND ANY UNIT'S THAT HAD ERRORED.

9.0 PROGRAM TEST DESCRIPTIONS

9.1 LOGIC TESTS (SA 200)

THIS DIAGNOSTIC CONTAINS A SERIES OF INDEPENDENT TESTS DESIGNED TO TEST LOGIC FUNCTIONS AND DATA PATHS OF THE AAV11 DAC CONTROL. A COMPLETE LIST OF TESTS IS AVAILABLE IN THE TABLE OF CONTENTS AT THE BEGINNING OF THE LISTING. THE COMMENT FIELD WITHIN EACH TEST CAN BE BENEFICIAL IN TEST UNDERSTANDING.
WHEN STARTED AT LOCATION 200, THE PROGRAM WILL AUTO-SIZE UP TO 4 AAV11'S TO BE TESTED.

9.2 RAMP LOOP (SA 204)

THIS LOOP IS PROVIDED A METHOD FOR THE OPERATOR TO INSPECT AND VERIFY ANALOG OPERATION OF ALL DAC BITS. THE LOOP ALSO ENABLES THE OPERATOR TO VERIFY THAT NO TWO DAC'S ARE INTERCONNECTED.

9.3 STATIC CALIBRATION LOOP (SA 210)

THIS LOOP PROVIDES THE OPERATOR WITH A SIMPLE LOOP FOR VERIFYING THE INDIVIDUAL DAC BITS AND THE OPERATION OF DAC #3 DIGITAL OUTPUT BITS. THE VALUE OF THE SWITCH REGISTER IS LOADED INTO ALL DAC'S AND THE OUTPUT VOLTAGE CAN BE MONITORED.

9.4 DYNAMIC CALIBRATION LOOP (SA 214)

THIS PROVIDES THE OPERATOR WITH A LOOP THAT LOADS THE VALUE OF THE SWITCH REGISTER INTO THE DAC'S AND THEN AFTER A DELAY CLEARS THE DAC REGISTERS. THIS PROVIDES A SWITCHING PATTERN BETWEEN THE SELECTED VOLTAGE AND 0.

9.5 EXTENDED UNITS (SA 230)

SAME FUNCTION AS LOGIC TEST BUT ON 16. AAV11'S

9.6 TESTER SUPPORT (SA 240)

INITIALL PERFORMS THE LOGIC TESTS AND THEN EMPLOYS A KNOWN GOOD A TO D CONVERTER TO AID IN ADJUSTING THE POT'S ON THE AAV11 BOARD. THE OPERATOR IS INFORMED AS TO WHICH POT TO ADJUST AND WHICH D TO A CONVERTER IS TESTED.

10.0 LISTING

```
                        %
.TITLE  MAINDEC-11-DVAAA-A      AAV11   DIAGNOSTIC
;#COPYRIGHT (C) 1976
;#DIGITAL EQUIPMENT CORP.
;#MAYNARD, MASS. 01754
;#
;#PROGRAM BY RAYMOND SHOOP
;#
```

```
                        ;*THIS PROGRAM WAS ASSEMBLED USING THE PDP-11 MAINDEC SYSMAC
                        ;*PACKAGE (MAINDEC-11-DZQAC-C1),MAR 24, 1976.
                        ;*
                        .SBTTL  BASIC DEFINITIONS

                        ;*INITIAL ADDRESS OF THE STACK POINTER *** 1100 ***
001100                  STACK=  1100
                        .EQUIV  EMT,ERROR       ;;BASIC DEFINITION OF ERROR CALL
                        .EQUIV  IOT,SCOPE       ;;BASIC DEFINITION OF SCOPE CALL

                        ;*MISCELLANEOUS DEFINITIONS
000011                  HT=     11              ;;CODE FOR HORIZONTAL TAB
000012                  LF=     12              ;;CODE FOR LINE FEED
000015                  CR=     15              ;;CODE FOR CARRIAGE RETURN
000200                  CRLF=   200             ;;CODE FOR CARRIAGE RETURN-LINE FEED
177776                  PS=     177776          ;;PROCESSOR STATUS WORD
                        .EQUIV  PS,PSW
177774                  STKLMT= 177774          ;;STACK LIMIT REGISTER
177772                  PIRQ=   177772          ;;PROGRAM INTERRUPT REQUEST REGISTER
177570                  DSWR=   177570          ;;HARDWARE SWITCH REGISTER
177570                  DDISP=  177570          ;;HARDWARE DISPLAY REGISTER

                        ;*GENERAL PURPOSE REGISTER DEFINITIONS
000000                  R0=     %0              ;;GENERAL REGISTER
000001                  R1=     %1              ;;GENERAL REGISTER
000002                  R2=     %2              ;;GENERAL REGISTER
000003                  R3=     %3              ;;GENERAL REGISTER
000004                  R4=     %4              ;;GENERAL REGISTER
000005                  R5=     %5              ;;GENERAL REGISTER
000006                  R6=     %6              ;;GENERAL REGISTER
000007                  R7=     %7              ;;GENERAL REGISTER
                        .EQUIV  R6,SP           ;;STACK POINTER
                        .EQUIV  R7,PC           ;;PROGRAM COUNTER

                        ;*PRIORITY LEVEL DEFINITIONS
000000                  PR0=    0               ;;PRIORITY LEVEL 0
000040                  PR1=    40              ;;PRIORITY LEVEL 1
000100                  PR2=    100             ;;PRIORITY LEVEL 2
000140                  PR3=    140             ;;PRIORITY LEVEL 3
000200                  PR4=    200             ;;PRIORITY LEVEL 4
000240                  PR5=    240             ;;PRIORITY LEVEL 5
000300                  PR6=    300             ;;PRIORITY LEVEL 6
000340                  PR7=    340             ;;PRIORITY LEVEL 7

                        ;*"SWITCH REGISTER" SWITCH DEFINITIONS
100000                  SW15=   100000
040000                  SW14=   40000
020000                  SW13=   20000
010000                  SW12=   10000
004000                  SW11=   4000
002000                  SW10=   2000
001000                  SW09=   1000
000400                  SW08=   400
000200                  SW07=   200
```

```
                        000100          SW06=   100
                        000040          SW05=   40
                        000020          SW04=   20
                        000010          SW03=   10
                        000004          SW02=   4
                        000002          SW01=   2
                        000001          SW00=   1
                                        .EQUIV  SW09,SW9
                                        .EQUIV  SW08,SW8
                                        .EQUIV  SW07,SW7
                                        .EQUIV  SW06,SW6
                                        .EQUIV  SW05,SW5
                                        .EQUIV  SW04,SW4
                                        .EQUIV  SW03,SW3
                                        .EQUIV  SW02,SW2
                                        .EQUIV  SW01,SW1
                                        .EQUIV  SW00,SW0

                                        ;*DATA BIT DEFINITIONS (BIT00 TO BIT15)
                        100000          BIT15=  100000
                        040000          BIT14=  40000
                        020000          BIT13=  20000
                        010000          BIT12=  10000
                        004000          BIT11=  4000
                        002000          BIT10=  2000
                        001000          BIT09=  1000
                        000400          BIT08=  400
                        000200          BIT07=  200
                        000100          BIT06=  100
                        000040          BIT05=  40
                        000020          BIT04=  20
                        000010          BIT03=  10
                        000004          BIT02=  4
                        000002          BIT01=  2
                        000001          BIT00=  1
                                        .EQUIV  BIT09,BIT9
                                        .EQUIV  BIT08,BIT8
                                        .EQUIV  BIT07,BIT7
                                        .EQUIV  BIT06,BIT6
                                        .EQUIV  BIT05,BIT5
                                        .EQUIV  BIT04,BIT4
                                        .EQUIV  BIT03,BIT3
                                        .EQUIV  BIT02,BIT2
                                        .EQUIV  BIT01,BIT1
                                        .EQUIV  BIT00,BIT0

                                        ;*BASIC "CPU" TRAP VECTOR ADDRESSES
                        000004          ERRVEC= 4               ;;TIME OUT AND OTHER ERRORS
                        000010          RESVEC= 10              ;;RESERVED AND ILLEGAL INSTRUCTIONS
                        000014          TBITVEC=14              ;;"T" BIT
                        000014          TRTVEC= 14              ;;TRACE TRAP
                        000014          BPTVEC= 14              ;;BREAKPOINT TRAP (BPT)
                        000020          IOTVEC= 20              ;;INPUT/OUTPUT TRAP (IOT) **SCOPE**
                        000024          PWRVEC= 24              ;;POWER FAIL
```

```
                                
404             000030          EMTVEC= 30              ;;EMULATOR TRAP (EMT) **ERROR**
405             000034          TRAPVEC=34              ;;"TRAP" TRAP
406             000060          TKVEC=  60              ;;TTY KEYBOARD VECTOR
407             000064          TPVEC=  64              ;;TTY PRINTER VECTOR
408             000240          PIRQVEC=240             ;;PROGRAM INTERRUPT REQUEST VECTOR
409
410             170440                  ABASE=170440
```

```
                                .SBTTL  OPERATIONAL SWITCH SETTINGS
                                ;*
                                ;*      SWITCH                  USE
                                ;*      ------          --------------------
                                ;*        15            HALT ON ERROR
                                ;*        14            LOOP ON TEST
                                ;*        13            INHIBIT ERROR TYPEOUTS
                                ;*        12            INHIBIT ITERATIONS
                                ;*        10            BELL ON ERROR
                                ;*         9            LOOP ON ERROR
                                ;*         8            LOOP ON TEST IN SWR<7:0>
                                .SBTTL  TRAP CATCHER

                    000000              .=0
                                ;*ALL UNUSED LOCATIONS FROM 4 - 776 CONTAIN A ".+2,HALT"
                                ;*SEQUENCE TO CATCH ILLEGAL TRAPS AND INTERRUPTS
                                ;*LOCATION 0 CONTAINS 0 TO CATCH IMPROPERLY LOADED VECTORS
                    000174              .=174
000174  000000             DISPREG: .WORD  0                  ;;SOFTWARE DISPLAY REGISTER
000176  000000             SWREG:   .WORD  0                  ;;SOFTWARE SWITCH REGISTER
                                .SBTTL  STARTING ADDRESS(ES)
000200  000137  001450             JMP     @#BEGIN ;;JUMP TO STARTING ADDRESS OF PROGRAM
000204  000137  006570             JMP     FULRMP                  ;JUMP TO FULL RAMP LOOP
000210  000137  006656             JMP     STATIC                  ;JUMP TO STATIC DAC CALIBRATION
000214  000137  006716             JMP     DYNCAL                  ;JUMP TO DYNAMIC DAC CALIBRATION

                    000230              .=230
000230  000137  001440             JMP     ADDOK           ;JUMP AND ENABLE EXTENDED UNITS (16.)

                    000240              .=240
000240  000137  001432             JMP     TESTER          ;JUMP TO TESTER SA.

                    000100              .=100
000100  000104  000200  000002     104,200,2               ;B EVENT SAFE GUARD
```

```
                                .SBTTL  ACT11 HOOKS

                                ;;######################################################################
                                ;HOOKS REQUIRED BY ACT11
000106                                  $SVPC=.                 ;SAVE PC
000046                                  .=46
000046  000554                          $ENDAD                  ;;1)SET LOC.46 TO ADDRESS OF SENDAD IN .SEOP
000052                                  .=52
000052  000000                          .WORD   0               ;;2)SET LOC.52 TO ZERO
000106                                  .=$SVPC                 ;; RESTORE PC
001000                                  .=1000
                                .SBTTL  APT PARAMETER BLOCK

                                ;;######################################################################
                                ;SET LOCATIONS 24 AND 44 AS REQUIRED FOR APT
                                ;;######################################################################
001000                                  .$X=.   ;;SAVE CURRENT LOCATION
000024                                  .=24    ;;SET POWER FAIL TO POINT TO START OF PROGRAM
000024  000200                          200     ;;FOR APT START UP
000044                                  .=44    ;;POINT TO APT INDIRECT ADDRESS PNTR.
000044  001000                          $APTHDR ;;POINT TO APT HEADER BLOCK
001000                                  .=.$X   ;;RESET LOCATION COUNTER
                                ;;######################################################################
                                ;SETUP APT PARAMETER BLOCK AS DEFINED IN THE APT-PDP11 DIAGNOSTIC
                                ;INTERFACE SPEC.

001000                          $APTHD:
001000  000000                  $HIBTS: .WORD   0       ;;TWO HIGH BITS OF 18 BIT MAILBOX ADDR.
001002  001174                  $MBADR: .WORD   $MAIL   ;;ADDRESS OF APT MAILBOX (BITS 0-15)
001004  000030                  $TSTM:  .WORD   30      ;;RUN TIM OF LONGEST TEST
001006  000010                  $PASTM: .WORD   10      ;;RUN TIME IN SECS. OF 1ST PASS ON 1 UNIT (QUICK VERIFY)
001010  000030                  $UNITM: .WORD   30      ;;ADDITIONAL RUN TIME (SECS) OF A PASS FOR EACH ADDITIONAL UNIT
001012  000031                          .WORD   $ETEND-$MAIL/2 ;;LENGTH MAILBOX-ETABLE(WORDS)
```

```
                                .SBTTL  COMMON TAGS

                                ;;**********************************************************************
                                ;*THIS TABLE CONTAINS VARIOUS COMMON STORAGE LOCATIONS
                                ;*USED IN THE PROGRAM.

                        001100                  .=1100
001100                  SCNTAG:                         ;;START OF COMMON TAGS
001100  000000                  .WORD   0
001102  000                     $TSTNM: .BYTE   0       ;;CONTAINS THE TEST NUMBER
001103  000                     $ERFLG: .BYTE   0       ;;CONTAINS ERROR FLAG
001104  000000                  $ICNT:  .WORD   0       ;;CONTAINS SUBTEST ITERATION COUNT
001106  000000                  $LPADR: .WORD   0       ;;CONTAINS SCOPE LOOP ADDRESS
001110  000000                  $LPERR: .WORD   0       ;;CONTAINS SCOPE RETURN FOR ERRORS
001112  000000                  $ERTTL: .WORD   0       ;;CONTAINS TOTAL ERRORS DETECTED
001114  000                     $ITEMB: .BYTE   0       ;;CONTAINS ITEM CONTROL BYTE
001115  001                     $ERMAX: .BYTE   1       ;;CONTAINS MAX. ERRORS PER TEST
001116  000000                  $ERRPC: .WORD   0       ;;CONTAINS PC OF LAST ERROR INSTRUCTION
001120  000000                  $GDADR: .WORD   0       ;;CONTAINS ADDRESS OF 'GOOD' DATA
001122  000000                  $BDADR: .WORD   0       ;;CONTAINS ADDRESS OF 'BAD' DATA
001124  000000                  $GDDAT: .WORD   0       ;;CONTAINS 'GOOD' DATA
001126  000000                  $BDDAT: .WORD   0       ;;CONTAINS 'BAD' DATA
001130  000000                          .WORD   0       ;;RESERVED--NOT TO BE USED
001132  000000                          .WORD   0
001134  000                     $AUTOB: .BYTE   0       ;;AUTOMATIC MODE INDICATOR
001135  000                     $INTAG: .BYTE   0       ;;INTERRUPT MODE INDICATOR
001136  000000                          .WORD   0
001140  177570                  $SWR:   .WORD   DSWR    ;;ADDRESS OF SWITCH REGISTER
001142  177570                  $DISPLAY: .WORD DDISP   ;;ADDRESS OF DISPLAY REGISTER
001144  177560                  $TKS:   177560          ;;TTY KBD STATUS
001146  177562                  $TKB:   177562          ;;TTY KBD BUFFER
001150  177564                  $TPS:   177564          ;;TTY PRINTER STATUS REG. ADDRESS
001152  177566                  $TPB:   177566          ;;TTY PRINTER BUFFER REG. ADDRESS
001154  000                     $NULL:  .BYTE   0       ;;CONTAINS NULL CHARACTER FOR FILLS
001155  002                     $FILLS: .BYTE   2       ;;CONTAINS # OF FILLER CHARACTERS REQUIRED
001156  012                     $FILLC: .BYTE   12      ;;INSERT FILL CHARS. AFTER A "LINE FEED"
001157  000                     $TPFLG: .BYTE   0       ;;"TERMINAL AVAILABLE" FLAG (BIT<07>=0=YES)
001160  000000                  $TIMES: 0               ;;MAX. NUMBER OF ITERATIONS
001162  000000                  $ESCAPE:0               ;;ESCAPE ON ERROR ADDRESS
001164  177607  000377        $BELL:  .ASCIZ  <207><377><377> ;;CODE FOR BELL
001170  077                     $QUES:  .ASCII  /?/     ;;QUESTION MARK
001171  015                     $CRLF:  .ASCII  <15>    ;;CARRIAGE RETURN
001172  000012                  $LF:    .ASCIZ  <12>    ;;LINE FEED
                                ;;**********************************************************************
                                .SBTTL  APT MAILBOX-ETABLE

                                ;;**********************************************************************
                                .EVEN
001174                          $MAIL:                  ;;APT MAILBOX
001174  000000                  $MSGTY: .WORD   AMSGTY   ;;MESSAGE TYPE CODE
001176  000000                  $FATAL: .WORD   AFATAL   ;;FATAL ERROR NUMBER
001200  000000                  $TESTN: .WORD   ATESTN   ;;TEST NUMBER
001202  000000                  $PASS:  .WORD   APASS    ;;PASS COUNT
001204  000000                  $DEVCT: .WORD   ADEVCT   ;;DEVICE COUNT
```

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                                    $UNIT:  .WORD   AUNIT   ;;I/O UNIT NUMBER
                                    $MSGAD: .WORD   AMSGAD  ;;MESSAGE ADDRESS
                                    $MSGLG: .WORD   AMSGLG  ;;MESSAGE LENGTH
                                    $ETABLE:                ;;APT ENVIRONMENT TABLE
                                    $ENV:   .BYTE   AENV    ;;ENVIRONMENT BYTE
                                    $ENVM:  .BYTE   AENVM   ;;ENVIRONMENT MODE BITS
                                    $SWREG: .WORD   ASWREG  ;;APT SWITCH REGISTER
                                    $USWR:  .WORD   AUSWR   ;;USER SWITCHES
                                    $CPUOP: .WORD   ACPUOP  ;;CPU TYPE,OPTIONS
                                                            BITS 15-11=CPU TYPE
                                                                    11/04=01,11/05=02,11/20=03,11/40=04,11/45=05
                                                                    11/70=06,PDQ=07,Q=10
                                                            BIT 10=REAL TIME CLOCK
                                                            BIT  9=FLOATING POINT PROCESSOR
                                                            BIT  8=MEMORY MANAGEMENT
001224  000     000     $MAMS1: .BYTE   AMAMS1  ;;HIGH ADDRESS,M.S. BYTE
001225  000     000     $MTYP1: .BYTE   AMTYP1  ;;MEM. TYPE,BLK#1
                                                            MEM.TYPE BYTE   --  (HIGH BYTE)
                                                                    900 NSEC CORE=001
                                                                    300 NSEC BIPOLAR=002
                                                                    500 NSEC MOS=003
001226  000000  000000  $MADR1: .WORD   AMADR1  ;;HIGH ADDRESS,BLK#1
                                                            MEM.LAST ADDR.=3 BYTES,THIS WORD AND LOW OF "TYPE" ABOVE
001230  000     000     $MAMS2: .BYTE   AMAMS2  ;;HIGH ADDRESS,M.S. BYTE
001231  000     000     $MTYP2: .BYTE   AMTYP2  ;;MEM.TYPE,BLK#2
001232  000000  000000  $MADR2: .WORD   AMADR2  ;;MEM.LAST ADDRESS,BLK#2
001234  000     000     $MAMS3: .BYTE   AMAMS3  ;;HIGH ADDRESS,M.S.BYTE
001235  000     000     $MTYP3: .BYTE   AMTYP3  ;;MEM.TYPE,BLK#3
001236  000000  000000  $MADR3: .WORD   AMADR3  ;;MEM.LAST ADDRESS,BLK#3
001240  000     000     $MAMS4: .BYTE   AMAMS4  ;;HIGH ADDRESS,M.S.BYTE
001241  000     000     $MTYP4: .BYTE   AMTYP4  ;;MEM.TYPE,BLK#4
001242  000000  000000  $MADR4: .WORD   AMADR4  ;;MEM.LAST ADDRESS,BLK#4
001244  000000  000000  $VECT1: .WORD   AVECT1  ;;INTERRUPT VECTOR#1,BUS PRIORITY#1
001246  000000  000000  $VECT2: .WORD   AVECT2  ;;INTERRUPT VECTOR#2BUS PRIORITY#2
001250  170440  170440  $BASE:  .WORD   ABASE   ;;BASE ADDRESS OF EQUIPMENT UNDER TEST
001252  000000  000000  $DEVM:  .WORD   ADEVM   ;;DEVICE MAP
001254  000000  000000  $CDW1:  .WORD   ACDW1   ;;CONTROLLER DESCRIPTION WORD#1
001256                  $ETEND:
                        .MEXIT
```

```
                                .SBTTL  ERROR POINTER TABLE

                                ;#THIS TABLE CONTAINS THE INFORMATION FOR EACH ERROR THAT CAN OCCUR.
                                ;#THE INFORMATION IS OBTAINED BY USING THE INDEX NUMBER FOUND IN
                                ;#LOCATION SITEMB. THIS NUMBER INDICATES WHICH ITEM IN THE TABLE IS PERTINENT.
                                ;#NOTE1:        IF SITEMB IS 0 THE ONLY PERTINENT DATA IS (SERRPC).
                                ;#NOTE2:      EACH ITEM IN THE TABLE CONTAINS 4 POINTERS EXPLAINED AS FOLLOWS:

                                ;#      EM              ;;POINTS TO THE ERROR MESSAGE
                                ;#      DH              ;;POINTS TO THE DATA HEADER
                                ;#      DT              ;;POINTS TO THE DATA
                                ;#      DF              ;;POINTS TO THE DATA FORMAT

001256                          SERRTB:

                                ;ITEM   1
001256  007122                          EM1                     ;BUT TIME-OUT WHEN REF. A DAC ADDRESS
001260  010322                          DH2                     ;ERRPC  BUSADR
001262  011112                          DT1                     ;SERRPC $BDDAT
001264  011204                          DF0

                                ;ITEM   2
001266  007176                          EM2                     ;DAC #0 REGISTER IN ERROR
001270  010267                          DH1                     ;ERRPC  BUSADR  GOOD    BAD
001272  011120                          DT2                     ;SERRPC DAC0    $GDDAT  $BDDAT
001274  011204                          DF0

                                ;ITEM   3
001276  007225                          EM3                     ;DAC #1 REGISTER IN ERROR
001300  010267                          DH1                     ;ERRPC  BUSADR  GOOD    BAD
001302  011132                          DT3                     ;SERRPC DAC1    $GDDAT  $BDDAT
001304  011204                          DF0

                                ;ITEM   4
001306  007254                          EM4                     ;DAC #2 REGISTER IN ERROR
001310  010267                          DH1                     ;ERRPC  BUSADR  GOOD    BAD
001312  011144                          DT4                     ;SERRPC DAC2    $GDDAT  $BDDAT
001314  011204                          DF0

                                ;ITEM   5
001316  007303                          EM5                     ;DAC #3 REGISTER IN ERROR
001320  010267                          DH1                     ;ERRPC  BUSADR  GOOD    BAD
001322  011156                          DT5                     ;SERRPC DAC3    $GDDAT  $BDDAT
001324  011204                          DF0

                                ;ITEM   6
001326  007332                          EM6                     ;SELECTED DAC OFFSET POT IS NOT ADJUSTED CORRECTLY
001330  010337                          DH6                     ;ERRPC  BUSADR  EXPECT  WAS     SPREAD
001332  011170                          DT6                     ;SERRPC DACBAD  $GDDAT  $BDDAT  SPREAD
001334  011204                          DF0
```

```
                                        ;ITEM   7
001336  007413                          EM7             ;SELECTED DAC GAIN POT IS NOT ADJUSTED CORRECTLY
001340  010337                          DH6             ;ERRPC  BUSADR  EXPECT  WAS     SPREAD
001342  011170                          DT6             ;SERRPC DACBAD  $GDDAT  $BDDAT  SPREAD
001344  011204                          DF0

                                        ;ITEM   10
001346  007472                          EM10            ;SELECTED DAC HAS A LINEARITY PROBLEM
001350  010337                          DH6             ;ERRPC  BUSADR  EXPECT  WAS     SPREAD
001352  011170                          DT6             ;SERRPC DACBAD  $GDDAT  $BDDAT  SPREAD
001354  011204                          DF0

                                        ;ITEM   11
001356  007537                          EM11            ;+15 VOLT SUPPLY IS INCORRECT
001360  010337                          DH6             ;ERRPC  BUSADR  EXPECT  WAS     SPREAD
001362  011170                          DT6             ;SERRPC DACBAD  $GDDAT  $BDDAT  SPREAD
001364  011204                          DF0

                                        ;ITEM   12
001366  007574                          EM12            ;-15 VOLT SUPPLY IS INCORRECT
001370  010337                          DH6             ;ERRPC  BUSADR  EXPECT  WAS     SPREAD
001372  011170                          DT6             ;SERRPC DACBAD  $GDDAT  $BDDAT  SPREAD
001374  011204                          DF0

                                        ;ITEM   13
001376  007631                          EM13            ;DAC #3 DIGITAL OUTPUT BITS IN ERROR
001400  010267                          DH1             ;ERRPC  BUSADR  GOOD    BAD
001402  011156                          DT5             ;SERRPC DAC3    $GDDAT  $BDDAT
001404  011204                          DF0

                                        ;ITEM   14
001406  007675                          EM14            ;WAKE UP OPERATOR AND ADJUST THE POT
001410  000000                          0
001412  000000                          0
001414  000000                          0

001416  000010                  VADDR:  10              ;OFFSET TO NEXT AAV11 ADDRESS
001420  000000                  EVER:   0
001422  170440                  DAC0:   ABASE
001424  170442                  DAC1:   ABASE+2
001426  170444                  DAC2:   ABASE+4
001430  170446                  DAC3:   ABASE+6
```

```
                                TESTER: INC     WFTST           ;INDICATE TESTER MODE
                                        BR      BEGIN1
                        007006  ADDOK:  MOV     #17.,NUMBOK     ;LOAD 16 MAX UNITS
                                        BR      BEGINA
                        007006  BEGIN:  MOV     #5.,NUMBOK      ;LOAD 4 MAX UNITS
                                BEGINA: CLR     WFTST
                                BEGIN1: CLR     TEMP
                                        CLR     EVER
                                        RESET
                                .SBTTL  INITIALIZE THE COMMON TAGS
                                ;;CLEAR THE COMMON TAGS (SCMTAG) AREA
                                        MOV     #SCMTAG,R0      ;;FIRST LOCATION TO BE CLEARED
                                        CLR     (R0)+           ;;CLEAR MEMORY LOCATION
                                        CMP     #SWR,R0 ;;DONE?
                                        BNE     .-6             ;;LOOP BACK IF NO
                                        MOV     #STACK,SP       ;;SETUP THE STACK POINTER
                                ;;INITIALIZE A FEW VECTORS
                                        MOV     #$SCOPE,@#IOTVEC ;;IOT VECTOR FOR SCOPE ROUTINE
                                        MOV     #340,@#IOTVEC+2 ;;LEVEL 7
                                        MOV     #$ERROR,@#EMTVEC ;;EMT VECTOR FOR ERROR ROUTINE
                                        MOV     #340,@#EMTVEC+2 ;;LEVEL 7
                                        MOV     #$TRAP,@#TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
                                        MOV     #340,@#TRAPVEC+2;LEVEL 7
                                        MOV     #$PWRDN,@#PWRVEC ;;POWER FAILURE VECTOR
                                        MOV     #340,@#PWRVEC+2 ;;LEVEL 7
                                        CLR     $TIMES          ;;INITIALIZE NUMBER OF ITERATIONS
                                        CLR     $ESCAPE         ;;CLEAR THE ESCAPE ON ERROR ADDRESS
                                        MOVB    #1,$ERMAX       ;;ALLOW ONE ERROR PER TEST
                                        MOV     #.,$LPADR       ;;INITIALIZE THE LOOP ADDRESS FOR SCOPE
                                        MOV     #.,$LPERR       ;;SETUP THE ERROR LOOP ADDRESS
                                ;;SIZE FOR A HARDWARE SWITCH REGISTER. IF NOT FOUND OR IT IS
                                ;;EQUAL TO A "-1", SETUP FOR A SOFTWARE SWITCH REGISTER.
                                        MOV     @#ERRVEC,-(SP)  ;;SAVE ERROR VECTOR
                                        MOV     #64$,@#ERRVEC   ;;SET UP ERROR VECTOR
                                        MOV     #0$SWR,SWR      ;;SETUP FOR A HARDWARE SWICH REGISTER
                                        MOV     #0DISP,DISPLAY  ;;AND A HARDWARE DISPLAY REGISTER
                                        CMP     #-1,@SWR        ;;TRY TO REFERENCE HARDWARE SWR
                                        BNE     66$             ;;BRANCH IF NO TIMEOUT TRAP OCCURRED
                                                                ;;AND  THE HARDWARE SWR IS NOT = -1
                                        BR      65$             ;;BRANCH IF NO TIMEOUT
                                64$:    MOV     #65$,(SP)       ;;SET UP FOR TRAP RETURN
                                        RTI
                                65$:    MOV     #SWREG,SWR      ;;POINT TO SOFTWARE SWR
                                        MOV     #DISPREG,DISPLAY
                                66$:    MOV     (SP)+,@#ERRVEC  ;;RESTORE ERROR VECTOR

                                        CLR     $PASS           ;;CLEAR PASS COUNT
                                        BITB    #APTSIZE,$ENVM  ;;TEST USER SIZE UNDER APT
                                        BEQ     67$             ;;YES,USE NON-APT SWITCH
                                        MOV     #SSWREG,SWR     ;;NO,USE APT SWITCH REGISTER
                                67$:
                                        CLR     BADUNT          ;RESET BAD INDICATOR
                                        JMP     INIT1
```

```
                                        ;SUBROUTINE TO LOAD A TRAP CATCHER
                                        
001746  012702  000252          LDTRAP: MOV     #252,R2                 ;LOAD R2
001752  012701  000250                  MOV     #250,R1                 ;LOAD R1
001756  010221                  5$:     MOV     R2,(R1)+                ;LOAD .+2
001760  005021                          CLR     (R1)+                   ;LOAD HALT
001762  010102                          MOV     R1,R2                   ;LOAD R2
001764  005722                          TST     (R2)+                   ;BUMP R2
001766  020227  001002                  CMP     R2,#1002                ;TEST FOR LAST
001772  001371                          BNE     5$                      ;BR UNTIL DONE
                                        
                                        ;AND LOAD DEVICE ADDRESSES LOCATIONS
                                        
001774  013700  001250                  MOV     $BASE,R0                ;GET BASE ADDRESS
002000  010037  001422                  MOV     R0,DAC0         ;LOAD X ADDRESS
002004  010037  001424                  MOV     R0,DAC1         ;LOAD Y ADDRESS
002010  010037  001426                  MOV     R0,DAC2                 ;LOAD DAC #2
002014  010037  001430                  MOV     R0,DAC3                 ;LOAD DAC #3
002020  062737  000002  001424          ADD     #2,DAC1
002026  062737  000004  001426          ADD     #4,DAC2
002034  062737  000006  001430          ADD     #6,DAC3
002042  000207                          RTS     PC                      EXIT
                                        
002044  004737  001746          INIT1:  JSR     PC,LDTRAP
002050  005737  007012                  TST     TEMP                    ;TEST IF START OR RESTART
002054  001012                          BNE     MTEST                   ;RESTART
002056  005737  000042                  TST     @#42                    ;TEST IF MONITOR
002062  001007                          BNE     MTEST                   ;BR IF NOT
002064  005737  007020                  TST     WFTST                   ;TEST IF ON TESTER
002070  001402                          BEQ     1$                      ;BR IF NOT
002072  104401                          TYPE
002074  010011                          MSGSW                           ;TELL OPERATOR ABOUT TESTER SWITCHES
002076  104401                  1$:     TYPE                            ;CALL MESSAGE PRINTER VIA 'EMT'
002100  007040                          TITLE                           ;TYPE PROGRAM HEADER.
```

```
                                        .SBTTL  DETERMINE THE NUMBER OF AAV11 ON THIS SYSTEM

002102 013737 001250 001126 MTEST:  MOV     $BASE,$BDDAT    ;GET THE BASE ADDRESS
002110 005037 007010                CLR     MASKNM
002114 005037 001206                CLR     $UNIT           ;CLEAR UNIT #
002120 012737 002164 000004         MOV     #2$,ERRVEC      ;LOAD TRAP RETURN
002126 005777 176774            1$: TST     @$BDDAT         ;TEST IF ADDR EXISTS
002132 063737 001416 001126         ADD     VADDR,$BDDAT    ;UPDATE THE BUS ADDRESS
002140 005237 001206                INC     $UNIT           ;UPDATE UNIT COUNT
002144 005737 001214                TST     $ENV            ;TEST IF "DO NOT SIZE"
002150 100413                       BMI     3$              ;BR IF NO SIZEING
002152 023737 007006 001206         CMP     NUMBOK,$UNIT    ;TEST IF MAX. NUMBER
002160 001362                       BNE     1$              ;BR IF NOT
002162 000406                       BR      3$              ;BR IF MAX.
002164 022626               2$:     CMP     (SP)+,(SP)+     ;CLEAN THE STACK
002166 005737 001206                TST     $UNIT           ;TEST IF ANY EXIST
002172 001002                       BNE     3$              ;BR IF SOME ARE THERE
002174 104001                       ERROR   1               ;BASE ADDRESS CAUSED AN BUS TRAP
002176 000443                       BR      TST1            ;IS $BASE CORRECT??
002200 005737 001420        3$:     TST     EVER            ;TEST IF # HAS BEEN REPORTED
002204 100422                       BMI     4$              ;BR IF IT HAS
002206 005737 007020                TST     WFTST           ;TEST IF TESTER MODE
002212 001010                       BNE     6$              ;BR IF TESTER
002214 104401                       TYPE
002216 010224                       FOUND1                  ;TELL OPERATOR THE # OF AAV11'S
002220 013746 001206                MOV     $UNIT,-(SP)
002224 104403                       TYPOS
002226     002                      .BYTE   2
002227     000                      .BYTE   0
002230 104401                       TYPE
002232 010250                       FOUND2
002234 013737 001206 001420 6$:     MOV     $UNIT,EVER      ;SAVE THE # OF AAV11'S FOR LATER
002242 052737 100000 001420         BIS     #BIT15,EVER     ;SET "REPORTED # FLAG"
002250 000405                       BR      5$              ;
002252 123737 001420 001206 4$:     CMPB    EVER,$UNIT      ;TEST IF ANY HAVE GONE AWAY
002260 001401                       BEQ     5$              ;BR IF ALL ARE STILL HERE
002262 104013                       ERROR   13              ;EXISTING UNIT FAILED TO RESPOND NOW
002264 005037 001206        5$:     CLR     $UNIT           ;RESET UNIT POINTER
002270 005037 001204                CLR     $DEVCT          ;MAKE APT HAPPY
002274 004737 001746                JSR     PC,LDTRAP       ;LOAD TRAP CATCHER AND BUS ADDRESSES
002300 012737 000001 007010         MOV     #BIT0,MASKNM    ;LOAD MASK NUMBER IF ERROR
```

```
                        ;;#################################################################
                        ;#TEST 1         TEST THAT THE AAV11 RESPONDS TO THE CPU
                        ;;#################################################################
002306  000004          TST1:   SCOPE
002310  012737  002340  000004          MOV     #1$,ERRVEC      ;LOAD BUS TRAP RETURN
002316  005777  177100                  TST     @DAC0           ;TEST DAC #0
002322  005777  177076                  TST     @DAC1           ;TEST DAC #1
002326  005777  177074                  TST     @DAC2           ;TEST DAC #2
002332  005777  177072                  TST     @DAC3           ;TEST DAC #3
002336  000407                          BR      2$              ;BR AND RESTORE LOC. 4
002340  022626                  1$:     CMP     (SP)+,(SP)+     ;CLEAN THE STACK
002342  104001                          ERROR   1               ;ERROR, BUS TIMEOUT WHEN ADDRESSING THE AAV11
002344  012737  000006  000004          MOV     #6,ERRVEC       ;LOAD LOC 4
002352  000137  004530                  JMP     REMAIN          ;TEST IF ANY OTHER'S
002356  012737  000006  000004  2$:     MOV     #6,ERRVEC       ;LOAD RETURN
                        ;;#################################################################
                        ;#TEST 2         TEST THAT DAC0 REGISTER CAN BE CLEARED
                        ;;#################################################################
002364  000004          TST2:   SCOPE
002366  005037  001124          CLR     $GDDAT                  ;LOAD EXPECTED
002372  013777  001124  177022          MOV     $GDDAT,@DAC0    ;LOAD REG
002400  017737  177016  001126          MOV     @DAC0,$BDDAT    ;READ REG
002406  023737  001124  001126          CMP     $GDDAT,$BDDAT   ;COMPARE
002414  001401                          BEQ     TST3                    ;;BR IF EQUAL
002416  104002                          ERROR   2               ;ERROR, DAC0 REGISTER NOT = 0

                        ;;#################################################################
                        ;#TEST 3         TEST THAT DAC0 REGISTER CAN BE LOADED WITH #7777
                        ;;#################################################################
002420  000004          TST3:   SCOPE
002422  012737  007777  001124          MOV     #7777,$GDDAT    ;LOAD EXPECTED
002430  013777  001124  176764          MOV     $GDDAT,@DAC0    ;LOAD REG
002436  017737  176760  001126          MOV     @DAC0,$BDDAT    ;READ REG
002444  023737  001124  001126          CMP     $GDDAT,$BDDAT   ;COMPARE
002452  001401                          BEQ     TST4                    ;;BR IF EQUAL
002454  104002                          ERROR   2               ;ERROR, DAC0 REGISTER NOT = 7777

                        ;;#################################################################
                        ;#TEST 4         TEST THAT DAC0 REGISTER CAN HOLD A FLOATING 1 PATTERN
                        ;;#################################################################
002456  000004          TST4:   SCOPE
002460  012737  000100  001160          MOV     #100,$TIMES     ;;DO 100 ITERATIONS
002466  012737  000001  001124          MOV     #BIT1,$GDDAT            ;LOAD EXPECTED
002474  013777  001124  176720  1$:     MOV     $GDDAT,@DAC0            ;LOAD DAC0 REGISTER
002502  017737  176714  001126          MOV     @DAC0,$BDDAT            ;READ THE REGISTER
002510  023737  001124  001126          CMP     $GDDAT,$BDDAT           ;COMPARE THE DATA
002516  001401                          BEQ     2$                      ;;BR IF SAME
002520  104002                          ERROR   2               ;ERROR, DAC0 REGISTER FAILED TO HOLD A FLOATING
002522  006237  001124          2$:     ASR     $GDDAT                  ;CHANGE THE DATA
002526  001362                          BNE     1$                      ;BR AND TEST MORE DATA
```

```
                                ;;#################################################################
                                ;#TEST 5         TEST THAT DACO CAN HOLD A FLOATING 1 PATTERN (DYNAMICLY)
                                ;;#################################################################
002530  000004                  TST5:   SCOPE
002532  012737  000100  001160          MOV     #100,STIMES     ;;DO 100 ITERATIONS
002540  012737  004000  001124          MOV     #BIT11,$GDDAT           ;LOAD EXPECTED
002546  013777  001124  176646          MOV     $GDDAT,@DACO            ;LOAD DACO
002554  017737  176642  001126  1$:     MOV     @DACO,$BDDAT            ;READ THE REGISTER
002562  023737  001124  001126          CMP     $GDDAT,$BDDAT           ;COMPARE THE GOOD TO DACO
002570  001407                        BEQ     2$              ;;BR IF THE SAME
002572  017737  176624  001126          MOV     @DACO,$BDDAT            ;SAVE FOR TYPEOUT
002600  104002                        ERROR   2                       ;DACO FAILED TO HOLD A FLOATING 1 PATTERN
002602  013777  001124  176612          MOV     $GDDAT,@DACO            ;LOAD DACO AGAIN
002610  006277  176606  2$:     ASR     @DACO                   ;CHANGE THE DATA
002614  006237  001124                  ASR     $GDDAT                  ;CHANGE THE EXPECTED
002620  001355                        BNE     1$                      ;BR IF MORE DATA
                                ;;#################################################################
                                ;#TEST 6         TEST THE "SUB" INSTRUCTION WORKS ON DACO
                                ;;#################################################################
002622  000004                  TST6:   SCOPE
002624  012737  000010  001160          MOV     #10,STIMES      ;;DO 10 ITERATIONS
002632  012737  007777  001124          MOV     #7777,$GDDAT            ;LOAD EXPECTED
002640  013777  001124  176554          MOV     $GDDAT,@DACO            ;LOAD DACO
002646  162737  000001  001124  1$:     SUB     #1,$GDDAT               ;SUB A VALUE
002654  162777  000001  176540          SUB     #1,@DACO                ;FROM EXPECTED AND DACO
002662  017737  176534  001126          MOV     @DACO,$BDDAT            ;READ THE REGISTER
002670  023737  001124  001126          CMP     $GDDAT,$BDDATI          ;COMPARE
002676  001404                        BEQ     2$              ;;BR IF SAME
002700  104002                        ERROR   2                       ;THE SUB INSTRUCTION FAILED ON DACO
002702  013777  001124  176512          MOV     $GDDAT,@DACO            ;LOAD THE REGISTER AGAIN
002710  005737  001124  2$:     TST     $GDDAT                  ;TEST FOR MORE DATA
002714  001354                        BNE     1$                      ;;BR IF MORE DATA
                                ;;#################################################################
                                ;#TEST 7         TEST THAT DAC1 REGISTER CAN BE CLEARED
                                ;;#################################################################
002716  000004                  TST7:   SCOPE
002720  005037  001124                  CLR     $GDDAT                  ;LOAD EXPECTED
002724  013777  001124  176472          MOV     $GDDAT,@DAC1            ;LOAD DAC1
002732  017737  176466  001126          MOV     @DAC1,$BDDAT            ;READ REG
002740  023737  001124  001126          CMP     $GDDAT,$BDDAT           ;COMPARE
002746  001401                        BEQ     TST10           ;;BR IF EQUAL
002750  104003                        ERROR   3                       ;ERROR, DAC1 REGISTER NOT = 0
                                ;;#################################################################
                                ;#TEST 10        TEST THAT DAC #1 REGISTER CAN BE LOADED WITH #7777
                                ;;#################################################################
002752  000004                  TST10:  SCOPE
002754  012737  007777  001124          MOV     #7777,$GDDAT            ;LOAD EXPECTED
002762  013777  001124  176434          MOV     $GDDAT,@DAC1            ;LOAD DAC 1
002770  017737  176430  001126          MOV     @DAC1,$BDDAT            ;READ REG
002776  023737  001124  001126          CMP     $GDDAT,$BDDAT           ;COMPARE
003004  001401                        BEQ     TST11           ;;BR IF EQUAL
003006  104003                        ERROR   3                       ;ERROR, DAC1 REGISTER NOT = 7777
```

```
                                ;;#################################################################
                                ;#TEST 11       TEST THAT DAC #1 REGISTER CAN HOLD A FLOATING 1 PATTERN
                                ;;#################################################################
003010  000004          TST11:  SCOPE
003012  012737  000100  001160          MOV     #100,STIMES     ;;DO 100 ITERATIONS
003020  012737  004000  001124          MOV     #BIT11,$GDDAT           ;LOAD EXPECTED
003026  013777  001124  176370  1$:     MOV     $GDDAT,@DAC1            ;LOAD THE REGISTER
003034  017737  176364  001126          MOV     @DAC1,$BDDAT            ;READ THE REGISTER
003042  023737  001124  001126          CMP     $GDDAT,$BDDAT           ;COMPARE THE DATA
003050  001401                          BEQ     2$              ;;BR IF DATA IS SAME
003052  104003                          ERROR   3               ;ERROR, DAC #1 REGISTER FAILED TO HOLD A FLOATIN
003054  006237  001124          2$:     ASR     $GDDAT          ;CHANGE THE DATA
003060  001362                          BNE     1$              ;BR AND TEST MORE DATA
                                ;;#################################################################
                                ;#TEST 12       TEST THAT DAC1 CAN HOLD A FLOATING 1 PATTERN (DYNAMICLY)
                                ;;#################################################################
003062  000004          TST12:  SCOPE
003064  012737  000100  001160          MOV     #100,STIMES     ;;DO 100 ITERATIONS
003072  012737  004000  001124          MOV     #BIT11,$GDDAT           ;LOAD EXPECTED
003100  013777  001124  176316          MOV     $GDDAT,@DAC1            ;LOAD DAC1
003106  017737  176312  001126  1$:     MOV     @DAC1,$BDDAT            ;READ THE REGISTER
003114  023737  001124  001126          CMP     $GDDAT,$BDDAT           ;COMPARE THE GOOD TO DAC1
003122  001407                          BEQ     2$              ;;BR IF THE SAME
003124  017737  176274  001126          MOV     @DAC1,$BDDAT            ;SAVE FOR TYPEOUT
003132  104003                          ERROR   3               ;DAC1 FAILED TO HOLD A FLOATING 1 PATTERN
003134  013777  001124  176262          MOV     $GDDAT,@DAC1            ;LOAD DAC1 AGAIN
003142  006277  176256          2$:     ASR     @DAC1           ;CHANGE THE DATA
003146  006237  001124          3$:     ASR     $GDDAT          ;CHANGE THE EXPECTED
003152  001355                          BNE     1$              ;BR IF MORE DATA
                                ;;#################################################################
                                ;#TEST 13       TEST THE "SUB" INSTRUCTION WORKS ON DAC1
                                ;;#################################################################
003154  000004          TST13:  SCOPE
003156  012737  000010  001160          MOV     #10,STIMES      ;;DO 10 ITERATIONS
003164  012737  007777  001124          MOV     #7777,$GDDAT            ;LOAD EXPECTED
003172  013777  001124  176224          MOV     $GDDAT,@DAC1            ;LOAD DAC1
003200  162737  000001  001124  1$:     SUB     #1,$GDDAT               ;SUB A VALUE
003206  162777  000001  176210          SUB     #1,@DAC1                ;FROM EXPECTED AND DAC1
003214  017737  176204  001126          MOV     @DAC1,$BDDAT            ;READ THE REGISTER
003222  023737  001124  001126          CMP     $GDDAT,$BDDATI          ;COMPARE
003230  001404                          BEQ     2$              ;;BR IF SAME
003232  104003                          ERROR   3               ;THE SUB INSTRUCTION FAILED ON DAC1
003234  013777  001124  176162          MOV     $GDDAT,@DAC1            ;LOAD THE REGISTER AGAIN
003242  005737  001124          2$:     TST     $GDDAT          ;TEST FOR MORE DATA
003246  001354                          BNE     1$              ;;BR IF MORE DATA
```

```
                                ;;#################################################################
                                ;#TEST 14        TEST THAT THE DAC #2 REGISTER CAN BE CLEARED
                                ;;#################################################################
003250  000004                  TST14:  SCOPE
003252  005037  001124                  CLR     $GDDAT                  ;LOAD EXPECTED
003256  013777  001124  176142          MOV     $GDDAT,@DAC2            ;LOAD REG
003264  017737  176136  001126          MOV     @DAC2,$BDDAT            ;READ REG
003272  023737  001124  001126          CMP     $GDDAT,$BDDAT           ;COMPARE
003300  001401                          BEQ     TST15           ;;BR IF EQUAL
003302  104004                          ERROR   4                       ;ERROR,  DAC #2 REGISTER NOT = 0

                                ;;#################################################################
                                ;#TEST 15        TEST THAT THE DAC #2 REGISTER CAN BE LOADED WITH #7777
                                ;;#################################################################
003304  000004                  TST15:  SCOPE
003306  012737  007777  001124          MOV     #7777,$GDDAT            ;LOAD EXPECTED
003314  013777  001124  176104          MOV     $GDDAT,@DAC2            ;LOAD REG
003322  017737  176100  001126          MOV     @DAC2,$BDDAT            ;READ REG
003330  023737  001124  001126          CMP     $GDDAT,$BDDAT           ;COMPARE
003336  001401                          BEQ     TST16           ;;BR IF EQUAL
003340  104004                          ERROR   4                       ;ERROR,  DAC #2 REGISTER NOT = 7777

                                ;;#################################################################
                                ;#TEST 16        TEST THAT THE DAC #2 REGISTER CAN HOLD A FLOATING 1 PATTERN
                                ;;#################################################################
003342  000004                  TST16:  SCOPE
003344  012737  000100  001160          MOV     #100.$TIMES     ;;DO 100 ITERATIONS
003352  012737  004000  001124          MOV     #BIT11,$GDDAT           ;LOAD EXPECTED
003360  013777  001124  176040  1$:     MOV     $GDDAT,@DAC2            ;LOAD DAC2 REGISTER
003366  017737  176034  001126          MOV     @DAC2,$BDDAT            ;READ THE REGISTER
003374  023737  001124  001126          CMP     $GDDAT,$BDDAT           ;COMPARE THE DATA
003402  001401                          BEQ     2$              ;;BR IF SAME
003404  104004                          ERROR   4                       ;ERROR, DAC #2 REGISTER FAILED TO HOLD A FLOATIN
003406  006237  001124          2$:     ASR     $GDDAT                  ;CHANGE THE DATA
003412  001362                          BNE     1$                      ;BR AND TEST MORE DATA

                                ;;#################################################################
                                ;#TEST 17        TEST THAT DAC2 CAN HOLD A FLOATING 1 PATTERN (DYNAMICLY)
                                ;;#################################################################
003414  000004                  TST17:  SCOPE
003416  012737  000100  001160          MOV     #100.$TIMES     ;;DO 100 ITERATIONS
003424  012737  004000  001124          MOV     #BIT11,$GDDAT           ;LOAD EXPECTED
003432  013777  001124  175766          MOV     $GDDAT,@DAC2            ;LOAD DAC2
003440  017737  175762  001126  1$:     MOV     @DAC2,$BDDAT            ;READ THE REGISTER
003446  023737  001124  001126          CMP     $GDDAT,$BDDAT           ;COMPARE THE GOOD TO DAC2
003454  001407                          BEQ     2$              ;;BR IF THE SAME
003456  017737  175744  001126          MOV     @DAC2,$BDDAT            ;SAVE FOR TYPEOUT
003464  104004                          ERROR   4                       ;DAC2 FAILED TO HOLD A FLOATING 1 PATTERN
003466  013777  001124  175732          MOV     $GDDAT,@DAC2            ;LOAD DAC2 AGAIN
003474  006277  175726          2$:     ASR     @DAC2                   ;CHANGE THE DATA
003500  006237  001124                  ASR     $GDDAT                  ;CHANGE THE EXPECTED
003504  001355                          BNE     1$                      ;BR IF MORE DATA
```

```
                                ;;*****************************************************************
                                ;*TEST 20        TEST THE "SUB" INSTRUCTION WORKS ON DAC2
                                ;;*****************************************************************
003506  000004                  TST20:  SCOPE
003510  012737  000010  001160          MOV     #10.,STIMES     ;;DO 10 ITERATIONS
003516  012737  007777  001124          MOV     #7777,$GDDAT            ;LOAD EXPECTED
003524  013777  001124  175674          MOV     $GDDAT,@DAC2            ;LOAD DAC2
003532  162737  000001  001124  1$:     SUB     #1,$GDDAT               ;SUB A VALUE
003540  162777  000001  175660          SUB     #1,@DAC2                ;FROM EXPECTED AND DAC2
003546  017737  175654  001126          MOV     @DAC2,$BDDAT            ;READ THE REGISTER
003554  023737  001124  001126          CMP     $GDDAT,$BDDATI          ;COMPARE
003562  001404                          BEQ     2$              ;;BR IF SAME
003564  104004                          ERROR   4               ;THE SUB INSTRUCTION FAILED ON DAC2
003566  013777  001124  175632          MOV     $GDDAT,@DAC2            ;LOAD THE REGISTER AGAIN
003574  005737  001124          2$:     TST     $GDDAT                  ;TEST FOR MORE DATA
003600  001354                          BNE     1$              ;;BR IF MORE DATA

                                ;;*****************************************************************
                                ;*TEST 21        TEST THAT THE DAC #3 REGISTER CAN BE CLEARED
                                ;;*****************************************************************
003602  000004                  TST21:  SCOPE
003604  005037  001124                  CLR     $GDDAT                  ;LOAD EXPECTED
003610  013777  001124  175612          MOV     $GDDAT,@DAC3            ;LOAD REG
003616  017737  175606  001126          MOV     @DAC3,$BDDAT            ;READ REG
003624  023737  001124  001126          CMP     $GDDAT,$BDDAT           ;COMPARE
003632  001401                          BEQ     TST22           ;;BR IF EQUAL
003634  104005                          ERROR   5               ;ERROR,  DAC #3 REGISTER NOT = 0

                                ;;*****************************************************************
                                ;*TEST 22        TEST THAT THE DAC #3 REGISTER CAN BE LOADED WITH #7777
                                ;;*****************************************************************
003636  000004                  TST22:  SCOPE
003640  012737  007777  001124          MOV     #7777,$GDDAT            ;LOAD EXPECTED
003646  013777  001124  175554          MOV     $GDDAT,@DAC3            ;LOAD REG
003654  017737  175550  001126          MOV     @DAC3,$BDDAT            ;READ REG
003662  023737  001124  001126          CMP     $GDDAT,$BDDAT           ;COMPARE
003670  001401                          BEQ     TST23           ;;BR IF EQUAL
003672  104005                          ERROR   5               ;ERROR,  DAC #3 REGISTER NOT = 7777

                                ;;*****************************************************************
                                ;*TEST 23        TEST THAT THE DAC #3 REGISTER CAN HOLD A FLOATING 1 PATTERN
                                ;;*****************************************************************
003674  000004                  TST23:  SCOPE
003676  012737  000100  001160          MOV     #100.,STIMES    ;;DO 100 ITERATIONS
003704  012737  004000  001124          MOV     #BIT11.,$GDDAT          ;LOAD EXPECTED
003712  013777  001124  175510  1$:     MOV     $GDDAT,@DAC3            ;LOAD DAC #3 REGISTER
003720  017737  175504  001126          MOV     @DAC3,$BDDAT            ;READ THE REGISTER
003726  023737  001124  001126          CMP     $GDDAT,$BDDAT           ;COMPARE THE DATA
003734  001401                          BEQ     2$              ;;BR IF SAME
003736  104005                          ERROR   5               ;ERROR, DAC #3 REGISTER FAILED TO HOLD A FLOATIN
003740  006237  001124          2$:     ASR     $GDDAT                  ;CHANGE THE DATA
003744  001362                          BNE     1$              ;BR AND TEST MORE DATA
```

```
1047                                    ;;*****************************************************************
1048                                    ;*TEST 24       TEST THAT DAC3 CAN HOLD A FLOATING 1 PATTERN (DYNAMICLY)
1049                                    ;;*****************************************************************
1050  003746  000004                    TST24:  SCOPE
1051  003750  012737  000100  001160            MOV     #100,$TIMES     ;;DO 100 ITERATIONS
1052  003756  012737  004000  001124            MOV     #BIT11,$GDDAT           ;LOAD EXPECTED
1053  003764  013777  001124  175436            MOV     $GDDAT,@DAC3            ;LOAD DAC3
1054  003772  017737  175432  001126    1$:     MOV     @DAC3,$BDDAT            ;READ THE REGISTER
1055  004000  023737  001124  001126            CMP     $GDDAT,$BDDAT           ;COMPARE THE GOOD TO DAC3
1056  004006  001407                            BEQ     2$              ;;BR IF THE SAME
1057  004010  017737  175414  001126            MOV     @DAC3,$BDDAT            ;SAVE FOR TYPEOUT
1058  004016  104005                            ERROR   5               ;DAC3 FAILED TO HOLD A FLOATING 1 PATTERN
1059  004020  013777  001124  175402            MOV     $GDDAT,@DAC3            ;LOAD DAC3 AGAIN
1060  004026  006277  175376            2$:     ASR     @DAC3           ;CHANGE THE DATA
1061  004032  006237  001124                    ASR     $GDDAT          ;CHANGE THE EXPECTED
1062  004036  001355                            BNE     1$              ;BR IF MORE DATA
1063                                    ;;*****************************************************************
1064                                    ;*TEST 25       TEST THE "SUB" INSTRUCTION WORKS ON DAC3
1065                                    ;;*****************************************************************
1066  004040  000004                    TST25:  SCOPE
1067  004042  012737  000010  001160            MOV     #10,$TIMES      ;;DO 10 ITERATIONS
1068  004050  012737  007777  001124            MOV     #7777,$GDDAT            ;LOAD EXPECTED
1069  004056  013777  001124  175344            MOV     $GDDAT,@DAC3            ;LOAD DAC3
1070  004064  162737  000001  001124    1$:     SUB     #1,$GDDAT               ;SUB A VALUE
1071  004072  162777  000001  175330            SUB     #1,@DAC3                ;FROM EXPECTED AND DAC3
1072  004100  017737  175324  001126            MOV     @DAC3,$BDDAT            ;READ THE REGISTER
1073  004106  023737  001124  001126            CMP     $GDDAT,$BDDATI          ;COMPARE
1074  004114  001404                            BEQ     2$              ;;BR IF SAME
1075  004116  104005                            ERROR   5               ;THE SUB INSTRUCTION FAILED ON DAC3
1076  004120  013777  001124  175302            MOV     $GDDAT,@DAC3            ;LOAD THE REGISTER AGAIN
1077  004126  005737  001124            2$:     TST     $GDDAT                  ;TEST FOR MORE DATA
1078  004132  001354                            BNE     1$              ;;BR IF MORE DATA
```

```
1079                                    ;;*****************************************************************
1080                                    ;*TEST 26       TEST THAT THE FOUR DAC REGISTERS CAN HOLD DIFFERENT DATA
1081                                    ;;*****************************************************************
1082  004134  000004                    TST26:  SCOPE
1083  004136  012777  001111  175256            MOV     #1111,@DAC0             ;LOAD DAC #0
1084  004144  012777  002222  175252            MOV     #2222,@DAC1             ;LOAD DAC #1
1085  004152  012777  004444  175246            MOV     #4444,@DAC2             ;LOAD DAC #2
1086  004160  012777  007777  175242            MOV     #7777,@DAC3             ;LOAD DAC #3
1087  004166  012737  001111  001124            MOV     #1111,$GDDAT            ;LOAD EXPECTED
1088  004174  017737  175222  001126            MOV     @DAC0,$BDDAT            ;READ REG
1089  004202  023737  001124  001126            CMP     $GDDAT,$BDDAT           ;COMPARE
1090  004210  001401                            BEQ     1$              ;;BR IF EQUAL
1091  004212  104002                            ERROR   2                       ;ERROR, SELECTED DAC #0 IN ERROR
1092
1093  004214  012737  002222  001124  1$:       MOV     #2222,$GDDAT            ;LOAD EXPECTED
1094  004222  017737  175176  001126            MOV     @DAC1,$BDDAT            ;READ REG
1095  004230  023737  001124  001126            CMP     $GDDAT,$BDDAT           ;COMPARE
1096  004236  001401                            BEQ     2$              ;;BR IF EQUAL
1097  004240  104003                            ERROR   3                       ;ERROR, SELECTED DAC #1 IN ERROR
1098
1099  004242  012737  004444  001124  2$:       MOV     #4444,$GDDAT            ;LOAD EXPECTED
1100  004250  017737  175152  001126            MOV     @DAC2,$BDDAT            ;READ REG
1101  004256  023737  001124  001126            CMP     $GDDAT,$BDDAT           ;COMPARE
1102  004264  001401                            BEQ     3$              ;;BR IF SAME
1103  004266  104004                            ERROR   4                       ;ERROR, SELECTED DAC #2 IN ERROR
1104
1105  004270  012737  007777  001124  3$:       MOV     #7777,$GDDAT            ;LOAD EXPECTED
1106  004276  017737  175126  001126            MOV     @DAC3,$BDDAT            ;READ REG
1107  004304  023737  001124  001126            CMP     $GDDAT,$BDDAT           ;COMPARE
1108  004312  001401                            BEQ     TST27           ;;BR IF SAME
1109  004314  104005                            ERROR   5                       ;ERROR, SELECTED DAC #3 IN ERROR
```

```
                                ;;*****************************************************************
                                ;*TEST 27       TEST THAT RESET CLEARS DAC #0 REGISTER
                                ;;*****************************************************************
004316  000004                  TST27:  SCOPE
004320  012737  000010  001160          MOV     #10,$TIMES      ;;DO 10 ITERATIONS
004326  012777  177777  175066          MOV     #-1,@DAC0
004334  005037  001124                  CLR     $GDDAT                  ;LOAD EXPECTED
004340  000005                          RESET
004342  017737  175054  001126          MOV     @DAC0,$BDDAT            ;READ REG
004350  023737  001124  001126          CMP     $GDDAT,$BDDAT           ;COMPARE
004356  001401                          BEQ     TST30           ;;BR IF EQUAL
004360  104002                          ERROR   2                       ;ERROR, RESET FAILED TO CLEAR DAC #0

                                ;;*****************************************************************
                                ;*TEST 30       TEST THAT RESET CLEARS DAC #1 REGISTER
                                ;;*****************************************************************
004362  000004                  TST30:  SCOPE
004364  012737  000010  001160          MOV     #10,$TIMES      ;;DO 10 ITERATIONS
004372  012777  177777  175024          MOV     #-1,@DAC1
004400  005037  001124                  CLR     $GDDAT                  ;LOAD EXPECTED
004404  000005                          RESET
004406  017737  175012  001126          MOV     @DAC1,$BDDAT            ;READ REG
004414  023737  001124  001126          CMP     $GDDAT,$BDDAT           ;COMPARE
004422  001401                          BEQ     TST31           ;;BR IF EQUAL
004424  104003                          ERROR   3                       ;ERROR, RESET FAILED TO CLEAR DAC #1

                                ;;*****************************************************************
                                ;*TEST 31       TEST THAT RESET CLEARS DAC #2 REGISTER
                                ;;*****************************************************************
004426  000004                  TST31:  SCOPE
004430  012737  000010  001160          MOV     #10,$TIMES      ;;DO 10 ITERATIONS
004436  012777  177777  174762          MOV     #-1,@DAC2               ;LOAD THE REGISTER
004444  005037  001124                  CLR     $GDDAT                  ;CLEAR EXPECTED
004450  000005                          RESET
004452  017737  174750  001126          MOV     @DAC2,$BDDAT            ;READ THE REGISTER
004460  001401                          BEQ     TST32           ;;BR IF CLEARED
004462  104004                          ERROR   4                       ;ERROR, RESET FAILED TO CLEAR DAC #2

                                ;;*****************************************************************
                                ;*TEST 32       TEST THAT RESET CLEARS DAC #3 REGISTER
                                ;;*****************************************************************
004464  000004                  TST32:  SCOPE
004466  012737  000010  001160          MOV     #10,$TIMES      ;;DO 10 ITERATIONS
004474  012777  177777  174726          MOV     #-1,@DAC3               ;LOAD THE REGISTER
004502  005037  001124                  CLR     $GDDAT                  ;CLEAR THE EXPECTED
004506  012737  000001  007012          MOV     #1,TEMP
004514  000005                          RESET
004516  017737  174706  001126          MOV     @DAC3,$BDDAT            ;READ THE REGISTER
004524  001401                          BEQ     TST33           ;;BR IF CLEARED
004526  104005                          ERROR   5                       ;ERROR, RESET FAILED TO CLEAR DAC #3
```

```
1162  004530                                  REMAIN:
                                              ;;*****************************************************************
                                              ;*TEST 33       DETERMINE IF MORE AAV11'S REMAIN TO BE TESTED
                                              ;;*****************************************************************
                                              TST33:  SCOPE
1166  004530  000004                                  MOV     #1,STIMES       ;;DO 1 ITERATION
1167  004534  012737  000001  001160                   INC     SUNIT                   ;UPDATE UNIT #
1170  004542  005237  001206                   CMPB    SUNIT,EVER              ;TEST IF MORE
1171  004546  123737  001206  001420                   BEQ     TST34           ;;BR IF NOT
1172  004554  001424                                  INC     $OEVCT                  ;APT UNIT #
1173  004556  005237  001204                   ADD     VADDR,DAC0              ;UPDATE BUS ADDRESS
1174  004562  062737  001416  001422                   ADD     VADDR,DAC1
1175  004570  062737  001416  001424                   ADD     VADDR,DAC2
1176  004576  062737  001416  001426                   ADD     VADDR,DAC3
1177  004604  062737  001416  001430
1200  004612  005737  007020                   ASL     MASKWR                  ;CHANGE THE ERROR FLAG BIT
1201  004616  005037  001102                   CLR     $ISTNM
1202  004620  000137  002306                   JMP     TST1                    ;TEST THE NEXT UNIT
1203
                                              ;;*****************************************************************
                                              ;*TEST 34       DETERMINE IF RUNNING ON THE HARDWARE TESTER     (IF NOT REPORT END OF PA
                                              ;;*****************************************************************
                                              TST34:  SCOPE
1210  004624  000004                                  MOV     #1,STIMES       ;;DO 1 ITERATION
1211  004630  012737  000001  001160                   TST     @#TST                   ;TEST IF ON TESTER
1212  004636  005737  007020                   BNE     TST35           ;;BR TO TEST
1213  004642  001002                                  JMP     $EOP
1214  004644  000137  005454
```

```
1188                                    ;;#################################################################
1189                                    ;#TEST 35       TEST THAT DAC #3 OUTPUT BITS (0-3) FUNCTION
1190                                    ;;#################################################################
1191  004646  000004                    TST35:  SCOPE
1192  004650  012737  000001  001160            MOV     #1,$TIMES       ;;DO 1 ITERATION
1193  004656  012737  000010  007014            MOV     #BIT3,$TEMP             ;LOAD DAC PATTERN
1194  004664  012737  004000  001124            MOV     #BIT11,$GDDAT           ;LOAD EXPECTED PATTERN
1195
1196  004672  013777  007014  174530    1$:     MOV     $TEMP,@DAC3             ;LOAD DAC REGISTER
1197  004700  017737  002120  001126            MOV     @DRIN,$BDDAT            ;READ THE REGISTER
1198  004706  042737  170377  001126            BIC     #170377,$BDDAT          ;MASK OFF OTHER BITS
1199  004714  023737  001124  001126            CMP     $GDDAT,$BDDAT           ;COMPARE
1200  004722  001401                            BEQ     2$              ;;BR IF THE SAME
1201  004724  104013                            ERROR   13              ;DAC #3 DIGITAL OUTPUT BITS IN ERROR
1202
1203  004726  006237  001124            2$:     ASR     $GDDCT                  ;ADJUST EXPECTED
1204  004732  006237  007014                    ASR     $TEMP                   ;ADJUST LOADED PATTERN
1205  004736  001355                            BNE     1$
1206
1207                                    ;;#################################################################
1208                                    ;#TEST 36       VERIFY THE AAV11 +15 SUPPLY
1209                                    ;;#################################################################
1210  004740  000004                    TST36:  SCOPE
1211  004742  012737  000001  001160            MOV     #1,$TIMES       ;;DO 1 ITERATION
1212  004750  013737  007032  001124            MOV     V5744,$GDDAT            ;LOAD EXPECTED
1213  004756  004537  006302                    JSR     R5,CONVRT               ;SAMPLE THE CHANNEL
1214  004762  000012                            12
1215  004764  013737  007034  007016            MOV     V144,SPREAD             ;LOAD TOLERANCE
1216  004772  004737  006520                    JSR     PC,COMPAR               ;TEST IT
1217  004776  000401                            BR      TST37           ;;BR
1218  005000  104011                            ERROR   11              ;+15 VOLT SUPPLY IS WRONG
1219
1220                                    ;;#################################################################
1221                                    ;#TEST 37       VERIFY THE AAV11 -15 SUPPLY
1222                                    ;;#################################################################
1223  005002  000004                    TST37:  SCOPE
1224  005004  012737  000001  001160            MOV     #1,$TIMES       ;;DO 1 ITERATION
1225  005012  013737  007036  001124            MOV     V2034,$GDDAT            ;LOAD EXPECTED
1226  005020  004537  006302                    JSR     R5,CONVRT               ;SAMPLE THE CHANNEL
1227  005[illegible]  000011                    11
1228  005[illegible]  013737  007034  007016            MOV     V144,SPREAD             ;LOAD TOLERANCE
1229  005[illegible]  004737  006520                    JSR     PC,COMPAR               ;TEST IT
1230  005040  000401                            BR      TST40           ;;BR
1231  005042  104012                            ERROR   12              ;-15 VOLT SUPPLY IS WRONG
1232
```

```
                                ;;#####################################################################
                                ;#TEST 40        DACO OFFSET ADJUSTMENT
                                ;;#####################################################################
005044  000004                TST40:  SCOPE
005046  012737  000001  001160        MOV     #1,$TIMES       ;;DO 1 ITERATION
005054  005737  001202                TST     $PASS                   ;TEST IF FIRST PASS
005060  001006                        BNE     TST41           ;;BR IF NOT

005062  004537  005634                JSR     R5,OFFDAC               ;LOAD AND EXECUTE DAC OFFSET ADJ.
005066  001422                        DACO                    ;DAC ADDRESS
005070  010726                        SELDO                   ;TYPEOUT ADDRESS
005072  010552                        ADJR46                  ;RES. TO ADJUST
005074  000013                        13                      ;RESULT CHANNEL #

                                ;;#####################################################################
                                ;#TEST 41        DACO GAIN ADJUSTMENT
                                ;;#####################################################################
005076  000004                TST41:  SCOPE
005100  012737  000001  001160        MOV     #1,$TIMES       ;;DO 1 ITERATION
005106  005737  001202                TST     $PASS                   ;TEST IF FIRST PASS
005112  001005                        BNE     TST42           ;;BR IF NOT

005114  004537  005764                JSR     R5,GAIDAC               ;LOAD AND EXECUTE DAC GAIN ADJ.
005120  001422                        DACO                    ;DAC ADDRESS
005122  010376                        ADJR34                  ;RES. TO ADJUST
005124  000013                        13                      ;CHANNEL # FOR RESULTS

                                ;;#####################################################################
                                ;#TEST 42        DACO CALIBRATION
                                ;;#####################################################################
005126  000004                TST42:  SCOPE
005130  012737  000001  001160        MOV     #1,$TIMES       ;;DO 1 ITERATION
005136  004537  006104                JSR     R5,CALDAC               ;LOAD AND EXECUTE CALIBRATION
005142  001422                        DACO                    ;DAC ADDRESS
005144  000013                        13                      ;CHANNEL # FOR RESULTS
```

```
1268                                    ;;#################################################################
1269                                    ;#TEST 43        DAC1 OFFSET ADJUSTMENT
1270                                    ;;#################################################################
1271  005146  000004                    TST43:  SCOPE
1272  005150  012737  000001  001160            MOV     #1,$TIMES       ;;DO 1 ITERATION
1273  005156  005737  001202                    TST     $PASS                   ;TEST IF FIRST PASS
1274  005162  001006                    BNE     TST44           ;;BR IF NOT
1275
1276  005164  004537  005634            JSR     R5,OFFDAC               ;LOAD AND EXECUTE DAC OFFSET ADJ.
1277  005170  001424                    DAC1                    ;DAC ADDRESS
1278  005172  010744                    SELD1                   ;TYPEOUT ADDRESS
1279  005174  010605                    ADJR47                  ;RES. TO ADJUST
1280  005176  000014                    14                      ;RESULT CHANNEL #
1281
1282                                    ;;#################################################################
1283                                    ;#TEST 44        DAC1 GAIN ADJUSTMENT
1284                                    ;;#################################################################
1285  005200  000004                    TST44:  SCOPE
1286  005202  012737  000001  001160            MOV     #1,$TIMES       ;;DO 1 ITERATION
1287  005210  005737  001202                    TST     $PASS                   ;TEST IF FIRST PASS
1288  005214  001005                    BNE     TST45           ;;BR IF NOT
1289
1290  005216  004537  005764            JSR     R5,GAIDAC               ;LOAD AND EXECUTE DAC GAIN ADJ.
1291  005222  001424                    DAC1                    ;DAC ADDRESS
1292  005224  010431                    ADJR35                  ;RES. TO ADJUST
1293  005226  000014                    14                      ;CHANNEL # FOR RESULTS
1294
1295                                    ;;#################################################################
1296                                    ;#TEST 45        DAC1 CALIBRATION
1297                                    ;;#################################################################
1298  005230  000004                    TST45:  SCOPE
1299  005232  012737  000001  001160            MOV     #1,$TIMES       ;;DO 1 ITERATION
1300  005240  004537  006104            JSR     R5,CALDAC               ;LOAD AND EXECUTE CALIBRATION
1301  005244  001424                    DAC1                    ;DAC ADDRESS
1302  005246  000014                    14                      ;CHANNEL # FOR RESULTS
```

```
1303                                    ;;*****************************************************************
1304                                    ;*TEST 46        DAC2 OFFSET ADJUSTMENT
1305                                    ;*****************************************************************
1306  005250  000004                  TST46:  SCOPE
1307  005252  012737  000001  001160          MOV     #1,$TIMES       ;;DO 1 ITERATION
1308  005260  005737  001202                  TST     $PASS                   ;TEST IF FIRST PASS
1309  005264  001006                          BNE     TST47           ;;BR IF NOT
1310
1311  005266  004537  005634                  JSR     R5,OFFDAC               ;LOAD AND EXECUTE DAC OFFSET ADJ.
1312  005272  001426                          DAC2                    ;DAC ADDRESS
1313  005274  010762                          SELD2                   ;TYPEOUT ADDRESS
1314  005276  010640                          ADJR48                  ;RES. TO ADJUST
1315  005300  000016                          16                      ;RESULT CHANNEL #
1316
1317                                    ;;*****************************************************************
1318                                    ;*TEST 47        DAC2 GAIN ADJUSTMENT
1319                                    ;*****************************************************************
1320  005302  000004                  TST47:  SCOPE
1321  005304  012737  000001  001160          MOV     #1,$TIMES       ;;DO 1 ITERATION
1322  005312  005737  001202                  TST     $PASS                   ;TEST IF FIRST PASS
1323  005316  001005                          BNE     TST50           ;;BR IF NOT
1324
1325  005320  004537  005764                  JSR     R5,GAIDAC               ;LOAD AND EXECUTE DAC GAIN ADJ.
1326  005324  001426                          DAC2                    ;DAC ADDRESS
1327  005326  010464                          ADJR36                  ;RES. TO ADJUST
1328  005330  000016                          16                      ;CHANNEL # FOR RESULTS
1329
1330                                    ;;*****************************************************************
1331                                    ;*TEST 50        DAC2 CALIBRATION
1332                                    ;*****************************************************************
1333  005332  000004                  TST50:  SCOPE
1334  005334  012737  000001  001160          MOV     #1,$TIMES       ;;DO 1 ITERATION
1335  005342  004537  006104                  JSR     R5,CALDAC               ;LOAD AND EXECUTE CALIBRATION
1336  005346  001426                          DAC2                    ;DAC ADDRESS
1337  005350  000016                          16                      ;CHANNEL # FOR RESULTS
```

```
1338                                    ;;#################################################################
1339                                    ;;*TEST 51          DAC3 OFFSET ADJUSTMENT
1340                                    ;;#################################################################
1341  005352  000004                    TST51:  SCOPE
1342  005354  012737  000001  001160            MOV     #1,$TIMES       ;;DO 1 ITERATION
1343  005362  005737  001202                    TST     $PASS                   ;TEST IF FIRST PASS
1344  005366  001006                    BNE     TST52           ;;BR IF NOT
1345
1346  005370  004537  005634                    JSR     R5,OFFDAC               ;LOAD AND EXECUTE DAC OFFSET ADJ.
1347  005374  001430                    DAC3                    ;DAC ADDRESS
1348  005376  011000                    SEL03                   ;TYPEOUT ADDRESS
1349  005400  010673                    ADJR49                  ;RES. TO ADJUST
1350  005402  000015                    15                      ;RESULT CHANNEL #
1351
1352                                    ;;#################################################################
1353                                    ;;*TEST 52          DAC3 GAIN ADJUSTMENT
1354                                    ;;#################################################################
1355  005404  000004                    TST52:  SCOPE
1356  005406  012737  000001  001160            MOV     #1,$TIMES       ;;DO 1 ITERATION
1357  005414  005737  001202                    TST     $PASS                   ;TEST IF FIRST PASS
1358  005420  001005                    BNE     TST53           ;;BR IF NOT
1359
1360  005422  004537  005764                    JSR     R5,GAIDAC               ;LOAD AND EXECUTE DAC GAIN ADJ.
1361  005426  001430                    DAC3                    ;DAC ADDRESS
1362  005430  010517                    ADJR37                  ;RES. TO ADJUST
1363  005432  000015                    15                      ;CHANNEL # FOR RESULTS
1364
1365                                    ;;#################################################################
1366                                    ;;*TEST 53          DAC3 CALIBRATION
1367                                    ;;#################################################################
1368  005434  000004                    TST53:  SCOPE
1369  005436  012737  000001  001160            MOV     #1,$TIMES       ;;DO 1 ITERATION
1370  005444  004537  006104                    JSR     R5,CALDAC               ;LOAD AND EXECUTE CALIBRATION
1371  005450  001430                    DAC3                    ;DAC ADDRESS
1372  005452  000015                    15                      ;CHANNEL # FOR RESULTS
```

```
                                        .SBTTL  END OF PASS ROUTINE

                                        ;;*****************************************************************
                                        ;*INCREMENT THE PASS NUMBER ($PASS)
                                        ;*TYPE "END PASS #XXXXX" (WHERE XXXXX IS A DECIMAL NUMBER)
                                        ;*IF THERES A MONITOR GO TO IT
                                        ;*IF THERE ISN'T JUMP TO INIT7

005454                                  SEOP:
005454 000004                                   SCOPE
005456 005037 001102                            CLR     $TSTNM          ;;ZERO THE TEST NUMBER
005462 005037 001160                            CLR     $TIMES          ;;ZERO THE NUMBER OF ITERATIONS
005466 005237 001202                            INC     $PASS           ;;INCREMENT THE PASS NUMBER
005472 042737 100000 001202                     BIC     #100000,$PASS   ;;DON'T ALLOW A NEG. NUMBER
005500 005327                                   DEC     (PC)+           ;;LOOP?
005502 000001                           SEOPCT: .WORD   1
005504 003022                                   BGT     $DOAGN          ;;YES
005506 012737                                   MOV     (PC)+,@(PC)+    ;;RESTORE COUNTER
005510 000001                           SENDCT: .WORD   1
005512 005502                                   SEOPCT
005514 104401 005561                            TYPE    ,SENDMG         ;;TYPE "END PASS #"
005520 013746 001202                            MOV     $PASS,-(SP)     ;;SAVE $PASS FOR TYPEOUT
005524 104405                                   TYPOS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
005526 104401 005556                            TYPE    ,SENULL         ;;TYPE A NULL CHARACTER
005532 013700 000042                    $GET42: MOV     @#42,R0         ;;GET MONITOR ADDRESS
005536 001405                                   BEQ     $DOAGN          ;;BRANCH IF NO MONITOR
005540 000005                                   RESET                   ;;CLEAR THE WORLD
005542 004710                           SENDAD: JSR     PC,(R0)         ;;GO TO MONITOR
005544 000240                                   NOP                     ;;SAVE ROOM
005546 000240                                   NOP                     ;;FOR
005550 000240                                   NOP                     ;;ACT11
005552                                  $DOAGN:
005552 000137                                   JMP     @(PC)+          ;;RETURN
005554 005576                           $RTNAD: .WORD   INIT7
005556     377      377      000        $ENULL: .BYTE   -1,-1,0         ;;NULL CHARACTER STRING
005561     015 042412 042116           $ENDMG: .ASCIZ  <15><12>/END PASS #/
005566 050040 051501 020123
005574 000043
005576

005576 005737 007020            INIT7:  TST     @#TST           ;TEST IF ON TESTER
005602 001012                           BNE     1$
005604 104401 010176                    TYPE,   ERRTOT
005610 013746 001112                    MOV     $ERTTL,-(SP)
005614 104405                           TYPOS
005616 104401 010210                    TYPE,   MESGD
005622 013746 007004                    MOV     $ADUNT,-(SP)    ;;SAVE $ADUNT FOR TYPEOUT
005626 104406                           TYPBN                   ;;GO TYPE--BINARY ASCII
005630 000137 002044            1$:     JMP     INIT1           ;TEST IT AGAIN
```

```
                                        .SBTTL  SUBROUTINE TO ADJUST THE DAC'S OFFSET POTS
                                
005634 012537 005762            OFFDAC: MOV     (R5)+,10$               ;GET BUS ADDRESS
005640 017737 000116 005762             MOV     @10$,10$                ;
005646 013737 005762 007002             MOV     10$,DACBAD              ;LOAD BUS ADDRES IF ERROR
005654 012537 005672                    MOV     (R5)+,11$               ;GET POINTER TO ASCII MESSAGE
005660 012537 005712                    MOV     (R5)+,12$               ;GET POINTER TO RES. MESSAGE
005664 012537 005732                    MOV     (R5)+,13$               ;GET AND SAVE CHANNEL #
005670 104401                           TYPE                            ;TELL OPERATOR TO SELECT DAC N
005672 010726                   11$:    SELDO
005674 004537 006212                    JSR     R5,SNDVLT               ;LOAD A VOLTAGE OF M5.1200 VOLTS.
005700 011064                           M51200
005702 012777 000000 000052             MOV     #0000,@10$              ;LOAD THE SELECTED DAC TO NULL
005710 104401                           TYPE                            ;TELL OPERATOR TO ADJUST RXX FOR NULL
005712 010552                   12$:    ADJR46
005714 004737 006422            1$:     JSR     PC,CSPACE               ;WAIT UNTIL THE IS READY
005720 012737 000000 001124             MOV     #0000,$GDDAT            ;LOAD EXPECTED VALUE
005726 004537 006302                    JSR     R5,CONVRT               ;SAMPLE THE CHANNEL
005732 000013                   13$:    13
005734 012737 000002 007016             MOV     #2,SPREAD
005742 004737 006520                    JSR     PC,COMPAR               ;TEST RESULTS
005746 000404                           BR      2$              ;;BR IF WITHIN THE LIMIT
005750 104006                           ERROR   6       ;SELECTED DAC OFFSET POT WAS NOT ADJUSTED INCORRECTLY
005752 104401                           TYPE
005754 011016                           TRYAGN
005756 000756                           BR      1$                      ;LOOP AGAIN
005760 000205                   2$:     RTS     R5                      ;EXIT
005762 000000                   10$:    0

                                        .SBTTL  SUBROUTINE TO ADJUST THE GAIN ADJUSTMENT POTS

005764 012537 006102            GAIDAC: MOV     (R5)+,10$               ;GET BUS ADDRESS
005770 017737 000106 006102             MOV     @10$,10$                ;
005776 013737 006102 007002             MOV     10$,DACBAD              ;LOAD BUS ADDRESS IF ERROR
006004 012537 006032                    MOV     (R5)+,11$               ;GET ASCII RES. ADDRESS
006010 012537 006052                    MOV     (R5)+,12$               ;GET CHANNEL
006014 004537 006212                    JSR     R5,SNDVLT               ;LOAD + 5.11?5 VOLTS
006020 011077                           P51175
006022 012777 007777 000052             MOV     #7777,@10$              ;LOAD THE DAC
006030 104401                           TYPE                            ;TELL OPERATOR WHICH RXX TO ADJUST FOR NULL
006032 010376                   11$:    ADJR34
006034 004737 006422            1$:     JSR     PC,CSPACE               ;WAIT FOR OPERATOR
006040 012737 007777 001124             MOV     #7777,$GDDAT            ;LOAD EXPECTED
006046 004537 006302                    JSR     R5,CONVRT               ;CONVERT THE VALUE
006052 000013                   12$:    13
006054 012737 000002 007016             MOV     #2,SPREAD               ;LOAD LIMIT
006062 004737 006520                    JSR     PC,COMPAR               ;TEST RESULTS
006066 000404                           BR      2$              ;;BR IF WITHIN LIMITS
006070 104007                           ERROR   7       ;SELECTED DAC GAIN POT WAS NOT ADJUSTED PROPERLY
006072 104401                           TYPE
006074 011016                           TRYAGN
006076 000756                           BR      1$
006100 000205                   2$:     RTS     R5                      ;EXIT
006102 000000                   10$:    0
```

```
                                        .SBTTL  SUBROUTINE TO TEST THE D/A CALIBRATION

006104 012537 006210          CALDAC: MOV     (R5)+,10$               ;GET BUS ADDRESS
006110 012737 000074 006210           MOV     @10$,10$                ;
006116 013737 006210 007002           MOV     10$,DACBAD              ;LOAD BUS ADDRESS IF ERROR
006124 012537 006150                  MOV     (R5)+,11$               ;GET CHANNEL #

006130 012777 007400 000052           MOV     #7400,@10$              ;LOAD THE DAC
006136 012737 007400 001124           MOV     #7400,$GDDAT            ;LOAD THE EXPECTED VALUE

006144 004537 006302          1$:     JSR     R5,CONVRT               ;SAMPLE THE CHANNEL
006150 000013                 11$:    13

006152 012737 000003 007016           MOV     #3,SPREAD               ;LOAD TOLERANCE
006160 004737 006520                  JSR     PC,COMPAR               ;TEST THE RESULTS
006164 000401                         BR      2$              ;;BR
006166 104010                         ERROR   10              ;NON-LINEARITY IN DAC DETECTED
006170 162777 000400 000012   2$:     SUB     #400,@10$               ;ADJUST THE CONTENTS
006176 162737 000400 001124           SUB     #400,$GDDAT             ;ADJUST THE EXPECTED
006204 001357                         BNE     1$              ;;BR IF NOT DONE
006206 000205                         RTS     R5                      ;EXIT

006210 000000                 10$:    0

                                        .SBTTL  SUBROUTINE TO LOAD A VOLTAGE INTO THE VOLTAGE SOURCE

006212 012500                 SNDVLT: MOV     (R5)+,R0                ;LOAD THE POINTER
006214 112001                 2$:     MOVB    (R0)+,R1                ;GET SOME DATA
006216 001421                         BEQ     3$                      ;BR IF TERM
006220 110177 000576                  MOVB    R1,@FILZ                ;LOAD THE DATA
006224 012701 001000                  MOV     #1000,R1
006230 005301                 5$:     DEC     R1                      ;DELAY
006232 001376                         BNE     5$
006234 052777 000200 000560           BIS     #BIT7,@FILZ             ;SET BIT 7
006242 012701 001000                  MOV     #1000,R1                ;LOAD DELAY
006246 005301                 1$:     DEC     R1                      ;DELAY
006250 001376                         BNE     1$
006252 042777 000200 000542           BIC     #BIT7,@FILZ
006260 000755                         BR      2$

006262 012701 000000          3$:     MOV     #0,R1                   ;LOAD DELAY
006266 152777 000177 000526           BISB    #177,@FILZ              ;DISABLE BITS
006274 005301                 4$:     DEC     R1                      ;DELAY
006276 001376                         BNE     4$
006300 000205                         RTS     R5                      ;EXIT
```

```
                                        .SBTTL  SUBROUTINE TO CONVERT CHANNEL N ON THE TESTER A/D
                                
006302  012537  006414          CONVRT: MOV     (R5)+,10$               ;GET THE CHANNEL #
006306  000337  006414                  SWAB    10$
006312  042737  170377  006414          BIC     #170377,10$             ;MASK OUT OTHER BITS
006320  013777  006414  000500          MOV     10$,@ADCS               ;SELECT CHANNEL
006326  005037  006416                  CLR     11$
006332  012737  000200  006420          MOV     #BIT7,12$               ;LOAD SHIFT COUNTER
006340  105277  000462          1$:     INCB    @ADCS                   ;CONVERT CHANNEL
006344  105777  000456          2$:     TSTB    @ADCS                   ;WAIT FOR DONE
006350  100375                  BPL     2$
006352  067737  000452  006416          ADD     @ADDBR,11$              ;UPDATE CONVERSION
006360  006237  006420          ASR     12$                             ;FINISHED ?
006364  001365                  BNE     1$
006366  000257                  CCC
006370  006037  006416          ROR     11$
006374  006237  006416          ASR     11$
006400  006237  006416          ASR     11$                             ;JUSTIFY DATA
006404  013737  006416  001126  MOV     11$,$BDDAT                      ;LOAD ACTUAL <ADJUSTED>
006412  000205                  RTS     R5                              ;EXIT
                                
006414  000000          10$:    0
006416  000000          11$:    0
006420  000000          12$:    0
                                
                                        .SBTTL  SUBROUTINE TO LOOP UNTIL OPERATOR TYPES AN "SPACE"
                                
006422  104401  007746  CSPACE: TYPE,   LDSPAC                          ;TELL OPERATOR TO HIT SPACE BAR
006426  012737  000014  006516  3$:     MOV     #14,11$                 ;LOAD DELAY COUNTER
006434  005037  006514          CLR     10$
006440  105777  172500  1$:     TSTB    @#TKS                           ;WAIT FOR OPERATOR
006444  100410                  BMI     2$                              ;BR IF FLAG IS SET
006446  005337  006514          DEC     10$                             ;DELAY
006452  001372                  BNE     1$                              ;BR IF NOT DONE
006454  005337  006516          DEC     11$                             ;DELAY AGAIN
006460  001367                  BNE     1$
006462  104014                  ERROR   14                              ;WAKE UP OPERATOR
006464  000760                  BR      3$                              ;LOOP
006466  017737  172454  006514  2$:     MOV     @#TKB,10$               ;READ THE CHARACTER
006474  042737  177600  006514          BIC     #177600,10$             ;MASK OF OTHER BITS
006502  022737  000040  006514          CMP     #40,10$                 ;TEST FOR "SPACE"
006510  001346                  BNE     3$                              ;LOOP
006512  000207                  RTS     PC                              ;EXIT
006514  000000          10$:    0
006516  000010          11$:    BIT3
```

```
                                        .SBTTL  SUBROUTINE TO COMPARE TWO LOCATIONS BY THE SPREAD

006520 010046                   COMPAR: MOV     R0,-(SP)                ;SAVE R0
006522 010146                           MOV     R1,-(SP)                ;SAVE R1
006524 013700 001124                    MOV     $GOODAT,R0              ;GET EXPECTED VALUE
006530 013701 001126                    MOV     $BDDAT,R1               ;GET THE UNKNOWN
006534 160100                           SUB     R1,R0                   ;SUBTRACT
006536 100001                           BPL     8$
006540 005400                           NEG     R0
006542 020037 007016            8$:     CMP     R0,SPREAD               ;TEST IF DIFFERENCE IF > SHAN SPREAD
006546 003405                           BLE     10$
006550 012601                   9$:     MOV     (SP)+,R1                ;RESTORE R1
006552 012600                           MOV     (SP)+,R0                ;RESTORE R0
006554 062716 000002                    ADD     #2,(SP)                 ;MAKE AN ERROR EXIT
006560 000207                           RTS     PC                      ;EXIT

006562 012601                   10$:    MOV     (SP)+,R1
006564 012600                           MOV     (SP)+,R0
006566 000207                           RTS     PC                      ;EXIT FOR GOOD LIMIT TEST

                                        .SBTTL  FULL SCALE RAMP ON EACH RAMP

006570 012706 001100            FULRMP: MOV     #STACK,SP               ;LOAD POINTER
006574 004737 001746                    JSR     PC,LDTRAP               ;LOAD BUS ADDRESS
006600 013700 001422            1$:     MOV     DAC0,R0         ;GET BUS ADDRESS
006604 004737 006642                    JSR     PC,10$                  ;LOAD THE RAMP ON DAC #1
006610 013700 001424                    MOV     DAC1,R0         ;GET BUS ADDRESS
006614 004737 006642                    JSR     PC,10$                  ;LOAD THE RAMP ON DAC #1
006620 013700 001426                    MOV     DAC2,R0         ;GET BUS ADDRESS
006624 004737 006642                    JSR     PC,10$                  ;LOAD THE RAMP ON DAC #2
006630 013700 001430                    MOV     DAC3,R0         ;GET THE BUS ADDRESS
006634 004737 006642                    JSR     PC,10$                  ;LOAD THE RAMP ON DAC #3
006640 000757                           BR      1$                      ;BR BACK

006642 005010                   10$:    CLR     (R0)                    ;CLEAR DAC
006644 062710 000010            11$:    ADD     #10,(R0)                ;UPDATE THE DATA
006650 005710                           TST     (R0)                    ;TEST IF DONE
006652 001374                           BNE     11$                     ;BR IF NOT
006654 000207                           RTS     PC                      ;EXIT
```

```
                                        .SBTTL  STATIC DAC CALIBRATION

006656  012706  001100        STATIC: MOV     #STACK,SP               ;LOAD STACK POINTER
006662  004737  001746                JSR     PC,LDTRAP               ;LOAD BUS ADDRESSES
006666  104410                1$:     CKSWR                           ;TEST FOR CTRL G
006670  017700  172244                MOV     @SWR,R0                 ;READ SWITCHES
006674  010077  172522                MOV     R0,@DAC0                ;LOAD DAC #0
006700  010077  172520                MOV     R0,@DAC1                ;LOAD DAC #1
006704  010077  172516                MOV     R0,@DAC2                ;LOAD DAC #2
006710  010077  172514                MOV     R0,@DAC3                ;LOAD DAC #3
006714  000764                        BR      1$

                                        .SBTTL  DYNAMIC DAC CALIBRATION

006716  012706  001100        DYNCAL: MOV     #STACK,SP               ;LOAD STACK POINTER
006722  004737  001746                JSR     PC,LDTRAP               ;LOAD BUS ADDRESSES
006726  104410                1$:     CKSWR                           ;TEST FOR CTRL G
006730  017700  172204                MOV     @SWR,R0                 ;READ SWR
006734  004737  006750                JSR     PC,10$                  ;LOAD THE SWR VALUE TO ALL DACS
006740  005000                        CLR     R0                      ;CLEAR R0
006742  004737  006750                JSR     PC,10$                  ;LOAD ALL DAC'S WITH 0
006746  000767                        BR      1$

006750  010077  172446        10$:    MOV     R0,@DAC0                ;LOAD DAC #0
006754  010077  172444                MOV     R0,@DAC1                ;LOAD DAC #1
006760  010077  172442                MOV     R0,@DAC2                ;LOAD DAC #2
006764  010077  172440                MOV     R0,@DAC3                ;LOAD DAC #3
006770  012700  000020                MOV     #20,R0                  ;LOAD DELAY COUNTER
006774  005300                11$:    DEC     R0                      ;DELAY
006776  100376                        BPL     11$                     ;WAIT
007000  000207                        RTS     PC                      ;EXIT

007002  170440        DACBAD: ABASE
007004  000000        BADUNT: 0
007006  000004        NUMBOK: 4.
007010  000001        MASKNM: BIT0
007012  000000        TEMP:   0
007014  000000        $TEMP:  0
007016  000000        SPREAD: 0
007020  000000        WFTST:  0
007022  167772        FILZ:   167772
007024  167774        DRIN:   167774
007026  170500        ADCS:   170500
007030  170502        ADBR:   170502
007032  005744        V5744:  5744
007034  000144        V144:   144
007036  002034        V2034:  2034
```

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                                        .SBTTL  ASCII MESSAGES

007040 005015 040412 053101  TITLE:  .ASCIZ  <15><12><12>'AAV11 DIAGNOSTIC TEST, (MAINDEC-11-DVAAA-A0)'<15><12>
007046 030461 042040 040511
007054 047107 051517 044524
007062 020103 042524 052123
007070 020054 046450 044501
007076 042116 041505 030455
007104 026461 053104 040501
007112 026501 030101 006451
007120 000012
007122 052502 020123 044524  EM1:    .ASCIZ  /BUS TIME-OUT WHEN REFERENCING A DAC ADDRESS/
007130 042515 047455 052125
007136 053440 042510 020116
007144 042522 042506 042522
007152 041516 047111 020107
007160 020101 040504 020103
007166 042101 051104 051505
007174 000123
007176 040504 030103 051040  EM2:    .ASCIZ  /DAC0 REGISTER IN ERROR/
007204 043505 051511 042524
007212 020122 047111 042440
007220 051122 051117    000
007225    104 041501 020061  EM3:    .ASCIZ  /DAC1 REGISTER IN ERROR/
007232 042522 044507 052123
007240 051105 044440 020116
007246 051105 047522 000122
007254 040504 031103 051040  EM4:    .ASCIZ  /DAC2 REGISTER IN ERROR/
007262 043505 051511 042524
007270 020122 047111 042440
007276 051122 051117    000
007303    104 041501 020063  EM5:    .ASCIZ  /DAC3 REGISTER IN ERROR/
007310 042522 044507 052123
007316 051105 044440 020116
007324 051105 047522 000122
007332 042523 042514 052103  EM6:    .ASCIZ  /SELECTED DAC OFFSET POT WAS ADJUSTED INCORRECTLY/
007340 042105 042040 041501
007346 047440 043106 042523
007354 020124 047520 020124
007362 040527 020123 042101
007370 052512 052123 042105
007376 044440 041516 051117
007404 042522 052103 054514
007412    000
007413    123 046105 041505  EM7:    .ASCIZ  /SELECTED DAC GAIN POT WAS ADJUSTED INCORRECTLY/
007420 042524 020104 040504
007426 020103 040507 047111
007434 050040 052117 053440
007442 051501 040440 045104
007450 051525 042524 020104
007456 047111 047503 051122
007464 041505 046124 000131
007472 042523 042514 052103  EM10:   .ASCIZ  /SELECTED DAC HAS A LINEARITY PROBLEM/
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1710  007500  042105  042040  041501
1711  007506  044040  051501  040440
1712  007514  046040  047111  040505
1713  007522  044522  054524  050040
1714  007530  047522  046102  046505
1715  007536      000
1716  007537      053  032461  053040  EM11:   .ASCIZ  /+15 VOLT SUPPLY IS INCORRECT/
1717  007544  046117  020124  052523
1718  007552  050120  054514  044440
1719  007560  020123  047111  047503
1720  007566  051122  041505  000124
1721  007574  030455  020065  047526  EM12:   .ASCIZ  /-15 VOLT SUPPLY IS INCORRECT/
1722  007602  052114  051440  050125
1723  007610  046120  020131  051511
1724  007616  044440  041516  051117
1725  007624  042522  052103      000
1726  007631      104  041501  021440  EM13:   .ASCIZ  /DAC #3 DIGITAL OUTPUT BITS IN ERROR/
1727  007636  020063  044504  044507
1728  007644  040524  020114  052517
1729  007652  050124  052125  041040
1730  007660  052111  020123  047111
1731  007666  042440  051122  051117
1732  007674      000
1733  007675      007  003407  040527  EM14:   .ASCIZ  <7><7><7>/WAKE UP OPERATOR AND ADJUST THE POT/<7><7>
1734  007702  042513  052440  020120
1735  007710  050117  051105  052101
1736  007716  051117  040440  042116
1737  007724  040440  045104  051525
1738  007732  020124  044124  020105
1739  007740  047520  003524  000007
1740  007746  042011  050105  042522  LDSPAC: .ASCIZ  /      DEPRESS THE "SPACE-BAR" WHEN DONE/
1741  007754  051523  052040  042510
1742  007762  021040  050123  041501
1743  007770  026505  040502  021122
1744  007776  053440  041516  020116
1745  010004  047504  042516      000
1746  010011      007  005015  042524  MSGSW:  .ASCII  <7><15><12>/TESTER SW1-2 AND SW1-5 ONLY MUST BE ON/
1747  010016  052123  051105  051440
1748  010024  030527  031055  040440
1749  010032  042116  051440  030527
1750  010040  032455  047440  046116
1751  010046  020131  052515  052123
1752  010054  041040  020105  047117
1753  010062  006407  051412  031127          .ASCII  <7><15><12>/SW2-2 SW2-4 AND SW2-5 MUST BE ON/
1754  010070  031055  051440  031127
1755  010076  032055  040440  042116
1756  010104  051440  031127  032455
1757  010112  046440  051505  020124
1758  010120  042502  047440      116
1759  010126      015  003412  047503          .ASCIZ  <15><12><7>/CONNECT AAV11 TO J09 OF TESTER ONLY/<15><12>
1760  010132  047116  041505  020124
1761  010140  040501  030524  020061
1762  010146  047524  046040  034460
1763  010154  047440  020106  042524
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1764  010162  052123  051105  047440
1765  010170  046116  006531  000012
1766  010176  021440  042440  051122  ERRTOT: .ASCIZ  / # ERRORS/
1767  010204  051117  000123
1768  010210  041040  042101  052440  MESGD:  .ASCIZ  / BAD UNITS /
1769  010216  044516  051524  000040
1770  010224     015     012          FOUND1: .BYTE   15,12
1771  010230  051120  043517  040522          .ASCIZ  /PROGRAM DETECTED /
1772  010234  020115  042504  042524
1773  010240  052103  042105  000040
1774  010250  034050  004451  040501  FOUND2: .ASCIZ  /(8)    AAV11(S) /
1775  010256  030526  024061  024523
1776  010264  020040     000
1777  010267     105  051122  041520  DH1:    .ASCIZ  /ERRPC  BUSADR  EXPECT   WAS/
1778  010274  041011  051525  042101
1779  010302  020122  042440  050130
1780  010310  041505  020124  020040
1781  010316  040527  000123
1782  010322  051105  050122  004503  DH2:    .ASCIZ  /ERRPC  BUSADR/
1783  010330  052502  040523  051104
1784  010336     000
1785  010337     105  051122  041520  DH6:    .ASCIZ  /ERRPC  BUSADR  EXPECT  WAS     SPREAD/
1786  010344  041011  051525  042101
1787  010352  004522  054105  042520
1788  010360  052103  053411  051501
1789  010366  051411  051120  040505
1790  010374  000104
1791  010376  005015  040440  045104  ADJR34: .ASCIZ  <15><12>/ ADJUST R34 FOR A NULL  /
1792  010404  051525  020124  031522
1793  010412  020064  047506  020122
1794  010420  020101  052516  046114
1795  010426  020040     000
1796  010431     015  020012  042101  ADJR35: .ASCIZ  <15><12>/ ADJUST R35 FOR A NULL  /
1797  010436  052512  052123  051040
1798  010444  032463  043040  051117
1799  010452  040440  047040  046125
1800  010460  020114  000040
1801  010464  005015  040440  045104  ADJR36: .ASCIZ  <15><12>/ ADJUST R36 FOR A NULL  /
1802  010472  051525  020124  031522
1803  010500  020066  047506  020122
1804  010506  020101  052516  046114
1805  010514  020040     000
1806  010517     015  020012  042101  ADJR37: .ASCIZ  <15><12>/ ADJUST R37 FOR A NULL  /
1807  010524  052512  052123  051040
1808  010532  032463  043040  051117
1809  010540  040440  047040  046125
1810  010546  020114  000040
1811  010552  005015  040440  045104  ADJR46: .ASCIZ  <15><12>/ ADJUST R46 FOR A NULL  /
1812  010560  051525  020124  032122
1813  010566  020066  047506  020122
1814  010574  020101  052516  046114
1815  010602  020040     000
1816  010605     015  020012  042101  ADJR47: .ASCIZ  <15><12>/ ADJUST R47 FOR A NULL  /
1817  010612  052512  052123  051040
```

```
1818  010620  033464  043040  051117
1819  010626  040440  047040  046125
1820  010634  020114  000040
1821  010640  005015  040440  045104  ADJR48: .ASCIZ  <15><12>/ ADJUST R48 FOR A NULL  /
1822  010646  051523  020124  032122
1823  010654  020070  047506  020122
1824  010662  020101  052516  046114
1825  010670  020040     000
1826  010673     015  020012  042101  ADJR49: .ASCIZ  <15><12>/ ADJUST R49 FOR A NULL  /
1827  010706  052512  052123  051040
1828  010716  033464  043040  051117
1829  010724  040440  047040  046125
1830  010732  020114  000040
1831
1832  010736  005015  042523  042514  SELD0:  .ASCIZ  <15><12>/SELECT DAC0/
1833  010744  052103  042040  041501
1834  010752  000060
1835  010754  005015  042523  042514  SELD1:  .ASCIZ  <15><12>/SELECT DAC1/
1836  010762  052103  042040  041501
1837  010770  000061
1838  010772  005015  042523  042514  SELD2:  .ASCIZ  <15><12>/SELECT DAC2/
1839  011000  052103  042040  041501
1840  011006  000062
1841  011010  005015  042523  042514  SELD3:  .ASCIZ  <15><12>/SELECT DAC3/
1842  011016  052103  042040  041501
1843  011024  000063
1844  011026  005015  042101  052512  TRYAGN: .ASCIZ  <15><12>/ADJUST THAT SAME POT AGAIN PLEASE/<15><12>
1845  011034  052123  052040  040510
1846  011042  020122  040523  042515
1847  011050  050040  052117  040440
1848  011056  040507  047111  060040
1849  011064  042514  051501  006505
1850  011062  000012
1851          000001                        STX=1
1852          000003                        ETX=3
1853  011064     001  N51200: .BYTE   STX
1854  011065     116  030465  030062        .ASCII  /N512000V/
1855  011072  030060     126
1856  011075     003     000                .BYTE   ETX,0
1857  011077     001  P51175: .BYTE   STX
1858  011100  032520  030461  032467        .ASCII  /P511750V/
1859  011106  053060
1860  011110     003     000                .BYTE   ETX,0
1861                                        .EVEN
1862  011112  001116  001126  000000  DT1:    $ERRPC,$BDDAT,0
1863  011120  001116  001122  001124  DT2:    $ERRPC,DAC0,$GDDAT,$BDDAT,0
1864  011130  001126  000000
1865  011132  001116  001124  001124  DT3:    $ERRPC,DAC1,$GDDAT,$BDDAT,0
1866  011142  001126  000000
1867  011144  001116  001126  001124  DT4:    $ERRPC,DAC2,$GDDAT,$BDDAT,0
1868  011152  001126  000000
1869  011154  001116  001130  001124  DT5:    $ERRPC,DAC3,$GDDAT,$BDDAT,0
1870  011164  001126  000000
1871  011170  001116  007002  001124  DT6:    $ERRPC,DACBAD,$GDDAT,$BDDAT,SPREAD,0
```

```
1872  011176  001126  007016  000000
1873  011204  000000  000000  000000  DFO:    0,0,0,0,0,0,0,0
1874  011212  000000  000000  000000
1875  011220  000000  000000
1876
1877                                  .SBTTL  BINARY TO ASCII AND TYPE ROUTINE
1878
1879                                  ;;#################################################################
1880                                  ;#THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 16-BIT
1881                                  ;#BINARY-ASCII NUMBER AND TYPE IT.
1882                                  ;#CALL:
1883                                  ;#      MOV     NUMBER,-(SP)    ;;NUMBER TO BE TYPED
1884                                  ;#      TYPBN                   ;;TYPE IT
1885
1886  011224  010146                  STYPBN: MOV     R1,-(SP)        ;;SAVE R1 ON THE STACK
1887  011226  016601  000006                  MOV     6(SP),R1        ;;GET THE INPUT NUMBER
1888  011232  000261                          SEC                     ;;SET "C" SO CAN KEEP TRACK OF THE NUMBER OF BITS
1889  011234  112737  000060  011276  1$:     MOVB    #'0,$BIN        ;;SET CHARACTER TO AN ASCII "0".
1890  011242  006101                          ROL     R1              ;;GET THIS BIT
1891  011244  001405                          BEQ     2$              ;;DONE?
1892  011246  105537  011276                  ADCB    $BIN            ;;NO--SET THE CHARACTER EQUAL TO THIS BIT
1893  011252  104401  011276                  TYPE    ,$BIN           ;;GO TYPE THIS BIT
1894  011256  000241                          CLC                     ;;CLEAR "C" SO CAN KEEP TRACK OF BITS
1895  011260  000765                          BR      1$              ;;GO DO THE NEXT BIT
1896  011262  012601                  2$:     MOV     (SP)+,R1        ;;POP THE STACK INTO R1
1897  011264  016666  000002  000004          MOV     2(SP),4(SP)     ;;ADJUST THE STACK
1898  011272  012616                          MOV     (SP)+,(SP)
1899  011274  000002                          RTI                     ;;RETURN TO USER
1900  011276     000     000          $BIN:   .BYTE   0,0             ;;STORAGE FOR ASCII CHAR. AND TERMINATOR
1901                                  .SBTTL  CONVERT BINARY TO DECIMAL AND TYPE ROUTINE
1902
1903                                  ;;#################################################################
1904                                  ;#THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 5-DIGIT
1905                                  ;#SIGNED DECIMAL (ASCII) NUMBER AND TYPE IT. DEPENDING ON WHETHER THE
1906                                  ;#NUMBER IS POSITIVE OR NEGATIVE A SPACE OR A MINUS SIGN WILL BE TYPED
1907                                  ;#BEFORE THE FIRST DIGIT OF THE NUMBER. LEADING ZEROS WILL ALWAYS BE
1908                                  ;#REPLACED WITH SPACES.
1909                                  ;#CALL:
1910                                  ;#      MOV     NUM,-(SP)       ;;PUT THE BINARY NUMBER ON THE STACK
1911                                  ;#      TYPDS                   ;;GO TO THE ROUTINE
1912
1913  011300                          STYPDS:
1914  011300  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
1915  011302  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
1916  011304  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
1917  011306  010346                          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
1918  011310  010546                          MOV     R5,-(SP)        ;;PUSH R5 ON STACK
1919  011312  012746  020200                  MOV     #20200,-(SP)    ;;SET BLANK SWITCH AND SIGN
1920  011316  016605  000020                  MOV     20(SP),R5       ;;GET THE INPUT NUMBER
1921  011322  100004                          BPL     1$              ;;BR IF INPUT IS POS.
1922  011324  005405                          NEG     R5              ;;MAKE THE BINARY NUMBER POS.
1923  011326  112766  000055  000001          MOVB    #'-,1(SP)       ;;MAKE THE ASCII NUMBER NEG.
1924  011334  005000                  1$:     CLR     R0              ;;ZERO THE CONSTANTS INDEX
1925  011336  012703  011514                  MOV     #SOBLK,R3       ;;SETUP THE OUTPUT POINTER
```

```
 1926  011342  112723  000040            MOVB    #' ,(R3)+       ;;SET THE FIRST CHARACTER TO A BLANK
 1927  011346  005002                 2$: CLR     R2              ;;CLEAR THE BCD NUMBER
 1928  011350  016001  011504           MOV     $DTBL(R0),R1    ;;GET THE CONSTANT
 1929  011354  160105                 3$: SUB     R1,R5           ;;FORM THIS BCD DIGIT
 1930  011356  002402                     BLT     4$              ;;BR IF DONE
 1931  011360  005202                     INC     R2              ;;INCREASE THE BCD DIGIT BY 1
 1932  011362  000774                     BR      3$
 1933  011364  060105                 4$: ADD     R1,R5           ;;ADD BACK THE CONSTANT
 1934  011366  005702                     TST     R2              ;;CHECK IF BCD DIGIT=0
 1935  011370  001002                     BNE     5$              ;;FALL THROUGH IF 0
 1936  011372  105716                     TSTB    (SP)            ;;STILL DOING LEADING 0'S?
 1937  011374  100407                     BMI     7$              ;;BR IF YES
 1938  011376  106316                 5$: ASLB    (SP)            ;;MSD?
 1939  011400  103003                     BCC     6$              ;;BR IF NO
 1940  011402  116663  000001  177777     MOVB    1(SP),-1(R3)    ;;YES--SET THE SIGN
 1941  011410  052702  000060         6$: BIS     #'0,R2          ;;MAKE THE BCD DIGIT ASCII
 1942  011414  052702  000040         7$: BIS     #' ,R2          ;;MAKE IT A SPACE IF NOT ALREADY A DIGIT
 1943  011420  110223                     MOVB    R2,(R3)+        ;;PUT THIS CHARACTER IN THE OUTPUT BUFFER
 1944  011422  005720                     TST     (R0)+           ;;JUST INCREMENTING
 1945  011424  020027  000010            CMP     R0,#10          ;;CHECK THE TABLE INDEX
 1946  011430  002746                     BLT     2$              ;;GO DO THE NEXT DIGIT
 1947  011432  003003                     BGT     8$              ;;GO TO EXIT
 1948  011434  010502                     MOV     R5,R2           ;;GET THE LSD
 1949  011436  000764                     BR      6$              ;;GO CHANGE TO ASCII
 1950  011440  105726                 8$: TSTB    (SP)+           ;;WAS THE LSD THE FIRST NON-ZERO?
 1951  011442  100003                     BPL     9$              ;;BR IF NO
 1952  011444  116663  177777  177776     MOVB    -1(SP),-2(R3)   ;;YES--SET THE SIGN FOR TYPING
 1953  011452  105013                 9$: CLRB    (R3)            ;;SET THE TERMINATOR
 1954  011454  012605                     MOV     (SP)+,R5        ;;POP STACK INTO R5
 1955  011456  012603                     MOV     (SP)+,R3        ;;POP STACK INTO R3
 1956  011460  012602                     MOV     (SP)+,R2        ;;POP STACK INTO R2
 1957  011462  012601                     MOV     (SP)+,R1        ;;POP STACK INTO R1
 1958  011464  012600                     MOV     (SP)+,R0        ;;POP STACK INTO R0
 1959  011466  104401  011514            TYPE    ,$OBLK          ;;NOW TYPE THE NUMBER
 1960  011472  016666  000002  000004     MOV     2(SP),4(SP)     ;;ADJUST THE STACK
 1961  011500  012616                     MOV     (SP)+,(SP)
 1962  011502  000002                     RTI                     ;;RETURN TO USER
 1963  011504  023420                 $DTBL:  10000.
 1964  011506  001750                         1000.
 1965  011510  000144                         100.
 1966  011512  000012                         10.
 1967  011514  000004                 $OBLK:  .BLKW   4
 1968                                  .SBTTL  SCOPE HANDLER ROUTINE
 1969
 1970                                  ;;++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 1971                                  ;;*THIS ROUTINE CONTROLS THE LOOPING OF SUBTESTS. IT WILL INCREMENT
 1972                                  ;;*AND LOAD THE TEST NUMBER($TSTNM) INTO THE DISPLAY REG.(DISPLAY<7:0>)
 1973                                  ;;*AND LOAD THE ERROR FLAG (SERFLG) INTO DISPLAY<15:08>
 1974                                  ;;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
 1975                                  ;;*SW14=1          LOOP ON TEST
 1976                                  ;;*SW11=1          INHIBIT ITERATIONS
 1977                                  ;;*SW09=1          LOOP ON ERROR
 1978                                  ;;*SW08=1          LOOP ON TEST IN SWR<7:0>
 1979                                  ;;*CALL
```

```
                                        ;#      SCOPE           ;;SCOPE=IOT
                                        $SCOPE:
011524                                          CKSWR           ;;TEST  FOR CHANGE IN SOFT-SWR
011524  104410                                  CKSWR
011526  104410                                  CKSWR
011530  032777  040000  167402    1$:   BIT     #BIT14,@SWR     ;;LOOP ON PRESENT TEST?
011536  001114                    1$    BNE     $OVER           ;;YES IF SW14=1
                                        ;#####START OF CODE FOR THE XOR TESTER#####
011540  000416                    $XTSTR: BR      6$              ;;IF RUNNING ON THE "XOR" TESTER CHANGE
                                                                ;;THIS INSTRUCTION TO A "NOP" (NOP=240)
011542  013746  000004                    MOV     @#ERRVEC,-(SP)  ;;SAVE THE CONTENTS OF THE ERROR VECTOR
011546  012737  011566  000004            MOV     #5$,@#ERRVEC    ;;SET FOR TIMEOUT
011554  005737  177060                    TST     @#177060        ;;TIME OUT ON XOR?
011560  012637  000004                    MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
011564  000463                    1$    BR      $SVLAD          ;;GO TO THE NEXT TEST
011566  022626                    5$:   CMP     (SP)+,(SP)+     ;;CLEAR THE STACK AFTER A TIME OUT
011570  012637  000004                    MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
011574  000423                    1$    BR      7$              ;;LOOP ON THE PRESENT TEST
011576                                  6$:;#####END OF CODE FOR THE XOR TESTER#####
011576  032777  000400  167334            BIT     #BIT08,@SWR     ;;LOOP ON SPEC. TEST?
011604  001404                    1$    BEQ     2$              ;;BR IF NO
011606  127737  167326  001102            CMPB    @SWR,$TSTNM     ;;ON THE RIGHT TEST?    SWR<7:0>
011614  001465                    1$    BEQ     $OVER           ;;BR IF YES
011616  105737  001103            2$:   TSTB    $ERFLG          ;;HAS AN ERROR OCCURRED?
011622  001421                    3$    BEQ     3$              ;;BR IF NO
011624  123737  001115  001103            CMPB    $ERMAX,$ERFLG   ;;MAX. ERRORS FOR THIS TEST OCCURRED?
011632  101015                    3$    BHI     3$              ;;BR IF NO
011634  032777  001000  167276            BIT     #BIT09,@SWR     ;;LOOP ON ERROR?
011642  001404                    4$    BEQ     4$              ;;BR IF NO
011644  013737  001110  001106    7$:     MOV     $LPERR,$LPADR   ;;SET LOOP ADDRESS TO LAST SCOPE
011652  000446                    $OVER BR
011654  105037  001103            4$:     CLRB    $ERFLG          ;;ZERO THE ERROR FLAG
011660  005037  001160                    CLR     $TIMES          ;;CLEAR THE NUMBER OF ITERATIONS TO MAKE
011664  000415                    1$    BR      1$              ;;ESCAPE TO THE NEXT TEST
011666  032777  004000  167244    3$:   BIT     #BIT11,@SWR     ;;INHIBIT ITERATIONS?
011674  001011                    1$    BNE     1$              ;;BR IF YES
011676  005737  001202                    TST     $PASS           ;;IF FIRST PASS OF PROGRAM
011702  001406                    1$    BEQ     1$              ;;      INHIBIT ITERATIONS
011704  005237  001104                    INC     $ICNT           ;;INCREMENT ITERATION COUNT
011710  023737  001160  001104            CMP     $TIMES,$ICNT    ;;CHECK THE NUMBER OF ITERATIONS MADE
011716  002024                    BGE     $OVER           ;;BR IF MORE ITERATION REQUIRED
011720  012737  000001  001104    1$:     MOV     #1,$ICNT        ;;REINITIALIZE THE ITERATION COUNTER
011726  013737  012004  001160            MOV     $MXCNT,$TIMES   ;;SET NUMBER OF ITERATIONS TO DO
011734  105237  001102            $SVLAD: INCB    $TSTNM          ;;COUNT TEST NUMBERS
011740  113737  001102  001200            MOVB    $TSTNM,$TESTN   ;;SET TEST NUMBER IN APT MAILBOX
011746  011637  001106                    MOV     (SP),$LPADR     ;;SAVE SCOPE LOOP ADDRESS
011752  011637  001110                    MOV     (SP),$LPERR     ;;SAVE ERROR LOOP ADDRESS
011756  005037  001162                    CLR     $ESCAPE         ;;CLEAR THE ESCAPE FROM ERROR ADDRESS
011762  112737  000001  001115            MOVB    #1,$ERMAX       ;;ONLY ALLOW ONE(1) ERROR ON NEXT TEST
011770  013777  001102  167144    $OVER:  MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER
011776  013716  001106                    MOV     $LPADR,(SP)     ;;FUDGE RETURN ADDRESS
012002  000002                    RTI                             ;;FIXES PS
012004  003720                    $MXCNT: 2000.                   ;;MAX. NUMBER OF ITERATIONS
                                        .SBTTL  ERROR HANDLER ROUTINE
```

```
                                        ;;**********************************************************************
                                        ;#THIS ROUTINE WILL INCREMENT THE ERROR FLAG AND THE ERROR COUNT,
                                        ;#SAVE THE ERROR ITEM NUMBER AND THE ADDRESS OF THE ERROR CALL
                                        ;#AND GO TO $ERRTYP ON ERROR
                                        ;#THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
                                        ;#SW15=1         HALT ON ERROR
                                        ;#SW13=1         INHIBIT ERROR TYPEOUTS
                                        ;#SW10=1         BELL ON ERROR
                                        ;#SW09=1         LOOP ON ERROR
                                        ;#CALL
                                        ;#      ERROR   N       ;;ERROR=EMT AND N=ERROR ITEM NUMBER

012006                                  $ERROR:
012006  104410                                  CKSWR                           ;;TEST FOR CHANGE IN SOFT-SWR
012010  053737  007010  007004                  BIS     MASKNM,BADUNT
012016  105237  001103                  7$:     INCB    $ERFLG                  ;;SET THE ERROR FLAG
012022  001775                                  BEQ     7$                      ;;DON'T LET THE FLAG GO TO ZERO
012024  013777  001102  167110                  MOV     $TSTNM,@DISPLAY         ;;DISPLAY TEST NUMBER AND ERROR FLAG
012032  032777  002000  167100                  BIT     #BIT10,@SWR             ;;BELL ON ERROR?
012040  001402                                  BEQ     1$                      ;;NO - SKIP
012042  104401  001164                          TYPE    ,$BELL                  ;;RING BELL
012046  005237  001112                  1$:     INC     $ERTTL                  ;;COUNT THE NUMBER OF ERRORS
012052  011637  001116                          MOV     (SP),$ERRPC             ;;GET ADDRESS OF ERROR INSTRUCTION
012056  162737  000002  001116                  SUB     #2,$ERRPC
012064  117737  167026  001114                  MOVB    @$ERRPC,$ITEMB          ;;STRIP AND SAVE THE ERROR ITEM CODE
012072  032777  020000  167040                  BIT     #BIT13,@SWR             ;;SKIP TYPEOUT IF SET
012100  001004                                  BNE     20$                     ;;SKIP TYPEOUTS
012102  004737  012202                          JSR     PC,$ERRTYP              ;;GO TO USER ERROR ROUTINE
012106  104401  001171                          TYPE    ,$CRLF
012112                                  20$:
012112  122737  000001  001214                  CMPB    #APTENV,$ENV            ;;RUNNING IN APT MODE
012120  001007                                  BNE     2$                      ;;NO,SKIP APT ERROR REPORT
012122  113737  001114  012134                  MOVB    $ITEMB,21$              ;;SET ITEM NUMBER AS ERROR NUMBER
012130  004737  014162                          JSR     PC,$ATY4                ;;REPORT FATAL ERROR TO APT
012134  000                             21$:    .BYTE   0
012135  000                                     .BYTE   0
012136  000777                          22$:    BR      22$                     ;;APT ERROR LOOP
012140  005777  166774                  2$:     TST     @SWR                    ;;HALT ON ERROR
012144  100002                                  BPL     3$                      ;;SKIP IF CONTINUE
012146  000000                                  HALT                            ;;HALT ON ERROR!
012150  104410                                  CKSWR                           ;;TEST FOR CHANGE IN SOFT-SWR
012154  032777  001000  166760          3$:     BIT     #BIT09,@SWR             ;;LOOP ON ERROR SWITCH SET?
012162  001402                                  BEQ     4$                      ;;BR IF NO
012164  013716  001110                          MOV     $LPERR,(SP)             ;;FUDGE RETURN FOR LOOPING
012170  005737  001162                  4$:     TST     $ESCAPE                 ;;CHECK FOR AN ESCAPE ADDRESS
012174  001402                                  BEQ     5$                      ;;BR IF NONE
012176  013716  001162                          MOV     $ESCAPE,(SP)            ;;FUDGE RETURN ADDRESS FOR ESCAPE
012202                                  5$:
012200  000002                                  RTI                             ;;RETURN
                                        .SBTTL  ERROR MESSAGE TYPEOUT ROUTINE

                                        ;;**********************************************************************
                                        ;#THIS ROUTINE USES THE "ITEM CONTROL BYTE" ($ITEMB) TO DETERMINE WHICH
```

```
                                ;#ERROR IS TO BE REPORTED. IT THEN OBTAINS, FROM THE "ERROR TABLE" (SERRTB),
                                ;#AND REPORTS THE APPROPRIATE INFORMATION CONCERNING THE ERROR.

012202                          SERRTYP:
012202 104401 001171                    TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
012206 010046                           MOV     R0,-(SP)        ;;SAVE R0
012210 005000                           CLR     R0              ;;PICKUP THE ITEM INDEX
012212 153700 001114                    BISB    @#$ITEMB,R0
012216 001004                           BNE     1$              ;;IF ITEM NUMBER IS ZERO, JUST
                                                                ;;TYPE THE PC OF THE ERROR
012220 013746 001116                    MOV     SERRPC,-(SP)    ;;SAVE SERRPC FOR TYPEOUT
                                                                ;;ERROR ADDRESS
012224 104402                           TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
012226 000426                           BR      6$              ;;GET OUT
012230 005300                   1$:     DEC     R0              ;;ADJUST THE INDEX SO THAT IT WILL
012232 006300                           ASL     R0              ;;      WORK FOR THE ERROR TABLE
012234 006300                           ASL     R0
012236 006300                           ASL     R0
012240 062700 001256                    ADD     #SERRTB,R0      ;;FORM TABLE POINTER
012244 012037 012254                    MOV     (R0)+,2$        ;;PICKUP "ERROR MESSAGE" POINTER
012250 001404                           BEQ     3$              ;;SKIP TYPEOUT IF NO POINTER
012252 104401                           TYPE                    ;;TYPE THE "ERROR MESSAGE"
012254 000000                   2$:     .WORD   0               ;;"ERROR MESSAGE" POINTER GOES HERE
012256 104401 001171                    TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
012262 012037 012272            3$:     MOV     (R0)+,4$        ;;PICKUP "DATA HEADER" POINTER
012266 001404                           BEQ     5$              ;;SKIP TYPEOUT IF 0
012270 104401                           TYPE                    ;;TYPE THE "DATA HEADER"
012272 000000                   4$:     .WORD   0               ;;"DATA HEADER" POINTER GOES HERE
012274 104401 001171                    TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
012300 011000                   5$:     MOV     (R0),R0         ;;PICKUP "DATA TABLE" POINTER
012302 001004                           BNE     7$              ;;GO TYPE THE DATA
012304 012600                   6$:     MOV     (SP)+,R0        ;;RESTORE R0
012306 104401 001171                    TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
012312 000207                           RTS     PC              ;;RETURN
012314                          7$:
012314 013046                           MOV     @(R0)+,-(SP)    ;;SAVE @(R0)+ FOR TYPEOUT
012316 104402                           TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
012320 005710                           TST     (R0)            ;;IS THERE ANOTHER NUMBER?
012322 001770                           BEQ     6$              ;;BR IF NO
012324 104401 012332                    TYPE    ,8$             ;;TYPE TWO(2) SPACES
012330 000771                           BR      7$              ;;LOOP
012332 020040 000               8$:     .ASCIZ  /  /            ;;TWO(2) SPACES
012336                                  .EVEN
                                .SBTTL  POWER DOWN AND UP ROUTINES

                                ;;**************************************************************
                                ;POWER DOWN ROUTINE
012236 012737 012502 000024     $PWRDN: MOV     #ILLUP,@#PWRVEC ;;SET FOR FAST UP
012244 012737 000340 000026             MOV     #340,@#PWRVEC+2 ;;PRIO:7
012252 010046                           MOV     R0,-(SP)        ;;PUSH R0 ON STACK
012254 010146                           MOV     R1,-(SP)        ;;PUSH R1 ON STACK
012256 010246                           MOV     R2,-(SP)        ;;PUSH R2 ON STACK
012260 010346                           MOV     R3,-(SP)        ;;PUSH R3 ON STACK
012262 010446                           MOV     R4,-(SP)        ;;PUSH R4 ON STACK
```

```
012364 010546                          MOV     R5,-(SP)        ;;PUSH R5 ON STACK
012366 017746 166546                   MOV     @SWR,-(SP)      ;;PUSH @SWR ON STACK
012372 010637 012506                   MOV     SP,$SAVR6       ;;SAVE SP
012376 012737 012410 000024            MOV     #$PWRUP,@#PWRVEC;;SET UP VECTOR
012404 000000                          HALT
012406 000776                          BR      .-2             ;;HANG UP

                                ;;*****************************************************************
                                ;POWER UP ROUTINE
012410 012737 012502 000024     $PWRUP: MOV     #$ILLUP,@#PWRVEC ;;SET FOR FAST DOWN
012416 013706 012506                    MOV     $SAVR6,SP       ;;GET SP
012422 005037 012506                    CLR     $SAVR6          ;;WAIT LOOP FOR THE TTY
012426 005237 012506            1$:     INC     $SAVR6          ;;WAIT FOR THE INC
012432 001375                           BNE     1$              ;;OF  WORD
012434 012677 166500                    MOV     (SP)+,@SWR      ;;POP STACK INTO @SWR
012440 012605                           MOV     (SP)+,R5        ;;POP STACK INTO R5
012442 012604                           MOV     (SP)+,R4        ;;POP STACK INTO R4
012444 012603                           MOV     (SP)+,R3        ;;POP STACK INTO R3
012446 012602                           MOV     (SP)+,R2        ;;POP STACK INTO R2
012450 012601                           MOV     (SP)+,R1        ;;POP STACK INTO R1
012452 012600                           MOV     (SP)+,R0        ;;POP STACK INTO R0
012454 012737 012336 000024             MOV     #$PWRON,@#PWRVEC;;SET UP THE POWER DOWN VECTOR
012462 012737 000340 000026             MOV     #340,@#PWRVEC+2 ;;PRIO:7
012470 104401                           TYPE                    ;;REPORT THE POWER FAILURE
012472 012510                   $PWRMG: .WORD   PWRMSG          ;;POWER FAIL MESSAGE POINTER
012474 012716                           MOV     (PC)+,(SP)      ;;RESTART AT BEGIN
012476 001450                   $PWRAD: .WORD   BEGIN           ;;RESTART ADDRESS
012500 000002                           RTI
012502 000000                   $ILLUP: HALT                    ;;THE POWER UP SEQUENCE WAS STARTED
012504 000776                           BR      .-2             ;; BEFORE THE POWER DOWN WAS COMPLETE
012506 000000                   $SAVR6: 0                       ;;PUT THE SP HERE
012510 005015 042522 052123     PWRMSG: .ASCIZ  <15><12>/RESTARTING AFTER A POWER FAILURE/<15><12><12>
012516 051101 044524 043516
012524 040440 052106 051105
012532 040440 050040 053517
012540 051105 043040 044501
012546 052514 042522 005015
012554 000012

                                .EVEN

                                .SBTTL  BINARY TO OCTAL (ASCII) AND TYPE

                                ;;*****************************************************************
                                ;#THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 6-DIGIT
                                ;#OCTAL (ASCII) NUMBER AND TYPE IT.
                                ;#$TYPOS---ENTER HERE TO SETUP SUPPRESS ZEROS AND NUMBER OF DIGITS TO TYPE
                                ;#CALL:
                                ;#      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
                                ;#      TYPOS                   ;;CALL FOR TYPEOUT
                                ;#      .BYTE   N               ;;N=1 TO 6 FOR NUMBER OF DIGITS TO TYPE
                                ;#      .BYTE   M               ;;M=1 OR 0
                                ;#                                      ;;1=TYPE LEADING ZEROS
                                ;#                                      ;;0=SUPPRESS LEADING ZEROS
                                ;#
```

```
                                        ;#STYPON----ENTER HERE TO TYPE OUT WITH THE SAME PARAMETERS AS THE LAST
                                        ;#STYPOS OR STYPOC
                                        ;#CALL:
                                        ;#      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
                                        ;#      TYPON                   ;;CALL FOR TYPEOUT
                                        ;#
                                        ;#STYPOC---ENTER HERE FOR TYPEOUT OF A 16 BIT NUMBER
                                        ;#CALL:
                                        ;#      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
                                        ;#      TYPOC                   ;;CALL FOR TYPEOUT
012556 017646 000000            STYPOS: MOV     @(SP),-(SP)     ;;PICKUP THE MODE
012562 116637 000001 013001             MOVB    1(SP),$OFILL    ;;LOAD ZERO FILL SWITCH
012570 116637 013003                    MOVB    (SP)+,$OMODE+1  ;;NUMBER OF DIGITS TO TYPE
012574 062716 000002                    ADD     #2,(SP)         ;;ADJUST RETURN ADDRESS
012600 000406                           BR      STYPON
012602 112737 000001 013001     STYPOC: MOVB    #1,$OFILL       ;;SET THE ZERO FILL SWITCH
012610 112737 000006 013003             MOVB    #6,$OMODE+1     ;;SET FOR SIX(6) DIGITS
012616 112737 000005 013000     STYPON: MOVB    #5,$OCNT        ;;SET THE ITERATION COUNT
012624 010346                           MOV     R3,-(SP)        ;;SAVE R3
012626 010446                           MOV     R4,-(SP)        ;;SAVE R4
012630 010546                           MOV     R5,-(SP)        ;;SAVE R5
012632 113704 013003                    MOVB    $OMODE+1,R4     ;;GET THE NUMBER OF DIGITS TO TYPE
012636 005404                           NEG     R4
012640 062704 000006                    ADD     #6,R4           ;;SUBTRACT IT FOR MAX. ALLOWED
012644 110437 013002                    MOVB    R4,$OMODE       ;;SAVE IT FOR USE
012650 113704 013001                    MOVB    $OFILL,R4       ;;GET THE ZERO FILL SWITCH
012654 016605 000012                    MOV     12(SP),R5       ;;PICKUP THE INPUT NUMBER
012660 005003                           CLR     R3              ;;CLEAR THE OUTPUT WORD
012662 006105                   1$:     ROL     R5              ;;ROTATE MSB INTO "C"
012664 000404                           BR      3$              ;;GO DO MSB
012666 006105                   2$:     ROL     R5              ;;FORM THIS DIGIT
012670 006103                           ROL     R3
012672 006105                           ROL     R5
012674 010503                           MOV     R5,R3
012676 006103                   3$:     ROL     R3              ;;GET LSB OF THIS DIGIT
012700 105337 013002                    DECB    $OMODE          ;;TYPE THIS DIGIT?
012704 100016                           BPL     7$              ;;BR IF NO
012706 042703 177770                    BIC     #177770,R3      ;;GET RID OF JUNK
012712 001002                           BNE     4$              ;;TEST FOR 0
012714 005704                           TST     R4              ;;SUPPRESS THIS 0?
012716 001403                           BEQ     5$              ;;BR IF YES
012720 005204                   4$:     INC     R4              ;;DON'T SUPPRESS ANYMORE 0'S
012722 052703 000060                    BIS     #'0,R3          ;;MAKE THIS DIGIT ASCII
012726 052703 000040            5$:     BIS     #' ,R3          ;;MAKE ASCII IF NOT ALREADY
012732 110337 012776                    MOVB    R3,6$           ;;SAVE FOR TYPING
012736 104401 012776                    TYPE    ,6$             ;;GO TYPE THIS DIGIT
012742 105337 013000            7$:     DECB    $OCNT           ;;COUNT BY 1
012746 003347                           BGT     2$              ;;BR IF MORE TO DO
012750 002402                           BLT     6$              ;;BR IF DONE
012752 005204                           INC     R4              ;;INSURE LAST DIGIT ISN'T A BLANK
012754 000744                           BR      3$              ;;GO DO THE LAST DIGIT
012756 012605                   6$:     MOV     (SP)+,R5        ;;RESTORE R5
012760 012604                           MOV     (SP)+,R4        ;;RESTORE R4
```

```
                                        MOV     (SP)+,R3        ;;RESTURE R3
                                        MOV     2(SP),4(SP)     ;;SET THE STACK FOR RETURNING
                                        MOV     (SP)+,(SP)
                                        RTI                     ;;RETURN
                                8$:     .BYTE   0               ;;STORAGE FOR ASCII DIGIT
                                        .BYTE   0               ;;TERMINATOR FOR TYPE ROUTINE
                                $OCNT:  .BYTE   0               ;;OCTAL DIGIT COUNTER
                                $OFILL: .BYTE   0               ;;ZERO FILL SWITCH
                                $OMODE: .WORD   0               ;;NUMBER OF DIGITS TO TYPE
                                .SBTTL  TYPE ROUTINE

                                ;;*****************************************************************
                                ;*ROUTINE TO TYPE ASCIZ MESSAGE. MESSAGE MUST TERMINATE WITH A 0 BYTE.
                                ;*THE ROUTINE WILL INSERT A NUMBER OF NULL CHARACTERS AFTER A LINE FEED.
                                ;*NOTE1:        $NULL CONTAINS THE CHARACTER TO BE USED AS THE FILLER CHARACTER.
                                ;*NOTE2:        $FILLS CONTAINS THE NUMBER OF FILLER CHARACTERS REQUIRED.
                                ;*NOTE3:        $FILLC CONTAINS THE CHARACTER TO FILL AFTER.
                                ;*
                                ;*CALL:
                                ;*1) USING A TRAP INSTRUCTION
                                ;*      TYPE    ,MESADR         ;;MESADR IS FIRST ADDRESS OF AN ASCIZ STRING
                                ;*OR
                                ;*      TYPE
                                ;*      MESADR
                                ;*

013004  105737  001157  $TYPE:  TSTB    $TPFLG          ;;IS THERE A TERMINAL?
013010  100002                  BPL     1$              ;;BR IF YES
013012  000000                  HALT                    ;;HALT HERE IF NO TERMINAL
013014  000430                  BR      3$              ;;LEAVE
013016  010046          1$:     MOV     R0,-(SP)        ;;SAVE R0
013020  017600  000002          MOV     @2(SP),R0       ;;GET ADDRESS OF ASCIZ STRING
013024  122737  000001  001214  CMPB    @#PTENV,$ENV    ;;RUNNING IN APT MODE
013032  001011                  BNE     6$              ;;NO,GO CHECK FOR APT CONSOLE
013034  132737  000100  001215  BITB    @#PTSPOOL,$ENVM ;;SPOOL MESSAGE TO APT
013042  001405                  BEQ     6$              ;;NO,GO CHECK FOR CONSOLE
013044  010037  013054          MOV     R0,61$          ;;SETUP MESSAGE ADDRESS FOR APT
013050  004737  014152          JSR     PC,$ATY3        ;;SPOOL MESSAGE TO APT
013054  000000          61$:    .WORD   0               ;;MESSAGE ADDRESS
013056  132737  000040  001215  6$:     BITB    @#PTCSUP,$ENVM  ;;APT CONSOLE SUPPRESSED
013064  001003                  BNE     60$             ;;YES,SKIP TYPE OUT
013066  112046          2$:     MOVB    (R0)+,-(SP)     ;;PUSH CHARACTER TO BE TYPED ONTO STACK
013070  001005                  BNE     4$              ;;BR IF IT ISN'T THE TERMINATOR
013072  005726                  TST     (SP)+           ;;IF TERMINATOR POP IT OFF THE STACK
013074  012600          60$:    MOV     (SP)+,R0        ;;RESTORE R0
013076  062716  000002          ADD     #2,(SP)         ;;ADJUST RETURN PC
013102  000002          3$:     RTI                     ;;RETURN
013104  122716  000011  4$:     CMPB    #HT,(SP)        ;;BRANCH IF <HT>
013110  001430                  BEQ     8$
013112  122716  000200          CMPB    #CRLF,(SP)      ;;BRANCH IF NOT <CRLF>
013116  001006                  BNE     5$
013120  005726                  TST     (SP)+           ;;POP  <CR><LF> EQUIV
013122  104401                  TYPE                    ;;TYPE A CR AND LF
013124  001171                  $CRLF
```

```
2304  013126  105037  013262            CLRB    $CHARCNT        ;;CLEAR CHARACTER COUNT
2305  013132  000755                    BR      2$              ;;GET NEXT CHARACTER
2306  013134  004737  013216    5$:     JSR     PC,$TYPEC       ;;GO TYPE THIS CHARACTER
2307  013140  123726  001156    6$:     CMPB    $FILLC,(SP)+    ;;IS IT TIME FOR FILLER CHARS.?
2308  013144  001350                    BNE     2$              ;;IF NO GO GET NEXT CHAR.
2309  013146  013746  001154            MOV     $NULL,-(SP)     ;;GET # OF FILLER CHARS. NEEDED
2310                                                            ;;AND THE NULL CHAR.
2311  013152  105366  000001    7$:     DECB    1(SP)           ;;DOES A NULL NEED TO BE TYPED?
2312  013156  002770                    BLT     6$              ;;BR IF NO--GO POP THE NULL OFF OF STACK
2313  013160  004737  013216            JSR     PC,$TYPEC       ;;GO TYPE A NULL
2314  013164  105337  013262            DECB    $CHARCNT        ;;DO NOT COUNT AS A COUNT
2315  013170  000770                    BR      7$              ;;LOOP
2316
2317                                    ;HORIZONTAL TAB PROCESSOR
2318
2319  013172  112716  000040    8$:     MOVB    #' ,(SP)        ;;REPLACE TAB WITH SPACE
2320  013176  004737  013216    9$:     JSR     PC,$TYPEC       ;;TYPE A SPACE
2321  013202  132737  000007  013262    BITB    #7,$CHARCNT     ;;BRANCH IF NOT AT
2322  013210  001372                    BNE     9$              ;;TAB STOP
2323  013212  005726                    TST     (SP)+           ;;POP SPACE OFF STACK
2324  013214  000724                    BR      2$              ;;GET NEXT CHARACTER
2325  013216  105777  165726    $TYPEC: TSTB    @$TPS           ;;WAIT UNTIL PRINTER IS READY
2326  013222  100375                    BPL     $TYPEC
2327  013224  116677  000002  165720    MOVB    2(SP),@$TPB     ;;LOAD CHAR TO BE TYPED INTO DATA REG.
2328  013232  122766  000015  000002    CMPB    #CR,2(SP)       ;;IS CHARACTER A CARRIAGE RETURN?
2329  013240  001003                    BNE     1$              ;;BRANCH IF NO
2330  013242  105037  013262            CLRB    $CHARCNT        ;;YES--CLEAR CHARACTER COUNT
2331  013246  000405                    BR      $TYPEX          ;;EXIT
2332  013250  122766  000012  000002  1$:     CMPB    #LF,2(SP)       ;;IS CHARACTER A LINE FEED?
2333  013256  001402                    BEQ     $TYPEX          ;;BRANCH IF YES
2334  013260  105227                    INCB    (PC)+           ;;COUNT THE CHARACTER
2335  013262  000000            $CHARCNT:.WORD  0               ;;CHARACTER COUNT STORAGE
2336  013264  000207            $TYPEX: RTS     PC
2337
2338                                    .SBTTL  TTY INPUT ROUTINE
2339
2340                                    ;;**************************************************************************
2341                                    .ENABL  LSB
2342
2343                                    ;;**************************************************************************
2344                                    ;#SOFTWARE SWITCH REGISTER CHANGE ROUTINE.
2345                                    ;#ROUTINE IS ENTERED FROM THE TRAP HANDLER, AND WILL
2346                                    ;#SERVICE THE TEST FOR CHANGE IN SOFTWARE SWITCH REGISTER TRAP CALL
2347                                    ;#WHEN OPERATING IN TTY FLAG MODE.
2348  013266  022737  000176  001140  $CKSWR: CMP     @#SWREG,SWR     ;;IS THE SOFT-SWR SELECTED?
2349  013274  001074                    BNE     15$             ;;BRANCH IF NO
2350  013276  105777  165642            TSTB    @$TKS           ;;CHAR THERE?
2351  013302  100071                    BPL     15$             ;;IF NO, DON'T WAIT AROUND
2352  013304  117746  165636            MOVB    @$TKB,-(SP)     ;;SAVE THE CHAR
2353  013310  042716  177600            BIC     #^C177,(SP)     ;;STRIP-OFF THE ASCII
2354  013314  022726  000007            CMP     #7,(SP)+        ;;IS IT A CONTROL G?
2355  013320  001062                    BNE     15$             ;;NO, RETURN TO USER
2356  013322  123727  001134  000001    CMPB    $AUTOB,#1       ;;ARE WE RUNNING IN AUTO-MODE?
2357  013330  001456                    BEQ     15$             ;;BRANCH IF YES
```

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                                                                ;;ECHO THE CONTROL-G (↑G)
013332  104401  014013          $GTSWR: TYPE    ,$CNTLG         ;;TYPE CURRENT CONTENTS
013336  104401  014020                  TYPE    ,$MSWR          ;;SAVE SWREG FOR TYPEOUT
013342  013746  000176                  MOV     $WREG,-(SP)     ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
013346  104402                          TYPOC                   ;;PROMPT FOR NEW SWR
013350  104401  014031                  TYPE    ,$MNEW          ;;CLEAR COUNTER
013354  005046                  19$:    CLR     -(SP)           ;;THE NEW SWR
013356  005046                          CLR     -(SP)           ;;CHAR THERE?
013360  105777  165560          7$:     TSTB    @$TKS           ;;IF NOT TRY AGAIN
013364  100375                          BPL     7$
                                                                ;;PICK UP CHAR
013366  117746  165554                  MOVB    @$TKB,-(SP)     ;;MAKE IT 7-BIT ASCII
013372  042716  177600                  BIC     #↑C177,(SP)
                                                                ;;IS IT A CONTROL-U?
013376  021627  000025          9$:     CMP     (SP),#25        ;;BRANCH IF NOT
013402  001005                          BNE     10$             ;;YES, ECHO CONTROL-U (↑U)
013404  104401  014006                  TYPE    ,$CNTLU         ;;IGNORE PREVIOUS INPUT
013410  062706  000006          20$:    ADD     #6,SP           ;;LET'S TRY IT AGAIN
013414  000757                          BR      19$
                                                                ;;IS IT A <CR>?
013416  021627  000015          10$:    CMP     (SP),#15        ;;BRANCH IF NO
013422  001022                          BNE     16$             ;;YES, IS IT THE FIRST CHAR?
013424  005766  000004                  TST     4(SP)           ;;BRANCH IF YES
013430  001403                          BEQ     11$             ;;SAVE NEW SWR
013432  016677  000002  165500          MOV     2(SP),@SWR      ;;CLEAR UP STACK
013440  062706  000006          11$:    ADD     #6,SP           ;;ECHO <CR> AND <LF>
013444  104401  001171          14$:    TYPE    ,$CRLF          ;;RE-ENABLE TTY KBD INTERRUPTS?
013450  123727  001135  000001          CMPB    $INTAG,#1       ;;BRANCH IF NOT
013456  001003                          BNE     15$             ;;RE-ENABLE TTY KBD INTERRUPTS
013460  012777  000100  165456          MOV     #100,@$TKS      ;;RETURN
013466  000002                  15$:    RTI                     ;;ECHO CHAR
013470  004737  013216          16$:    JSR     PC,$TYPEC       ;;CHAR < 0?
013474  021627  000060                  CMP     (SP),#60        ;;BRANCH IF YES
013500  002420                          BLT     18$             ;;CHAR > 7?
013502  021627  000067                  CMP     (SP),#67        ;;BRANCH IF YES
013506  003015                          BGT     18$             ;;STRIP-OFF ASCII
013510  042726  000060                  BIC     #60,(SP)+       ;;IS THIS THE FIRST CHAR
013514  005766  000002                  TST     2(SP)           ;;BRANCH IF YES
013520  001403                          BEQ     17$             ;;NO, SHIFT PRESENT
013522  006316                          ASL     (SP)            ;;    CHAR OVER TO MAKE
013524  006316                          ASL     (SP)            ;;    ROOM FOR NEW ONE.
013526  006316                          ASL     (SP)
013530  005266  000002          17$:    INC     2(SP)           ;;KEEP COUNT OF CHAR
013534  056616  177776                  BIS     -2(SP),(SP)     ;;SET IN NEW CHAR
013540  000707                          BR      7$              ;;GET THE NEXT ONE
013542  104401  001170          18$:    TYPE    ,$QUES          ;;TYPE ?(CR)(LF)
013546  000720                          BR      20$             ;;SIMULATE CONTROL-U

                                .DSABL  LSB

                                ;;*****************************************************************
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```
                                        ;*THIS ROUTINE WILL INPUT A SINGLE CHARACTER FROM THE TTY
                                        ;*CALL:
                                        ;*      RDCHR                   ;;INPUT A SINGLE CHARACTER FROM THE TTY
                                        ;*      RETURN HERE             ;;CHARACTER IS ON THE STACK
                                        ;*                              ;;WITH PARITY BIT STRIPPED OFF
                                        ;
013550  011646                  SRDCHR: MOV     (SP),-(SP)      ;;PUSH DOWN THE PC
013552  016666  000004  000002          MOV     4(SP),2(SP)     ;;SAVE THE PS
013560  105777  165360          1$:     TSTB    @#TKS           ;;WAIT FOR
013564  100375                          BPL     1$              ;;A CHARACTER
013566  117766  165354  000004          MOVB    @#TKB,4(SP)     ;;READ THE TTY
013574  042766  177600  000004          BIC     #^C<177>,4(SP)  ;;GET RID OF JUNK IF ANY
013602  026627  000004  000023          CMP     4(SP),#23       ;;IS IT A CONTROL-S?
013610  001013                          BNE     3$              ;;BRANCH IF NO
013612  105777  165326          2$:     TSTB    @#TKS           ;;WAIT FOR A CHARACTER
013616  100375                          BPL     2$              ;;LOOP UNTIL ITS THERE
013620  117746  165322                  MOVB    @#TKB,-(SP)     ;;GET CHARACTER
013624  042716  177600                  BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII
013630  026627  000021                  CMP     (SP)+,#21       ;;IS IT A CONTROL-Q?
013634  001366                          BNE     2$              ;;IF NOT DISCARD IT
013636  000750                          BR      1$              ;;YES, RESUME
013640  026627  000004  000140  3$:     CMP     4(SP),#140      ;;IS IT UPPER CASE?
013646  002407                          BLT     4$              ;;BRANCH IF YES
013650  026627  000004  000175          CMP     4(SP),#175      ;;IS IT A SPECIAL CHAR?
013656  003003                          BGT     4$              ;;BRANCH IF YES
013660  042766  000040  000004          BIC     #40,4(SP)       ;;MAKE IT UPPER CASE
013666  000002                  4$:     RTI                     ;;GO BACK TO USER
                                        ;;**************************************************************
                                        ;*THIS ROUTINE WILL INPUT A STRING FROM THE TTY
                                        ;*CALL:
                                        ;*      RDLIN                   ;;INPUT A STRING FROM THE TTY
                                        ;*      RETURN HERE             ;;ADDRESS OF FIRST CHARACTER WILL BE ON THE STACK
                                        ;*                              ;;TERMINATOR WILL BE A BYTE OF ALL 0'S
013670  010346                  $RDLIN: MOV     R3,-(SP)        ;;SAVE R3
013672  012703  013776          1$:     MOV     #$TTYIN,R3      ;;GET ADDRESS
013676  022703  014006          2$:     CMP     #$TTYIN+6.,R3   ;;BUFFER FULL?
013702  101405                          BLOS    4$              ;;BR IF YES
013704  104411                          RDCHR                   ;;GO READ ONE CHARACTER FROM THE TTY
013706  112613                          MOVB    (SP)+,(R3)      ;;GET CHARACTER
013710  122713  000177          10$:    CMPB    #177,(R3)       ;;IS IT A RUBOUT
013714  001003                          BNE     3$              ;;SKIP IF NOT
013716  104401  001170          4$:     TYPE    ,$QUES          ;;TYPE A '?'
013722  000763                          BR      1$              ;;CLEAR THE BUFFER AND LOOP
013724  111337  013774          3$:     MOVB    (R3),9$         ;;ECHO THE CHARACTER
013730  104401  013774                  TYPE    ,9$
013734  122723  000015                  CMPB    #15,(R3)+       ;;CHECK FOR RETURN
013740  001366                          BNE     2$              ;;LOOP IF NOT RETURN
013742  105063  177777                  CLRB    -1(R3)          ;;CLEAR RETURN (THE 15)
013746  104401  001172                  TYPE    ,$LF            ;;TYPE A LINE FEED
013752  012603                          MOV     (SP)+,R3        ;;RESTORE R3
013754  011646                          MOV     (SP),-(SP)      ;;ADJUST THE STACK AND PUT ADDRESS OF THE
013756  016666  000004  000002          MOV     4(SP),2(SP)     ;;      FIRST ASCII CHARACTER ON IT
```

```
2466  013764 012766 013776 000004          MOV     @STTYIN,4(SP)
2467  013772 000002                        RTI                     ;;RETURN
2468  013774    000               9$:      .BYTE   0               ;;STORAGE FOR ASCII CHAR. TO TYPE
2469  013775    000                        .BYTE   0               ;;TERMINATOR
2470  013776 000010               $TTYIN:  .BLKB   8.              ;;RESERVE 8 BYTES FOR TTY INPUT
2471  014006 052536 005015   000  $CNTLU:  .ASCIZ  /^U/<15><12>    ;;CONTROL "U"
2472  014013    136 006507 000012 $CNTLG:  .ASCIZ  /^G/<15><12>    ;;CONTROL "G"
2473  014020 005015 053523 020122 $MSWR:   .ASCIZ  <15><12>/SWR = /
2474  014026 020075    000
2475  014031    040 047040 053505 $MNEW:   .ASCIZ  /  NEW = /
2476  014036 036440 000040
2477                               .SBTTL  READ AN OCTAL NUMBER FROM THE TTY
2478
2479                               ;;*******************************************************************
2480                               ;*THIS ROUTINE WILL READ AN OCTAL (ASCII) NUMBER FROM THE TTY AND
2481                               ;*CHANGE IT TO BINARY.
2482                               ;*CALL:
2483                               ;*      RDOCT                   ;;READ AN OCTAL NUMBER
2484                               ;*      RETURN HERE             ;;LOW ORDER BITS ARE ON TOP OF THE STACK
2485                               ;*                              ;;HIGH ORDER BITS ARE IN $HIOCT
2486
2487  014042 011646               $RDOCT:  MOV     (SP),-(SP)      ;;PROVIDE SPACE FOR THE
2488  014044 016666 000004 000002          MOV     4(SP),2(SP)     ;;INPUT NUMBER
2489  014052 010046                        MOV     R0,-(SP)        ;;PUSH R0 ON STACK
2490  014054 010146                        MOV     R1,-(SP)        ;;PUSH R1 ON STACK
2491  014056 010246                        MOV     R2,-(SP)        ;;PUSH R2 ON STACK
2492  014060 104412               1$:      RDLIN                   ;;READ AN ASCIZ LINE
2493  014062 012600                        MOV     (SP)+,R0        ;;GET ADDRESS OF 1ST CHARACTER
2494  014064 005001                        CLR     R1              ;;CLEAR DATA WORD
2495  014066 005002                        CLR     R2
2496  014070 112046               2$:      MOVB    (R0)+,-(SP)     ;;PICKUP THIS CHARACTER
2497  014072 001412                        BEQ     3$              ;;IF ZERO GET OUT
2498  014074 006301                        ASL     R1              ;;*2
2499  014076 006102                        ROL     R2
2500  014100 006301                        ASL     R1              ;;*4
2501  014102 006102                        ROL     R2
2502  014104 006301                        ASL     R1              ;;*8
2503  014106 006102                        ROL     R2
2504  014110 042716 177770                BIC     #^C7,(SP)       ;;STRIP THE ASCII JUNK
2505  014114 062601                        ADD     (SP)+,R1        ;;ADD IN THIS DIGIT
2506  014116 000764                        BR      2$              ;;LOOP
2507  014120 005726               3$:      TST     (SP)+           ;;CLEAN TERMINATOR FROM STACK
2508  014122 010166 000012                 MOV     R1,12(SP)       ;;SAVE THE RESULT
2509  014126 010237 014142                 MOV     R2,$HIOCT
10    014132 012602                        MOV     (SP)+,R2        ;;POP STACK INTO R2
11    014134 012601                        MOV     (SP)+,R1        ;;POP STACK INTO R1
12    014136 012600                        MOV     (SP)+,R0        ;;POP STACK INTO R0
13    014140 000002                        RTI                     ;;RETURN
14    014142 000000               $HIOCT:  .WORD   0               ;;HIGH ORDER BITS GO HERE
15                                 .SBTTL  APT COMMUNICATIONS ROUTINE
16
17                                 ;;*******************************************************************
18    014144 112737 000001 014410 $ATY1:   MOVB    #1,$FFLG        ;;TO REPORT FATAL ERROR
519   014152 112737 000001 014406 $ATY3:   MOVB    #1,$MFLG        ;;TO TYPE A MESSAGE
```

```
                                                BR      $ATYC
                                                MOVB    #1,$FFLG        ;;TO ONLY REPORT FATAL ERROR
                                        $ATYC:
                                                MOV     R0,-(SP)        ;;PUSH R0 ON STACK
                                                MOV     R1,-(SP)        ;;PUSH R1 ON STACK
                                                TSTB    $MFLG           ;;SHOULD TYPE A MESSAGE?
                                                BEQ     5$              ;;IF NOT:  BR
                                                CMPB    #APTENV,$ENV    ;;OPERATING UNDER APT?
                                                BNE     3$              ;;IF NOT:  BR
                                                BITB    #APTSPOOL,$ENVM ;;SHOULD SPOOL MESSAGES?
                                                BEQ     3$              ;;IF NOT:  BR
                                                MOV     @4(SP),R0       ;;GET MESSAGE ADDR.
                                                ADD     #2,4(SP)                ;;BUMP RETURN ADDR.
                                        1$:     TST     $MSGTYPE        ;;SEE IF DONE W/ LAST XMISSION?
                                                BNE     1$              ;;IF NOT:  WAIT
                                                MOV     R0,$MSGAD       ;;PUT ADDR IN MAILBOX
                                        2$:     TSTB    (R0)+           ;;FIND END OF MESSAGE
                                                BNE     2$
                                                SUB     $MSGAD,R0       ;;SUB START OF MESSAGE
                                                ASR     R0              ;;GET MESSAGE LNGTH IN WORDS
                                                MOV     R0,$MSGLGT      ;;PUT LENGTH IN MAILBOX
                                                MOV     #4,$MSGTYPE     ;;TELL APT TO TAKE MSG.
                                                BR      5$
                                        3$:     MOV     @4(SP),4$       ;;PUT MSG ADDR IN JSR LINKAGE
                                                ADD     #2,4(SP)                ;;BUMP RETURN ADDRESS
                                                MOV     177776,-(SP)    ;;PUSH 177776 ON STACK
                                                JSR     PC,$TYPE        ;;CALL TYPE MACRO
                                        4$:     .WORD   0
                                        5$:
                                        10$:    TSTB    $FFLG           ;;SHOULD REPORT FATAL ERROR?
                                                BEQ     12$             ;;IF NOT:  BR
                                                TST     $ENV            ;;RUNNING UNDER APT?
                                                BEQ     12$             ;;IF NOT:  BR
                                        11$:    TST     $MSGTYPE        ;;FINISHED LAST MESSAGE?
                                                BNE     11$             ;;IF NOT:  WAIT
                                                MOV     @4(SP),$FATAL   ;;GET ERROR #
                                                ADD     #2,4(SP)                ;;BUMP RETURN ADDR.
                                                INC     $MSGTYPE        ;;TELL APT TO TAKE ERROR
                                        12$:    CLRB    $FFLG           ;;CLEAR FATAL FLAG
                                                CLRB    $LFLG           ;;CLEAR LOG FLAG
                                                CLRB    $MFLG           ;;CLEAR MESSAGE FLAG
                                                MOV     (SP)+,R1        ;;POP STACK INTO R1
                                                MOV     (SP)+,R0        ;;POP STACK INTO R0
                                                RTS     PC              ;;RETURN
                                        $MFLG:  .BYTE   0               ;;MESSG. FLAG
                                        $LFLG:  .BYTE   0               ;;LOG FLAG
                                        $FFLG:  .BYTE   0               ;;FATAL FLAG
                                                .EVEN
                                        APTSIZE=200
                                        APTENV=001
                                        APTSPOOL=100
                                        APTCSUP=040
```

```
                                .SBTTL  TRAP DECODER

                                ;;######################################################################
                                ;#THIS ROUTINE WILL PICKUP THE LOWER BYTE OF THE "TRAP" INSTRUCTION
                                ;#AND USE IT TO INDEX THROUGH THE TRAP TABLE FOR THE STARTING ADDRESS
                                ;#OF THE DESIRED ROUTINE. THEN USING THE ADDRESS OBTAINED IT WILL
                                ;#GO TO THAT ROUTINE.

014412  010046                  STRAP:  MOV     R0,-(SP)        ;;SAVE R0
014414  016600  000002                  MOV     2(SP),R0        ;;GET TRAP ADDRESS
014420  005740                          TST     -(R0)           ;;BACKUP BY 2
014422  111000                          MOVB    (R0),R0         ;;GET RIGHT BYTE OF TRAP
014424  006300                          ASL     R0              ;;POSITION FOR INDEXING
014426  016000  014446                  MOV     $TRPAD(R0),R0   ;;INDEX TO TABLE
014432  000200                          RTS     R0              ;;GO TO ROUTINE

                                ;;THIS IS USE TO HANDLE THE "GETPRI" MACRO

014434  011646                  STRAP2: MOV     (SP),-(SP)      ;;MOVE THE PC DOWN
014436  016666  000004  000002          MOV     4(SP),2(SP)     ;;MOVE THE PSW DOWN
014444  000002                          RTI                     ;;RESTORE THE PSW

                                .SBTTL  TRAP TABLE

                                ;#THIS TABLE CONTAINS THE STARTING ADDRESSES OF THE ROUTINES CALLED
                                ;#BY THE "TRAP" INSTRUCTION.

                                ;       ROUTINE
                                ;       -------
014446  014434                  $TRPAD: .WORD   STRAP2
014450  013004                          $TYPE   ;;CALL=TYPE     TRAP+1(104401)  TTY TYPEOUT ROUTINE
014452  012602                          $TYPOC  ;;CALL=TYPOC    TRAP+2(104402)  TYPE OCTAL NUMBER (WITH LEADING ZEROS)
014454  012556                          $TYPOS  ;;CALL=TYPOS    TRAP+3(104403)  TYPE OCTAL NUMBER (NO LEADING ZEROS)
014456  012616                          $TYPON  ;;CALL=TYPON    TRAP+4(104404)  TYPE OCTAL NUMBER (AS PER LAST CALL)
014460  011300                          $TYPDS  ;;CALL=TYPDS    TRAP+5(104405)  TYPE DECIMAL NUMBER (WITH SIGN)
014462  011224                          $TYPBN  ;;CALL=TYPBN    TRAP+6(104406)  TYPE BINARY (ASCII) NUMBER

014464  013336                          $GTSWR  ;;CALL=GTSWR    TRAP+7(104407)  GET SOFT-SWR SETTING

014466  013266                          $CKSWR  ;;CALL=CKSWR    TRAP+10(104410) TEST FOR CHANGE IN SOFT-SWR
014470  013550                          $RDCHR  ;;CALL=RDCHR    TRAP+11(104411) TTY TYPEIN CHARACTER ROUTINE
014472  013670                          $RDLIN  ;;CALL=RDLIN    TRAP+12(104412) TTY TYPEIN STRING ROUTINE
014474  014042                          $RDOCT  ;;CALL=RDOCT    TRAP+13(104413) READ AN OCTAL NUMBER FROM TTY

000001                          .END
```

```
ABASE = 170440          410#    526     567     663     664     665     666    1639
ACDMI = 000000          526     569
ACDMI2= 000000          526
ACPUOP= 000000          526     541
AD8R    007030         1532    1650#
ADCS    007026         1526#   1529#   1530    1649#
ADDOK   001440          439     669#
ADDMD = 000000          526
ADDMI = 000000          526
ADDMII= 000000          526
ADDMII= 000000          526
ADDMI2= 000000          526
ADDMI3= 000000          526
ADDMI4= 000000          526
ADDMI5= 000000          526
ADDMI6= 000000          526
ADDMI7= 000000          526
ADDMI8= 000000          526
ADDMI9= 000000          526
ADDMI1= 000000          526
ADDMI2= 000000          526
ADDMI3= 000000          526
ADEVCT= 000000          526     532
ADEVM = 000000          526     568
ADJR34  010376         1257    1461    1791#
ADJR35  010431         1292    1796#
ADJR36  010464         1327    1801#
ADJR37  010517         1362    1806#
ADJR46  010552         1244    1435    1811#
ADJR47  010605         1279    1816#
ADJR48  010640         1314    1821#
ADJR49  010673         1349    1826#
AENV  = 000000          526     537
AENVM = 000000          526     538
AFATAL= 000000          526     539
AMBDRI= 000000          526     554
AMBDR2= 000000          526     558
AMBDR3= 000000          526     561
AMBDR4= 000000          526     564
AMBMSI= 000000          526     548
AMBMS2= 000000          526     551
AMBMS3= 000000          526     555
AMBMS4= 000000          526     562
AMSGAD= 000000          526     534
AMSGLG= 000000          526     535
AMSGTY= 000000          526     536
AMTYP1= 000000          526     549
AMTYP2= 000000          526     557
AMTYP3= 000000          526     560
AMTYP4= 000000          526     563
APOSS = 000000          526     531
APRIOR= 000000          526
APTCSU= 000040         2289    2571#
```

```
APTENV=  000001          2065    2282    2527    2569#
APTSIZ=  000200           714    2568#
APTSP0=  000100          2284    2529    2570#
ASWREG=  000000           526     539
ATESTN=  000000           526     530
AUNIT =  000000           526     533
AUSWR =  000000           526     540
AVECT1=  000000           526     565
AVECT2=  000000           526     566
BADUNT   007004           718#   1418    1640#   2049#
BEGIN    001450           433     671#   2168
BEGINA   001456           670     672#
BEGIN1   001462           668     673#
BIT0  =  000001           394#    794    1642
BIT00 =  000001           394#    394
BIT01 =  000002           393#    393
BIT02 =  000004           392#    392
BIT03 =  000010           391#    391
BIT04 =  000020           390#    390
BIT05 =  000040           389#    389
BIT06 =  000100           388#    388
BIT07 =  000200           387#    387
BIT08 =  000400           386#    386    1999
BIT09 =  001000           385#    385    2007    2076
BIT1  =  000002           393#
BIT10 =  002000           374#   2053
BIT11 =  004000           373#    837     850     902     915     969     983    1038    1052    1194    2014
BIT12 =  010000           372#
BIT13 =  020000           371#   2060
BIT14 =  040000           370#   1985
BIT15 =  100000           369#    786
BIT2  =  000004           392#
BIT3  =  000010           391#   1193    1565
BIT4  =  000020           390#
BIT5  =  000040           389#
BIT6  =  000100           388#
BIT7  =  000200           387#   1508    1512    1528
BIT8  =  000400           386#
BIT9  =  001000           385#
BPTVEC=  000014           401#
CALDAC   006104          1265    1300    1335    1370    1477#
CKSWR =  104410          1611    1623    1983    1984    2048    2075    2613#
COMPAR   006520          1216    1229    1441    1467    1489    1569#
CONVRT   006302          1213    1226    1438    1464    1485    1523#
CR    =  000015           309#   2328    2338
CRLF  =  000200           310#   2299    2338
CSPACE   006422          1436    1462    1548#
DACBAD   007002          1425#   1454#   1479#   1639#   1871
DAC0     001422           663#    734#    800     815#    816     826#    827     838#    839     851#    852     855     857#
                          858#    867#    869#    870     874#   1083#   1088    1115#   1118    1172#   1242    1256    1266
                         1591    1613#   1630#   1863
DAC1     001424           664#    735#    738#    801     882#    883     892#    893     903#    904     916#    917     920
                          922#    923#    932#    934#    935     939#   1084#   1094    1128#   1131    1173#   1277    1291
                         1301    1593    1614#   1631#   1865
```

```
DAC2    001426          665#    736*    739*    802     947*    948     958*    959     970*    971     984*    985     988
                        990*    991*    1000*   1002*   1003    1007*   1085*   1100    1142*   1145    1174*   1312    1326
                        1336    1595    1615*   1632*   1867
DAC3    001430          666#    737*    740*    803     1016*   1017    1027*   1028    1033*   1040    1053*   1054    1057
                        1059*   1060*   1069*   1071*   1072    1076*   1086*   1106    1154*   1158    1175*   1196*   1347
                        1361    1371    1597    1616*   1633*   1869
DDISP = 177570          316#    507     702
DF0     011204          593     599     605     611     617     623     629     635     641     647     653     1873#
DH1     010267          597     603     609     615     651     1777#
DH2     010322          591     1782#
DH6     010337          621     627     633     639     645     1785#
DISPLA  001142          507#    702*    710*    2029*   2052*
DISPRE  000174          430#    710
DRIN    007024          1197    1648#
DSWR  = 177570          315#    506     701
DT1     011112          592     1862#
DT2     011120          598     1863#
DT3     011132          604     1865#
DT4     011144          610     1867#
DT5     011156          616     652     1869#
DT6     011170          622     628     634     640     646     1871#
DYNCRL  006716          436     1621#
EMTVEC= 000030          404#    686*    687*
EM1     007122          590     1668#
EM10    007472          632     1709#
EM11    007537          638     1716#
EM12    007574          644     1721#
EM13    007631          650     1726#
EM14    007675          656     1733#
EM2     007176          596     1676#
EM3     007225          602     1680#
EM4     007254          608     1684#
EM5     007303          614     1688#
EM6     007332          620     1692#
EM7     007413          626     1701#
ERRTOT  010176          1414    1766#
ERRVEC= 000004          397#    699     700*    711*    759*    799*    807*    809*    1990    1991*   1993*   1996*
ETX   = 000003          1852#   1856    1860
EVER    001420          662#    674*    773     785*    786*    798     1169
FILZ    007022          1504*   1508*   1512*   1516*   1647#
FOUND1  010224          778     1770#
FOUND2  010250          784     1774#
FULRMP  006570          434     1589#
GAIDAC  005764          1255    1290    1325    1360    1452#
GNS   = ******  U       429     2604    2605    2606    2607    2608    2609    2611    2613    2614    2615    2616
GTSWR = 104407          2611#
HT    = 000011          307#    2297    2338
INIT1   002044          719     743#    1420
INIT2   002576          1406    1412#
IOTVEC= 000020          402#    684*    685*
LDSPAC  007746          1548    1740#
LDTRAP  001746          722#    743     793     1590    1610    1622
LF    = 000012          308#    2332    2338
MASKNM  007010          757*    794*    1176*   1642#   2049
```

DVAAAA.P11 CROSS REFERENCE TABLE

```
MESGD   010210          1417    1768#
MSGSW   010011           751    1746#
MTEST   002102           745     747     756#
NUMBOK  007006           669#    671#    765     1641#
NS1200  011064          1432    1853#
OFFDAC  005634          1241    1276    1311    1346    1423#
PC      =%000007         328#    741#    743#    793#   1216#   1229#   1387#   1390#   1400#   1405    1436#   1441#   1462#
                        1467#   1489#   1563#   1581#   1585#   1590#   1592#   1594#   1596#   1598#   1605#   1610#   1622#
                        1625#   1627#   1637#   2062#   2068#   2121#   2167    2287#   2306#   2313#   2320#   2334#   2336#
                        2392#   2546#   2563#
PIRQ    = 177772         3148
PIRQVE= 000240           4088
PR0     = 000000         3318
PR1     = 000040         3328
PR2     = 000100         3338
PR3     = 000140         3348
PR4     = 000200         3358
PR5     = 000240         3368
PR6     = 000300         3378
PR7     = 000340         3388
PS      = 177776         3118     312
PSW     = 177776         3128
PWRMSG  012510          2166    2173#
PWRVEC= 000024           403#     690#    691#    2135#   2136#   2145#   2151#   2163#   2164#
PS1175  011077          1458    1857#
RDCHR   = 104411        2451    2614#
RDLIN   = 104412        2492    2615#
RDOCT   = 104413        2616#
REMAIN  004530           808    1162#
RESVEC= 000010           398#
R0      =%000000         319#    733#    734     735     736     737     1397#   1400    1501#   1502    1569    1571#   1573#
                        1575#   1576    1579#   1584#   1591#   1593#   1595#   1597#   1601#   1602#   1603    1612#   1613
                        1614    1615    1616    1624#   1626#   1630    1631    1632    1633    1634#   1635#   1914    1924#
                        1928    1944    1945    1958#   2093    2094#   2095#   2102#   2103#   2104#   2105#   2106#   2107
                        2112    2117#   2119#   2123    2125    2137    2162#   2280    2281#   2286    2291    2294#   2489
                        2493#   2496    2512#   2523    2531#   2535    2536    2538#   2539#   2540    2562#   2581    2582#
                        2583    2584#   2585#   2586#   2587#
R1      =%000001         320#    723#    724#    725#    726     1502#   1504    1505#   1506#   1509#   1510#   1515#   1517#
                        1570    1572#   1573    1578#   1583#   1886    1887#   1890#   1896#   1915    1928#   1929    1933
                        1957#   2138    2161#   2490    2494#   2498#   2500#   2502#   2505#   2508    2511#   2524    2561#
R2      =%000002         321#    722#    724     726#    727     728     1916    1927#   1931#   1934    1941#   1942#   1943
                        1948#   1956#   2139    2160#   2491    2495#   2499#   2501#   2503#   2509    2510#
R3      =%000003         322#    1917    1925#   1926#   1940#   1943#   1952#   1953#   1955#   2140    2159#   2215    2224#
                        2230#   2231#   2234#   2239#   2240#   2241    2250#   2447    2448#   2449    2452#   2453    2457
                        2459    2461#   2463#
R4      =%000004         323#    2141    2158#   2216    2218#   2219#   2220#   2221    2222#   2236    2238#   2246#   2249#
R5      =%000005         324#    1213#   1226#   1241#   1255#   1265#   1276#   1290#   1300#   1311#   1325#   1335#   1346#
                        1360#   1370#   1423    1426    1427    1428    1431#   1438#   1447#   1452    1455    1456    1457#
                        1464#   1473#   1477    1480    1485#   1495#   1501    1519#   1523    1540#   1918    1920#   1922#
                        1929#   1933#   1948    1954#   2142    2157#   2217    2223#   2225#   2227#   2228#   2229#   2230
                        2248#
R6      =%000006         325#    327     678#    679#    680
R7      =%000007         326#    328
SELDO   010726          1243    1430    1832#
```

```
SELD1   010744          1278    1835#
SELD2   010762          1313    1838#
SELD3   011000          1348    1841#
SNDVLT  006212          1431    1457    1501#
SP     =X000006          327#     682*    699*    707*    711     768     779*    805    1394*   1415*   1418*   1569*   1570*
                        1578    1579    1580*   1583    1584    1589*   1609*   1621*   1886*   1887    1896    1897*   1898*
                        1914*   1915*   1916*   1917*   1918*   1919*   1920    1923*   1936    1938*   1940    1950    1952
                        1954    1955    1956    1957    1958    1960*   1961*   1990*   1993    1995    1996    2025    2026
                        2030*   2057    2078*   2081*   2093*   2098*   2119    2123*   2137*   2138*   2139*   2140*   2141*
                        2142*   2143*   2144    2152*   2156    2157    2158    2159    2160    2161    2162    2167*   2207*
                        2208    2209    2210*   2215*   2216*   2217*   2223    2248    2249    2250    2251*   2252*   2280*
                        2281    2291*   2293    2294    2295*   2297    2299    2301    2307    2309*   2311*   2319*   2323
                        2324    2326    2332    2352*   2353*   2354    2361*   2364*   2365*   2369*   2370*   2374    2377*
                        2381    2383    2385    2386*   2393    2395    2397*   2398    2400*   2401*   2402*   2403*   2404*
                        2419*   2420*   2423*   2424*   2425    2429*   2430*   2431    2434    2436    2438*   2447*   2452
                        2463    2464*   2465*   2466*   2487*   2488*   2489*   2490*   2491*   2493    2496*   2504*   2505
                        2507    2508*   2510    2511    2512    2523*   2524*   2531    2532*   2543    2544*   2545*   2555
                        2556*   2561    2562    2581*   2582    2592*   2593*
SPREAD  007016          1215*   1228*   1440*   1466*   1488*   1576    1645#   1871
STACK = 001100           302#     682     1589    1609    1621
STATIC  006656           435     1609#
STKLMT= 177774          3138
STX    = 000001         1851#   1853    1857
SWR     001140           506#     680     701*    703     709*    716*    1612    1624    1985    1999    2001    2007    2014
                        2053    2060    2072    2076    2143    2156*   2348    2385*
SWREG   000176           431#     709     2348    2361
SW0    = 000001          366#
SW00   = 000001          356#     366
SW01   = 000002          355#     365
SW02   = 000004          354#     364
SW03   = 000010          353#     363
SW04   = 000020          352#     362
SW05   = 000040          351#     361
SW06   = 000100          350#     360
SW07   = 000200          349#     359
SW08   = 000400          348#     358
SW09   = 001000          347#     357
SW1    = 000002          365#
SW10   = 002000          346#
SW11   = 004000          345#
SW12   = 010000          344#
SW13   = 020000          343#
SW14   = 040000          342#
SW15   = 100000          341#
SW2    = 000004          364#
SW3    = 000010          363#
SW4    = 000020          362#
SW5    = 000040          361#
SW6    = 000100          360#
SW7    = 000200          359#
SW8    = 000400          358#
SW9    = 001000          357#
TBITVE= 000014          3998
TEMP    007012          673#     744     1156*   1643#
```

```
TESTER  001432              442    667#
TITLE   007040              753   1659#
TKVEC =  000060              406#
TPVEC =  000064              407#
TRAPVE=  000034              405#   688*   689*
TRTVEC=  000014              400#
TRYAGN  011016             1445   1471   1844#
TST1    002306              772    798#   1178
TST10   002752              885    890#
TST11   003010              895    900#
TST12   003062              913#
TST13   003154              929#
TST14   003250              945#
TST15   003304              950    956#
TST16   003342              961    967#
TST17   003414              981#
TST2    002364              813#
TST20   003506              997#
TST21   003602             1014#
TST22   003636             1019   1025#
TST23   003674             1030   1036#
TST24   003746             1050#
TST25   004040             1066#
TST26   004134             1082#
TST27   004316             1108   1113#
TST3    002420              818    824#
TST30   004362             1120   1126#
TST31   004426             1133   1140#
TST32   004464             1146   1152#
TST33   004530             1159   1166#
TST34   004624             1170   1183#
TST35   004646             1186   1191#
TST36   004740             1210#
TST37   005002             1217   1223#
TST4    002456              829    835#
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DVAAAA.P11 CROSS REFERENCE TABLE

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                 890   891   896   898   899   900   901   906   911   912   913   914   919   927   928
                 929   930   937   941   943   944   945   946   951   954   955   956   957   962   965
                 966   967   968   973   978   980   981   982   987   995   996   997   998  1005  1009
                1012  1013  1014  1015  1020  1023  1024  1025  1026  1031  1034  1035  1036  1037  1042
                1048  1049  1050  1051  1056  1064  1065  1066  1067  1074  1078  1080  1081  1082  1083
                1090  1096  1102  1109  1111  1112  1113  1114  1121  1124  1125  1126  1127  1134  1138
                1139  1140  1141  1147  1150  1151  1152  1153  1160  1164  1165  1166  1167  1168  1171
                1181  1182  1183  1184  1185  1187  1189  1190  1191  1192  1193  1200  1208  1209  1210
                1211  1212  1218  1221  1222  1223  1224  1225  1231  1234  1235  1236  1237  1238  1240
                1248  1249  1250  1251  1252  1254  1261  1262  1263  1264  1265  1269  1270  1271  1272
                1273  1275  1283  1284  1285  1286  1287  1288  1289  1297  1298  1299  1300  1304  1305
                1306  1307  1308  1310  1318  1319  1320  1321  1322  1324  1331  1332  1333  1334  1335
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                1369  1370  1376  1379  1383  1389  1392  1407  1442  1468  1490  1494  1880  1904  1971
                1998  2001  2002  2005  2032  2033  2036  2038  2053  2083  2084  2087  2102  2131  2134
                2150  2165  2185  2262  2341  2344  2412  2414  2419  2440  2441  2450  2454  2471  2480
                2518  2576  2582
.IFT            2013  2063  2414  2419  2498  2514  2515
.IFTF           2011  2062  2359  2412  2415  2494  2498  2514
.IIF             289   294   298   416   417   418   419   422   423   429   522   526   683   686   692
                 693   695   696  1377  1383  1384  1395  1407  1411  1419  1974  1975  1976  1977  1978
                1979  1983  2012  2013  2029  2032  2033  2039  2040  2041  2042  2043  2048  2075  2083
                2084  2099  2124  2338  2341  2362  2463  2471  2477  2604  2605  2606  2607  2608  2609
                2611  2613  2614  2615  2616
.IRP             588   676   795   810   821   832   845   861   877   887   897   910   926   942   953
                 964   978   994  1011  1022  1033  1047  1063  1079  1110  1123  1137  1149  1163  1180
                1188  1207  1220  1233  1247  1260  1268  1282  1295  1303  1317  1330  1338  1352  1365
                1914  1954  1984  2049  2137  2143  2156  2157  2469  2510  2523  2524  2545  2561  2562
.LIST              1   289   409   422   429   516   523   526   588   676   697   742   795   799   810
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                 910   914   926   930   942   946   953   957   964   968   978   982   994   998  1011
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                1330  1334  1338  1342  1352  1356  1365  1369  1383  1399  1587  1655  1978  2083  2440
                2596  2604  2605  2606  2607  2608  2609  2610  2611  2612  2613  2614  2615  2616  2617
.MACRO             1   423   479   667   713  1180  1791  1832  2596
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.NLIST             1   289   409   422   429   516   523   526   588   676   697   742   795   799   810
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                 910   914   926   930   942   946   953   957   964   968   978   982   994   998  1011
                1015  1022  1026  1033  1037  1047  1051  1063  1067  1079  1083  1110  1114  1123  1127
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```

```
          1237    1247    1251    1260    1264    1268    1272    1282    1286    1295    1299    1303    1307    1317    1321
          1330    1334    1338    1342    1352    1356    1365    1369    1383    1399    1587    1655    1978    2083    2440
          2596    2604    2605    2606    2607    2608    2609    2610    2611    2612    2613    2614    2615    2616    2617
.PAGE      479     572
.REM         1
.REPT      429
.SBTTL     299     412     423     432     446     457     479     523     572     676     742     754     795     810     821
           832     845     861     877     887     897     910     926     942     953     964     978     994    1011    1022
          1033    1047    1063    1079    1110    1123    1137    1149    1163    1180    1188    1207    1220    1233    1247
          1260    1268    1282    1295    1303    1317    1330    1338    1352    1365    1373    1421    1450    1475    1499
          1521    1546    1567    1587    1607    1619    1655    1657    1877    1901    1968    2033    2084    2131    2182
          2259    2338    2477    2515    2573    2596
.TITLE     289
.WORD      429     430     431     454     473     474     475     476     477     478     487     490     491     492     493
           496     497     498     499     500     501     502     505     506     507     528     529     530     531     532
           533     534     535     539     540     541     554     558     561     564     565     566     567     568     569
          1388    1391    1406    2110    2115    2166    2168    2258    2288    2335    2514    2547    2603
```

```
ERRORS DETECTED:  0

#,DVAAAA.SEQ/SOL/CRF/NL:TOC/DS:ERFZ=DVAAAA.SML,DVAAAA.P11
RUN-TIME:  54 64 6 SECONDS
CORE USED:  33K
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Spooler runtime 11 Seconds, 49 KCS, 299 disk reads, 5 disk writes, 73 pages

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  10                        ...B1    2421   013560   105777   ...B5
  57                        ...C1    2475   014031      040   ...C5
 104                        ...D1    2529   014212   132737   ...D5
 158                        ...E1    2582   014414   016600   ...E5
 209                        ...F1  HDDW10=  000000            ...F5
 251                        ...G1  BADUNT   007004            ...G5
 305                        ...H1  DH2      010322            ...H5
 359                        ...I1                             ...I5
                            ...J1                             ...J5
 420                        ...K1  TST11    003010            ...K5
 455              000106    ...L1  $APTHD   001000            ...L5
 488  001102         000    ...M1  $GDDAT   001124            ...M5
 542                        ...N1  $PWRAD   012476            ...N5

 591                        ...B2  $TRPAD   014446            ...B6
 634  001352   011170       ...C2  GETSWR      1#     409#    ...C6
 676                        ...D2  .SWRHI      1#     289#    ...D6
 729  001772   001371       ...E2                973     987  ...E6
 763  002144   005737       ...F2                930     931  ...F6
 804  002336   000407       ...G2                822     823  ...G6
 854  002570   001407       ...H2                849     854  ...H6
 906  003050   001401       ...I2               1260    1268  ...I6
 951  003302   104004       ...J2  **END** USER DAVIES,TOM    ...J6
1003  003546   017737       ...K2
1056  004006   001407       ...L2
1088  004174   017737       ...M2
1119  004350   023737       ...N2

1171  004554   005237       ...B3
1197  004700   017737       ...C3
1242  005066   001422       ...D3
1277  005170   001424       ...E3
1312  005272   001426       ...F3
1347  005374   001430       ...G3
1382  005454   000004       ...H3
1430  005672   010726       ...I3
1484  006136   012737       ...J3
1530  006344   105777       ...K3
1576  006542   020037       ...L3
1615  006704   010077       ...M3
1665  007104   026461       ...N3

1719  007560   020123       ...B4
1773  010242   052103       ...C4
1827  010700   052512       ...D4
1881                        ...E4
1935  011370   001002       ...F4
1989                        ...G4
2043                        ...H4
2097                        ...I4
2151  012410   012737       ...J4
2205                        ...K4
2259                        ...L4
2313  013160   004737       ...M4
2367  013364   100375       ...N4
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