ADV11

PERFORMANCE TEST

MD-11-DVADA-A

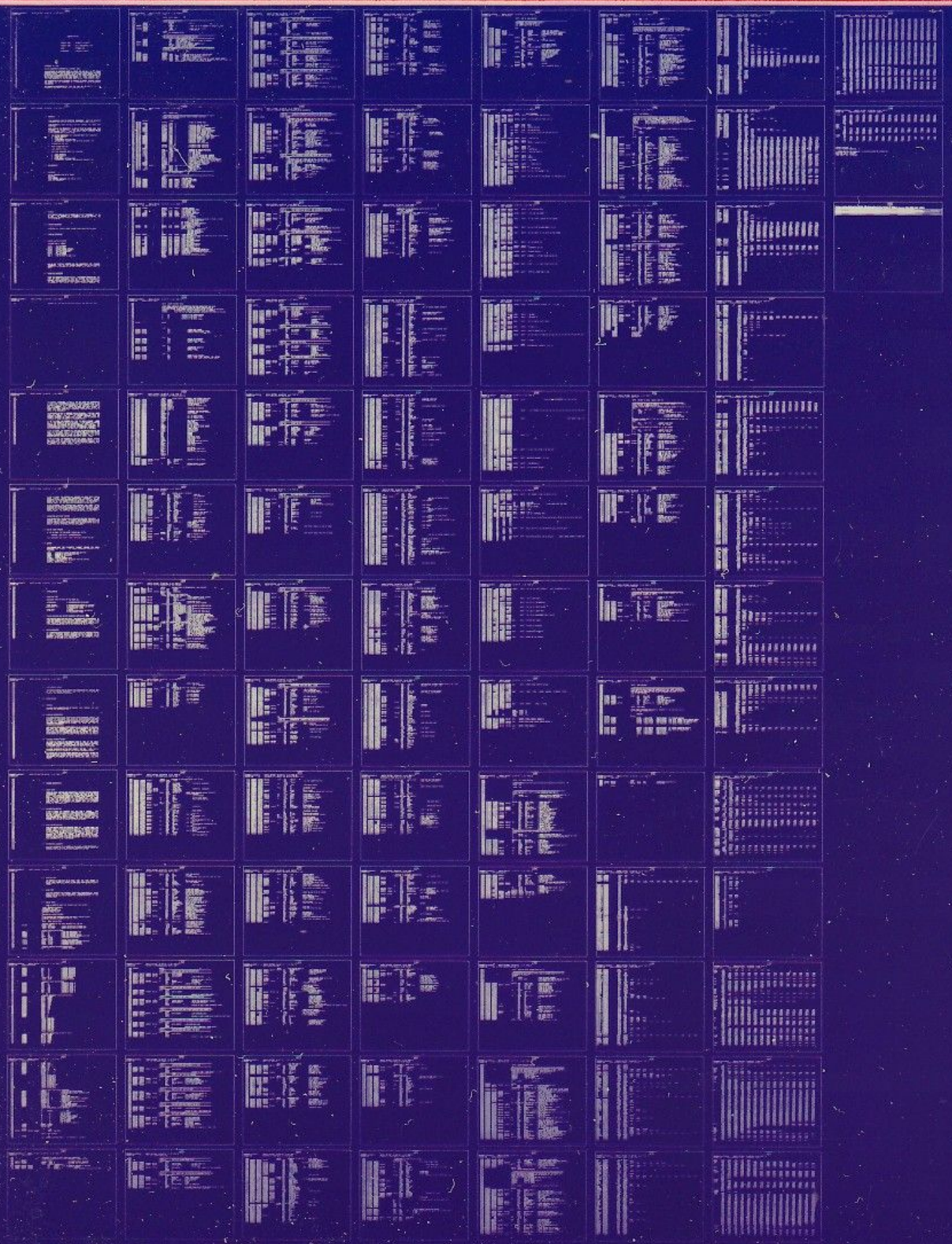
EP-DVADA-A-DL-A

FICHE 1 OF 1

NOV 1976

digital

MADE IN U.S.A



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.REM  x
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IDENTIFICATION

PRODUCT CODE: MAINDEC-11-DVADA-A
PRODUCT NAME: ADV11 PERFORMANCE TEST
DATE: OCTOBER 1976
MAINTAINER: DIAGNOSTIC GROUP

1.0 ABSTRACT

THIS DIAGNOSTIC HAS TWO STARTING ADDRESSES: 200 FOR STANDARD TOLERANCES AND 210 FOR THE OPTION TEST AREA'S BURN IN TEST.

THIS DIAGNOSTIC TESTS THE ADV11 WITH OR WITHOUT THE BERG TEST CONNECTOR.

WHEN STARTING THE DIAGNOSTIC, A SET OF TESTS IS LISTED AND THIS STATEMENT IS PRINTED OUT: "TYPE THE LETTER AND CARRIAGE RETURN OF THE DESIRED TEST:". THE FOLLOWING CHART INDICATES WHICH LETTER CORRESPONDS TO WHICH TEST:

W: THE ENTIRE WRAPAROUND TEST (REQUIRES BERG TEST CONNECTOR)
- A. ANALOG SUBTESTS
- B. NOISE TEST
- C. INTERCHANNEL SETTLING TEST
- D. DIFFERENTIAL LINEARITY AND RELATIVE ACCURACY TEST

C: CALIBRATION TEST ONLY

P: PRINT VALUES TEST ONLY

L: LOGIC SUBTESTS ONLY

A: AUTO TEST (REQUIRES BERG TEST CONNECTOR)
- A. LOGIC SUBTESTS
- B. ANALOG SUBTESTS
- C. NOISE TEST
- D. INTERCHANNEL SETTLING TEST
- E. DIFFERENTIAL LINEARITY AND RELATIVE ACCURACY TEST

2.0 REQUIREMENTS

2.1 EQUIPMENT

LSI-11 COMPUTER WITH 8K OF MEMORY
TELETYPE
ADV11 MODULE
VT55 TERMINAL SUPPORTED FOR GRAPHIC OUTPUT
BERG TEST CONNECTOR

2.2 STORAGE

THIS PROGRAM USES ALL 8K OF MEMORY AND IS NOT "CHAINABLE" ON AN 8K CPU. THE PROGRAM IS "CHAINABLE" ON 12K OR GREATER. THE PROGRAM WILL DESTROY "ABSOLUTE LOADER" ON AN 8K CPU, IF "W" OR "A" IS SELECTED.

3.0 LOADING PROCEDURE

PROCEDURE FOR LOADING NORMAL BINARY TAPES SHOULD BE FOLLOWED.

4.0 STARTING PROCEDURE

4.1 CONTROL SWITCH SETTINGS

STANDARD PDP-11 FORMAT

```
SW15=1    HALT ON ERROR
SW14=1    LOOP ON TEST
SW13=1    INHIBIT ERROR TYPEOUTS
SW12=1    HALT FOR VT55 DISPLAY
SW11=1    INHIBIT ITERATIONS
SW10=1    BELL ON ERROR
SW9 =1    LOOP ON ERROR
SW8 =1    LOOP ON TEST IN SWR <7:0>
```

200 IS THE STARTING ADDRESS OF THE DIAGNOSTIC FOR STANDARD TOLERANCES. 204 IS THE RESTART ADDRESS. 210 IS THE STARTING ADDRESS OF THE DIAGNOSTIC FOR THE OPTION TEST AREA'S BURN IN TEST.

5.0 OPERATING PROCEDURE

START THE DIAGNOSTIC AT 200 OR 210. THE PROGRAM HEADING AND THE LIST OF TESTS AVAILABLE, WILL BE PRINTED OUT FOLLOWED BY A MESSAGE "TYPE LETTER AND <CR> FOR TEST:". THEN TYPE THE LETTER YOU WANT, ACCORDING TO THE TABLE LISTED AND HIT CARRIAGE RETURN. IF STARTED AT THE OPTION TEST AREA'S STARTING ADDRESS, THE

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  161                    PROGRAM WILL NOT ASK FOR THE TEST BUT WILL RUN THE LOGIC TEST.
```

```
162
163
164
165                     TWO CONTROL CHARACTERS, ↑A AND ↑C, ARE SET ASIDE FOR INTERRUPTING
166                     A TEST AND TRANSFERRING CONTROL TO EITHER THE BEGINNING OF THE
167                     DIAGNOSTIC (↑C) OR TO THE BEGINNING OF THE SPECIFIC TEST WHICH
168                     WAS IN PROGRESS (↑A). DURING THE LOGIC TESTS WHILE A RESET IS
169                     BEING PERFORMED, ↑C OR ↑A WILL NOT BE EXECUTED UNTIL AFTER THE
170                     RESET HAS BEEN COMPLETED, THEREFORE CONTINUE TYPING ↑C OR ↑A
171                     UNTIL IT IS SUCCESSFUL.
172
173                     FOR MACHINES WITHOUT A HARDWARE SWITCH REGISTER, LOCATION SWREG
174                     (176) IS USED AS A SOFTWARE SWITCH REGISTER. TO MODIFY THE
175                     CONTENTS OF SWREG, TYPE ↑G. THE PROGRAM RESPONDS WITH THE
176                     CURRENT CONTENTS OF SWREG AND A SLASH. TYPE THE DESIRED NEW
177                     CONTENTS OF SWREG FOLLOWED BY A CARRIAGE RETURN.
178
179                     IF "W" IS TYPED, THE PROGRAM WILL TYPE "XX ADV11'S FOUND". WHERE
180                     XX IS THE NUMBER OF ADV11'S IN OCTAL. IF THE NUMBER IS GREATER
181                     THAN 1, THE TEST WILL BE RUN SUCCESSIVELY ON EACH ADV11. THE
182                     PROGRAM WILL RUN THROUGH THE ANALOG SUBTESTS, THE NOISE TEST, THE
183                     INTERCHANNEL SETTLING TEST, AND THE DIFFERENTIAL LINEARITY AND
184                     RELATIVE ACCURACY TEST. THE BERG TEST CONNECTOR IS REQUIRED.
185
186                     IF "C" IS TYPED, THE PROGRAM WILL RUN THE CALIBRATION ROUTINE AND
187                     LOOP ON THE TEST UNTIL IT IS CALIBRATED AND A CARRIAGE RETURN
188                     TYPED. IF A CERTAIN ADV11 IS TO BE CALIBRATED, ITS STATUS
189                     REGISTER ADDRESS MUST BE LOADED INTO $BASE (1250), AND ITS VECTOR
190                     ADDRESS MUST BE LOADED INTO THE LOW BYTE OF $VECT1 (1244).
191
192                     IF "P" IS TYPED, THE PROGRAM WILL RUN THE PRINT VALUES ROUTINE
193                     AND WILL LOOP ON THAT TEST UNTIL THE OPERATOR HALTS IT. IF A
194                     CERTAIN ADV11 IS TO BE TESTED, ITS STATUS REGISTER ADDRESS MUST
195                     BE LOADED INTO $BASE (1250), AND ITS VECTOR ADDRESS MUST BE
196                     LOADED INTO THE LOW BYTE OF $VECT1 (1244).
```

IF "A" IS TYPED, THE PROGRAM WILL EXECUTE THE LOGIC TESTS, ANALOG TESTS, NOISE, SETTLE AND DIFFERENTIAL LINEARITY. AT THE BEGINNING OF THE TEST THE PROGRAM WILL TYPE "XX ADV11'S FOUND". WHERE XX IS THE NUMBER OF ADV11'S IN OCTAL. IF THE NUMBER IS GREATER THAN 1 THE TEST WILL RUN SUCCESSIVELY ON EACH ADV11.

IF "L" IS TYPED, THE PROGRAM WILL EXECUTE THE LOGIC TESTS, PRINTING "END PASS" WHEN IT HAS COMPLETED AN ENTIRE PASS. AT THE BEGINNING OF THE TEST THE PROGRAM WILL TYPE "XX ADV11'S FOUND". WHERE XX IS THE NUMBER OF ADV11'S IN OCTAL. IF THE NUMBER IS GREATER THAN 1, THE TEST WILL BE RUN SUCCESSIVELY ON EACH ADV11.

5.1 INHIBITING AUTO-SIZE FEATURE

THIS PROGRAM WILL AUTOMATICALLY AUTO-SIZE AND TEST EACH ADV11 IT DETECTS ON THE SYSTEM. TO INHIBIT THIS FEATURE, SET BIT 15 OF LOCATION SENVM (1214). ALSO, LOAD LOCATION SBASE (1250) WITH THE ADV11'S STATUS REGISTER ADDRESS AND THE LOW BYTE OF LOCATION SVECT1 (1244) WITH THE ADV11'S VECTOR ADDRESS.

5.2 END OF PASS TYPEOUTS

AT END OF PASS, THE FOLLOWING TYPEOUT WILL OCCUR:

"ENDPASS GOOD UNITS 0000000000000011

THIS INDICATES THAT UNITS 1 AND 2 HAVE RUN WITHOUT FAILURE.

6.0 ERRORS

THIS PROGRAM USES THE DIAGNOSTIC "SYSMAC" PACKAGE FOR ERROR REPORTING AND TYPEOUT. THE ERROR INFORMATION CONSISTS OF THE FOLLOWING:

ERRPC: LOCATION AT WHICH AN ERROR WAS DETECTED.
STREG: ADDRESS OF THE STATUS REGISTER.
ADBUFF: ADDRESS OF THE BUFFER
CHANL: CHANNEL VALUE
NOMINAL: EXPECTED CORRECT DATA
TOLERANCE: THE ACCEPTABLE DEVIATION FROM THE NOMINAL
ACTUAL: ACTUAL DATA
EXPECTED: EXPECTED CORRECT DATA

7.0 MISCELLANEOUS

7.1 EXECUTION TIME

EXECUTION TIME FOR EACH OF THE TESTS IS:

CALIBRATION:	5 CONVERSIONS/MIN @110 BAUD
PRINT VALUES:	8 CONVERSIONS/8 SECONDS @ 110 BAUD
WRAPAROUND TEST:	7 MINUTES FIRST PASS; 32 MINUTES FOR SUCCESSIVE PASSES
LOGIC TEST:	1 MINUTE
AUTO TEST:	8 MINUTES FIRST PASS, 33 MINUTES FOR SUCCESSIVE PASSES

7.2 STATUS REGISTEN AND VECTOR ADDRESSES AND PRIORITY

WHEN TESTING MORE THAN ONE ADV11, THE DIFFERENCE IN ADDRESSES IS 4 FOR BUS ADDRESS AND 10 FOR VECTOR ADDRESS. THESE VALUES ARE IN VADR (BUS ADDRESS) (1332) AND VVCT (VECTOR ADDRESS) (1334). THE FIRST ADV11'S STATUS REGISTER ADDRESS MUST BE IN $BASE (1250), ITS VECTOR ADDRESS MUST BE IN THE LOW BYTE OF $VECT1 (1244).

7.3 SWITCH REGISTER

IF A HARDWARE SWITCH REGISTER IS PRESENT AND THE OPERATOR DESIRES TO USE A SOFTWARE SWITCH REGISTER AND THE ↑G FEATURE; IT IS NECESSARY TO LOAD THE STARTING ADDRESS, SET THE HARDWARE SWITCH REGISTER TO ALL ONES (-1), AND HIT START. THE PROGRAM WILL THEN RUN WITH THE SOFTWARE SWITCH REGISTER.

7.4 VT55 GRAPHIC OUTPUT

THE SCREEN DISPLAY MAY BE HALTED FOR EXAMINATION BY SETTING BIT 12 OF THE SWITCH REGISTER. AND THEN JUST HIT CONTINUE TO COMPLETE THE PROGRAM'S EXECUTION.

8.0 RESTRICTIONS

8.1 TESTING

THE BERG TEST CONNECTOR MUST BE PRESENT WHEN RUNNING THE AUTO TEST AND THE WRAPAROUND TEST.

8.2 STARTING RESTRICTION

IF A FREE-RUNNING CLOCK, SUCH AS 60HZ FROM THE POWER SUPPLY, IS ATTACHED TO THE BEVNT BUS LINE ON BOTH REV LEVEL C/D AND E SYSTEMS, AN INTERRUPT TO LOCATION 100 WILL OCCUR WHEN USING THE "G" AND "L" COMMANDS PRIOR TO EXECUTING THE FIRST INSTRUCTION. THEREFORE THIS PROGRAM CAN NOT DISABLE THE BEVNT BUS LINE BY INHIBITING INTERRUPTS.

USER SYSTEMS REQUIRING A FREE-RUNNING CLOCK ATTACHED TO THE BEVNT BUS LINE CAN TEMPORARILY AVOID THIS SITUATION BY SETTING THE PSW(R5) TO 200, INSTEAD OF USING THE "G" COMMAND, LOAD THE PC (R7) WITH THE STARTING ADDRESS AND USE THE PROCEED "P" COMMAND. BEFORE USING THE "L" COMMAND, THE PSW(R5) CAN BE SET TO 200 TO AVOID RECEIVING THE BEVNT INTERRUPT AFTER LOADING THE ABS LOADER.

8.3 POSSIBLE PROGRAM "BOMBS"

THE FIRST TWO TESTS OF THIS PROGRAM CHECK TO SEE IF THE ADV11 RESPONDS TO THE EXPECTED ADDRESS. IF THE ADV11 DOES NOT RESPOND, A BUSS ERROR OCCURS. ALSO BUS ERRORS CAN OCCUR DURING THE TIME THE PROGRAM SIZES TO SEE HOW MANY ADV11'S ARE ON YOUR SYSTEM.

FOR MORE INFORMATION ON THE NEXT SUBJECT, SEE JAN. 1976 LSI-11 ENGINEERING BULLETIN ISSUED BY THE DIGITAL COMPONENTS GROUP.

BUS ERRORS MAY ALTER THE PRESET CONTENTS OF LOCATION 4 BEFORE THE TRAP IS EXECUTED, THEREBY TRANSFERRING PROGRAM CONTROL TO AREA IN THE PROGRAM THAT WAS NOT SET UP TO HANDLE THE TRAP. IF THIS HAPPENS, THE PROGRAM WILL "BOMB" AND POSSIBLY REWRITE PARTS OF ITSELF.

9.0 PROGRAM DESCRIPTION

9.1 LOGIC TESTS

THESE 23 LOGIC SUBTESTS RUN SEQUENTIALLY WITHOUT FURTHER OPERATOR INTERVENTION. ITS PURPOSE IS TO CHECK THAT EACH OF THE STATUS REGISTER BITS THAT ARE READ/WRITE CAN BE LOADED AND PROPERLY READ BACK; THAT INITIALIZE CLEARS THE EXTERNAL START ENABLE BIT, THE DONE BIT, THE INTERRUPT ENABLE BIT, THE OVERFLOW BIT, THE ERROR FLAG, AND THE A/D START BIT. IT ALSO CHECKS THAT THE A/D DONE FLAG SETS AT END OF CONVERSION AND CLEARS WHEN THE CONVERTED VALUE IS READ. IT CHECKS THE INTERRUPT LOGIC AND THE CORRECT SETTING OF THE ERROR FLAG.

9.2 CALIBRATION ROUTINE

IF "C" IS TYPED, THE PROGRAM WILL ASK FOR A CHANNEL. TYPE CHANNEL NUMBER FOLLOWED BY A CARRIAGE RETURN. THE PROGRAM WILL ASK YOU IF YOU WANT OFFSET OR GAIN. APPLY VOLTAGE REQUESTED TO SELECTED CHANNEL. ADJUST POT REQUESTED FOR 0.00 LSB TYPEOUT. TYPE CARRIAGE RETURN WHEN ADJUSTED. THE LAST TYPEOUT WILL BE CHECKED FOR 0.00 LSB WITH A TOLERANCE OF 0.04 LSB IF OUTSIDE, THE PROGRAM WILL ASK YOU TO ADJUST THE SAME POT AGAIN.

9.3 PRINT VALUES ROUTINE

THIS TEST BEGINS WHEN THE OPERATOR TYPES "P". IT THEN LOADS THE CHANNEL FROM THE SWITCH REGISTER BITS 0-7 AND DOES A CONVERSION ON THAT CHANNEL. IF SWR BIT 13 IS DOWN (0), IT PRINTS OUT THE CONVERTED VALUE ON THE TELETYPE; OTHERWISE, IF SWR BIT 13 IS UP (1), IT PUTS THE CONVERTED VALUE IN THE DISPLAY REGISTER. THE OPERATOR MAY CHANGE THE CHANNEL AT ANY TIME DURING THE TEST, HOWEVER THE NEW VALUES FROM THE NEW CHANNEL WILL NOT BE PRINTED UNTIL THE NEXT LINE OF 8 VALUES IS PRINTED. THE 8 VALUES ON EACH LINE CORRESPOND TO ONLY ONE CHANNEL.

9.4 DIFFERENTIAL LINEARITY

THIS TEST DETERMINE IF A CHANGE IN THE INPUT VOLTAGE REPRESENTS A SIMILAR CHANGE IN THE RESULTING CONVERTED BINARY VALUE, BY MEASURING THE WIDTH OF EACH STATE CORRECT TO 0.01 LSB.

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                                9.5  SETTLING TEST

                                     THE PURPOSE OF THIS TEST IS TO CHECK  THAT  THE  TIME  NEEDED  TO
                                     SETTLE  AND  CORRECTLY  REPORT  A NEW INPUT VALUE AFTER SWITCHING
                                     CHANNELS DOES NOT EXCEED THE EXPECTED AMOUNT OF TIME FOR  SUCH  A
                                     CHANGE.



                                9.6  NOISE TEST

                                     THIS TEST MEASURES THE INTERNAL  SHORT-TERM  REPEATABILITY  NOISE
                                     WITHIN  THE  A/D.   RMS  NOISE EQUALS 1 STANDARD DEVIATION OF THE
                                     GAUSSIAN CURVE, PEAK NOISE EQUALS 2.3 STANDARD DEVIATION  OF  THE
                                     GAUSSIAN CURVE.



                                9.7  ANALOG TESTS

                                     THESE 6 SUBTESTS CHECK THE CHANNELS AND THEIR OUTPUT.
                                        %
                                .TITLE  MAINDEC-11-DVADA-A
                                ;*COPYRIGHT (C) 1976
                                ;*DIGITAL EQUIPMENT CORP.
                                ;*MAYNARD, MASS. 01754
                                ;*
                                ;*PROGRAM BY GEORGE STEVENS
                                ;*
                                ;*THIS PROGRAM WAS ASSEMBLED USING THE PDP-11 MAINDEC SYSMAC
                                ;*PACKAGE (MAINDEC-11-DZQAC-CO),MAR 21, 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
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                        R1=     %1              ;;GENERAL REGISTER
                        R2=     %2              ;;GENERAL REGISTER
                        R3=     %3              ;;GENERAL REGISTER
                        R4=     %4              ;;GENERAL REGISTER
                        R5=     %5              ;;GENERAL REGISTER
                        R6=     %6              ;;GENERAL REGISTER
                        R7=     %7              ;;GENERAL REGISTER
                        .EQUIV  R6,SP           ;;STACK POINTER
                        .EQUIV  R7,PC           ;;PROGRAM COUNTER

                        ;*PRIORITY LEVEL DEFINITIONS
                        PR0=    0               ;;PRIORITY LEVEL 0
                        PR1=    40              ;;PRIORITY LEVEL 1
                        PR2=    100             ;;PRIORITY LEVEL 2
                        PR3=    140             ;;PRIORITY LEVEL 3
                        PR4=    200             ;;PRIORITY LEVEL 4
                        PR5=    240             ;;PRIORITY LEVEL 5
                        PR6=    300             ;;PRIORITY LEVEL 6
                        PR7=    340             ;;PRIORITY LEVEL 7

                        ;*"SWITCH REGISTER" SWITCH DEFINITIONS
                        SW15=   100000
                        SW14=   40000
                        SW13=   20000
                        SW12=   10000
                        SW11=   4000
                        SW10=   2000
                        SW09=   1000
                        SW08=   400
                        SW07=   200
                        SW06=   100
                        SW05=   40
                        SW04=   20
                        SW03=   10
                        SW02=   4
                        SW01=   2
                        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
```

```
                                BIT08=  400
                                BIT07=  200
                                BIT06=  100
                                BIT05=  40
                                BIT04=  20
                                BIT03=  10
                                BIT02=  4
                                BIT01=  2
                                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
000030                          EMTVEC= 30              ;;EMULATOR TRAP (EMT) **ERROR**
000034                          TRAPVEC=34              ;;"TRAP" TRAP
000060                          TKVEC=  60              ;;TTY KEYBOARD VECTOR
000064                          TPVEC=  64              ;;TTY PRINTER VECTOR
000240                          PIRQVEC=240             ;;PROGRAM INTERRUPT REQUEST VECTOR
                                .SBTTL  OPERATIONAL SWITCH SETTINGS
                                ;*
                                ;*      SWITCH                  USE
                                ;*      ------          --------------------
                                ;*        15            HALT ON ERROR
                                ;*        14            LOOP ON TEST
                                ;*        13            INHIBIT ERROR TYPEOUTS
                                ;*        12            HALT FOR VT55 DISPLAY
                                ;*        11            INHIBIT ITERATIONS
                                ;*        10            BELL ON ERROR
                                ;*         9            LOOP ON ERROR
                                ;*         8            LOOP ON TEST IN SWR<7:0>
170400                          ABASE=  170400
100400                          AVECT1= 100400
000200                          APRIOR= 200

000100                                  .=100
000100  000104  000200  000002          .WORD   104,200,2

                                .SBTTL  TRAP CATCHER

000000                                  .=0
                                ;*ALL UNUSED LOCATIONS FROM 4 - 776 CONTAIN A ".+2,HALT"
```

NO1


```
                                ;*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  001644          JMP     @#BEGIN ;;JUMP TO STARTING ADDRESS OF PROGRAM
000204  000137  002262          JMP     @#BEG2          ;RESTART ADDRESS
000210  000137  001652          JMP     @#BEGIN2                ;START ADDRESS FOR OPTION TEST AREA
```

```
                                .SBTTL  ACT11 HOOKS

                                ;;**********************************************************************
                                ;HOOKS REQUIRED BY ACT11
000214                                  $SVPC=.                 ;SAVE PC
000046                                  .=46
000046  011744                          $ENDAD                  ;;1)SET LOC.46 TO ADDRESS OF $ENDAD IN .$EOP
000052                                  .=52
000052  000000                          .WORD   0               ;;2)SET LOC.52 TO ZERO
000214                                  .=$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.

                                $APTHD:
001000                          $HIBTS: .WORD   0       ;;TWO HIGH BITS OF 18 BIT MAILBOX ADDR.
001002  001174                  $MEADR: .WORD   $MAIL   ;;ADDRESS OF APT MAILBOX (BITS 0-15)
001004  002260                  $TSTM:  .WORD   120C.   ;;RUN TIM OF LONGEST TEST
001006  000764                  $PASTM: .WORD   500.    ;;RUN TIME IN SECS. OF 1ST PASS ON 1 UNIT (QUICK VERIFY)
001010  003244                  $UNITM: .WORD   1700.   ;;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                  000000  $CMTAG:                         ;;START OF COMMON TAGS
001100  000000                          .WORD   0
001102      000         000     $TSTNM: .BYTE   0               ;;CONTAINS THE TEST NUMBER
001103      000         000     $ERFLG: .BYTE   0               ;;CONTAINS ERROR FLAG
001104  000000          000     $ICNT:  .WORD   0               ;;CONTAINS SUBTEST ITERATION COUNT
001106  000000          000     $LPADR: .WORD   0               ;;CONTAINS SCOPE LOOP ADDRESS
001110  000000          000     $LPERR: .WORD   0               ;;CONTAINS SCOPE RETURN FOR ERRORS
001112  000000          000     $ERTTL: .WORD   0               ;;CONTAINS TOTAL ERRORS DETECTED
001114      000         000     $ITEMB: .BYTE   0               ;;CONTAINS ITEM CONTROL BYTE
001115      001         001     $ERMAX: .BYTE   1               ;;CONTAINS MAX. ERRORS PER TEST
001116  000000          000     $ERRPC: .WORD   0               ;;CONTAINS PC OF LAST ERROR INSTRUCTION
001120  000000          000     $GDADR: .WORD   0               ;;CONTAINS ADDRESS OF 'GOOD' DATA
001122  000000          000     $BDADR: .WORD   0               ;;CONTAINS ADDRESS OF 'BAD' DATA
001124  000000          000     $GDDAT: .WORD   0               ;;CONTAINS 'GOOD' DATA
001126  000000          000     $BDDAT: .WORD   0               ;;CONTAINS 'BAD' DATA
001130  000000          000             .WORD   0               ;;RESERVED--NOT TO BE USED
001132  000000          000             .WORD   0
001134      000         000     $AUTOB: .BYTE   0               ;;AUTOMATIC MODE INDICATOR
001135      000         000     $INTAG: .BYTE   0               ;;INTERRUPT MODE INDICATOR
001136  000000          000             .WORD   0
001140  177570          000     SWR:    .WORD   DSWR            ;;ADDRESS OF SWITCH REGISTER
001142  177570          000     DISPLAY: .WORD  DDISP           ;;ADDRESS OF DISPLAY REGISTER
001144  177560          000     $TKS:   177560                  ;;TTY KBD STATUS
001146  177562          000     $TKB:   177562                  ;;TTY KBD BUFFER
001150  177564          000     $TPS:   177564                  ;;TTY PRINTER STATUS REG. ADDRESS
001152  177566          000     $TPB:   177566                  ;;TTY PRINTER BUFFER REG. ADDRESS
001154      000         000     $NULL:  .BYTE   0               ;;CONTAINS NULL CHARACTER FOR FILLS
001155      002         002     $FILLS: .BYTE   2               ;;CONTAINS # OF FILLER CHARACTERS REQUIRED
001156      012         012     $FILLC: .BYTE   12              ;;INSERT FILL CHARS. AFTER A "LINE FEED"
001157      000         000     $TPFLG: .BYTE   0               ;;"TERMINAL AVAILABLE" FLAG (BIT<07>=0=YES)
001160  000000          000     $TIMES: 0                       ;;MAX. NUMBER OF ITERATIONS
001162  000000          000     $ESCAPE:0                       ;;ESCAPE ON ERROR ADDRESS
001164  177607  000377    000     $BELL:  .ASCIZ  <207><377><377> ;;CODE FOR BELL
001170      077         077     $QUES:  .ASCII  /?/             ;;QUESTION MARK
001171      015         015     $CRLF:  .ASCII  <15>            ;;CARRIAGE RETURN
001172  000012          000     $LF:    .ASCIZ  <12>            ;;LINE FEED
                                ;;**********************************************************************
                                .SBTTL  APT MAILBOX-ETABLE

                                ;;**********************************************************************
                                .EVEN
001174                          $MAIL:                          ;;APT MAILBOX
001174  000000          000     $MSGTY: .WORD   AMSGTY          ;;MESSAGE TYPE CODE
001176  000000          000     $FATAL: .WORD   AFATAL          ;;FATAL ERROR NUMBER
001200  000000          000     $TESTN: .WORD   ATESTN          ;;TEST NUMBER
001202  000000          000     $PASS:  .WORD   APASS           ;;PASS COUNT
001204  000000          000     $DEVCT: .WORD   ADEVCT          ;;DEVICE COUNT
001206  000000          000     $UNIT:  .WORD   AUNIT           ;;I/O UNIT NUMBER
001210  000000          000     $MSGAD: .WORD   AMSGAD          ;;MESSAGE ADDRESS
```

```
  662  001212  000000                $MSGLG: .WORD   AMSGLG  ;;MESSAGE LENGTH
  663  001214                      $ETABLE:                    ;;APT ENVIRONMENT TABLE
  664  001214      000             $ENV:   .BYTE   AENV    ;;ENVIRONMENT BYTE
  665  001215      000             $ENVM:  .BYTE   AENVM   ;;ENVIRONMENT MODE BITS
  666  001216  000000              $SWREG: .WORD   ASWREG  ;;APT SWITCH REGISTER
  667  001220  000000              $USWR:  .WORD   AUSWR   ;;USER SWITCHES
  668  001222  000000              $CPUOP: .WORD   ACPUOP  ;;CPU TYPE,OPTIONS
  669                              ;*                      BITS 15-11=CPU TYPE
  670                              ;*                              11/04=01,11/05=02,11/20=03,11/40=04,11/45=05
  671                              ;*                              11/70=06,PDQ=07,Q=10
  672                              ;*                      BIT 10=REAL TIME CLOCK
  673                              ;*                      BIT  9=FLOATING POINT PROCESSOR
  674                              ;*                      BIT  8=MEMORY MANAGEMENT
  675  001224      000             $MAMS1: .BYTE   AMAMS1  ;;HIGH ADDRESS,M.S. BYTE
  676  001225      000             $MTYP1: .BYTE   AMTYP1  ;;MEM. TYPE,BLK#1
  677                              ;*                      MEM.TYPE BYTE   --  (HIGH BYTE)
  678                              ;*                              900 NSEC CORE=001
  679                              ;*                              300 NSEC BIPOLAR=002
  680                              ;*                              500 NSEC MOS=003
  681  001226  000000              $MADR1: .WORD   AMADR1  ;;HIGH ADDRESS,BLK#1
  682                              .*                        MEM.LAST ADDR.=3 BYTES,THIS WORD AND LOW OF "TYPE" ABOVE
  683  001230      000             $MAMS2: .BYTE   AMAMS2  ;;HIGH ADDRESS,M.S. BYTE
  684  001231      000             $MTYP2: .BYTE   AMTYP2  ;;MEM.TYPE,BLK#2
  685  001232  000000              $MADR2: .WORD   AMADR2  ;;MEM.LAST ADDRESS,BLK#2
  686  001234      000             $MAMS3: .BYTE   AMAMS3  ;;HIGH ADDRESS,M.S.BYTE
  687  001235      000             $MTYP3: .BYTE   AMTYP3  ;;MEM.TYPE,BLK#3
  688  001236  000000              $MADR3: .WORD   AMADR3  ;;MEM.LAST ADDRESS,BLK#3
  689  001240      000             $MAMS4: .BYTE   AMAMS4  ;;HIGH ADDRESS,M.S.BYTE
  690  001241      000             $MTYP4: .BYTE   AMTYP4  ;;MEM.TYPE,BLK#4
  691  001242  000000              $MADR4: .WORD   AMADR4  ;;MEM.LAST ADDRESS,BLK#4
  692  001244  100400              $VECT1: .WORD   AVECT1  ;;INTERRUPT VECTOR#1,BUS PRIORITY#1
  693  001246  000000              $VECT2: .WORD   AVECT2  ;;INTERRUPT VECTOR#2BUS PRIORITY#2
  694  001250  170400              $BASE:  .WORD   ABASE   ;;BASE ADDRESS OF EQUIPMENT UNDER TEST
  695  001252  000000              $DEVM:  .WORD   ADEVM   ;;DEVICE MAP
  696  001254  000000              $CDW1:  .WORD   ACDW1   ;;CONTROLLER DESCRIPTION WORD#1
  697  001256                      $ETEND:
  698                              .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  014261                          EM1                     ;STATUS REG, ERROR
001260  014401                          DH1                     ;ERRPC STREG EXPECTED ACTUAL
001262  014560                          DT1                     ;SERRPC, STREG, $GDDAT, $BDDAT
001264  014620                          DF1


                                ;ITEM   2
001266  014303                          EM2                     ;FAILED TO INTERRUPT
001270  014520                          DH3                     ;ERRPC STREG ACTUAL
001272  014610                          DT3                     ;SERRPC, STREG,  $BDDAT
001274  014620                          DF1

                                ;ITEM   3
001276  014327                          EM3                     ;UNEXPECTED INTERRUPT
001300  014520                          DH3                     ;ERRPC STREG
001302  014610                          DT3                     ;SERRPC, STREG
001304  014620                          DF1

                                ;ITEM   4
001306  014354                          EM4                     ;ERROR ON A/D CHANNEL
001310  014435                          DH2                     ;ERRPC  STREG  CHAN  NOMINAL  TOL  ACTUAL
001312  014572                          DT2                     ;SERRPC,STREG,CHANL,$GDDAT,SPREAD,$BDDAT
001314  014620                          DF1
```

```
                                .SBTTL      MISCELLANEOUS, TEMPORARY, AND STORAGE LOCATIONS
001316  170400          STREG:  ABASE                   ;ADDRESS OF STATUS REGISTER
001320  170401          ADSTI:  ABASE+1                 ;UPPER BYTE OF STATUS REG.
001322  170402          ADBUFF: ABASE+2                 ;ADDRESS OF A/D BUFFER
001324  100400          VECTOR: AVECT1                  ;VECTOR ADDRESS
001326  000200          BASEBR: APRIOR                  ;INTERRUPT PRIORITY LEVEL
001330  100402          VECTR1: AVECT1+2
001332  100404          VECTR2: AVECT1+4                ;ERROR VECTOR ADDRESS
001334  100406          VECTR3: AVECT1+6
001336  000004          VADR:   4                       ;INCREMENT FOR BUS ADDRESS
001340  000010          VVCT:   10                      ;INCREMENT FOR VECTOR ADDRESS
001342  000000          BASECH: 0                       ;BASE CHANNEL
001344  000060          KBVECT: 60
001346  000000          WIDE:   0                       ;NO. OF WIDE STATES
001350  000000          NARROW: 0                       ;NO. OF NARROW STATES
001352  000000          FIRST:  0
001354  000000          SKIPST: 0                       ;NO. OF SKIPPED STATES
001356  000000          TEMP:   0                       ;WORK AREA
001360  000000          CH1:    0                       ;FIRST CHANNEL
001362  000000          CH2:    0                       ;SECOND CHANNEL
001364  000000          NAEXT:  0                       ;NO. OF ADV11'S TO BE TESTED
001366  000000          N'EXT:  0                       ;NO. OF ADV11'S TO BE TESTED
001370  000000          DUMMY:  0                       ;DUMMY CHANNEL
001372  000000          CHANL:  0                       ;CHANNEL VALUE
001374  000000          TADDR:  0                       ;TEST ADDRESS
001376  000000          RNA:    0                       ;RANDOM
001400  000000          RNB:    0                       ;NUMBER
001402  000000          RNC:    0                       ;VALUES
001404  000000          RMS:    0                       ;RMS NOISE VALUE
001406  000000          PEAK:   0                       ;PEAK NOISE VALUE
001410  000000          FLAG:   0                       ;VT55 FLAG
001412  000000          SPREAD: 0                       ;DEVIATION FROM THE NOMINAL
001414  000000          DAC:    0                       ;SAR VALUE
001416  000000          DELAY:  0                       ;TIME DELAY COUNTER
001420  000000          EDGE:   0                       ;EDGE VALUE
001422  000000          BITPNT: 0
001424  000000          MIN:    0                       ;MIN VALUE
001426  000000          WFTEST: 0                       ;OPTION TEST AREA FLAG
001430  000000          MAX:    0                       ;MAX VALUE
001432  000000          PERCNT: 0                       ;PERCENT FOR SAR ROUTINE
001434  000000          OUT:    0
001436  000000          GUNITS: 0
001440  000001          TSTBIT: 1

001442                  UNEXP:
001442  012737  001456  001162        MOV     #1$,$ESCAPE     ;;ESCAPE TO 1$ ON ERROR
001450  005237  001103                INC     $ERFLG
001454  104003                      ERROR   3
001456  005037  001162          1$:   CLR     $ESCAPE         ;RETURN ESCAPE TO NORMAL
001462  000002                      RTI                     ;UNEXPECTED INTERRUPT
```

```
                                        .SBTTL      CONTROL A AND C DECODERS
001464  010046                  ISERV:  MOV     R0,-(SP)                ;SAVE R0
001466  017700  177454                  MOV     @#TKB,R0                ;GET CHARACTER
001472  042700  177600                  BIC     #177600,R0
001476  120027  000003                  CMPB    R0,#3                   ;IS IT ↑C?
001502  001010                          BNE     1$
001504  104400  012036                  TYPE    ,CMSG                   ;ECHO CHARACTER
001510  012706  001100                  MOV     #STACK,SP
001514  004737  011300                  JSR     PC,RST                  ;RESET & SET INTRPT. EN.
001520  000137  002262                  JMP     @#BEG2
001524  120027  000001          1$:     CMPB    R0,#1                   ;IS IT ↑A?
001530  001010                          BNE     2$
001532  104400  012031                  TYPE    ,ASMSG                  ;ECHO CHARACTER
001536  012706  001100                  MOV     #STACK,SP
001542  004737  011300                  JSR     PC,RST                  ;RESET & SET INTRPT. EN.
001546  000177  176622                  JMP     @#TADDR                 ;RETURN TO TEST
001552  120027  000007          2$:     CMPB    R0,#7                   ;IS IT ↑G?
001556  001027                          BNE     NONE
001560  023727  001140  177570          CMP     @#SWR,#177570           ;HARDWARE SWREG?
001566  001423                          BEQ     NONE
001570  104400  012043                  TYPE    ,GMSG                   ;ECHO CHARACTER
001574  017746  177340                  MOV     @#SWR,-(SP)     ;;SAVE @#SWR FOR TYPEOUT
                                        ;;TYPE SWREG
001600  104402                          TYPOS                   ;;GO TYPE--OCTAL ASCII
001602     006                          .BYTE   6               ;;TYPE 6 DIGITS
001603     001                          .BYTE   1               ;;TYPE LEADING ZEROS
001604  104400  012223                  TYPE    ,SLASH
001610  104407                          RDOCT                   ;READ NEW VALUE
001612  012677  177322                  MOV     (SP)+,@#SWR             ;LOAD NEW SWREG VALUE
001616  012600                  POPR0:  MOV     (SP)+,R0
001620  022776  000001  000000  RETURN: CMP     #1,20(SP)       ;DOES IT RETURN TO A WAIT?
001626  001002                          BNE     1$              ;NO
001630  062716  000002                  ADD     #2,(SP)         ;BUMP RETURN ADDRESS
001634  000002                  1$:     RTI
001636  104400  012027          NONE:   TYPE    ,QUEST                  ;TYPE "?"
001642  000765                          BR      POPR0
```

```
827                                             .SBTTL          INITIAL START-UP,HOUSEKEEPING, AND DIALOGUE
828  001644  005037  001426                     BEGIN:  CLR     @#FTEST
829  001650  000403                                     BR      RBEG
830  001652  012737  000001  001426             BEGIN2: MOV     #1,@#FTEST
831  001660  000005                             RBEG:   RESET
832                                             .SBTTL  INITIALIZE THE COMMON TAGS
833                                             ;;CLEAR THE COMMON TAGS (SCMTAG) AREA
834  001662  012706  001100                             MOV     #SCMTAG,R6      ;;FIRST LOCATION TO BE CLEARED
835  001666  005026                                     CLR     (R6)+           ;;CLEAR MEMORY LOCATION
836  001670  022706  001140                             CMP     #SWR,R6 ;;DONE?
837  001674  001374                                     BNE     .-6             ;;LOOP BACK IF NO
838  001676  012706  001100                             MOV     #STACK,SP       ;;SETUP THE STACK POINTER
839                                             ;;INITIALIZE A FEW VECTORS
840  001702  012737  015216  000020                     MOV     #$SCOPE,@#IOTVEC ;;IOT VECTOR FOR SCOPE ROUTINE
841  001710  012737  000340  000022                     MOV     #340,@#IOTVEC+2 ;;LEVEL 7
842  001716  012737  015474  000030                     MOV     #$ERROR,@#EMTVEC ;;EMT VECTOR FOR ERROR ROUTINE
843  001724  012737  000340  000032                     MOV     #340,@#EMTVEC+2 ;;LEVEL 7
844  001732  012737  017064  000034                     MOV     #$TRAP,@#TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
845  001740  012737  000340  000036                     MOV     #340,@#TRAPVEC+2;LEVEL 7
846  001746  013737  011664  011656                     MOV     $ENDCT,$EOPCT   ;;SETUP END-OF-PROGRAM COUNTER
847  001754  005037  001160                             CLR     $TIMES          ;;INITIALIZE NUMBER OF ITERATIONS
848  001760  005037  001162                             CLR     $ESCAPE         ;;CLEAR THE ESCAPE ON ERROR ADDRESS
849  001764  112737  000001  001115                     MOVB    #1,$ERMAX       ;;ALLOW ONE ERROR PER TEST
850  001772  012737  001772  001106                     MOV     #.,$LPADR       ;;INITIALIZE THE LOOP ADDRESS FOR SCOPE
851  002000  012737  002000  001110                     MOV     #.,$LPERR       ;;SETUP THE ERROR LOOP ADDRESS
852                                             ;;SIZE FOR A HARDWARE SWITCH REGISTER. IF NOT FOUND OR IT IS
853                                             ;;EQUAL TO A "-1", SETUP FOR A SOFTWARE SWITCH REGISTER.
854  002006  013746  000004                             MOV     @#ERRVEC,-(SP)  ;;SAVE ERROR VECTOR
855  002012  012737  002046  000004                     MOV     #64$,@#ERRVEC   ;;SET UP ERROR VECTOR
856  002020  012737  177570  001140                     MOV     #DSWR,SWR       ;;SETUP FOR A HARDWARE SWICH REGISTER
857  002026  012737  177570  001142                     MOV     #DDISP,DISPLAY  ;;AND A HARDWARE DISPLAY REGISTER
858  002034  022777  177777  177076                     CMP     #-1,@SWR        ;;TRY TO REFERENCE HARDWARE SWR
859  002042  001012                                     BNE     66$             ;;BRANCH IF NO TIMEOUT TRAP OCCURRED
860                                                                             ;;AND  THE HARDWARE SWR IS NOT = -1
861  002044  000403                                     BR      65$             ;;BRANCH IF NO TIMEOUT
862  002046  012716  002054                     64$:    MOV     #65$,(SP)       ;;SET UP FOR TRAP RETURN
863  002052  000002                                     RTI
864  002054  012737  000176  001140             65$:    MOV     #SWREG,SWR      ;;POINT TO SOFTWARE SWR
865  002062  012737  000174  001142                     MOV     #DISPREG,DISPLAY
866  002070  012637  000004                     66$:    MOV     (SP)+,@#ERRVEC  ;;RESTORE ERROR VECTOR
867
868  002074  005037  001202                             CLR     $PASS           ;;CLEAR PASS COUNT
869  002100  132737  000200  001215                     BITB    #APTSIZE,$ENVM  ;;TEST USER SIZE UNDER APT
870  002106  001403                                     BEQ     67$             ;;YES,USE NON-APT SWITCH
871  002110  012737  001216  001140                     MOV     #$SWREG,SWR     ;;NO,USE APT SWITCH REGISTER
872  002116                                     67$:
```

```
  873  002116  005037  001410                    CLR     FLAG            ;CLEAR VT55 FLAG
  874  002122  005737  000042                    TST     @#42                    ;IS IT CHAINED?
  875  002126  001033                            BNE     RESTI
  876                                  .SBTTL          DETERMINE IF VT55 TYPE TERMINAL IS PRESENT
  877  002130  042777  000100  177006            BIC     #100,@#TKS
  878  002136  104400  013724                    TYPE    ,CO             ;TYPE ASCIZ STRING
  879  002142  004737  002432                    JSR     PC,VTFLG        ;GET A CHARACTER
  880  002146  020027  000033                    CMP     R0,#33
  881  002152  001017                            BNE     NOVT55          ;NO VT55 PRESENT
  882  002154  004737  002432                    JSR     PC,VTFLG        ;GET A CHARACTER
  883  002160  020027  000057                    CMP     R0,#57
  884  002164  001012                            BNE     NOVT55          ;NO VT55 PRESENT
  885  002166  004737  002432                    JSR     PC,VTFLG        ;GET A CHARACTER
  886  002172  020027  000103                    CMP     R0,#103
  887  002176  001403                            BEQ     VT55            ;VT55 IS PRESENT
  888  002200  020027  000105                    CMP     R0,#105
  889  002204  001002                            BNE     NOVT55
  890  002206  005237  001410          VT55:     INC     FLAG
```

```
                                        .SBTTL      DIALOGUE TO DETERMINE WHICH TEST TO RUN
002212  104400  014067          NOVT55: TYPE    ,READI
002216  000005                  REST1:  RESET
002220  004737  006310                  JSR     PC,FIXONE               ;INITIALIZE ADDRESSES
002224  013700  001344                  MOV     KBVECT,R0
002230  012720  001464                  MOV     #ISERV,(R0)+
002234  012710  000340                  MOV     #340,(R0)
002240  012737  062341  001376          MOV     #62341,RNA              ;RANDOM NO, VARIABLES
002246  012737  142315  001400          MOV     #142315,RNB
002254  012737  127623  001402          MOV     #127623,RNC
002262  012706  001100          BEG2:   MOV     #STACK,SP       ;RESET STACK POINTER INCASE RESTARTED
002266  000005                          RESET                   ;RESTART ADDRESS
002270  005737  000042                  TST     @#42                    ;IS IT CHAINED?
002274  001405                          BEQ     1$
002276  000137  006030          2$:     JMP     BEGL                    ;GO TO LOGIC TESTS
002302  005737  001426                  TST     WFTEST                  ;TEST FOR OPTION TEST
002306  001373                          BNE     2$              ;;
002310  104400  013541          1$:     TYPE    ,MSG71
002314  104406                  TRYAG:  RDLIN
002316  052777  000100  176620          BIS     #100,@#STKS
002324  005046                          CLR     -(SP)                   ;CLEAR PSW
002326  012746  002334                  MOV     #1$,-(SP)
002332  000002                          RTI
002334  012600                  1$:     MOV     (SP)+,R0                ;READ ANSWER
002336  142710  000040                  BICB    #40,(R0)
002342  121027  000101                  CMPB    (R0),#'A                ;IS IT A?
002346  001002                          BNE     2$              ;;NO, TRY C
002350  000137  006066                  JMP     BEGINA                  ;GO TO AUTO TEST
002354  121027  000103          2$:     CMPB    (R0),#'C                ;IS IT C?
002360  001002                          BNE     3$              ;;NO, TRY P
002362  000137  005364                  JMP     BEGINC                  ;GO TO CALIBRATION TEST
002366  121027  000120          3$:     CMPB    (R0),#'P                ;IS IT P?
002372  001002                          BNE     4$              ;;NO, TRY L
002374  000137  005640                  JMP     BEGINP                  ;GO TO DISPLAY CONVERSIONS TEST
002400  121027  000114          4$:     CMPB    (R0),#'L                ;IS IT L?
002404  001002                          BNE     5$              ;;NO, TRY W
002406  000137  006030                  JMP     BEGL                    ;GO TO LOGIC TESTS
002412  121027  000127          5$:     CMPB    (R0),#'W                ;IS IT W?
002416  001002                          BNE     6$              ;;NO,TRY AGAIN
002420  000137  006150                  JMP     BEGINW                  ;GO TO WRAPAROUND TEST
002424  104400  012027          6$:     TYPE    ,QUEST
002430  000731                          BR      TRYAG                   ;WAIT FOR CHARACTER
```

```
                                VTFLG:  CLR     R0              ;TEST FOR PRESENCE
002434  105777  176504                1$:     TSTB    @$TKS           ;OF VT55
002440  100404                        BMI     2$              ;;VT55 RESPONDS WITH <33><57>[<103> OR <105>]
002442  005300                        DEC     R0
002444  001373                        BNE     1$              ;;
002446  005726                        TST     (SP)+           ;POP A WORD OFF STACK
002450  000660                        BR      NOVT55          ;;NO VT55 PRESENT
002452  017700  176470                2$:     MOV     @$TKB,R0
002456  042700  177600                BIC     #177600,R0              ;TEST VT55 CODE
002462  000207                        RTS     PC

002464  005037  001202                TESTAD: CLR     $PASS           ;CLEAR PASS COUNT
002470  005037  001436                        CLR     GUNITS          ;CLEAR UNIT ERROR BITS
002474  012737  000001  001440                MOV     #1,TSTBIT       ;INITIALIZE MODULE ERROR TEST BIT
002502  012737  000001  001356                MOV     #1,TEMP         ;SET UP FOR ONLY ONE A/D
002510  105737  001215                        TSTB    $ENVM           ;TESTING ONLY ONE A/D?
002514  100411                        BMI     3$              ;;YES
002516  012737  000004  001356                MOV     #4,TEMP         ;SET UP MAX NO OF A/D'S
002524  005737  001426                        TST     WFTEST          ;IS IT IN OPTION TEST
002530  001403                        BEQ     3$              ;;NOT IN OPTION TEST
002532  012737  000020  001356                MOV     #16.,TEMP       ;SET UP OPTION MAX NO OF A/D'S
002540  013737  001250  001126        3$:     MOV     $BASE,$BODAT    ;SETUP TO TEST FOR ADV11'S
002546  013746  000004                        MOV     @#ERRVEC,-(SP)  ;SAVE ERRVEC
002552  012737  002624  000004                MOV     #2$,ERRVEC      ;SET UP FOR TIME OUT ERROR
002560  005037  001364                        CLR     NBEXT           ;CLEAR ADV11 COUNTER
002564  005777  176336                1$:     TST     @$BODAT         ;ADDRESS ADV11
002570  005237  001364                        INC     NBEXT           ;INCREMENT ADV11 COUNTER
002574  053737  001440  001436                BIS     TSTBIT,GUNITS   ;SET A/D BIT UNDER TEST
002602  006337  001440                        ASL     TSTBIT          ;SET TEST BIT FOR NEXT UNIT
002606  005337  001356                        DEC     TEMP            ;REACHED MAX?
002612  001405                        BEQ     4$              ;;REACHED MAX NO OF A/D'S
002614  063737  001336  001126                ADD     VADR,$BODAT     ;GET NEXT ADV11
002622  000760                        BR      1$              ;;TRY NEXT ADV11
002624  022626                        2$:     CMP     (SP)+,(SP)+     ;POP 2 WORDS OFF STACK
002626                                4$:
002626  013746  001364                        MOV     NBEXT,-(SP)     ;;SAVE NBEXT FOR TYPEOUT
                                                                        ;;TYPE NUMBER OF ADV11'S
002632  104402                        TYPOS                           ;;GO TYPE--OCTAL ASCII
0026[illegible]  002                  .BYTE   2               ;;TYPE 2 DIGIT(S)
0026[illegible]  000                  .BYTE   0               ;;SUPPRESS LEADING ZEROS
0026[illegible]  104410  013101        TYPE    ,MSG50
002642  005337  001364                DEC     NBEXT           ;ADJUST ADV11 COUNT
002646  013737  001364  001366        MOV     NBEXT,NMBEXT    ;KEEP COUNT OF NUMBER
0026[illegible]  012637  000004        MOV     (SP)+,ERRVEC    ;RESTORE ERRVEC
0026[illegible]  012737  000001  001440        MOV     #1,TSTBIT       ;INITIALIZE MODULE ERROR TEST BIT
002666  000207                        RTS     PC
```

```
  979  002670                          BEGINL:
  980                                  ;;*****************************************************************
  981                                  ;*TEST 1        FLOAT A ONE THRU MULTIPLEXER BITS
  982                                  ;;*****************************************************************
  983  002670  012737  002670  001106 TST1:   MOV     #TST1,$LPADR
  984  002676  012737  002670  001110         MOV     #TST1,$LPERR
  985  002704  012737  000400  001124         MOV     #BIT8,$GDDAT            ;LOAD FIRST BIT
  986  002712  1044.1                  2$:     CHKIT
  987  002714  104001                         ERROR   1                       ;FAILED TO LOAD + READ BIT
  988  002716  006337  001124         1$:     ASL     $GDDAT                  ;GET NEXT BIT
  989  002722  023727  001124  010000         CMP     $GDDAT,#BIT12           ;FINISHED?
  990  002730  001370                         BNE     2$              ;;NO,GO TO NEXT TEST
  991
  992                                  ;;*****************************************************************
  993                                  ;*TEST 2        LOAD AND READ BACK ERROR I.E. BIT14
  994                                  ;;*****************************************************************
  995  002732  000004                 TST2:   SCOPE
  996  002734  012737  040000  001124         MOV     #BIT14,$GDDAT
  997  002742  10441:                          CHKIT
  998  002744  10400:                          ERROR   1                       ;FAILED TO LOAD + READ ERROR I.E.
  999                                  ;;*****************************************************************
 1000                                  ;*TEST 3        LOAD AND READ BACK INTERRUPT ENABLE BIT6
 1001                                  ;;*****************************************************************
 1002  002746  000004                 TST3:   SCOPE
 1003  002750  012777  001442  176346         MOV     #UNEXP,@VECTOR          ;SETUP FOR UNEXPECTED INTERUPT
 1004  002756  012737  000100  001124         MOV     #BIT6,$GDDAT            ;LOAD EXPECTED DATA
 1005  002764  104411                         CHKIT
 1006  002766  104001                         ERROR   1                       ;FAILED TO LOAD + READ INTERRUPT ENABLE
 1007
 1008                                  ;;*****************************************************************
 1009                                  ;*TEST 4        LOAD AND READ BACK CLOCK OVERFLOW START ENABLE BIT5
 1010                                  ;;*****************************************************************
 1011  002770  000004.                 TST4:   SCOPE
 1012  002772  012737  000040  001124         MOV     #BIT5,$GDDAT            ;LOAD EXPECTED DATA
 1013  003000  104411                         CHKIT
 1014  003002  104001                         ERROR   1                       ;FAILED TO LOAD + READ CLOCK OVERFLOW START ENAB
 1015
 1016                                  ;;*****************************************************************
 1017                                  ;*TEST 5        LOAD AND READ BACK EXTERNAL START ENABLE BIT4
 1018                                  ;;*****************************************************************
 1019  003004  000004                 TST5:   SCOPE
 1020  003006  012737  003020  001124         MOV     #BIT4,$GDDAT    ;LOAD EXPECTED DATA
 1021  003014  104411                         CHKIT
 1022  003016  104001                         ERROR   1               ;FAILED TO LOAD + READ EXT. START ENABLE
 1023                                  ;;*****************************************************************
 1024                                  ;*TEST 6        LOAD AND READ BACK MAINT. TST BIT2
 1025                                  ;;*****************************************************************
 1026  003020  000004                 TST6:   SCOPE
 1027  003022  012737  000004  001124         MOV     #BIT2,$GDDAT
 1028  003030  104411                         CHKIT
 1029  003032  104001                         ERROR   1                       ;FAILED TO LOAD + READ BACK MAINT. TST
```

```
                                        ;;*****************************************************************
                                        ;*TEST 7         LOAD AND READ BACK ENABLE I.D. BIT3
                                        ;;*****************************************************************
003034  000004                          TST7:   SCOPE
003036  012737  000010  001124                  MOV     #BIT3,$GDDAT
003044  104411                                 CHKIT
003046  104001                                 ERROR   1                       ;FAILED TO LOAD + READ ENABLE I.D. BIT
                                        ;;*****************************************************************
                                        ;*TEST 10        TEST I.D. BIT (BIT 12) CLEARED
                                        ;;*****************************************************************
003050  000004                          TST10:  SCOPE
003052  012777  000001  176236                  MOV     #1,@STREG       ;CLEAR I.D. ENABLE
003060  105777  176232                  1$:     TSTB    @STREG          ;WAIT FOR CONVERSION
003064  100375                                 BPL     1$              ;;CONVERSION IS NOT DONE YET
003066  032777  010000  176226                  BIT     #BIT12,@ADBUFF  ;IS I.D. BIT CLEARED?
003074  001401                                 BEQ     TST11           ;;YES - GOTO NEXT TEST
003076  104001                                 ERROR   1
                                        ;;*****************************************************************
                                        ;*TEST 11        TEST I.D. BIT (BIT 12) SET
                                        ;;*****************************************************************
003100  000004                          TST11:  SCOPE
003102  012777  000011  176206                  MOV     #BIT3!BIT0,@STREG       ;SET I.D. ENABLE BIT
003110  105777  176202                  1$:     TSTB    @STREG          ;WAIT FOR CONVERSION
003114  100375                                 BPL     1$              ;;CONVERSION IS NOT DONE YET
003116  032777  010000  176176                  BIT     #BIT12,@ADBUFF  ;IS I.D. BIT SET?
003124  001001                                 BNE     TST12           ;;YES - GOTO NEXT TEST
003126  104001                                 ERROR   1
                                        ;;*****************************************************************
                                        ;*TEST 12        LOAD AND READ BACK ERROR FLAG BIT15
                                        ;;*****************************************************************
003130  000004                          TST12:  SCOPE
003132  012737  100000  001124                  MOV     #BIT15,$GDDAT   ;LOAD EXPECTED DATA
003140  104411                                 CHKIT
003142  104001                                 ERROR   1                       ;FAILED TO LOAD + READ ERROR FLAG
                                        ;;*****************************************************************
                                        ;*TEST 13        TEST INIT CLEARS BITS 2-6,8-11,14
                                        ;;*****************************************************************
003144  000004                          TST13:  SCOPE
003146  012737  000300  001160                  MOV     #300,$TIMES     ;;DO 300 ITERATIONS
003154  005037  001124                          CLR     $GDDAT          ;LOAD EXPECTED DATA
003160  012777  047574  176130          2$:     MOV     #47574,@STREG   ;SET STATUS REGISTER
003166  000005                                 RESET                   ;INITIALIZE
003170  052777  000100  175746                  BIS     #100,@STKS      ;SET INTRPT. ENABLE
003176  017737  176114  001126                  MOV     @STREG,$BDDAT   ;READ STATUS REGISTER
003204  001401                                 BEQ     TST14           ;;NEXT TEST
003206  104001                                 ERROR   1               ;RESET FAILED TO CLEAR AD ST. REG. BITS
```

```
1079                                    ;;*****************************************************************
1080                                    ;*TEST 14        TEST INIT CLEARS ERROR FLAG
1081                                    ;;*****************************************************************
1082  003210  000004                    TST14:  SCOPE
1083  003212  012737  000300  001160            MOV     #300.,@TIMES            ;DO 300 ITERATIONS
1084  003220  012777  100000  176070            MOV     #BIT15,@STREG           ;SET BIT 15
1085  003226  000005                            RESET                           ;ISSUE INIT
1086  003230  052777  000100  175706            BIS     #100,@STKS                      ;SET INTRPT. EN. FOR KEYBOARD
1087  003236  104410                            CHECK
1088  003240  104001                            ERROR   1
1089                                    ;;*****************************************************************
1090                                    ;*TEST 15        TEST  DONE FLAG  SETS AND BIT0 CLEARS ON END OF CONV.
1091                                    ;;*****************************************************************
1092  003242  000004                    TST15:  SCOPE
1093  003244  012700  001000                    MOV     #BIT9,R0        ;STALL TIME COUNTER
1094  003250  005277  176042                    INC     @STREG          ;START CONVERSION
1095  003254  012737  000200  001124            MOV     #BIT7,$GDDAT    ;LOAD EXPECTED
1096  003262  005300                    1$:     DEC     R0              ;STALL
1097  003264  001376                            BNE     1$              ;TIME
1098  003266  042777  100000  176022            BIC     #BIT15,@STREG   ;MASK OUT ERROR BIT
1099  003274  104410                            CHECK
1100  003276  104001                            ERROR   1               ;A/D DONE FLAG FAILED TO SET;BIT0 FAILED TO CLEAR
1101  003300  017700  176016                    MOV     @ADBUFF,R0      ;CLEAR DONE FLAG FOR ITERATIONS
```

```
                                        ;;*****************************************************************
                                        ;*TEST 16        TEST INIT CLEARS DONE FLAG
                                        ;;*****************************************************************
                                TST16:  SCOPE
003304  000004                          
003306  012737  000300  001160          MOV     #300,$TIMES     ;;DO 300 ITERATIONS
003314  005037  001124                  CLR     $GDDAT          ;CLEAR EXPECTED
003320  005277  175772                  INC     @STREG          ;START CONVERSION
003324  105777  175766          2$:     TSTB    @STREG
003330  100375                          BPL     2$
003332  000005                          RESET
003334  104410                          CHECK
003336  104001                          ERROR   1               ;DONE FLAG FAILED TO CLEAR
003340  052777  000100  175576          BIS     #100,@STKS              ;SET INTRPT. EN. BIT

                                        ;;*****************************************************************
                                        ;*TEST 17        TEST A/D DONE FLAG CLEARS WHEN READ CONVERTED VALUE
                                        ;;*****************************************************************
                                TST17:  SCOPE
003346  000004                          
003350  005277  175742                  INC     @STREG          ;SET A/D START CONVERSION BIT
003354  105777  175736          1$:     TSTB    @STREG          ;WAIT FOR FLAG
003360  100375                          BPL     1$
003362  017700  175734                  MOV     @ADBUFF,R0      ;READ CONVERTED VALUE
003366  104410                          CHECK
003370  104001                          ERROR   1               ;DONE FLAG FAILED TO CLEAR
                                        ;;*****************************************************************
                                        ;*TEST 20        TEST ALL '0'S RESULTS USING MAINT. ADTST. BIT
                                        ;;*****************************************************************
                                TST20:  SCOPE
003372  000004                          
003374  005037  001124                  CLR     $GDDAT          ;CLEAR EXPECTED VALUE
003430  005037  001372                  CLR     CHANL           ;SET CHANL = 0
003404  005037  001412                  CLR     SPREAD          ;SET SPREAD = 0
003410  012777  000005  175700          MOV     #5,@STREG       ;CONVERT EVEN CHANNEL WITH MAINT. BIT SET
003416  105777  175674          1$:     TSTB    @STREG          ;WAIT FOR DONE
003422  100375                          BPL     1$
003424  017737  175672  001126          MOV     @ADBUFF,$BDDAT  ;RESULTS TO BDDAT FOR CHECKING
003432  001401                          BEQ     TST21           ;;GOTO NEXT TEST
003434  104004                          ERROR   4               ;DID NOT GET ALL '0'S RSULT WITH MAINT. ADTST

                                        ;;*****************************************************************
                                        ;*TEST 21        TEST ALL '1'S RESULT USING MAINT. ADTST. BIT
                                        ;;*****************************************************************
                                TST21:  SCOPE
003436  000004                          
003440  012737  007777  001124          MOV     #7777,$GDDAT    ;EXPECT ALL '1'S RESULT
003446  012737  000001  001372          MOV     #1,CHANL        ;SET CHANL = 1
003454  005037  001412                  CLR     SPREAD          ;SET SPREAD = 0
003460  012777  000405  175630          MOV     #405,@STREG     ;CONVERT ODD CHANNEL WITH MAINT. BIT SET
003466  105777  175624          1$:     TSTB    @STREG          ;WAIT FOR DONE
003472  100375                          BPL     1$
003474  017737  175622  001126          MOV     @ADBUFF,$BDDAT  ;RESULTS TO BDDAT FOR CHECKING
003502  023737  001124  001126          CMP     $GDDAT,$BDDAT   ;EQUAL?
003510  001401                          BEQ     TST22           ;;GOTO NEXT TEST
003512  104004                          ERROR   4               ;DID NOT GET ALL '1'S RESULT WITH MAINT. ADTST
```

```
                                ;;*****************************************************************
                                ;*TEST 22       GENERATE INTERRUPT WHEN DONE FLAG SETS AFTER CONVERSION
                                ;;*****************************************************************
003514  000004                  TST22:  SCOPE
                                        ;* "ENTERING TEST 22" TYPED OUT TO TELL YOU THE NEXT
                                        ;*TEST THAT IS GOING TO BE EXECUTED. IT IS ONLY TYPED ON PASS 0.
                                        ;*THERE IS DANGER THAT THE UNIBUS COULD GET "HUNG" WHILE
                                        ;*EXECUTING TEST "22".
003516  012700  000022                  MOV     #22,R0          ;GET TEST NO.
003522  004737  011176                  JSR     PC,DUMM         ;PRINT MESSAGE
003526  005046                          CLR     -(SP)           ;RESET PRIORITY
003530  012746  003536                  MOV     #3$,-(SP)
003534  000002                          RTI
003536  012777  003612  175560  3$:     MOV     #1$,@VECTOR     ;INTERRUPT VECTOR ADDRESS
003544  012777  000200  175556          MOV     #200,@VECTR1    ;SET UP NEW PSW
003552  012777  000101  175536          MOV     #BIT6!BIT0,@STREG ;SET INTERRUPT ENABLE BIT + START CONVERSION
003560  105777  175532          2$:     TSTB    @STREG          ;WAIT FOR DONE
003564  100375                          BPL     2$              ;FLAG TO SET
003566  017737  175524  001126          MOV     @STREG,$BDDAT   ;READ STATUS REGISTER
003574  012737  000300  001124          MOV     #BIT7!BIT6,$GDDAT ;GOOD DATA
003602  104002                          ERROR   2               ;FAILED TO INTERRUPT ON DONE
003604  004737  011250                  JSR     PC,DUMC         ;TYPE COMPLETED
003610  000414                          BR      TST23           ;BRANCH TO NEXT TEST
003612  022626                  1$:     CMP     (SP)+,(SP)+     ;RESET STACK POINTER
003614  012777  001442  175502          MOV     #UNEXP,@VECTOR  ;SET UP FOR UNEXPECTED INTERRUPT
003622  005046                          CLR     -(SP)           ;CLEAR PSW
003624  012746  003632                  MOV     #4$,-(SP)
003630  000002                          RTI
003632  004737  011250          4$:     JSR     PC,DUMC         ;TYPE COMPLETED
003636  005777  175460                  TST     @ADBUFF         ;CLEAR DONE BIT
                                ;;*****************************************************************
                                ;*TEST 23       TEST INTERRUPT OCCURS WHEN ERROR AND I.E.E. IS SET
                                ;;*****************************************************************
003642  000004                  TST23:  SCOPE
                                        ;* "ENTERING TEST 23" TYPED OUT TO TELL YOU THE NEXT
                                        ;*TEST THAT IS GOING TO BE EXECUTED. IT IS ONLY TYPED ON PASS 0.
                                        ;*THERE IS DANGER THAT THE UNIBUS COULD GET "HUNG" WHILE
                                        ;*EXECUTING TEST "23".
003644  012700  000023                  MOV     #23,R0          ;GET TEST NO.
003650  004737  011176                  JSR     PC,DUMM         ;PRINT MESSAGE
003654  012777  003714  175450          MOV     #1$,@VECTR2     ;SETUP VECTOR ADDRESS
003662  012777  140000  175426          MOV     #BIT15!BIT14,@STREG     ;CAUSE AN INTERRUPT
003670  017737  175422  001126          MOV     @STREG,$BDDAT   ;BAD DATA
003676  012737  140000  001124          MOV     #BIT15!BIT14,$GDDAT     ;GOOD DATA
003704  104002                          ERROR   2
003706  004737  011250                  JSR     PC,DUMC         ;TYPE COMPLETED
003712  000627                          BR      TST20
003714  022626                  1$:     CMP     (SP)+,(SP)+     ;POP STACK
003716  004737  011250                  JSR     PC,DUMC
003722  005077  175370                  CLR     @STREG
```

```
                                        ;;*****************************************************************
                                        ;*TEST 24       TEST ERROR FLAG SETS IF  2ND CONVERSION ENDS BEFORE READING BUFFER
                                        ;;*****************************************************************
003726 000004                   TST24:  SCOPE
003730 012777 000001 175360             MOV     #BIT0,@STREG    ;START CONVERSION
003736 105777 175354            1$:     TSTB    @STREG          ;WAIT FOR
003742 100375                           BPL     1$
003744 012737 100200 001124     2$:     MOV     #BIT15!BIT7,$GOODAT ;LOAD EXPECTED VALUE
003752 012777 000001 175336             MOV     #BIT0,@STREG    ;START 2ND CONVERSION
003760 012700 001000                    MOV     #BIT9,R0        ;WAIT FOR 2ND
003764 005300                   3$:     DEC     R0              ;CONVERSION TO END
003766 001376                           BNE     3$
003770 104410                   4$:     CHECK
003772 104001                           ERROR   1               ;ERROR FLAG NOT SET WHEN 2ND
                                                                ; CONVERT ENDS BEFORE READ BUFFER FROM FIRST
003774 017700 175322                    MOV     @ADBUFF,R0      ;CLEAR DONE FLAG
                                        ;;*****************************************************************
                                        ;*TEST 25       TEST ERROR FLAG SETS IF START 2ND CONV. BEFORE DONE FLAG SETS
                                        ;;*****************************************************************
004000 000004                   TST25:  SCOPE
004002 012737 100000 001124             MOV     #BIT15,$GOODAT  ;LOAD EXPECTED DATA
004010 012777 000001 175300             MOV     #BIT0,@STREG    ;START CONVERSION
004016 112777 000001 175272             MOVB    #BIT0,@STREG            ;START NEXT CONVERSION
004024 112777 000001 175264             MOVB    #BIT0,@STREG            ;ONCE AGAIN IN CASE REFRESH INTERVENED
004032 017737 175260 001126             MOV     @STREG,$BOOAT           ;READ STATUS REGISTER
004040 042737 077777 001126             BIC     #77777,$BOOAT           ;MASK OUT BIT 15
004046 023737 001124 001126             CMP     $GOODAT,$BOOAT          ;COMPARE RESULTS
004054 001401                           BEQ     1$              ;;BRANCH OVER ERROR
004056 104001                           ERROR   1               ;ERROR FLAG NOT SET WHEN 2ND
                                                                ;CONVERT BEGINS BEFORE FIRST DONE
004060 017700 175236            1$:     MOV     @ADBUFF,R0              ;READ CONVERTED VALUE
004064 005077 175226                    CLR     @STREG                  ;CLEAR STATUS REGISTER
004070 000004                           SCOPE
004072 000207                           RTS     PC              ;RETURN TO TEST SECTION


                                        ;;SUBROUTINE FOR LOGIC TESTS;;
004074 013777 001124 175214     TESTIT: MOV     $GOODAT,@STREG          ;LOAD EXPECTED VALUE
004102 017737 175210 001126     TEST:   MOV     @STREG,$BOOAT           ;READ ST. REG.
004110 023737 001124 001126             CMP     $GOODAT,$BOOAT          ;COMPARE RESULTS
004116 001002                           BNE     RETERR          ;;ERROR RETURN
004120 062716 000002                    ADD     #2,(SP)                 ;BUMP RETURN ADDRESS TO GET AROUND ERROR
004124 000002                   RETERR: RTI
```

```
                                        .SBTTL      WRAPAROUND TEST SECTION
004126                                  WRAP:
                                        ;;*****************************************************************
                                        ;*TEST 26       TEST CH0 GROUND
                                        ;;*****************************************************************
004126 012737 000026 001102     TST26:  MOV     #STN,$TSTNM
004134 012737 000010 001160             MOV     #10.,$TIMES     ;;DO 10 ITERATIONS
004142 012737 004126 001110             MOV     #TST26,$LPERR
004150 012737 004126 001106             MOV     #TST26,$LPADR
004156 004537 011016                    JSR     R5,CONVRT               ;CONVERT 8 TIMES
004162 000000                           0
004164 004537 011130                    JSR     R5,COMPAR               ;COMPARE RESULTS
004170 004000                           4000                            ;NOMINAL
004172 011576                           V12                             ;TOLERANCE
004174 104004                           ERROR   4                       ;ERROR ON A/D CHANNEL
                                        ;;*****************************************************************
                                        ;*TEST 27       TEST CH1 +4.5 VOLT
                                        ;;*****************************************************************
004176 000004                   TST27:  SCOPE
004200 012737 000010 001160             MOV     #10.,$TIMES     ;;DO 10 ITERATIONS
004206 004537 011016                    JSR     R5,CONVRT               ;CONVERT 8 TIMES
004212 000001                           1                               ;CHANNEL 1
004214 004537 01113C                    JSR     R5,COMPAR               ;COMPARE RESULTS
004220 007344                           7344                            ;NOMINAL
004222 011602                           V326                            ;TOLERANCE
004224 104004                           ERROR   4                       ;ERROR ON A/D CHANNEL
                                        ;;*****************************************************************
                                        ;*TEST 30       TEST CH2 -4.5 VOLT
                                        ;;*****************************************************************
004226 000004                   TST30:  SCOPE
004230 012737 000010 001160             MOV     #10.,$TIMES     ;;DO 10 ITERATIONS
004236 004537 011016                    JSR     R5,CONVRT               ;CONVERT 8 TIMES
004242 000002                           2                               ;CHANNEL 2
004244 004537 011130                    JSR     R5,COMPAR               ;COMPARE RESULTS
004250 000434                           434                             ;NOMINAL
004252 011602                           V326                            ;TOLERANCE
004254 104004                           ERROR   4                       ;ERROR ON A/D CHANNEL
                                        ;;*****************************************************************
                                        ;*TEST 31       TEST GROUND ON CHANNELS 4 - 17
                                        ;;*****************************************************************
004256 000004                   TST31:  SCOPE
004260 012737 000010 001160             MOV     #10.,$TIMES     ;;DO 10 ITERATIONS
004266 012737 000004 004300             MOV     #4,2$           ;SET UP FIRST CHANNEL
004274 004537 011016            1$:     JSR     R5,CONVRT       ;CONVERT CHANNEL
004300 000004                   2$:     4
004302 004537 011130                    JSR     R5,COMPAR       ;TEST RESULTS
004306 004000                           4000
004310 011576                           V12
004312 104004                           ERROR   4
004314 005237 004300                    INC     2$              ;GET NEXT CHANNEL
004320 022737 000017 004300             CMP     #17,2$          ;DONE?
004326 001362                           BNE     1$              ;;NO
```

F03


```
                                        ;;*****************************************************************
                                        ;*TEST 32        TEST VERNIER OFFSET DAC ON CH0
                                        ;;*****************************************************************
004330  000004                  TST32:  SCOPE
004332  012737  000001  001160          MOV     #1,$TIMES       ;;DO 1 ITERATION
004340  005077  174756                  CLR     @ADOBUFF                ;SET VERNIER DAC = 0
004344  004537  011016                  JSR     R5,CONVRT               ;CONV. CH0, DIRECT VERNIER DAC
004350  000000                          0
004352  013704  001356                  MOV     TEMP,R4                 ;SAVE VALUE IN R4
004356  012777  000377  174736  1$:     MOV     #377,@ADOBUFF           ;SET VERNIER DAC = 377
004364  004537  011016                  JSR     R5,CONVRT               ;CONVERT IT
004370  000000                          0
004372  160437  001356                  SUB     R4,TEMP                 ;TEMP=DIFF. BETWEEN VALUE & PREVIOUS
004376  004537  011130                  JSR     R5,COMPAR               ;COMPARE RESULTS
004402  000005                          5
004404  011572                          V2
004406  104004                          ERROR   4
                                        ;;*****************************************************************
                                        ;*TEST 33        OFFSET ON CH0
                                        ;;*****************************************************************
004410  000004                  TST33:  SCOPE
004412  012737  000001  001160          MOV     #1,$TIMES       ;;DO 1 ITERATION
004420  013737  001342  001372          MOV     BASECH,CHANL            ;LOAD CHANNEL
004426  013737  001342  001370          MOV     BASECH,DUMMY            ;LOAD DUMMY
004434  004737  005160                  JSR     PC,OFFSET       ;FIND OFFSET
004440  104400  013736                  TYPE    ,MOFSET         ;TYPE "OFFSET="
004444  004737  005234                  JSR     PC,TOFF         ;TYPE OFFSET
004450  004537  011130                  JSR     R5,COMPAR       ;IS RESULT WITHIN LIMITS?
004454  000000                          0
004456  011600                          V500
004460  000401                          BR      OFFERR          ;NO-ERROR
004462  000403                          BR      OFFOK           ;YES-OK
004464  104400  012547          OFFERR: TYPE    ,ERMSG
004470  000402                          BR      TST34           ;;GO TO NEXT TEST
004472  104400  012225          OFFOK:  TYPE    ,OKMSG
```

```
                                        ;;*****************************************************************
                                        ;*TEST 34        TEST RAMP RANGE, CH3
                                        ;;*****************************************************************
004476  000004                  TST34:  SCOPE
004500  012737  000001  001160          MOV     #1,$TIMES               ;DO THIS ONCE
004506  012703  007777                  MOV     #7777,R3                ;INIT R3 VALUE
004512  005004                          CLR     R4                      ;AND R4
004514  012777  001400  174574          MOV     #1400,@STREG            ;SETUP FOR CH3
004522  012702  047040                  MOV     #20000.,R2              ;SETUP FOR 20,000 CONVERSIONS
004526  105277  174564          1$:     INCB    @STREG
004532  105777  174560          2$:     TSTB    @STREG
004536  100375                          BPL     2$
004540  027704  174556                  CMP     @#ADBUFF,R4
004544  003402                          BLE     3$
004546  017704  174550                  MOV     @#ADBUFF,R4             ;HIT A NEW HIGH
004552  027703  174544          3$:     CMP     @#ADBUFF,R3
004556  002002                          BGE     4$
004560  017703  174536                  MOV     @#ADBUFF,R3             ;HIT A NEW LOW
004564  005302                  4$:     DEC     R2
004566  001357                          BNE     1$
004570  010337  001356                  MOV     R3,TEMP
004574  004537  011130                  JSR     R5,COMPAR
004600  000000                          0
004602  011570                          VO
004604  104004                          ERROR   4                       ;RAMP DIDN'T REACH LOW END OF RANGE
004606  010437  001356                  MOV     R4,TEMP
004612  004537  011130                  JSR     R5,COMPAR
004616  007777                          7777
004620  011570                          VO
004622  104004                          ERROR   4                       ;RAMP DIDN'T REACH HIGH END OF RANGE
```

```
1365                                    ;;*****************************************************************
1366                                    ;*TEST 3S        NOISE TEST, 1 EDGE
1367                                    ;;*****************************************************************
1368  004624  000004                    TST3S:  SCOPE
1369  004626  012737  000001  001160            MOV     #1,$TIMES       ;;DO 1 ITERATION
1370  004634  104400  011764                    TYPE    ,NOIMSG
1371  004640  005037  001372                    CLR     CHANL           ;LOAD CHANNEL 0
1372  004644  013737  001372  001370  1$:      MOV     CHANL,DUMMY             ;LOAD DUMMY CHANNEL
1373  004652  004737  006714                    JSR     PC,GETEDG               ;GET EDGE VALUE
1374  004656  005037  001404                    CLR     RMS                     ;CLEAR RMS VLAUE
1375  004662  005037  001406                    CLR     PEAK                    ;CLEAR PEAK VALUE
1376  004666  004537  007074                    JSR     R5,SARSUB               ;DO SAR ROUTINE AT 16%
1377  004672  000020                    16.
1378  004674  063737  001414  001404            ADD     DAC,RMS         ;ADD RESULT TO RMS
1379  004702  004537  007074                    JSR     R5,$ARSUB               ;DO SAR ROUTINE AT 84%
1380  004706  000124                    84.
1381  004710  163737  001414  001404            SUB     DAC,RMS         ;SUBTRACT RESULT FROM RMS
1382  004716  004537  007074                    JSR     R5,$ARSUB               ;DO SAR ROUTINE AT 1%
1383  004722  000001                    1
1384  004724  063737  001414  001406            ADD     DAC,PEAK                ;ADD RESULT TO PEAK
1385  004732  004537  007074                    JSR     R5,$ARSUB               ;DO SAR ROUTINE AT 99%
1386  004736  000143                    99.
1387  004740  163737  001414  001406            SUB     DAC,PEAK                ;SUBTRACT RESULT FROM PEAK
1388  004746  012737  000001  007072            MOV     #1,EDGFLG
1389  004754  004737  010666                    JSR     PC,TYPRP                ;TYPE RMS AND PEAK VALUES
1390  004760  005237  001372                    INC     CHANL                   ;GET NEXT CHANNEL
1391  004764  022737  000003  001372            CMP     #3,CHANL                ;CHANNEL 3?
1392  004772  001002                            BNE     2$              ;;NO
1393  004774  005237  001372                    INC     CHANL           ;CHANNEL 3 IS SKIPED
1394  005000  022737  000017  001372  2$:      CMP     #17,CHANL       ;DONE?
1395  005006  001316                            BNE     1$              ;;NO
```

```
1396                                        ;;*****************************************************************
1397                                        ;*TEST 36       INTERCHANNEL SETTLING TEST, 1 EDGE
1398                                        ;;*****************************************************************
1399  005010  000004                       TST36:  SCOPE
1400  005012  012737  000001  001160               MOV     #1,$TIMES       ;;DO 1 ITERATION
1401  005020  104400  012003                      TYPE    ,SETMSG         ;TYPE "SETTLING TEST"
1402  005024  012737  000001  001360               MOV     #1,CH1          ;DO TEST BETWEEN CHANNEL 1 AND 2
1403  005032  012737  000002  001362               MOV     #2,CH2
1404  005040  013737  001362  001372  1$:         MOV     CH2,CHANL
1405  005046  004737  006714                      JSR     PC,GETEDG       ;GET EDGE VALUES
1406  005052  005002                              CLR     R2
1407  005054  004737  006652                      JSR     PC,SET1A        ;SCALING = .02 LSB
1408  005060  004737  006652                      JSR     PC,SET1A        ;MAKE IT .01 LSB
1409  005064  100001                              BPL     2$
1410  005066  005402                              NEG     R2              ;MAKE IT POSITIVE
1411  005070  010204                      2$:     MOV     R2,R4
1412  005072  012737  000001  007072               MOV     #1,EDGFLG
1413  005100  004737  006522                      JSR     PC,TYPSET       ;TYPE SETTLING INFORMATION
1414  005104  022737  000002  001360               CMP     #2,CH1          ;DONE?
1415  005112  001410                              BEQ     TST37           ;;YES
1416  005114  013702  001360                      MOV     CH1,R2          ;SETTLE THE OTHER WAY
1417  005120  013737  001362  001360               MOV     CH2,CH1
1418  005126  010237  001362                      MOV     R2,CH2
1419  005132  000742                              BR      1$              ;;
1420  005134                              3$:
1421                                        ;;*****************************************************************
1422                                        ;*TEST 37       DIFFERENTIAL LINEARITY AND RELATIVE ACCURACY TEST
1423                                        ;;*****************************************************************
1424  005134  000004                       TST37:  SCOPE
1425  005136  012737  000001  001160               MOV     #1,$TIMES       ;;DO 1 ITERATION
1426  005144  005737  001202                      TST     $PASS                   ;FIRST TIME-SKIP DIFLIN
1427  005150  001402                              BEQ     LEND
1428  005152  004737  007266                      JSR     PC,DIFLIN
1429  005156  000207                      LEND:   RTS     PC                      ;RETURN TO TEST SECTION
1430
1431  005160  012737  004001  001420  OFFSET: MOV     #4001,EDGE              ;4000,4001 EDGE
1432  005166  004537  007074                      JSR     R5,SARSUB
1433  005172  000062                              50.
1434  005174  013737  001414  001356               MOV     DAC,TEMP
1435  005202  012737  004000  001420               MOV     #4000,EDGE              ;3777,4000 EDGE
1436  005210  004537  007074                      JSR     R5,SARSUB
1437  005214  000062                              50.
1438  005216  063737  001414  001356               ADD     DAC,TEMP
1439  005224  162737  000400  001356               SUB     #400,TEMP
1440  005232  000207                              RTS     PC
```

```
1441  005234  013702  001356          TOFF:   MOV     TEMP,R2
1442  005240  100402                          BMI     1$              ;;IS THE NUMBER POSITIVE?
1443  005242  104400  012545                  TYPE    ,POSITV
1444  005246  104412                  1$:     TYPOC
1445  005250  104400  013751                  TYPE    ,MLSB           ;TYPE ASCIZ STRING
1446  005254  000207                          RTS     PC
1447  005256  005303                  TCHK:   DEC     R3              ;DECREMENT COUNT
1448  005260  001005                          BNE     1$              ;;
1449  005262  012703  000005                  MOV     #5,R3           ;RESET COUNT
1450  005266  104400  001171                  TYPE    ,$CRLF          ;TYPE A CARRIAGE RETURN AND LINE FEED
1451  005272  000402                          BR      2$              ;;
1452  005274  104400  012114          1$:     TYPE    ,SPACE          ;TYPE FOUR (4) SPACES
1453  005300  005037  001416          2$:     CLR     DELAY           ;CLEAR DELAY
1454  005304  005077  173634                  CLR     @#STKS          ;CLEAR INTERRUPT ENABLE
1455  005310  105777  173630          3$:     TSTB    @#STKS          ;IS KEYBOARD FLAG SET?
1456  005314  100404                          BMI     4$              ;;YES
1457  005316  005237  001416                  INC     DELAY           ;IS DELAY ZERO?
1458  005322  001372                          BNE     3$              ;;NO
1459  005324  000416                          BR      6$              ;;
1460  005326  005777  173614          4$:     TST     @#STKB          ;CLEAR FLAG
1461  005332  012777  000100  173604          MOV     #100,@#STKS     ;SET INTERRUPT ENABLE
1462  005340  004537  011130                  JSR     R5,COMPAR       ;TEST LAST CONVERSION
1463  005344  000000                          0
1464  005346  011574                          V4                      ;TOLERANCE .04 LSB
1465  005350  000402                          BR      5$              ;;
1466  005352  062716  000002                  ADD     #2,(SP)         ;BUMP RETURN ADDRESS
1467  005356  062716  000002          5$:     ADD     #2,(SP)         ;BUMP RETURN ADDRESS 2 WORDS
1468  005362  000207                  6$:     RTS     PC
1469  005364  104400  012236          BEGINC: TYPE    ,CCHAN          ;ASK FOR CHANNEL
1470  005370  104407                          RDOCT                   ;READ CHANNEL NUMBER
1471  005372  012637  001372                  MOV     (SP)+,CHANL     ;STORE CHANNEL NUMBER
1472  005376  013737  001372  001370          MOV     CHANL,DUMMY     ;LOAD DUMMY
1473  005404  104400  012264          1$:     TYPE    ,SEL            ;SELECT OFFSET OR GAIN ADJUST
1474  005410  104406                          RDLIN                   ;GET TEST
1475  005412  012600                          MOV     (SP)+,R0        ;MOVE POINTER TO R0
1476  005414  121027  000117                  CMPB    (R0),#'O        ;IS IT "O"?
1477  005420  001406                          BEQ     AJOFF           ;;YES, GO TO ADJUST OFFSET
1478  005422  121027  000107                  CMPB    (R0),#'G        ;IS IT "G"?
1479  005426  001430                          BEQ     AJGAIN          ;;YES, GO TO ADJUST GAIN
1480  005430  104400  001170                  TYPE    ,$QUES          ;TYPE "?"
1481  005434  000763                          BR      1$              ;;
```

K03


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1482  005436  104400  012377          AJOFF:  TYPE    ,IGND           ;GROUND CHANNEL
1483  005442  104406                          RDLIN                   ;WAIT FOR CR
1484  005444  005726                          TST     (SP)+           ;POP 1 WORD OFF STACK
1485  005446  104400  012337          1$:     TYPE    ,XADJ           ;ADJUST MESSAGE
1486  005452  104400  012436                  TYPE    ,CRWR           ;TYPE "TYPE CR WHEN READY"
1487  005456  012703  000005                  MOV     #5,R3           ;SET UP COUNT
1488  005462  004737  005150          2$:     JSR     PC,OFFSET       ;TEST AND TYPE OFFSET ERROR
1489  005466  004737  005234                  JSR     PC,TOFF         ;TYPE OFFSET
1490  005472  004737  005256                  JSR     PC,TCHK         ;CHECK FOR A CHARACTER AND DELAY
1491  005476  000771                          BR      2$              ;;
1492  005500  000762                          BR      1$              ;;NOT WITHIN TOLLERANCE, TRY AGAIN
1493  005502  000005                          RESET
1494  005504  000137  002262                  JMP     BEG2
1495  005510  104400  012465          AJGAIN: TYPE    ,IVOLT          ;INPUT +5.115 VOLTS ON CHANNEL
1496  005514  104400  012436                  TYPE    ,CRWR
1497  005520  104406                          RDLIN                   ;WAIT FOR CR
1498  005522  005726                          TST     (SP)+           ;POP 1 WORD OFF STACK
1499  005524  104400  012531          1$:     TYPE    ,YADJ           ;ADJUST MESSAGE
1500  005530  104400  012353                  TYPE    ,MOLSB          ;TYPE " FOR 0.00 LSB ERROR"
1501  005534  104400  012436                  TYPE    ,CRWR
1502  005540  012703  000005                  MOV     #5,R3           ;SET UP COUNT
1503  005544  012737  007777  001420  2$:     MOV     #7777,EDGE      ;LOOK FOR 7776,7777 EDGE
1504  005552  004537  007074                  JSR     R5,SARSUB
1505  005556  000062                          50.
1506  005560  013737  001414  001356          MOV     DAC,TEMP        ;SAVE DAC
1507  005566  012737  007776  001420          MOV     #7776,EDGE      ;LOOK FOR 7775,7776 EDGE
1508  005574  004537  007074                  JSR     R5,SARSUB
1509  005600  000062                          50.
1510  005602  063737  001414  001356          ADD     DAC,TEMP        ;ADD RESULTS
1511  005610  162737  000400  001356          SUB     #400,TEMP       ;OFFSET RESULT
1512  005616  004737  005234                  JSR     PC,TOFF         ;TYPE GAIN
1513  005622  004737  005256                  JSR     PC,TCHK         ;CHECK FOR CHARACTER AND DELAY
1514  005626  000746                          BR      2$              ;;
1515  005630  000735                          BR      1$              ;;NOT WITHIN TOLLERANCE, TRY AGAIN
1516  005632  000005                          RESET
1517  005634  000137  002262                  JMP     BEG2
```

```
1518                                    .SBTTL      PRINT VALUES ROUTINE
1519  005640  012737  005640  001374  BEGINP: MOV     #BEGINP,TADDR           ;TEST ADDRESS IN TADDR
1520  005646  005077  173444                  CLR     @STREG                  ;CLEAR STATUS REGISTER
1521  005652  104400  013645                  TYPE    ,HEADS                  ;TYPE OUT HEADING
1522  005656  005046                         CLR     -(SP)                   ;CLEAR PSW
1523  005660  012746  005666                  MOV     #1$,-(SP)
1524  005664  000002                         RTI
1525  005666  017700  173246          1$:     MOV     @SWR,R0                 ;READ CHANNEL FROM SWITCH REG.
1526  005672  042700  177700                  BIC     #177700,R0              ;ISOLATE MUX BITS
1527  005676  032777  020000  173234         BIT     #BIT13,@SWR             ;IS BIT 13 SET?
1528  005704  001005                         BNE     2$                  ;;YES,SKIP TYPEOUT
1529  005706  104400  012111                  TYPE    ,CH
1530  005712  010046                         MOV     R0,-(SP)            ;;SAVE R0 FOR TYPEOUT
1531                                                                      ;;TYPE CHANNEL
1532  005714  104402                         TYPOS                       ;;GO TYPE--OCTAL ASCII
1533  005716     002                         .BYTE   2                   ;;TYPE 2 DIGIT(S)
1534  005717     000                         .BYTE   0                   ;;SUPPRESS LEADING ZEROS
1535  005720  012777  001620  173376  2$:     MOV     #RETURN,@VECTOR         ;ADDRESS AFTER INTRPT.
1536  005726  000300                         SWAB    R0                      ;SWITCH BYTES
1537  005730  052700  000100                  BIS     #BIT6,R0
1538  005734  010077  173356                  MOV     R0,@STREG               ;LOAD THE CHANNEL
1539  005740  012702  000010                  MOV     #10,R2                  ;TYPEOUT COUNTER
1540  005744  005277  173346          3$:     INC     @STREG                  ;START CONVERSION
1541  005750  000001                         WAIT                            ;WAIT FOR INTRPT.
1542  005752  017700  173344                  MOV     @ADBUFF,R0              ;READ CONVERTED VALUE
1543  005756  032777  020000  173154         BIT     #BIT13,@SWR             ;IS BIT 13 SET?
1544  005764  001403                         BEQ     4$                      ;NOT SET, TYPE OUT LIST
1545  005766  010077  173150                  MOV     R0,@DISPLAY                     ;PUT VALUE IN DISPLAY FOR DISPLAY CONTRO
1546  005772  000735                         BR      1$                      ;REPEAT CONVERSION
1547  005774  104400  012114          4$:     TYPE    ,SPACE
1548  006000  010046                         MOV     R0,-(SP)            ;;SAVE R0 FOR TYPEOUT
1549                                                                      ;;PRINT OCTAL CONVERTED VALUE
1550  006002  104402                         TYPOS                       ;;GO TYPE--OCTAL ASCII
1551  006004     004                         .BYTE   4                   ;;TYPE 4 DIGIT(S)
1552  006005     001                         .BYTE   1                   ;;TYPE LEADING ZEROS
1553  006006  012701  010000                  MOV     #10000,R1
1554  006012  005301                  5$:     DEC     R1
1555  006014  001376                         BNE     5$
1556  006016  005302                         DEC     R2                      ;DECREMENT THE COUNTER
1557  006020  001351                         BNE     3$                      ;NO CARRIAGE RETURN
1558  006022  104400  001171                  TYPE    ,$CRLF                  ;CARRIAGE RETURN
1559  006026  000717                         BR      1$                      ;REPEAT CONVERSION
```

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1560                                            .SBTTL      LOGIC TEST SECTION
1561  006030  012737  006030  001374  BEGL:     MOV     #BEGL,TADDR     ;TEST ADDRESS
1562  006036  004737  002464                     JSR     PC,TESTAD       ;NO OF ADDITIONAL AD'S
1563  006042  004737  002670          1$         JSR     PC,BEGINL       ;LOGIC TESTS
1564  006046  004737  006206                     JSR     PC,BUMPAD       ;MORE TO TEST?
1565  006052  000773                             BR      1$              ;TEST NEXT A/D
1566  006054  012737  006042  011626             MOV     #1$,AGTST       ;ADDRESS FOR EOP
1567  006062  000137  011630                     JMP     $EOP            ;TYPE END OF PASS
1568
1569                                            .SBTTL      AUTO TEST
1570  006066  012737  006066  001374  BEGINA:  MOV     #BEGINA,TADDR   ;TEST ADDRESS
1571  006074  004737  002464                     JSR     PC,TESTAD       ;NO. OF AD'S TO BE TESTED
1572  006100  004737  002670          1$:        JSR     PC,BEGINL       ;LOGIC TESTS
1573  006104  104400  013037                     TYPE    ,MEND           ;TYPE END OF LOGIC TEST
1574  006110  013746  001316                     MOV     $TREG,-(SP)     ;SAVE STREG FOR TYPEOUT
1575  006114  104402                             TYPOS                   ;TYPE OCTAL NUMBER
1576  006116     006                             .BYTE   6               ;TYPE 6 DIGITS
1577  006117     001                             .BYTE   1               ;TYPE LEADING ZEROS
1578  006120  104400  001171                     TYPE    ,$CRLF          ;TYPE A CR,LF
1579  006124  004737  004126                     JSR     PC,WRAP
1580  006130  004737  006206                     JSR     PC,BUMPAD       ;TEST NEXT A/D
1581  006134  000761                             BR      1$              ;TEST NEXT AD
1582  006136  012737  006100  011626             MOV     #1$,AGTST       ;ADDRESS FOR EOP
1583  006144  000137  011630                     JMP     $EOP            ;TYPE END OF PASS
1584
1585                                            .SBTTL      WRAPAROUND TEST
1586  006150  012737  006150  001374  BEGINW:  MOV     #BEGINW,TADDR   ;TEST ADDRESS
1587  006156  004737  002464                     JSR     PC,TESTAD       ;NO. OF AD'S TO BE TESTED
1588  006162  004737  004126          1$:        JSR     PC,WRAP         ;WRAPAROUND TESTS
1589  006166  004737  006206                     JSR     PC,BUMPAD       ;MORE A/D'S TO BE TESTED?
1590  006172  000773                             BR      1$              ;YES-GO TEST NEXT ADV11
1591  006174  012737  006162  011626             MOV     #1$,AGTST
1592  006202  000137  011630                     JMP     $EOP            ;INCREMENTS $PASS
```

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1593                                            .SBTTL      DETERMINE IF MORE ADV11'S TO BE TESTED
1594  006206  005737  001364            BUMPAD: TST     NBEXT                   ;ADDITIONAL AD'S?
1595  006212  001434                            BEQ     FIXADR                  ;NO-INITIALIZE ADDRESSES
1596  006214  006337  001440                    ASL     TSTBIT          ;MOVE BIT TO NEXT MODULE
1597  006220  063737  001336  001316            ADD     VADR,STREG              ;SET UP NEW ST. REG.
1598  006226  063737  001336  001320            ADD     VADR,ADST1              ;SET UP NEW ADST1
1599  006234  063737  001336  001322            ADD     VADR,ADBUFF             ;SET UP NEW BUFFER ADDRESS
1600  006242  063737  001340  001324            ADD     VVCT,VECTOR             ;SET UP NEW VECTOR
1601  006250  063737  001340  001330            ADD     VVCT,VECTR1
1602  006256  063737  001340  001332            ADD     VVCT,VECTR2
1603  006264  063737  001340  001334            ADD     VVCT,VECTR3
1604  006272  005077  173032                    CLR     @VECTR1
1605  006276  005337  001364                    DEC     NBEXT                   ;ONE LESS ADV11
1606  006302  000465                            BR      BYPASS
1607  006304  062716  000002            FIXADR: ADD     #2,(SP)
1608  006310  012737  000001  001440    FIXONE: MOV     #1,TSTBIT       ;INITIALIZE MODULE ERROR TEST BIT
1609  006316  013737  001250  001316            MOV     $BASE,STREG             ;RELOAD INITIAL ADDRESSES
1610  006324  013737  001250  001320            MOV     $BASE,ADST1
1611  006332  013737  001250  001322            MOV     $BASE,ADBUFF
1612  006340  005237  001320                    INC     ADST1
1613  006344  062737  000002  001322            ADD     #2,ADBUFF
1614  006352  013737  001244  001324            MOV     $VECT1,VECTOR
1615  006360  042737  170000  001324            BIC     #170000,VECTOR
1616  006366  113737  001245  001326            MOVB    $VECT1+1,BASEBR
1617  006374  105037  001327                    CLRB    BASEBR+1                ;CLEAR HIGH BYTE
1618  006400  013737  001324  001330            MOV     VECTOR,VECTR1
1619  006406  062737  000002  001330            ADD     #2,VECTR1
1620  006414  013737  001324  001332            MOV     VECTOR,VECTR2
1621  006422  062737  000004  001332            ADD     #4,VECTR2
1622  006430  013737  001324  001334            MOV     VECTOR,VECTR3
1623  006436  062737  000006  001334            ADD     #6,VECTR3
1624  006444  005077  172660                    CLR     @VECTR1
1625  006450  013737  001366  001364            MOV     NMBEXT,NBEXT            ;RESET COUNTER
1626                                          ;;LOAD .+2 AND HALT TRAP CATCH;;
1627  006456  012700  000216            BYPASS: MOV     #216,R0                 ;FILL .+2
1628  006462  012701  000214                    MOV     #214,R1                 ;LOAD HALT
1629  006466  020137  001344            1$:     CMP     R1,KBVECT
1630  006472  001410                            BEQ     2$
1631  006474  010021                            MOV     R0,(R1)+
1632  006476  005021                            CLR     (R1)+
1633  006500  010100                            MOV     R1,R0
1634  006502  005720                            TST     (R0)+
1635  006504  020027  001002                    CMP     R0,#1002
1636  006510  001366                            BNE     1$
1637  006512  000207                            RTS     PC                      ;TEST NEXT A/D
1638  006514  022021                    2$:     CMP     (R0)+,(R1)+
1639  006516  022021                            CMP     (R0)+,(R1)+
1640  006520  000762                            BR      1$
```

```
1641  006522  104412                          TYPSET: TYPDC
1642  006524  104400  012121                          TYPE    ,LSB
1643  006530  013746  001356                          MOV     CH2,-(SP)       ;;SAVE CH2 FOR TYPEOUT
1644                                                                          ;;TYPE CH
1645  006534  104402                                  TYPOS                   ;;GO TYPE--OCTAL ASCII
1646  006536     002                                  .BYTE   2               ;;TYPE 2 DIGIT(S)
1647  006537     000                                  .BYTE   0               ;;SUPPRESS LEADING ZEROS
1648  006540  104400  013757                          TYPE    ,MAT            ;TYPE ASCIZ STRING
1649  006544  004737  007030                          JSR     PC,TYPEDG
1650  006550  104400  012134                          TYPE    ,SETCH
1651  006554  013746  001360                          MOV     CH1,-(SP)       ;;SAVE CH1 FOR TYPEOUT
1652                                                                          ;;TYPE CH
1653  006560  104402                                  TYPOS                   ;;GO TYPE--OCTAL ASCII
1654  006562     002                                  .BYTE   2               ;;TYPE 2 DIGIT(S)
1655  006563     000                                  .BYTE   0               ;;SUPPRESS LEADING ZEROS
1656  006564  104400  012156                          TYPE    ,ATMSG
1657  006570  013737  001360  006616                  MOV     CH1,1$
1658  006576  163737  001342  006616                  SUB     BASECH,1$
1659  006604  012777  000200  172510                  MOV     #200,@ADBUFF
1660  006612  004537  011016                          JSR     R5,CONVRT
1661  006616  000000                          1$:     0
1662  006620  013746  001356                          MOV     TEMP,-(SP)      ;;SAVE TEMP FOR TYPEOUT
1663                                                                          ;;TYPE VALUE
1664  006624  104402                                  TYPOS                   ;;GO TYPE--OCTAL ASCII
1665  006626     004                                  .BYTE   4               ;;TYPE 4 DIGIT(S)
1666  006627     001                                  .BYTE   1               ;;TYPE LEADING ZEROS
1667  006630  020437  011610                          CMP     R4,VSET
1668  006634  003003                                  BGT     ERR
1669  006636  104400  012225                          TYPE    ,OKMSG
1670  006642  000207                                  RTS     PC
1671  006644  104400  012547                  ERR:    TYPE    ,ERMSG
1672  006650  000207                                  RTS     PC
1673
1674                                          ;;SUBROUTINE FOR SETTLING TESTS;;
1675  006652  013737  001362  001370          SETIA:  MOV     CH2,DUMMY               ;LOAD DUMMY
1676  006660  004537  007074                          JSR     R5,SARSUB               ;DO SAR ROUTINE AT 50%
1677  006664  000062                                  50.
1678  006666  063702  001414                          ADD     DAC,R2          ;ADD RESULT TO R2
1679  006672  013737  001360  001370                  MOV     CH1,DUMMY               ;CHANGE DUMMY VALUE
1680  006700  004537  007074                          JSR     R5,SARSUB               ;DO SAR ROUTINE AT 50%
1681  006704  000062                                  50.
1682  006706  163702  001414                          SUB     DAC,R2          ;SUBTRACT RESULT FROM R2
1683  006712  000207                                  RTS     PC              ;RETURN
```

```
1684                                        ;SUBROUTINE TO GET EDGE VALUE
1685                                        ;CALL=JSR   PC,GETEDG
1686                                        ;CONVERSIONS ON A/D CHANNEL 'CHANL'
1687                                        ;RESULT IN EDGE, USES R0
1688  006714  012777  000200  172400  GETEDG: MOV     #200,@ADBUFF    ;LOAD VERNIER DAC
1689  006722  113700  001372                MOVB    CHANL,R0                ;GET CHANNEL
1690  006726  000300                       SWAB    R0              ;SET UP A.D STATUS REG.
1691  006730  052700  000100                BIS     #100,R0         ;ENABLE INTRPT.
1692  006734  010077  172356                MOV     R0,@STREG
1693  006740  012700  000100                MOV     #100,R0         ;DAC SETTLING DELAY
1694  006744  005300                1$:     DEC     R0
1695  006746  001376                       BNE     1$
1696  006750  005037  001420                CLR     EDGE
1697  006754  012700  000010                MOV     #10,R0
1698  006760  012777  001620  172336        MOV     #RETURN,@VECTOR         ;RETURN ADDRESS
1699  006766  005277  172324          CONV: INC     @STREG                  ;START CONVERSION
1700  006772  000001                       WAIT                            ;WAIT FOR INTERRUPT
1701  006774  067737  172322  001420        ADD     @ADBUFF,EDGE
1702  007002  005300                       DEC     R0
1703  007004  001370                       BNE     CONV
1704  007006  006237  001420                ASR     EDGE
1705  007012  006237  001420                ASR     EDGE
1706  007016  006237  001420                ASR     EDGE
1707  007022  005537  001420                ADC     EDGE
1708  007026  000207                       RTS     PC
1709
1710                                        ;;SUBROUTINE TO TYPE EDGE VALUES;;
1711  007030  013703  001420          TYPEDG: MOV     EDGE,R3
1712  007034  010346                       MOV     R3,-(SP)        ;;SAVE R3 FOR TYPEOUT
1713                                                                ;;TYPE OCTAL VALUE OF EDGE
1714  007036  104402                       TYPOS                   ;;GO TYPE--OCTAL ASCII
1715  007040     004                       .BYTE   4               ;;TYPE 4 DIGIT(S)
1716  007041     001                       .BYTE   1               ;;TYPE LEADING ZEROS
1717  007042  023727  007072  000001        CMP     EDGFLG,#1
1718  007050  001407                       BEQ     RET
1719  007052  062703  000007                ADD     #7,R3
1720  007056  104400  012025                TYPE    ,MINUS          ;TYPE ASCIZ STRING
1721  007062  010346                       MOV     R3,-(SP)        ;;SAVE R3 FOR TYPEOUT
1722                                                                ;;TYPE EDGE VALUE
1723  007064  104402                       TYPOS                   ;;GO TYPE--OCTAL ASCII
1724  007066     004                       .BYTE   4               ;;TYPE 4 DIGIT(S)
1725  007067     001                       .BYTE   1               ;;TYPE LEADING ZEROS
1726  007070  000207                RET:   RTS     PC
1727  007072  000000                EDGFLG: 0
```

```
                                        ;SUBROUTINE TO DO SUCCESSIVE APPROXIMATION ROUTINE
                                        ;CALL=JSR   R5,SARSUB
                                        ;       XXX;XXX=PERCENT
                                        ;RESULT RETURNED IN 'DAC',USES R0,R1,R4
007074 012537 001432            SARSUB: MOV     (R5)+,PERCNT            ;GET PERCENT
007100 006337 001432                    ASL     PERCNT
007104 006337 001432                    ASL     PERCNT
007110 006337 001432                    ASL     PERCNT                  ;RESCALE PERCENT FOR 1600.
007114 006337 001432                    ASL     PERCNT                  ;POINTS PER BURST
007120 012737 000200 001422     SAR1:   MOV     #200,BITPNT             ;INITIALIZE BIT POINTER AT MSB
007126 005037 001414                    CLR     DAC                     ;INITIALIZE DAC VALUE
007132 005000                   TRY:    CLR     R0
007134 063737 001422 001414             ADD     BITPNT,DAC              ;TRY BIT
007142 013777 001414 172152             MOV     DAC,@ADBUFF
007150 012701 003100                    MOV     #1600.,R1               ;SET UP FOR 1600. CONVERSIONS
007154 113777 001370 172136     NXTCVT: MOVB    DUMMY,@ADST1            ;PRESET MUX TO DUMMY CHANNEL
007162 012777 001620 172134             MOV     #RETURN,@VECTOR         ;RETURN ADDRESS
007170 052777 000101 172120             BIS     #101,@STREG             ;CONVERSION ON DUMMY CHANNEL
007176 000001                           WAIT                            ;WAIT FOR INTERRUPT
007200 017704 172116                    MOV     @ADBUFF,R4              ;DUMMY READ
007204 013704 001372                    MOV     CHANL,R4
007210 000304                           SWAB    R4
007212 052704 000101                    BIS     #101,R4                 ;INTERRUPT ENABLE START
007216 010477 172074                    MOV     R4,@STREG               ;JUMP TO CHANNEL + START CONVERT
007222 000001                           WAIT                            ;WAIT FOR INTERRUPT
007224 027737 172072 001420             CMP     @ADBUFF,EDGE
007232 002001                           BGE     2$
007234 005200                           INC     R0                      ;COUNT RESULTS .LT. EDGE
007236 005301                   2$:     DEC     R1
007240 001345                           BNE     NXTCVT
007242 020037 001432                    CMP     R0,PERCNT
007246 003003                           BGT     SHIFT
007250 163737 001422 001414             SUB     BITPNT,DAC              ;TAKE THE BIT OUT
007256 006237 001422            SHIFT:  ASR     BITPNT
007262 001323                           BNE     TRY
007264 000205                           RTS     R5
```

```
 1764                                        ;;DIFFERENTIAL LINEARITY SUBROUTINE;;
 1765  007266  104400  013162        DIFLIN: TYPE    ,MSG20
 1766  007272  013702  001376                MOV     RNA,R2          ;SET UP RANDOM NUMBER GENERATOR
 1767  007276  013704  001400                MOV     RNB,R4
 1768  007302  013705  001402                MOV     RNC,R5
 1769  007306  012700  017754                MOV     #BUFFER,R0
 1770  007312  012701  010000                MOV     #4096.,R1       ;4096 WORDS FOR HISTOGRAM
 1771  007316  005020                CLEAR1: CLR     (R0)+           ;CLEAR BUFFER AREA
 1772  007320  005301                        DEC     R1
 1773  007322  001375                        BNE     CLEAR1
 1774  007324  012700  017134                MOV     #DIST,R0        ;DISTRIBUTION BUFFER POINTER
 1775  007330  012701  000310                MOV     #200.,R1        ;200. WORDS FOR DISTRIBUTION
 1776  007334  005003                        CLR     R3
 1777  007336  005037  001434                CLR     OUT
 1778  007342  005037  001346                CLR     WIDE
 1779  007346  005037  001350                CLR     NARROW
 1780  007352  005037  001352                CLR     FIRST
 1781  007356  005037  001354                CLR     SKIPST
 1782  007362  005020                CLEAR2: CLR     (R0)+           ;CLEAR DISTRIBUTION BUFFER AREA
 1783  007364  005301                        DEC     R1
 1784  007366  001375                        BNE     CLEAR2
 1785  007370  012700  000003        CHANNL: MOV     #3,R0           ;CHANNEL 3
 1786  007374  063700  001342                ADD     BASECH,R0
 1787  007400  000300                        SWAB    R0                              ;LOAD MUX BITS
 1788  007402  052700  000100                BIS     #100,R0
 1789  007406  010077  171704                MOV     R0,@STREG
 1790  007412  012700  001440                MOV     #800.,R0        ;NOMINAL STATE WIDTH - 1 LSB
 1791  007416  012777  001620  171700        MOV     #RETURN,@VECTOR
 1792  007424  012701  007776        AGAIN:  MOV     #4094.,R1
 1793  007430  060402                NEXT:   ADD     R4,R2
 1794  007432  060502                        ADD     R5,R2
 1795  007434  005502                        ADC     R2
 1796  007436  060204                        ADD     R2,R4
 1797  007440  060504                        ADD     R5,R4
 1798  007442  005504                        ADC     R4
 1799  007444  060205                        ADD     R2,R5
 1800  007446  060405                        ADD     R4,R5
 1801  007450  005505                        ADC     R5
 1802  007452  010246                        MOV     R2,-(SP)
 1803  007454  042702  177760                BIC     #177760,R2      ;MASK IT TO 4 BITS ONLY
 1804  007460  001402                        BEQ     CONVR
 1805  007462  005302                DELAY3: DEC     R2              ;STALL
 1806  007464  001376                        BNE     DELAY3          ;TIME
 1807  007466  005277  171624        CONVR:  INC     @STREG          ;START CONVERSION
 1808  007472  000001                        WAIT
 1809  007474  017702  171622                MOV     @ADBUFF,R2      ;GET CONVERTED VALUE
 1810  007500  001413                        BEQ     DELAY1          ;IGNORE IF =0
 1811  007502  020227  007777                CMP     R2,#7777        ;IGNORE IF =7777
 1812  007506  001413                        BEQ     DELAY2
 1813  007510  006302                        ASL     R2
 1814  007512  005262  017754                INC     BUFFER(R2)      ;MAKE HISTOGRAM
 1815  007516  100013                        BPL     OKAY
 1816  007520  012762  077777  017754        MOV     #077777,BUFFER(R2)      ;PREVENT OVERFLOW
 1817  007526  000407                        BR      OKAY
```

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 1818  007530  020227  007777      DELAY1: CMP     R2,#7777        ;EQUALIZE LOOP TIME
 1819  007534  001400                  BEQ     DELAY2          ;WITH DUMMY INSTR.
 1820  007536  005201              DELAY2: INC     R1
 1821  007540  005263  001356          INC     TEMP(R3)
 1822  007544  100404                  BMI     NOTOK
 1823  007546  012602              OKAY:   MOV     (SP)+,R2        ;POP RANDOM NUMBER FROM STACK
 1824  007550  005301                  DEC     R1
 1825  007552  001326                  BNE     NEXT
 1826  007554  000403                  BR      AROUND
 1827  007556  005037  001356      NOTOK:  CLR     TEMP
 1828  007562  000771                  BR      OKAY
 1829  007564  005300              AROUND: DEC     R0
 1830  007566  001316                  BNE     AGAIN
 1831  007570  012700  007776          MOV     #4094.,R0
 1832  007574  012701  017756          MOV     #BUFFER+2,R1
 1833  007600  012102              READ:   MOV     (R1)+,R2        ;GET STATE WIDTH
 1834  007602  006202                  ASR     R2              ;1 LSB = 800.
 1835  007604  006202                  ASR     R2
 1836  007606  006202                  ASR     R2
 1837  007610  005502                  ADC     R2              ;1 LSB = 100.
 1838  007612  020227  000310          CMP     R2,#200.        ;OUT OF RANGE?
 1839  007616  002403                  BLT     INRNGE
 1840  007620  005237  001434          INC     OUT             ;YES - INCREMENT COUNTER
 1841  007624  000423                  BR      TYPBAD
 1842  007626  006302              INRNGE: ASL     R2
 1843  007630  005262  017134          INC     DIST(R2)        ;MAKE STATE WIDTH DISTRIBUTION
 1844  007634  006202                  ASR     R2
 1845  007636  020227  000062          CMP     R2,#50.         ;IS IT 1/2 LSB?
 1846  007642  002007                  BGE     NOTNAR
 1847  007644  005237  001350          INC     NARROW
 1848  007650  005702                  TST     R2              ;IS IT A SKIPPED STATE?
 1849  007652  001002                  BNE     31$
 1850  007654  005237  001354          INC     SKIPST
 1851  007660  000405              31$:    BR      TYPBAD
 1852  007662  020227  000226      NOTNAR: CMP     R2,#150.        ;IS IT 1.5 LSB?
 1853  007666  003425                  BLE     LAST
 1854  007670  005237  001346          INC     WIDE
 1855  007674  005737  001352      TYPBAD: TST     FIRST
 1856  007700  001004                  BNE     60$
 1857  007702  005237  001352          INC     FIRST
 1858  007706  104400  012071          TYPE    ,STATE
 1859  007712  010103              60$:    MOV     R1,R3
 1860  007714  162703  017756          SUB     #BUFFER+2,R3
 1861  007720  006203                  ASR     R3
 1862  007722  010346                  MOV     R3,-(SP)        ;;SAVE R3 FOR TYPEOUT
 1863                                                          ;;TYPE STATE
 1864  007724  104402                  TYPOS                   ;;GO TYPE--OCTAL ASCII
 1865  007726     004                  .BYTE   4               ;;TYPE 4 DIGIT(S)
 1866  007727     001                  .BYTE   1               ;;TYPE LEADING ZEROS
 1867  007730  104400  012065          TYPE    ,DASH
 1868  007734  104412                  TYPDC
 1869  007736  104400  012056          TYPE    ,LSBMSG
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1870  007742  005300                  LAST:   DEC     R0
1871  007744  001315                          BNE     READ
1872  007746  112737  000177  014554          MOVB    #177,DECPNT
1873  007754  013702  001354                  MOV     SKIPST,R2               ;GET NO. OF SKIPPED STATES
1874  007760  104412                          TYPOC                           ;TYPE IT
1875  007762  104400  012564                  TYPE    ,SKPMSG         ;TYPE MESSAGE
1876  007766  005737  001354                  TST     SKIPST
1877  007772  001403                          BEQ     1$
1878  007774  104400  012547                  TYPE    ,ERMSG          ;TYPE "ERROR"
1879  010000  000402                          BR      NAR
1880  010002  104400  012225          1$:     TYPE    ,OKMSG          ;TYPE "OK"
1881  010006  013702  001350          NAR:    MOV     NARROW,R2               ;GET NO. OF NARROW STATES
1882  010012  104412                          TYPOC                           ;TYPE IT
1883  010014  104400  012606                  TYPE    ,NARMSG         ;TYPE MESSAGE
1884  010020  013702  001346                  MOV     WIDE,R2
1885  010024  063702  001434                  ADD     OUT,R2
1886  010030  104412                          TYPOC                           ;TYPE NO. OF WIDE STATES
1887  010032  104400  012645                  TYPE    ,WIDMSG         ;TYPE MESSAGE
1888  010036  013702  001434                  MOV     OUT,R2
1889  010042  104412                          TYPOC                           ;TYPE NO. OF STATES OUTSIDE 2 LSB
1890  010044  104400  012704                  TYPE    ,OUTMSG         ;TYPE MESSAGE
1891  010050  005737  001434                  TST     OUT
1892  010054  001403                          BEQ     11$
1893  010056  104400  012547                  TYPE    ,ERMSG          ;TYPE "ERROR"
1894  010062  000402                          BR      HALF
1895  010064  104400  012225          11$:    TYPE    ,OKMSG          ;TYPE "OK"
1896  010070  013702  001350          HALF:   MOV     NARROW,R2
1897  010074  063702  001346                  ADD     WIDE,R2
1898  010100  063702  001434                  ADD     OUT,R2
1899  010104  010200                          MOV     R2,R0
1900  010106  104412                          TYPOC                           ;TYPE NO. OF STATES OUTSIDE LIMITS
1901  010110  112737  000056  014554          MOVB    #56,DECPNT
1902  010116  104400  012737                  TYPE    ,HAFMSG
1903  010122  020027  000051                  CMP     R0,#41.         ;COMPARE IT TO NOMINAL
1904  010126  003403                          BLE     21$
1905  010130  104400  012547                  TYPE    ,ERMSG          ;TYPE "ERROR"
1906  010134  000402                          BR      SWDIST
1907  010136  104400  012225          21$:    TYPE    ,OKMSG          ;TYPE "OK"
1908  010142  005737  001410          SWDIST: TST     FLAG            ;VT55?
1909  010146  001426                          BEQ     RELACC
1910  010150  004737  010626                  JSR     PC,DELCLR       ;WAIT AWHILE, THEN CLEAR VT55
1911  010154  104400  013214                  TYPE    ,MSG16
1912  010160  104400  014006                  TYPE    ,BUFF1          ;TYPE BUFF1-PRINT GRID
1913  010164  012700  017134                  MOV     #DIST,R0        ;POINTER TO STATE WIDTH DISTRIBUTION
1914  010170  012701  000310                  MOV     #200.,R1        ;GO 200. TIMES UP TO 2 LSB
1915  010174  012002          NXTY1:  MOV     (R0)+,R2
1916  010176  004737  011322                  JSR     PC,LOADY
1917  010202  005002                          CLR     R2
1918  010204  004737  011322                  JSR     PC,LOADY
1919  010210  005301                          DEC     R1
1920  010212  001370                          BNE     NXTY1
1921  010214  104400  013727                  TYPE    ,C2             ;TYPE ASCIZ STRING
1922  010220  004737  010626                  JSR     PC,DELCLR
```

H04


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                                        ;CHANGE HISTOGRAM ERROR TO RELATIVE ACCURACY ERROR

010224  005001                  RELACC: CLR     R1              ;RUNNING ERROR = 0
010226  005003                          CLR     R3              ;MAXIMUM ERROR = 0
010230  104400  013577                  TYPE    ,MSG21
010234  012700  017756                  MOV     #BUFFER+2,R0
010240  011002                  NXTSTA: MOV     (R0),R2         ;STATE WIDTH = R2
010242  162702  001440                  SUB     #800.,R2        ;STATE WIDTH ERROR IN R2
010246  060201                          ADD     R2,R1           ;UPDATE RUNNING ERROR
010250  010120                          MOV     R1,(R0)+        ;SAVE IN BUFFER
010252  010104                          MOV     R1,R4           ;SAVE IN R4 ALSO
010254  100001                          BPL     PLUS            ;IS IT POSITIVE?
010256  005404                          NEG     R4              ;NO - MAKE IT POSITIVE
010260  020403                  PLUS:   CMP     R4,R3           ;CHECK AGAINST PREVIOUS MAX. ERROR
010262  003405                          BLE     NOTNEW          ;NOT A NEW MAXIMUM
010264  010403                          MOV     R4,R3           ;UPDATE MAXIMUM IN R3
010266  010005                          MOV     R0,R5
010270  162705  017756                  SUB     #BUFFER+2,R5
010274  006205                          ASR     R5              ;R5=EDGE VALUE AT MAX. RELACC
010276  020027  037752          NOTNEW: CMP     R0,#BUFFER+8190.  ;DONE?
010302  001356                          BNE     NXTSTA          ;NO - REPEAT
010304  006203                          ASR     R3              ;RESCALE FROM 1 LSB = 800. SCALING
010306  006203                          ASR     R3              ;TO 1 LSB = 100. SCALING
010310  006203                          ASR     R3
010312  005503                          ADC     R3
010314  010302                          MOV     R3,R2
010316  104412                          TYPDC
010320  104400  013624                  TYPE    ,LINEA
010324  010546                          MOV     R5,-(SP)        ;;SAVE R5 FOR TYPEOUT
                                                                ;;TYPE VALUE
010326  104402                          TYPOS                   ;;GO TYPE--OCTAL ASCII
010330     004                          .BYTE   4               ;;TYPE 4 DIGIT(S)
010331     001                          .BYTE   1               ;;TYPE LEADING ZEROS
010332  104400  012223                  TYPE    ,SLASH                  ;PRINT '/'
010336  005205                          INC     R5
010340  010546                          MOV     R5,-(SP)        ;;SAVE R5 FOR TYPEOUT
                                                                ;;TYPE VALUE
010342  104402                          TYPOS                   ;;GO TYPE--OCTAL ASCII
010344     004                          .BYTE   4               ;;TYPE 4 DIGIT(S)
010345     001                          .BYTE   1               ;;TYPE LEADING ZEROS
010346  020337  011612                  CMP     R3,VLIN
010352  003403                          BLE     41$
010354  104400  012547                  TYPE    ,ERMSG
010360  000402                          BR      42$
010362  104400  012225          41$:    TYPE    ,OKMSG
010366  005737  001410          42$:    TST     FLAG            ;VT55?
010372  001503                          BEQ     LO2
010374  012700  017754                  MOV     #BUFFER,R0
010400  012701  010000                  MOV     #4096.,R1
```

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1972  010404  011002                GETDAT: MOV     (R0),R2         ;GET RELATIVE ACCURACY ERROR SCALED 1LSB = 800.
1973  010406  006202                        ASR     R2              ;RESCALE IT TO 1 LSB = 100.
1974  010410  006202                        ASR     R2
1975  010412  006202                        ASR     R2
1976  010414  005502                        ADC     R2
1977  010416  062702  000166              ADD     #118.,R2        ;AND MOVE IT TO MID-SCREEN
1978  010422  010220                      MOV     R2,(R0)+        ;PUT IT BACK INTO BUFFER
1979  010424  005301                      DEC     R1
1980  010426  001366                      BNE     GETDAT
1981  010430  012700  017754              MOV     #BUFFER,R0
1982  010434  012704  017754              MOV     #BUFFER,R4
1983  010440  012705  017756              MOV     #BUFFER+2,R5
1984  010444  012701  001000              MOV     #512.,R1
1985  010450  012702  000007      NXT8:   MOV     #7.,R2
1986  010454  012003                      MOV     (R0)+,R3
1987  010456  010337  001424              MOV     R3,MIN          ;MINIMUM
1988  010462  010337  001430              MOV     R3,MAX          ;MAXIMUM
1989  010466  012003              NXTCMP: MOV     (R0)+,R3
1990  010470  020337  001424              CMP     R3,MIN
1991  010474  002002                      BGE     MAXTST
1992  010476  010337  001424              MOV     R3,MIN          ;NEW MINIMUM
1993  010502  020337  001430      MAXTST: CMP     R3,MAX
1994  010506  003402                      BLE     TST8
1995  010510  010337  001430              MOV     R3,MAX          ;NEW MAXIMUM
1996  010514  005302              TST8:   DEC     R2
1997  010516  001363                      BNE     NXTCMP
1998  010520  013724  001424              MOV     MIN,(R4)+
1999  010524  013725  001430              MOV     MAX,(R5)+
2000  010530  022425                      CMP     (R4)+,(R5)+     ;BUMP EACH ONCE MORE
2001  010532  005301                      DEC     R1
2002  010534  001345                      BNE     NXT8
2003  010536  104400  013122              TYPE    ,MSG18
2004  010542  104400  014034              TYPE    ,BUFF2          ;TYPE BUFF2
2005  010546  012700  017754              MOV     #BUFFER,R0
2006  010552  004737  010604              JSR     PC,LOAD
2007  010556  104400  013734              TYPE    ,C3             ;TYPE ASCIZ STRING
2008  010562  012700  017756              MOV     #BUFFER+2,R0
2009  010566  004737  010604              JSR     PC,LOAD
2010  010572  104400  013727              TYPE    ,C2             ;TYPE ASCIZ STRING
2011  010576  004737  010626              JSR     PC,DELCLR
2012  010602  000207              L02:    RTS     PC
2013  010604  012701  001000      LOAD:   MOV     #512.,R1
2014  010610  012002              LOADO:  MOV     (R0)+,R2
2015  010612  005720                      TST     (R0)+
2016  010614  004737  011322              JSR     PC,LOADY
2017  010620  005301                      DEC     R1
2018  010622  001372                      BNE     LOADO
2019  010624  000207                      RTS     PC
```

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 2020  010626  032777  010000  170304  DELCLR: BIT     #BIT12,@SWR     ;TEST FOR HALT FOR DISPLAY
 2021  010634  001402                          BEQ     1$              ;;DON'T HALT FOR DISPLAY
 2022  010636  000000                          HALT
 2023  010640  000407                          BR      3$              ;;
 2024  010642  005000                  1$:     CLR     R0
 2025  010644  012701  000020                  MOV     #20,R1          ;DELAY BEFORE CLEANING SCREEN
 2026  010650  005300                  2$:     DEC     R0
 2027  010652  001376                          BNE     2$
 2028  010654  005301                          DEC     R1
 2029  010656  001374                          BNE     2$
 2030  010660  104400  014054          3$:     TYFE    ,VTINIT
 2031  010664  000207                          RTS     PC
 2032                                  ;;TYPE RMS AND PEAK VALUES;;
 2033  010666  104400  012163          TYPRP:  TYPE    ,NOI
 2034  010672  005737  001404                  TST     RMS
 2035  010676  100002                          BPL     POSRMS
 2036  010700  005037  001404                  CLR     RMS                     ;RMS<0,SET RMS=0
 2037  010704  005737  001406          POSRMS: TST     PEAK
 2038  010710  100002                          BPL     POSPEA
 2039  010712  005037  001406                  CLR     PEAK                    ;PEAK<0,SET PEAK=0
 2040  010716  013702  001404          POSPEA: MOV     RMS,R2
 2041  010722  104412                          TYPOC
 2042  010724  104400  013006                  TYPE    ,MESR           ;TYPE " LSB RMS, "
 2043  010730  013702  001406                  MOV     PEAK,R2
 2044  010734  104412                          TYPOC
 2045  010736  104400  013021                  TYPE    ,MESP           ;TYPE " LSB PEAK AT "
 2046  010742  004737  007030                  JSR     PC,TYPEDG
 2047  010746  104400  012173                  TYPE    ,CHAN           ;TYPE " ON CHANNEL "
 2048  010752  013746  001372                  MOV     CHANL,-(SP)     ;;SAVE CHANL FOR TYPEOUT
 2049                                                                  ;;TYPE CHANL
 2050  010756  104402                          TYPOS                   ;;GO TYPE--OCTAL ASCII
 2051  010760     002                          .BYTE   2               ;;TYPE 2 DIGIT(S)
 2052  010761     000                          .BYTE   0               ;;SUPPRESS LEADING ZEROS
 2053  010762  023737  001404  011604          CMP     RMS,VNR         ;WITHIN LIMITS?
 2054  010770  003007                          BGT     ER
 2055  010772  023737  001406  011606          CMP     PEAK,VNP                ;WITHIN LIMITS?
 2056  011000  003003                          BGT     ER
 2057  011002  104400  012225                  TYPE    ,OKMSG
 2058  011006  000207                          RTS     PC
 2059  011010  104400  012547          ER:     TYPE    ,ERMSG
 2060  011014  000207                          RTS     PC
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2061                                        ;;ROUTINE TO AVERAGE 8 CONVERSIONS;;
2062  011016  012500                CONVRT: MOV     (R5)+,R0            ;GET CHANNEL VALUE
2063  011020  063700  001342              ADD     BASECH,R0
2064  011024  010037  001372              MOV     R0,CHANL
2065  011030  000300                      SWAB    R0
2066  011032  005037  001356              CLR     TEMP
2067  011036  010077  170254              MOV     R0,@STREG           ;LOAD CHANNEL INTO MIX BITS
2068  011042  012700  010000              MOV     #10000,R0
2069  011046  005300                2$:   DEC     R0
2070  011050  001376                      BNE     2$
2071  011052  012777  001620  170244      MOV     #RETURN,@VECTOR     ;LOAD VECTOR
2072  011060  012700  000010              MOV     #10,R0              ;SET UP COUNTER
2073  011064  152777  000101  170224  1$:  BISB    #101,@STREG         ;SET INTRPT. EN., START CONV.
2074  011072  000001                      WAIT                        ;WAIT FOR CONVERSION
2075  011074  067737  170222  001356      ADD     @ADBUFF,TEMP        ;READ BUFFER
2076  011102  005300                      DEC     R0
2077  011104  001367                      BNE     1$                  ;DO 8 TIMES
2078  011106  006237  001356              ASR     TEMP                ;AVERAGE VALUE
2079  011112  006237  001356              ASR     TEMP
2080  011116  006237  001356              ASR     TEMP
2081  011122  005537  001356              ADC     TEMP
2082  011126  000205                      RTS     R5                  ;RETURN
2083
2084                                        ;COMPARE $GDDAT AND $BDDAT;;
2085  011130  012537  001124      COMPAR: MOV     (R5)+,$GDDAT        ;GET GOOD DATA
2086  011134  013537  001412              MOV     @(R5)+,SPREAD       ;GET SPREAD
2087  011140  013737  001356  001126      MOV     TEMP,$BDDAT         ;GET BAD(ACTUAL) DATA
2088  011146  013701  001126              MOV     $BDDAT,R1
2089  011152  013700  001124              MOV     $GDDAT,R0
2090  011156  160100                      SUB     R1,R0               ;GET DIFFERENCE
2091  011160  100001                      BPL     7$
2092  011162  005400                      NEG     R0
2093  011164  020037  001412        7$:   CMP     R0,SPREAD           ;COMPARE IT TO SPREAD
2094  011170  003001                      BGT     10$                 ;GO TO ERROR PRINTOUT
2095  011172  005725                      TST     (R5)+               ;BUMP RETURN POINTER AROUND ERROR CALL
2096  011174  000205                10$:  RTS     R5
```

```
MAINDEC-11-DVADA-A     MACY11 27(732)  21-OCT-76  11:18  PAGE 51
DVADAA.CMB             DETERMINE IF MORE ADV11'S TO BE TESTED

 2097                                          ;;SUBROUTINE TO TYPE INTRPT. TST MSG.;;
 2098  011176  005737  001202          DUMW:   TST     $PASS
 2099  011202  001021                          BNE     20$
 2100  011204  012737  011246  001110          MOV     #20$,$LPERR
 2101  011212  012737  011246  001106          MOV     #20$,$LPADR
 2102  011220  104400  013764                  TYPE    ,MESST          ;TYPE ASCIZ STRING
 2103  011224  010046                          MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
 2104                                                                  ;;TYPE TEST NO.
 2105  011226  104402                          TYPOS                   ;;GO TYPE--OCTAL ASCII
 2106  011230     002                          .BYTE   2               ;;TYPE 2 DIGIT(S)
 2107  011231     000                          .BYTE   0               ;;SUPPRESS LEADING ZEROS
 2108  011232  104400  013063                  TYPE    ,ONAD
 2109  011236  013746  001316                  MOV     $TREG,-(SP)     ;;SAVE STREG FOR TYPEOUT
 2110                                                                  ;;TYPE BUS ADDRESS
 2111  011242  104402                          TYPOS                   ;;GO TYPE--OCTAL ASCII
 2112  011244     006                          .BYTE   6               ;;TYPE 6 DIGITS
 2113  011245     001                          .BYTE   1               ;;TYPE LEADING ZEROS
 2114  011246  000207                  20$:    RTS     PC
 2115
 2116  011250  005737  001202          DUMC:   TST     $PASS
 2117  011254  001010                          BNE     30$
 2118  011256  012737  011276  001110          MOV     #30$,$LPERR
 2119  011264  012737  011276  001106          MOV     #30$,$LPADR
 2120  011272  104400  012210                  TYPE    ,DONE
 2121  011276  000207                  30$:    RTS     PC
```

```
2122                                    ;SUBROUTINE TO RESET & SET INTRPT. EN.;
2123  011300  000005                   RST:    RESET
2124  011302  052777  000100  167634          BIS     #100,@#STKS
2125  011310  005046                           CLR     -(SP)           ;CLEAR PSW
2126  011312  012746  011320                   MOV     #1$,-(SP)
2127  011316  000002                           RTI
2128  011320  000207                   1$:     RTS     PC
2129
2130                                    ;SUBROUTINE LOADY;
2131  011322  005702                   LOADY:  TST     R2              ;ROUTINE TO LOAD VLAUE INTO R2
2132  011324  100001                           BPL     PLUSR2          ;AS A VTSS Y-VALUE
2133  011326  005002                           CLR     R2
2134  011330  020227  000353          PLUSR2: CMP     R2,#235.
2135  011334  002402                           BLT     LESS
2136  011336  012702  000353                   MOV     #235.,R2
2137  011342  010203                   LESS:   MOV     R2,R3
2138  011344  042702  177740                   BIC     #177740,R2
2139  011350  052702  000040                   BIS     #40,R2
2140  011354  105777  167570          B10:    TSTB    @#STPS          ;PRINT CHARACTER
2141  011360  100375                           BPL     B10
2142  011362  110277  167564                   MOVB    R2,@#STPB
2143  011366  006203                           ASR     R3
2144  011370  006203                           ASR     R3
2145  011372  006203                           ASR     R3
2146  011374  006203                           ASR     R3
2147  011376  006203                           ASR     R3
2148  011400  042703  177770                   BIC     #177770,R3
2149  011404  052703  000040                   BIS     #40,R3
2150  011410  105777  167534          B11:    TSTB    @#STPS          ;PRINT CHARACTER
2151  011414  100375                           BPL     B11
2152  011416  110377  167530                   MOVB    R3,@#STPB
2153  011422  000207                           RTS     PC
```

```
                                        ;;SUBROUTINE TO TYPE DECIMAL VALUE;;
                                        ;;IN R2 AS X.XX;;
011424  005702                  DECTYP: TST     R2              ;TEST VALUE TO BE TYPED
011426  100003                          BPL     POS
011430  104400  012025                  TYPE    ,MINUS                  ;TYPE MINUS SIGN
011434  005402                          NEG     R2
011436  020227  001747          POS:    CMP     R2,#999.                ;>999. REPLACE IT WITH 999.
011442  003402                          BLE     OKAYD
011444  012702  001747                  MOV     #999.,R2
011450  105037  014556          OKAYD:  CLRB    ONES            ;CLEAR ONES
011454  105037  014555                  CLRB    TENS            ;CLEAR TENS
011460  105037  014553                  CLRB    HUNS            ;CLEAR HUNS
011464  005702                  TESTR2: TST     R2                      ;CONVERT VALUE TO A DECIMAL VALUE
011466  001424                          BEQ     TYPOUT
011470  005302                          DEC     R2
011472  105237  014556                  INCB    ONES
011476  123727  014556  000012          CMPB    ONES,#10.
011504  001367                          BNE     TESTR2
011506  105037  014556                  CLRB    ONES
011512  105237  014555                  INCB    TENS
011516  123727  014555  000012          CMPB    TENS,#10.
011524  001357                          BNE     TESTR2
011526  105037  014555                  CLRB    TENS
011532  105237  014553                  INCB    HUNS
011536  000752                          BR      TESTR2
011540  152737  000060  014553  TYPOUT: BISB    #60,HUNS                ;PREPARE FOR TYPOUT
011546  152737  000060  014555          BISB    #60,TENS
011554  152737  000060  014556          BISB    #60,ONES
011562  104400  014553                  TYPE    ,HUNS           ;TYPE VALUE
011566  000002                          RTI
011570  000000                  V0:     0                       ;TOLERANCE VALUES FOR FUNCTIONAL TESTS
011572  000002                  V2:     2
011574  000004                  V4:     4
011576  000012                  V12:    12
011600  000062                  V50:    50.
011602  000326                  V326:   326
011604  000041                  VNR:    33.             ;.33 LSB,NORMAL LIMITS FOR SYSTEM
011606  000310                  VNP:    200.            ;2 LSB,  INTEGRATION AND FIELD USE ON SPEC TESTS
011610  000144                  VSET:   100.            ;1 LSB
011612  000175                  VLIN:   125.            ;1.25 LSB
011614  100000                          BIT15
011616  052777  000100  167320  AGATST: BIS     #100,@$TKS
011624  000137                          JMP     @(PC)+
011626  001644                  AGTST:  BEGIN
```

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                                        .SBTTL  END OF PASS ROUTINE
                                        ;;**************************************************************************
                                        ;*INCREMENT THE PASS NUMBER ($PASS)
                                        ;*IF THERES A MONITOR GO TO IT
                                        ;*IF THERE ISN'T JUMP TO AGAIST
011630                                  $EOP:
011630  000240                                NOP
011632  005037  001102                      CLR     $TSTNM          ;;ZERO THE TEST NUMBER
011636  005037  001160                      CLR     $TIMES          ;;ZERO THE NUMBER OF ITERATIONS
011642  005237  001202                      INC     $PASS           ;;INCREMENT THE PASS NUMBER
011646  042737  100000  001202              BIC     #100000,$PASS   ;;DON'T ALLOW A NEG. NUMBER
011654  005327                            1$: DEC     (PC)+           ;;LOOP'
011656  000001                            $EOPCT: .WORD   1
011660  003035                                BGT     $DOAGN          ;;YES
011662  012737                                MOV     (PC)+,2(PC)+    ;;RESTORE COUNTER
011664  000001                            $ENDCT: .WORD   1
011666  011656                                $EOPCT
011670  104400  011676                      TYPE    ,65$            ;;TYPE ASCIZ STRING
011674  000414                              BR      64$             ;;GET OVER THE ASCIZ
                                        ;;65$:  .ASCIZ  <15><12>/ENDPASS  GOOD UNITS  /
011726                                  64$:
011726  013746  001436                      MOV     GUNITS,-(SP)    ;;SAVE GUNITS FOR TYPEOUT
011732  104404                              TYPBN                   ;;GO TYPE--BINARY ASCII
011734  013700  000042                  $GET42: MOV     @#42,R0         ;;GET MONITOR ADDRESS
011740  001405                              BEQ     $DOAGN          ;;BRANCH IF NO MONITOR
011742  000005                              RESET                   ;;CLEAR THE WORLD
011744  004710                          $ENMOD: JSR     PC,(R0)         ;;GO TO MONITOR
011746  000240                              NOP                     ;;SAVE ROOM
011750  000240                              NOP                     ;;FOR
011752  000240                              NOP                     ;;ACT11
011754                                  $DOAGN:
011754  000137                              JMP     @(PC)+          ;;RETURN
011756  011616                          $RTNAD: .WORD   AGAIST
011760     377     377     000          $ENULL: .BYTE   -1,-1,0         ;;NULL CHARACTER STRING
011764                                          .EVEN
```

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                                                .SBTTL          ASCII MESSAGES
2238  011764  005015  047516  051511  NOIMSG: .ASCIZ  <15><12>/NOISE TEST/<15><12>
2239  011772  020105  042524  052123
2240  012000  005015      000
2241  012003      u15 051412  052105  SETMSG: .ASCIZ  <15><12>/SETTLING TEST/<15><12>
2242  012010  046124  047111  020107
2243  012016  042524  052123  005015
2244  012024      000
2245  012025      055     000         MINUS:  .BYTE   55,0
2246  012027      077     000         QUEST:  .BYTE   77,0
2247  012031      136     101     040 AMSG:   .BYTE   136,101,40,40,0
2248  012034      040     000
2249  012036      136     103     040 CMSG:   .BYTE   136,103,40,40,0
2250  012041      040     000
2251  012043      136     107     015 GMSG:   .BYTE   136,107,15,12,123,127,122,105,107,72,0
2252  012046      012     123     127
2253  012051      122     105     107
2254  012054      072     000
2255  012056  046040  041123  005015  LSBMSG: .ASCIZ  / LSB/<15><12>
2256  012064      000
2257  012065      055  020055     000  DASH:   .ASCIZ  /-- /
2258  012071      123  040524  042524  STATE:  .ASCIZ  /STATE-- WIDTH/<15><12>
2259  012076  026455  053440  042111
2260  012104  044124  005015     000
2261  012111      103  000110         CH:     .ASCIZ  /CH/
2262  012114  020040  020040     000  SPACE:  .ASCIZ  /   /
2263  012121      040  051514  020102  LSB:    .ASCIZ  / LSB ON CH/
2264  012126  047117  041440  000110
2265  012134  051440  052105  046124  SETCH:  .ASCIZ  / SETTLING FROM CH/
2266  012142  047111  020107  051106
2267  012150  046517  041440  000110
2268  012156  040440  020124     000  ATMSG:  .ASCIZ  / AT /
2269  012163      116  044517  042523  NOI:    .ASCIZ  /NOISE: /
2270  012170  020072      000
2271  012173      040  047117  041440  CHAN:   .ASCIZ  / ON CHANNEL /
2272  012200  040510  047116  046105
2273  012206  000040
2274  012210  020040  020040  047504  DONE:   .ASCIZ  /   DONE/<15><12>
2275  012216  042516  005015     000
2276  012223      057     000         SLASH:  .ASCIZ  #/#
2277  012225      040  020040  047440  OKMSG:  .ASCIZ  /   OK/<15><12>
2278  012232  006513  000012
2279  012236  005015  054524  042520  CCHAN:  .ASCIZ  <15><12>/TYPE CHANNEL & CR: /
2280  012244  041440  040510  047116
2281  012252  046105  023040  041440
2282  012260  035122  000040
2283  012264  005015  054524  042520  SEL:    .ASCIZ  <15><12>/TYPE "O" FOR OFFSET, "G" FOR GAIN & CR: /
2284  012272  021040  021117  043040
2285  012300  051117  047440  043106
2286  012306  042523  026124  021040
2287  012314  021107  043040  051117
2288  012322  043440  044501  020116
2289  012330  020046  051103  020072
2290  012336      000
```

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  2291  012337     015  040412  045104  XADJ:   .ASCII  <15><12>/ADJUST R15/
  2292  012344  051525  020124  030522
  2293  012352     065
  2294  012353     040  047506  020122  MOLSB:  .ASCIZ  / FOR 0.00 LSB ERROR/
  2295  012360  027060  030060  046040
  2296  012366  041123  042440  051122
  2297  012374  051117     000
  2298  012377     015  044412  050116  IGND:   .ASCII  <15><12>/INPUT A GROUND ON THE CHANNEL/
  2299  012404  052125  040440  043440
  2300  012412  047522  047125  020104
  2301  012420  047117  052040  042510
  2302  012426  041440  040510  047116
  2303  012434  046105
  2304  012436  005015  054524  042520  CRWR:   .ASCIZ  <15><12>/TYPE CR WHEN READY/<15><12>
  2305  012444  041440  020122  044127
  2306  012452  047105  051040  040505
  2307  012460  054504  005015     000
  2308  012465     015  044412  050116  IVOLT:  .ASCIZ  <15><12>/INPUT +5.115 VOLTS ON THE CHANNEL/
  2309  012472  052125  025440  027065
  2310  012500  030461  020065  047526
  2311  012506  052114  020123  047117
  2312  012514  052040  042510  041440
  2313  012522  040510  047116  046105
  2314  012530     000
  2315  012531     015  040412  045104  YADJ:   .ASCIZ  <15><12>/ADJUST R3/
  2316  012536  051525  020124  031522
  2317  012544     000
  2318  012545     053     000          POSITV: .ASCIZ  /+/
  2319  012547     040  025052  051105  ERMSG:  .ASCIZ  / **ERROR**/<15><12>
  2320  012554  047522  025122  006452
  2321  012562  000012
  2322  012564  051440  044513  050120  SKPMSG: .ASCIZ  / SKIPPED STATE(S)/
  2323  012572  042105  051440  040524
  2324  012600  042524  051450  000051
  2325  012606  047040  051101  047522  NARMSG: .ASCIZ  # NARROW (< 1/2 LSB) STATE(S)#<15><12>
  2326  012614  020127  036050  030440
  2327  012622  031057  046040  041123
  2328  012630  020051  052123  052101
  2329  012636  024105  024523  005015
  2330  012644     000
  2331  012645     040  044527  042504  WIDMSG: .ASCIZ  # WIDE (> 1 1/2 LSB) STATE(S)#<15><12>
  2332  012652  024040  020076  020061
  2333  012660  027461  020062  051514
  2334  012666  024502  051440  040524
  2335  012674  042524  051450  006451
  2336  012702  000012
  2337  012704  051440  040524  042524  OUTMSG: .ASCIZ  / STATE(S) WIDER THAN 2 LSB/
  2338  012712  051450  020051  044527
  2339  012720  042504  020122  044124
  2340  012726  047101  031040  046040
  2341  012734  041123     000
```

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2342  012737  000040  052123  052101  HAFMSG: .ASCIZ  # STATE-WIDTH(S) OUTSIDE + OR - 1/2 LSB#
2343  012744  026505  044527  052104
2344  012752  024110  024523  047440
2345  012760  052125  044523  042504
2346  012766  025440  047440  020122
2347  012774  020055  027461  020062
2348  013002  051514  000102
2349  013006  046040  041123  051040  MESR:   .ASCIZ  / LSB RMS, /
2350  013014  051515  020054  000
2351  013021  000040  051514  020102  MESP:   .ASCIZ  / LSB PEAK AT /
2352  013026  042520  045501  040440
2353  013034  020124  000000
2354  013037  000015  042412  042116  MEND:   .ASCII  <15><12>/END OF LOGIC TESTS/
2355  013044  047440  020106  047514
2356  013052  044507  020103  042524
2357  013060  052123  000123
2358  013063  000040  047117  040440  ONAD:   .ASCIZ  / ON ADV11 AT /
2359  013070  053104  030461  040440
2360  013076  020124  000000
2361  013101  000040  042101  030526  MSGSO:  .ASCIZ  / ADV11'S FOUND/<15><12>
2362  013106  023461  020123  047506
2363  013114  047125  006504  000012
2364  013122  005012  025412  027461  MSG18:  .ASCII  <12><12><12>#+1/2 LSB#<15><12><12><12><12><12><12><12><12><12><12><12><1
2365  013130  020062  051514  006502
2366  013136  005012  005012  005012
2367  013144  005012  005012  005012
2368  013152  030455  031057  051514          .ASCIZ  \-1/2LSB\
2369  013160  000102
2370
2371                                          .EVEN
2372  013162  044504  043106  051105  MSG20:  .ASCIZ  /DIFFERENTIAL LINEARITY:/<15><12>
2373  013170  047105  044524  046101
2374  013176  046040  047111  040505
2375  013204  044522  054524  006472
2376  013212  000012
```

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2377  013214  020040  020040  020040  MSG16:  .ASCII  /                    STATE-WIDTH DISTRIBUTION/<15><12><12><12>
2378  013222  020040  020040  020040
2379  013230  020040  020040  020040
2380  013236  020040  052123  052101
2381  013244  026505  044527  052104
2382  013252  020110  044504  052123
2383  013260  044522  052502  044524
2384  013266  047117  005015  005012
2385  013274  020040  020043  043117          .ASCII  /  # OF STATES/<12><12><12><12><12><12><12><12><12><12><12><12><12><12><
2386  013302  051440  040524  042524
2387  013310  005123  005012  005012
2388  013316  005012  005012  005012
2389  013324  005012  005012  005012
2390  013332  005012
2391  013334  020040  020040  020040          .ASCII  /                                                STATE WIDTH (LSB)/<15>
2392  013342  020040  020040  020040
2393  013350  020040  020040  020040
2394  013356  020040  020040  020040
2395  013364  020040  020040  020040
2396  013372  020040  020040  020040
2397  013400  020040  020040  020040
2398  013406  020040  020040  020040
2399  013414  051440  040524  042524
2400  013422  053440  042111  044124
2401  013430  024040  051514  024502
2402  013436  005015
2403  013440  030040  020040  020040          .ASCIZ  # 0              1/2              1              1 1/2              2#
2404  013446  020040  020040  020040
2405  013454  020040  020040  027461
2406  013462  020062  020040  020040
2407  013470  020040  020040  020040
2408  013476  020040  020061  020040
2409  013504  020040  020040  020040
2410  013512  020040  030440  030440
2411  013520  031057  020040  020040
2412  013526  020040  020040  020040
2413  013534  020040  031040      000
2414  013541      015  052012  050131  MSG71:  .ASCIZ  <15><12>/TYPE LETTER & CR FOR TEST: /
2415  013546  020105  042514  052124
2416  013554  051105  023040  041440
2417  013562  020122  047506  020122
2418  013570  042524  052123  020072
2419  013576      000
2420  013577      122  046105  052101  MSG21:  .ASCIZ  /RELATIVE ACCURACY:/<15><12>
2421  013604  053111  020105  041501
2422  013612  052503  040522  054503
2423  013620  006472  000012
2424  013624  046040  041123  046440  LINEA:  .ASCIZ  / LSB MAXIMUM AT /
2425  013632  054101  046511  046525
2426  013640  040440  020124      000
2427  013645      015  050012  044522  HEADS:  .ASCII  <15><12>/PRINT VALUES--/
2428  013652  052116  020040  046101
2429  013660  042525  026523      055
```

```
2430  013665  040     042523  020124  ASKCH:  .ASCIZ  / SET CHANNEL IN SWR LOW BYTE/<15><12>
2431  013672  044103  047101  042516
2432  013700  020114  047111  051440
2433  013706  051127  046040  053517
2434  013714  041040  052131  006505
2435  013722  000012
2436  013724  055033  000             CO:     .ASCIZ  <33><132>
2437  013727  033     015462  000110  C2:     .ASCIZ  <33><62><33><110>       ;CLEAR GRAPH MODE AND HOME
2438  013734  000112                  C3:     .ASCIZ  <112>
2439  013736  005015  043117  051506  MOFSET: .ASCIZ  <15><12>/OFFSET =/
2440  013744  052105  036440  000
2441  013751  040     051514  020102  MLSB:   .ASCIZ  / LSB /
2442  013756  000
2443  013757  040     052101  000040  MAT:    .ASCIZ  / AT /
2444  013764  005015  042440  052116  METST:  .ASCIZ  <15><12>/ ENTERING TEST /
2445  013772  051105  047111  020107
2446  014000  042524  052123  000040
2447  014006  033     061     101     BUFF1:  .BYTE   33,61,101,61,111,62,114,41,60,45,63,51,66,55,71,61,74,110,41,40,112,0
2448  014011  061     111     062
2449  014014  114     041     060
2450  014017  045     063     051
2451  014022  066     055     071
2452  014025  061     074     110
2453  014030  041     040     112
2454  014033  000
2455  014034  033     061     101     BUFF2:  .BYTE   33,61,101,47,111,61,104,50,65,44,62,110,40,40,102,0
2456  014037  047     111     061
2457  014042  104     050     065
2458  014045  044     062     110
2459  014050  040     040     102
2460  014053  000
2461  014054  033     110     033     VTINIT: .BYTE   33,110,33,112,33,61,101,40,33,62,0      ;HOME & ERASE SCREEN & CLEAR GRA
2462  014057  112     033     061
2463  014062  101     040     033
2464  014065  062     000
```

```
 2465  014067     015  005012  042115  HEAD1:  .ASCII  <15><12><12>/MD-11-DVADA-A    ADV11 DIAGNOSTIC/<15><12>
 2466  014074  030455  026461  053104
 2467  014102  042101  026501  020101
 2468  014110  020040  040440  053104
 2469  014116  030461  042040  040511
 2470  014124  047107  051517  044524
 2471  014132  006503     012
 2472  014135     012  035101  040440          .ASCII  <12>/A: AUTO TEST/
 2473  014142  052125  020117  042524
 2474  014150  052123
 2475  014152  005015  035103  041440          .ASCII  <15><12>/C: CALIBRATION/
 2476  014160  046101  041111  040522
 2477  014166  044524  047117
 2478  014172  005015  035120  050040          .ASCII  <15><12>/P: PRINT VALUES/
 2479  014200  044522  052116  053040
 2480  014206  046101  042525     123
 2481  014213     015  046012  020072          .ASCII  <15><12>/L: LOGIC TEST/
 2482  014220  047514  044507  020103
 2483  014226  042524  052123
 2484  014232  005015  035127  053440          .ASCIZ  <15><12>/W: WRAPAROUND TEST/<15><12>
 2485  014240  040522  040520  047522
 2486  014246  047125  020104  042524
 2487  014254  052123  005015     000
 2488  014261     123  040524  052524  EM1:    .ASCIZ  /STATUS REG. ERROR/
 2489  014266  020123  042522  027107
 2490  014274  042440  051122  051117
 2491  014302     000
 2492  014303     106  044501  042514  EM2:    .ASCIZ  /FAILED TO INTERRUPT/
 2493  014310  020104  047524  044440
 2494  014316  052116  051105  052522
 2495  014324  052120     000
 2496  014327     125  042516  050130  EM3:    .ASCIZ  /UNEXPECTED INTERRUPT/
 2497  014334  041505  042524  020104
 2498  014342  047111  042524  051122
 2499  014350  050125  000124
 2500  014354  051105  047522  020122  EM4:    .ASCIZ  #ERROR ON A/D CHANNEL#
 2501  014362  047117  040440  042057
 2502  014370  041440  040510  047116
 2503  014376  046105     000
```

```
2504  014401  000105  051122  041520  DH1:    .ASCIZ  /ERRPC STREG EXPECTED ACTUAL/
2505  014406  051440  051124  043505
2506  014414  042440  050130  041505
2507  014422  042524  020104  041501
2508  014430  052524  046101  000
2509  014435  000105  051122  041520  DH2:    .ASCIZ  /ERRPC  STREG   CHANNEL  NOMINAL  TOLERANCE  ACTUAL/
2510  014442  020040  052123  042522
2511  014450  020107  020040  044103
2512  014456  047101  042516  020114
2513  014464  047040  046517  047111
2514  014472  046101  020040  047524
2515  014500  042514  040522  041516
2516  014506  020105  040440  052103
2517  014514  040525  000114
2518  014520  051105  050122  020103  DH3:    .ASCIZ  /ERRPC      STREG    ACTUAL/
2519  014526  020040  020040  051440
2520  014534  051124  043505  020040
2521  014542  020040  041501  052524
2522  014550  046101  000
2523  014553  000                     MUNS:   .BYTE   0
2524  014554  056                     DECPNT: .BYTE   56
2525  014555  000                     TENS:   .BYTE   0
2526  014556  000     000             ONES:   .BYTE   0,0
2527                                  .EVEN
2528
2529  014560  001116  001316  001124  DT1:    $ERRPC, STREG, $GDDAT, $BDDAT,0
2530  014566  001126  000000
2531  014572  001116  001316  001372  DT2:    $ERRPC,STREG,CHANL,$GDDAT,$PREAD,$BDDAT,0
2532  014600  001124  001412  001126
2533  014606  000000
2534  014610  001116  001316  001126  DT3:    $ERRPC,STREG,$BDDAT,0
2535  014616  000000
2536  014620  000000                  DF1:    0
```

```
                                        .SBTTL  TTY INPUT ROUTINE

                                        ;;*****************************************************************
                                        .ENABL  LSB

                                        .DSABL  LSB


                                        ;;*****************************************************************
                                        ;*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
                                        ;
014622  011646          $RDCHR: MOV     (SP),-(SP)      ;;PUSH DOWN THE PC
014624  016666  000004  000002          MOV     4(SP),2(SP)     ;;SAVE THE PS
014632  105777  164306          1$:     TSTB    @$TKS           ;;WAIT FOR
014636  100375                          BPL     1$              ;;A CHARACTER
014640  117766  164302  000004          MOVB    @$TKB,4(SP)     ;;READ THE TTY
014646  042766  177600  000004          BIC     #^C(177),4(SP)  ;;GET RID OF JUNK IF ANY
014654  026627  000004  000023          CMP     4(SP),#23       ;;IS IT A CONTROL-S?
014662  001013                          BNE     3$              ;;BRANCH IF NO
014664  105777  164254          2$:     TSTB    @$TKS           ;;WAIT FOR A CHARACTER
014670  100375                          BPL     2$              ;;LOOP UNTIL ITS THERE
014672  117746  164250                  MOVB    @$TKB,-(SP)     ;;GET CHARACTER
014676  042716  177600                  BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII
014702  022627  000021                  CMP     (SP)+,#21       ;;IS IT A CONTROL-Q?
014706  001366                          BNE     2$              ;;IF NOT DISCARD IT
014710  000750                          BR      1$              ;;YES, RESUME
014712  026627  000004  000140  3$:     CMP     4(SP),#140      ;;IS IT UPPER CASE?
014720  002407                          BLT     4$              ;;BRANCH IF YES
014722  026627  000004  000175          CMP     4(SP),#175      ;;IS IT A SPECIAL CHAR?
014730  003003                          BGT     4$              ;;BRANCH IF YES
014732  042766  000040  000004          BIC     #40,4(SP)       ;;MAKE IT UPPER CASE
014740  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

014742  010346          $RDLIN: MOV     R3,-(SP)        ;;SAVE R3
014744  012703  015050          1$:     MOV     #$TTYIN,R3      ;;GET ADDRESS
014750  022703  015060          2$:     CMP     #$TTYIN+80.,R3  ;;BUFFER FULL?
014754  101405                          BLOS    4$              ;;BR IF YES
014756  104405                          RDCHR                   ;;GO READ ONE CHARACTER FROM THE TTY
014760  112613                          MOVB    (SP)+,(R3)      ;;GET CHARACTER
014762  122713  000177          10$:    CMPB    #177,(R3)       ;;IS IT A RUBOUT
014766  001003                          BNE     3$              ;;SKIP IF NOT
014770  104400  001170          4$:     TYPE    ,$QUES          ;;TYPE A '?'
014774  000763                          BR      1$              ;;CLEAR THE BUFFER AND LOOP
014776  111337  015046          3$:     MOVB    (R3),9$         ;;ECHO THE CHARACTER
015002  104400  015046                  TYPE    ,9$
```

```
2593  015006  122723  000015                    CMPB    #15,(R3)+       ;;CHECK FOR RETURN
2594  015012  001356                            BNE     2$              ;;LOOP IF NOT RETURN
2595  015014  105063  177777                    CLRB    -1(R3)          ;;CLEAR RETURN (THE 15)
2596  015020  104400  001172                    TYPE    ,$LF            ;;TYPE A LINE FEED
2597  015024  012603                            MOV     (SP)+,R3        ;;RESTORE R3
2598  015026  011646                            MOV     (SP),-(SP)      ;;ADJUST THE STACK AND PUT ADDRESS OF THE
2599  015030  016666  000004  000002            MOV     4(SP),2(SP)     ;;      FIRST ASCII CHARACTER ON IT
2600  015036  012766  015050  000004            MOV     #STTYIN,4(SP)
2601  015044  000002                            RTI                     ;;RETURN
2602  015046     000                  9$:        .BYTE   0               ;;STORAGE FOR ASCII CHAR. TO TYPE
2603  015047     000                             .BYTE   0               ;;TERMINATOR
2604  015050  000010                  STTYIN:    .BLKB   8.              ;;RESERVE 8 BYTES FOR TTY INPUT
2605  015060  052536  005015     000  $CNTLU:    .ASCIZ  /↑U/<15><12>    ;;CONTROL "U"
2606  015065     136  006507  000012  $CNTLG:    .ASCIZ  /↑G/<15><12>    ;;CONTROL "G"
2607  015072  005015  053523  020122  $MSWR:     .ASCIZ  <15><12>/SWR = /
2608  015100  020075     000
2609  015103     040  047040  053505  $MNEW:     .ASCIZ  /  NEW = /
2610  015110  036440  000040
```

```
                                        .SBTTL  READ AN OCTAL NUMBER FROM THE TTY

                                        ;;**********************************************************************
                                        ;*THIS ROUTINE WILL READ AN OCTAL (ASCII) NUMBER FROM THE TTY AND
                                        ;*CHANGE IT TO BINARY.
                                        ;*CALL:
                                        ;*      RDOCT                   ;;READ AN OCTAL NUMBER
                                        ;*      RETURN HERE             ;;LOW ORDER BITS ARE ON TOP OF THE STACK
                                        ;*                              ;;HIGH ORDER BITS ARE IN $HIOCT

015114  011646                 $RDOCT: MOV     (SP),-(SP)      ;;PROVIDE SPACE FOR THE
015116  016666  000004  000002          MOV     4(SP),2(SP)     ;;INPUT NUMBER
015124  010046                         MOV     R0,-(SP)        ;;PUSH R0 ON STACK
015126  010146                         MOV     R1,-(SP)        ;;PUSH R1 ON STACK
015130  010246                         MOV     R2,-(SP)        ;;PUSH R2 ON STACK
015132  104406                 1$:     RDLIN                   ;;READ AN ASCIZ LINE
015134  012600                         MOV     (SP)+,R0        ;;GET ADDRESS OF 1ST CHARACTER
015136  005001                         CLR     R1              ;;CLEAR DATA WORD
015140  005002                         CLR     R2
015142  112046                 2$:     MOVB    (R0)+,-(SP)     ;;PICKUP THIS CHARACTER
015144  001412                         BEQ     3$              ;;IF ZERO GET OUT
015146  006301                         ASL     R1              ;;*2
015150  006102                         ROL     R2
015152  006301                         ASL     R1              ;;*4
015154  006102                         ROL     R2
015156  006301                         ASL     R1              ;;*8
015160  006102                         ROL     R2
015162  042716  177770                 BIC     #^C7,(SP)       ;;STRIP THE ASCII JUNK
015166  062601                         ADD     (SP)+,R1        ;;ADD IN THIS DIGIT
015170  000764                         BR      2$              ;;LOOP
015172  005726                 3$:     TST     (SP)+           ;;CLEAN TERMINATOR FROM STACK
015174  010166  000012                 MOV     R1,12(SP)       ;;SAVE THE RESULT
015200  010237  015214                 MOV     R2,$HIOCT
015204  012602                         MOV     (SP)+,R2        ;;POP STACK INTO R2
015206  012601                         MOV     (SP)+,R1        ;;POP STACK INTO R1
015210  012600                         MOV     (SP)+,R0        ;;POP STACK INTO R0
015212  000002                         RTI                     ;;RETURN
015214  000000                 $HIOCT: .WORD   0               ;;HIGH ORDER BITS GO HERE
```

```
                                        .SBTTL  SCOPE HANDLER ROUTINE

                                        ;;**********************************************************************
                                        ;*THIS ROUTINE CONTROLS THE LOOPING OF SUBTESTS. IT WILL INCREMENT
                                        ;*AND LOAD THE TEST NUMBER($TSTNM) INTO THE DISPLAY REG.(DISPLAY<7:0>)
                                        ;*AND LOAD THE ERROR FLAG ($ERFLG) INTO DISPLAY<15:08>
                                        ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
                                        ;*SW14=1         LOOP ON TEST
                                        ;*SW11=1         INHIBIT ITERATIONS
                                        ;*SW09=1         LOOP ON ERROR
                                        ;*SW08=1         LOOP ON TEST IN SWR<7:0>
                                        ;*CALL
                                        ;*      SCOPE            ;;SCOPE=IOT

015216                                  $SCOPE:
015216  032777  040000  163714          1$:     BIT     #BIT14,@SWR     ;;LOOP ON PRESENT TEST?
015224  001114                                  BNE     $OVER           ;;YES IF SW14=1
                                        ;##,##START OF CODE FOR THE X)R TESTER#####
015226  000416                          $XTSTR: BR      6$              ;;IF RUNNING ON THE "XOR" TESTER CHANGE
                                                                        ;;THIS INSTRUCTION TO A "NOP" (NOP=240)
015230  013746  000004                          MOV     @#ERRVEC,-(SP)  ;;SAVE THE CONTENTS OF THE ERROR VECTOR
015234  012737  015254  000004                  MOV     #5$,@#ERRVEC    ;;SET FOR TIMEOUT
015242  005737  177060                          TST     @#177060        ;;TIME OUT ON XOR?
015246  012637  000004                          MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
015252  000463                                  BR      $SVLAD          ;;GO TO THE NEXT TEST
015254  022626                          5$:     CMP     (SP)+,(SP)+     ;;CLEAR THE STACK AFTER A TIME OUT
015256  012637  000004                          MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
015262  000423                                  BR      7$              ;;LOOP ON THE PRESENT TEST
015264                                  6$:;#####END OF CODE FOR THE XOR TESTER#####
015264  032777  000400  163646                  BIT     #BIT08,@SWR     ;;LOOP ON SPEC. TEST?
015272  001404                                  BEQ     2$              ;;BR IF NO
015274  127737  163640  001102                  CMPB    @SWR,$TSTNM     ;;ON THE RIGHT TEST?    SWR<7:0>
015302  001465                                  BEQ     $OVER           ;;BR IF YES
015304  105737  001103                  2$:     TSTB    $ERFLG          ;;HAS AN ERROR OCCURRED?
015310  001421                                  BEQ     3$              ;;BR IF NO
015312  123737  001115  001103                  CMPB    $ERMAX,$ERFLG   ;;MAX. ERRORS FOR THIS TEST OCCURRED?
015320  101015                                  BHI     3$              ;;BR IF NO
015322  032777  001000  163610                  BIT     #BIT09,@SWR     ;;LOOP ON ERROR?
015330  001404                                  BEQ     4$              ;;BR IF NO
015332  013737  001110  001106          7$:     MOV     $LPERR,$LPADR   ;;SET LOOP ADDRESS TO LAST SCOPE
015340  000446                                  BR      $OVER
015342  105037  001103                  4$:     CLRB    $ERFLG          ;;ZERO THE ERROR FLAG
015346  005037  001160                          CLR     $TIMES          ;;CLEAR THE NUMBER OF ITERATIONS TO MAKE
015352  000415                                  BR      1$              ;;ESCAPE TO THE NEXT TEST
015354  032777  004000  163556          3$:     BIT     #BIT11,@SWR     ;;INHIBIT ITERATIONS?
015362  001011                                  BNE     1$              ;;BR IF YES
015364  005737  001202                          TST     $PASS           ;;IF FIRST PASS OF PROGRAM
015370  001406                                  BEQ     1$              ;;      INHIBIT ITERATIONS
015372  005237  001104                          INC     $ICNT           ;;INCREMENT ITERATION COUNT
015376  023737  001160  001104                  CMP     $TIMES,$ICNT    ;;CHECK THE NUMBER OF ITERATIONS MADE
015404  002024                                  BGE     $OVER           ;;BR IF MORE ITERATION REQUIRED
015406  012737  000001  001104          1$:     MOV     #1,$ICNT        ;;REINITIALIZE THE ITERATION COUNTER
015414  013737  015472  001160                  MOV     $MXCNT,$TIMES   ;;SET NUMBER OF ITERATIONS TO DO
015422  105237  001102                  $SVLAD: INCB    $TSTNM          ;;COUNT TEST NUMBERS
015426  113737  001102  001200                  MOVB    $TSTNM,$TESTN   ;;SET TEST NUMBER IN APT MAILBOX
015434  011637  001106                          MOV     (SP),$LPADR     ;;SAVE SCOPE LOOP ADDRESS
```

```
 2705  015440  011637  001110                 MOV     (SP),$LPERR     ;;SAVE ERROR LOOP ADDRESS
 2706  015444  005037  001162                 CLR     $ESCAPE         ;;CLEAR THE ESCAPE FROM ERROR ADDRESS
 2707  015450  112737  000001  001115         MOVB    #1,$ERMAX       ;;ONLY ALLOW ONE(1) ERROR ON NEXT TEST
 2708  015456  013777  001102  163456 $OVER:  MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER
 2709  015464  013716  000106                 MOV     $LPADR,(SP)     ;;FUDGE RETURN ADDRESS
 2710  015470  000002                         RTI                     ;;FIXES PS
 2711  015472  003720                 $MXCNT: 2000.                   ;;MAX. NUMBER OF ITERATIONS
 2712                                  .SBTTL  ERROR HANDLER ROUTINE
 2713
 2714                                  ;;**************************************************************
 2715                                  ;*THIS ROUTINE WILL INCREMENT THE ERROR FLAG AND THE ERROR COUNT,
 2716                                  ;*SAVE THE ERROR ITEM NUMBER AND THE ADDRESS OF THE ERROR CALL
 2717                                  ;*AND GO TO $ERRTYP ON ERROR
 2718                                  ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
 2719                                  ;*SW15=1         HALT ON ERROR
 2720                                  ;*SW13=1         INHIBIT ERROR TYPEOUTS
 2721                                  ;*SW10=1         BELL ON ERROR
 2722                                  ;*SW09=1         LOOP ON ERROR
 2723                                  ;*CALL
 2724                                  ;*      ERROR   N       ;;ERROR=EMT AND N=ERROR ITEM NUMBER
 2725
 2726  015474                         $ERROR:
 2727  015474  043737  001440  001436         BIC     TSTBIT,GUNITS
 2728  015502  105237  001103         7$:    INCB    $ERFLG          ;;SET THE ERROR FLAG
 2729  015506  001775                         BEQ     7$              ;;DON'T LET THE FLAG GO TO ZERO
 2730  015510  013777  001102  163424         MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER AND ERROR FLAG
 2731  015516  032777  002000  163414         BIT     #BIT10,@SWR     ;;BELL ON ERROR?
 2732  015524  001402                         BEQ     1$              ;;NO - SKIP
 2733  015526  104400  001164                 TYPE    ,$BELL          ;;RING BELL
 2734  015532  005237  001112         1$:    INC     $ERTTL          ;;COUNT THE NUMBER OF ERRORS
 2735  015536  011637  001116                 MOV     (SP),$ERRPC     ;;GET ADDRESS OF ERROR INSTRUCTION
 2736  015542  162737  000002  001116         SUB     #2,$ERRPC
 2737  015550  117737  163342  001114         MOVB    @$ERRPC,$ITEMB  ;;STRIP AND SAVE THE ERROR ITEM CODE
 2738  015556  032777  020000  163354         BIT     #BIT13,@SWR     ;;SKIP TYPEOUT IF SET
 2739  015564  001004                         BNE     20$             ;;SKIP TYPEOUTS
 2740  015566  004737  015676                 JSR     PC,$ERRTYP      ;;GO TO USER ERROR ROUTINE
 2741  015572  104400  001171                 TYPE    ,$CRLF
 2742  015576                         20$:
 2743  015600  122737  000001  001214         CMPB    #APTENV,$ENV    ;;RUNNING IN APT MODE
 2744  015606  001007                         BNE     2$              ;;NO,SKIP APT ERROR REPORT
 2745  015610  113737  001114  015620         MOVB    $ITEMB,21$      ;;SET ITEM NUMBER AS ERROR NUMBER
 2746  015616  004737  016332                 JSR     PC,$ATY4        ;;REPORT FATAL ERROR TO APT
 2747  015622  000             21$:    .BYTE   0
 2748  015623  000                     .BYTE   0
 2749  015624  000777         22$:    BR      22$             ;;APT ERROR LOOP
 2750  015626  005777  163310  2$:     TST     @SWR            ;;HALT ON ERROR
 2751  015632  100001                 BPL     3$              ;;SKIP IF CONTINUE
 2752  015634  000000                 HALT                    ;;HALT ON ERROR!
 2753  015636  032777  001000  163276 3$:     BIT     #BIT09,@SWR     ;;LOOP ON ERROR SWITCH SET?
 2754  015644  001402                 BEQ     4$              ;;BR IF NO
 2755  015646  013716  177710         MOV     $LPERR,(SP)     ;;FUDGE RETURN FOR LOOPING
 2756  015652  005737  001162         4$:     TST     $ESCAPE         ;;CHECK FOR AN ESCAPE ADDRESS
 2757  015656  001402                 BEQ     5$              ;;BR IF NONE
 2758  015660  013716  001162                 MOV     $ESCAPE,(SP)    ;;FUDGE RETURN ADDRESS FOR ESCAPE
 2759  015664                         5$:
 2760  015664  022737  011744  000042         CMP     #SENDAD,@#42    ;;ACT-11 AUTO-ACCEPT?
```

```
015670  001001                          BNE     6$              ;;BRANCH IF NO
015672  000000                          HALT                    ;;YES
                                6$:
015674  000002                          RTI                     ;;RETURN
                                .SBTTL  ERROR MESSAGE TYPEOUT ROUTINE
                                ;;**************************************************************
                                ;*THIS ROUTINE USES THE "ITEM CONTROL BYTE" ($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.

015676                          SERRTYP:
015676  104400  001171                  TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
015702  010046                          MOV     R0,-(SP)        ;;SAVE R0
015704  005000                          CLR     R0              ;;PICKUP THE ITEM INDEX
015706  153700  001114                  BISB    @#$ITEMB,R0
015712  001004                          BNE     1$              ;;IF ITEM NUMBER IS ZERO, JUST
                                                                ;;TYPE THE PC OF THE ERROR
015714  013746  001116                  MOV     $ERRPC,-(SP)    ;;SAVE $ERRPC FOR TYPEOUT
                                                                ;;ERROR ADDRESS
015720  104401                          TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
015722  000426                          BR      6$              ;;GET OUT
015724  005300                  1$:     DEC     R0              ;;ADJUST THE INDEX SO THAT IT WILL
015726  006300                          ASL     R0              ;;      WORK FOR THE ERROR TABLE
015730  006300                          ASL     R0
015732  006300                          ASL     R0
015734  062700  001256                  ADD     #$ERRTB,R0      ;;FORM TABLE POINTER
015740  012037  015750                  MOV     (R0)+,2$        ;;PICKUP "ERROR MESSAGE" POINTER
015744  001404                          BEQ     3$              ;;SKIP TYPEOUT IF NO POINTER
015746  104400                          TYPE                    ;;TYPE THE "ERROR MESSAGE"
015750  000000                  2$:     .WORD   0               ;;"ERROR MESSAGE" POINTER GOES HERE
015752  104400  001171                  TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
015756  012037  015766          3$:     MOV     (R0)+,4$        ;;PICKUP "DATA HEADER" POINTER
015762  001404                          BEQ     5$              ;;SKIP TYPEOUT IF 0
015764  104400                          TYPE                    ;;TYPE THE "DATA HEADER"
015766  000000                  4$:     .WORD   0               ;;"DATA HEADER" POINTER GOES HERE
015770  104400  001171                  TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
015774  011000                  5$:     MOV     (R0),R0         ;;PICKUP "DATA TABLE" POINTER
015776  001004                          BNE     7$              ;;GO TYPE THE DATA
016000  012600                  6$:     MOV     (SP)+,R0        ;;RESTORE R0
016002  104400  001171                  TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
016006  000207                          RTS     PC              ;;RETURN
016010                          7$:
016010  013046                          MOV     @(R0)+,-(SP)    ;;SAVE @(R0)+ FOR TYPEOUT
016012  104401                          TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
016014  005710                          TST     (R0)            ;;IS THERE ANOTHER NUMBER?
016016  001770                          BEQ     6$              ;;BR IF NO
016020  104400  016026                  TYPE    ,8$             ;;TYPE TWO(2) SPACES
016024  000771                          BR      7$              ;;LOOP
016026  020040      000         8$:     .ASCIZ  /  /            ;;TWO(2) SPACES
016032                                  .EVEN
```

```
                                .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
                                ;*

016032  105737  001157          $TYPE:  TSTB    $TPFLG          ;;IS THERE A TERMINAL?
016036  100002                          BPL     1$              ;;BR IF YES
016040  000000                          HALT                    ;;HALT HERE IF NO TERMINAL
016042  000430                          BR      3$              ;;LEAVE
016044  010046                  1$:     MOV     R0,-(SP)        ;;SAVE R0
016046  017600  000002                  MOV     2(SP),R0        ;;GET ADDRESS OF ASCIZ STRING
016052  122737  000001  001214          CMPB    #APTENV,$ENV    ;;RUNNING IN APT MODE
016060  001011                          BNE     62$             ;;NO,GO CHECK FOR APT CONSOLE
016062  132737  000100  001215          BITB    #APTSPOOL,$ENVM ;;SPOOL MESSAGE TO APT
016070  001405                          BEQ     62$             ;;NO,GO CHECK FOR CONSOLE
016072  010037  016102                  MOV     R0,61$          ;;SETUP MESSAGE ADDRESS FOR APT
016076  004737  016322                  JSR     PC,$ATY3        ;;SPOOL MESSAGE TO APT
016102  000000                  61$:    .WORD   0               ;;MESSAGE ADDRESS
016104  132737  000040  001215  62$:    BITB    #APTCSUP,$ENVM  ;;APT CONSOLE SUPPRESSED
016112  001003                          BNE     60$             ;;YES,SKIP TYPE OUT
016114  112046                  2$:     MOVB    (R0)+,-(SP)     ;;PUSH CHARACTER TO BE TYPED ONTO STACK
016116  001005                          BNE     4$              ;;BR IF IT ISN'T THE TERMINATOR
016120  005726                          TST     (SP)+           ;;IF TERMINATOR POP IT OFF THE STACK
016122  012600                  60$:    MOV     (SP)+,R0        ;;RESTORE R0
016124  062716  000002          3$:     ADD     #2,(SP)         ;;ADJUST RETURN PC
016130  000002                          RTI                     ;;RETURN
016132  122716  000011          4$:     CMPB    #HT,(SP)        ;;BRANCH IF <HT>
016136  001430                          BEQ     8$
016140  122716  000200                  CMPB    #CRLF,(SP)      ;;BRANCH IF NOT <CRLF>
016144  001006                          BNE     5$
016146  005726                          TST     (SP)+           ;;POP  <CR><LF> EQUIV
016150  104400                          TYPE                    ;;TYPE A CR AND LF
016152  001171                          $CRLF
016154  105037  016310                  CLRB    $CHARCNT        ;;CLEAR CHARACTER COUNT
016160  000755                          BR      2$              ;;GET NEXT CHARACTER
016162  004737  016244          5$:     JSR     PC,$TYPEC       ;;GO TYPE THIS CHARACTER
016166  123726  001156          6$:     CMPB    $FILLC,(SP)+    ;;IS IT TIME FOR FILLER CHARS.?
016172  001350                          BNE     2$              ;;IF NO GO GET NEXT CHAR.
016174  013746  001154                  MOV     $NULL,-(SP)     ;;GET # OF FILLER CHARS. NEEDED
                                                                ;;AND THE NULL CHAR.
016200  105366  000001          7$:     DECB    1(SP)           ;;DOES A NULL NEED TO BE TYPED?
016204  002770                          BLT     6$              ;;BR IF NO--GO POP THE NULL OFF OF STACK
016206  004737  016244                  JSR     PC,$TYPEC       ;;GO TYPE A NULL
016212  105337  016310                  DECB    $CHARCNT        ;;DO NOT COUNT AS A COUNT
```

```
 2868  016216  000770                        BR      7$              ;;LOOP
 2869
 2870                                  ;HORIZONTAL TAB PROCESSOR
 2871
 2872  016220  112716  000040          8$:   MOVB    #' ,(SP)        ;;REPLACE TAB WITH SPACE
 2873  016224  004737  016244          9$:   JSR     PC,$TYPEC       ;;TYPE A SPACE
 2874  016230  132737  000007  016310        BITB    #7,$CHARCNT     ;;BRANCH IF NOT AT
 2875  016236  001372                        BNE     9$              ;;TAB STOP
 2876  016240  005726                        TST     (SP)+           ;;POP SPACE OFF STACK
 2877  016242  000724                        BR      2$              ;;GET NEXT CHARACTER
 2878  016244  105777  162700        $TYPEC: TSTB    @$TPS           ;;WAIT UNTIL PRINTER IS READY
 2879  016250  100375                        BPL     $TYPEC
 2880  016252  116677  000002  162672        MOVB    2(SP),@$TPB     ;;LOAD CHAR TO BE TYPED INTO DATA REG.
 2881  016260  122766  000015  000002        CMPB    #CR,2(SP)       ;;IS CHARACTER A CARRIAGE RETURN?
 2882  016266  001003                        BNE     1$              ;;BRANCH IF NO
 2883  016270  105037  016310                CLRB    $CHARCNT        ;;YES--CLEAR CHARACTER COUNT
 2884  016274  000406                        BR      $TYPEX          ;;EXIT
 2885  016276  122766  000012  000002  1$:   CMPB    #LF,2(SP)       ;;IS CHARACTER A LINE FEED?
 2886  016304  001402                        BEQ     $TYPEX          ;;BRANCH IF YES
 2887  016306  105227                        INCB    (PC)+           ;;COUNT THE CHARACTER
 2888  016310  000000        $CHARCNT:.WORD  0                       ;;CHARACTER COUNT STORAGE
 2889  016312  000207        $TYPEX: RTS     PC
 2890
 2891                                  .SBTTL  APT COMMUNICATIONS ROUTINE
 2892
 2893                                  ;;**************************************************************
 2894  016314  112737  000001  016560  $ATY1:  MOVB    #1,$FFLG        ;;TO REPORT FATAL ERROR
 2895  016322  112737  000001  016556  $ATY3:  MOVB    #1,$MFLG        ;;TO TYPE A MESSAGE
 2896  016330  000403                        BR      $ATYC
 2897  016332  112737  000001  016560  $ATY4:  MOVB    #1,$FFLG        ;;TO ONLY REPORT FATAL ERROR
 2898  016340                        $ATYC:
 2899  016340  010046                        MOV     R0,-(SP)        ;;PUSH R0 ON STACK
 2900  016342  010146                        MOV     R1,-(SP)        ;;PUSH R1 ON STACK
 2901  016344  105737  016556                TSTB    $MFLG           ;;SHOULD TYPE A MESSAGE?
 2902  016350  001450                        BEQ     5$              ;;IF NOT:  BR
 2903  016352  122737  000001  001214        CMPB    #APTENV,$ENV    ;;OPERATING UNDER APT?
 2904  016360  001031                        BNE     3$              ;;IF NOT:  BR
 2905  016362  132737  000100  001215        BITB    #APTSPOOL,$ENVM ;;SHOULD SPOOL MESSAGES?
 2906  016370  001425                        BEQ     3$              ;;IF NOT:  BR
 2907  016372  017600  000004                MOV     @4(SP),R0       ;;GET MESSAGE ADDR.
 2908  016376  062766  000002  000004        ADD     #2,4(SP)                ;;BUMP RETURN ADDR.
 2909  016404  005737  001174          1$:   TST     $MSGTYPE        ;;SEE IF DONE W/ LAST XMISSION?
 2910  016410  001375                        BNE     1$              ;;IF NOT:  WAIT
 2911  016412  010037  001210                MOV     R0,$MSGAD       ;;PUT ADDR IN MAILBOX
 2912  016416  105720                  2$:   TSTB    (R0)+           ;;FIND END OF MESSAGE
 2913  016420  001376                        BNE     2$
 2914  016422  163700  001210                SUB     $MSGAD,R0       ;;SUB START OF MESSAGE
 2915  016426  006200                        ASR     R0              ;;GET MESSAGE LNGTH IN WORDS
 2916  016430  010037  001212                MOV     R0,$MSGLGT      ;;PUT LENGTH IN MAILBOX
 2917  016434  012737  000004  001174        MOV     #4,$MSGTYPE     ;;TELL APT TO TAKE MSG.
 2918  016442  000413                        BR      5$
 2919  016444  017637  000004  016470  3$:   MOV     @4(SP),4$       ;;PUT MSG ADDR IN JSR LINKAGE
 2920  016452  062766  000002  000004        ADD     #2,4(SP)                ;;BUMP RETURN ADDRESS
 2921  016460  013746  177776                MOV     177776,-(SP)    ;;PUSH 177776 ON STACK
 2922  016464  004737  016032                JSR     PC,$TYPE        ;;CALL TYPE MACRO
 2923  016470  000000          4$:   .WORD   0
```

E06


```
016472                                  5$:
016472  105737  016560          10$:    TSTB    $FFLG           ;;SHOULD REPORT FATAL ERROR?
016476  001416                          BEQ     12$             ;;IF NOT:  BR
016500  005737  001214                  TST     $ENV            ;;RUNNING UNDER APT?
016504  001413                          BEQ     12$             ;;IF NOT:  BR
016506  005737  001174          11$:    TST     $MSGTYPE        ;;FINISHED LAST MESSAGE?
016512  001375                          BNE     11$             ;;IF NOT:  WAIT
016514  017637  000004  001176          MOV     @4(SP),$FATAL   ;;GET ERROR #
016522  062766  000002  000004          ADD     #2,4(SP)        ;;BUMP RETURN ADDR.
016530  005237  001174                  INC     $MSGTYPE        ;;TELL APT TO TAKE ERROR
016534  105037  016560          12$:    CLRB    $FFLG           ;;CLEAR FATAL FLAG
016540  105037  016557                  CLRB    $LFLG           ;;CLEAR LOG FLAG
016544  105037  016556                  CLRB    $MFLG           ;;CLEAR MESSAGE FLAG
016550  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
016552  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
016554  000207                          RTS     PC              ;;RETURN
016556     000          $MFLG:  .BYTE   0               ;;MESSG. FLAG
016557     000          $LFLG:  .BYTE   0               ;;LOG FLAG
016560     000          $FFLG:  .BYTE   0               ;;FATAL FLAG
016562                          .EVEN
000200                  APTSIZE=200
000001                  APTENV=001
000100                  APTSPOOL=100
000040                  APTCSUP=040
```

```
                                .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.
                                ;*$TYPOS---ENTER HERE TO SETUP SUPPRESS ZEROS AND NUMBER OF DIGITS TO TYPE
                                ;*CALL:
                                ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
                                ;*      TYPOS                   ;;CALL FOR TYPEOUT
                                ;*      .BYTE   N               ;;N=1 TO 6 FOR NUMBER OF DIGITS TO TYPE
                                ;*      .BYTE   M               ;;M=1 OR 0
                                ;*                                      ;;1=TYPE LEADING ZEROS
                                ;*                                      ;;0=SUPPRESS LEADING ZEROS
                                ;*
                                ;*$TYPON----ENTER HERE TO TYPE OUT WITH THE SAME PARAMETERS AS THE LAST
                                ;*$TYPOS OR $TYPOC
                                ;*CALL:
                                ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
                                ;*      TYPON                   ;;CALL FOR TYPEOUT
                                ;*
                                ;*$TYPOC---ENTER HERE FOR TYPEOUT OF A 16 BIT NUMBER
                                ;*CALL:
                                ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
                                ;*      TYPOC                   ;;CALL FOR TYPEOUT

016562 017646 000000            $TYPOS: MOV     @(SP),-(SP)     ;;PICKUP THE MODE
016566 116637 000001 017005             MOVB    1(SP),$OFILL    ;;LOAD ZERO FILL SWITCH
016574 112637 017007                    MOVB    (SP)+,$OMODE+1  ;;NUMBER OF DIGITS TO TYPE
016600 062716 000002                    ADD     #2,(SP)         ;;ADJUST RETURN ADDRESS
016604 000406                           BR      $TYPON
016606 112737 000001 017005     $TYPOC: MOVB    #1,$OFILL       ;;SET THE ZERO FILL SWITCH
016614 112737 000006 017007             MOVB    #6,$OMODE+1     ;;SET FOR SIX(6) DIGITS
016622 112737 000005 017004     $TYPON: MOVB    #5,$OCNT        ;;SET THE ITERATION COUNT
016630 010346                           MOV     R3,-(SP)        ;;SAVE R3
016632 010446                           MOV     R4,-(SP)        ;;SAVE R4
016634 010546                           MOV     R5,-(SP)        ;;SAVE R5
016636 113704 017007                    MOVB    $OMODE+1,R4     ;;GET THE NUMBER OF DIGITS TO TYPE
016642 005404                           NEG     R4
016644 062704 000006                    ADD     #6,R4           ;;SUBTRACT IT FOR MAX. ALLOWED
016650 110437 017006                    MOVB    R4,$OMODE       ;;SAVE IT FOR USE
016654 113704 017005                    MOVB    $OFILL,R4       ;;GET THE ZERO FILL SWITCH
016660 016605 000012                    MOV     12(SP),R5       ;;PICKUP THE INPUT NUMBER
016664 005003                           CLR     R3              ;;CLEAR THE OUTPUT WORD
016666 006105                   1$:     ROL     R5              ;;ROTATE MSB INTO "C"
016670 000404                           BR      3$              ;;GO DO MSB
016672 006105                   2$:     ROL     R5              ;;FORM THIS DIGIT
016674 006105                           ROL     R5
016676 006105                           ROL     R5
016700 010503                           MOV     R5,R3
016702 006103                   3$:     ROL     R3              ;;GET LSB OF THIS DIGIT
016704 105337 017006                    DECB    $OMODE          ;;TYPE THIS DIGIT?
016710 100016                           BPL     7$              ;;BR IF NO
016712 042703 177770                    BIC     #177770,R3      ;;GET RID OF JUNK
016716 001002                           BNE     4$              ;;TEST FOR 0
016720 005704                           TST     R4              ;;SUPPRESS THIS 0?
016722 001403                           BEQ     5$              ;;BR IF YES
```

```
 3004  016724  005204                    4$:     INC     R4              ;;DON'T SUPPRESS ANYMORE 0'S
 3005  016726  052703  000060            5$:     BIS     #'0,R3          ;;MAKE THIS DIGIT ASCII
 3006  016732  052703  000040                    BIS     #' ,R3          ;;MAKE ASCII IF NOT ALREADY
 3007  016736  110337  017002                    MOVB    R3,B$           ;;SAVE FOR TYPING
 3008  016742  104400  017002                    TYPE    B$              ;;GO TYPE THIS DIGIT
 3009  016746  105337  017004            7$:     DECB    $OCNT           ;;COUNT BY 1
 3010  016752  003347                            BGT     2$              ;;BR IF MORE TO DO
 3011  016754  002402                            BLT     6$              ;;BR IF DONE
 3012  016756  005204                            INC     R4              ;;INSURE LAST DIGIT ISN'T A BLANK
 3013  016760  000744                            BR      2$              ;;GO DO THE LAST DIGIT
 3014  016762  012605                    6$:     MOV     (SP)+,R5        ;;RESTORE R5
 3015  016764  012604                            MOV     (SP)+,R4        ;;RESTORE R4
 3016  016766  012603                            MOV     (SP)+,R3        ;;RESTORE R3
 3017  016770  016666  000002  000004            MOV     2(SP),4(SP)     ;;SET THE STACK FOR RETURNING
 3018  016776  012616                            MOV     (SP)+,(SP)
 3019  017000  000002                            RTI                     ;;RETURN
 3020  017002     000            B$:     .BYTE   0               ;;STORAGE FOR ASCII DIGIT
 3021  017003     000                    .BYTE   0               ;;TERMINATOR FOR TYPE ROUTINE
 3022  017004     000            $OCNT:  .BYTE   0               ;;OCTAL DIGIT COUNTER
 3023  017005     000            $OFILL: .BYTE   0               ;;ZERO FILL SWITCH
 3024  017006  000000            $OMODE: .WORD   0               ;;NUMBER OF DIGITS TO TYPE
```

```
                                        .SBTTL  BINARY TO ASCII AND TYPE ROUTINE

                                        ;;*****************************************************************
                                        ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 16-BIT
                                        ;*BINARY-ASCII NUMBER AND TYPE IT.
                                        ;*CALL:
                                        ;*      MOV     NUMBER,-(SP)    ;;NUMBER TO BE TYPED
                                        ;*      TYPBN                   ;;TYPE IT

017010  010146                  $TYPBN: MOV     R1,-(SP)        ;;SAVE R1 ON THE STACK
017012  016601  000006                  MOV     6(SP),R1        ;;GET THE INPUT NUMBER
017016  000261                          SEC                     ;;SET "C" SO CAN KEEP TRACK OF THE NUMBER OF BITS
017020  112737  000060  017062  1$:     MOVB    #'0,$BIN        ;;SET CHARACTER TO AN ASCII "0".
017026  006101                          ROL     R1              ;;GET THIS BIT
017030  001406                          BEQ     2$              ;;DONE?
017032  105537  017062                  ADCB    $BIN            ;;NO--SET THE CHARACTER EQUAL TO THIS BIT
017036  104400  017062                  TYPE    ,$BIN           ;;GO TYPE THIS BIT
017042  000241                          CLC                     ;;CLEAR "C" SO CAN KEEP TRACK OF BITS
017044  000765                          BR      1$              ;;GO DO THE NEXT BIT
017046  012601                  2$:     MOV     (SP)+,R1        ;;POP THE STACK INTO R1
017050  016666  000002  000004          MOV     2(SP),4(SP)     ;;ADJUST THE STACK
017056  012616                          MOV     (SP)+,(SP)
017060  000002                          RTI                     ;;RETURN TO USER
017062     000     000          $BIN:   .BYTE   0,0             ;;STORAGE FOR ASCII CHAR. AND TERMINATOR
```

```
                                .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.

017064  010046          $TRAP:  MOV     R0,-(SP)        ;;SAVE R0
017066  016600  000002          MOV     2(SP),R0        ;;GET TRAP ADDRESS
017072  005740                  TST     -(R0)           ;;BACKUP BY 2
017074  111000                  MOVB    (R0),R0         ;;GET RIGHT BYTE OF TRAP
017076  006300                  ASL     R0              ;;POSITION FOR INDEXING
017100  016000  017106          MOV     $TRPAD(R0),R0   ;;INDEX TO TABLE
017104  000200                  RTS     R0              ;;GO TO ROUTINE

                                .SBTTL  TRAP TABLE

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

                                ;       ROUTINE
                                ;       -------
017106                  $TRPAD:
017106  016032                  $TYPE   ;;CALL=TYPE     TRAP+0(104400)  TTY TYPEOUT ROUTINE
017110  016606                  $TYPOC  ;;CALL=TYPOC    TRAP+1(104401)  TYPE OCTAL NUMBER (WITH LEADING ZEROS)
017112  016562                  $TYPOS  ;;CALL=TYPOS    TRAP+2(104402)  TYPE OCTAL NUMBER (NO LEADING ZEROS)
017114  016622                  $TYPON  ;;CALL=TYPON    TRAP+3(104403)  TYPE OCTAL NUMBER (AS PER LAST CALL)
017116  017010                  $TYPBN  ;;CALL=TYPBN    TRAP+4(104404)  TYPE BINARY (ASCII) NUMBER

017120  014622                  $RDCHR  ;;CALL=RDCHR    TRAP+5(104405)  TTY TYPEIN CHARACTER ROUTINE
017122  014742                  $RDLIN  ;;CALL=RDLIN    TRAP+6(104406)  TTY TYPEIN STRING ROUTINE
017124  015114                  $RDOCT  ;;CALL=RDOCT    TRAP+7(104407)  READ AN OCTAL NUMBER FROM TTY
017126  004102                  TEST    ;;CALL=CHECK    TRAP+10(104410)
017130  004074                  TESTIT  ;;CALL=CHKIT    TRAP+11(104411)
017132  011424                  DECTYP  ;;CALL=TYPDC    TRAP+12(104412)
```

```
MAINDEC-11-DVADA-A     MACY11 27(732)  21-OCT-76  11:18  PAGE 75
DVADAA.CMB     TRAP TABLE

3086                                    .EVEN
3087  017134  000310                    DISI:  .BLKW   200.          ;STATE-WIDTH DISTRIBUTION
3088  017754  010000                    BUFFER: .BLKW  4096.         ;BUFFER AREA
3089
3090          000001                    .END
```

```
ABASE = 170400            553*   653     694     742     743     744
ACDW1 = 000000            653    696
ACDW2 = 000000            653
ACPUOP= 000000            653    668
ADBUFF  001322            744*  1044    1055    1101    1123    1136    1150    1183    1219    1234    1305*   1309*   1347
                         1349   1350    1352    1542   1599*   1611*   1613*   1659*   1688*   1701    1741*   1747    1753
                         1809   2075
ADDW0 = 000000            653
ADDW1 = 000000            653
ADDW10= 000000            653
ADDW11= 000000            653
ADDW12= 000000            653
ADDW13= 000000            653
ADDW14= 000000            653
ADDW15= 000000            653
ADDW2 = 000000            653
ADDW3 = 000000            653
ADDW4 = 000000            653
ADDW5 = 000000            653
ADDW6 = 000000            653
ADDW7 = 000000            653
ADDW8 = 000000            653
ADDW9 = 000000            653
ADEVCT= 000000            653    659
ADEVM = 000000            653    695
ADST1   001320            743*  1598*   1610*   1612*   1743*
AEMV  = 000000            653    664
AEMVM = 000000            653    665
AFATAL= 000000            653    656
AGAIN   007424           1792*  1830
AGATST  011616           2197*  2234
AGTST   011626           1566*  1582*   1591*   2199*
AJGAIN  005510           1479   1495*
AJOFF   005436           1477   1482*
AMDOR1= 000000            653    681
AMDOR2= 000000            653    685
AMDOR3= 000000            653    688
AMDOR4= 000000            653    691
AMDMS1= 000000            653    675
AMDMS2= 000000            653    683
AMDMS3= 000000            653    686
AMDMS4= 000000            653    689
AMSG    012031            803   2247*
AMSGAD= 000000            653    661
AMSGLG= 000000            653    662
AMSGTY= 000000            653    655
AMTYP1= 000000            653    676
AMTYP2= 000000            653    684
AMTYP3= 000000            653    687
AMTYP4= 000000            653    690
APASS = 000000            653    658
APRIOR= 000200            555*   653     746
APTCSL= 000040           2842   2947*
APTENV= 000001           2743   2835    2903    2945*
APTSIZ= 000200            869   2944*
APTSPO= 000100           2837   2905    2946*
```

```
AROUND  007564          1826    1829#
ASKCH   013665          2430#
ASWREG= 000000           653     666
ATESTN= 000000           653     657
ATMSG   012156          1656    2268#
AUNIT = 000000           653     660
AUSWR = 000000           653     667
AVECT1= 100400           554#    653     692     745     747     748     749
AVECT2= 000000           653     693
BASEBR  001326           746#    1616*   1617*
BASECH  001342           752#    1322    1323    1658    1786    2063
BEGIN   001644           570     828#    2199
BEGINA  006066           918     1570#
BEGINC  005364           921     1469#
BEGINL  002670           979#    1563    1572
BEGINP  005640           924     1519#
BEGINW  006150           930     1586#
BEGIN2  001652           572     830#
BEGL    006030           905     927     1561#
BEG2    002262           571     800     901#    1494    1517
BITPNT  001422           776#    1737*   1740    1760    1761*
BIT0  = 000001           526#    1052    1169    1208    1212    1225    1226    1227
BIT00 = 000001           516#    526
BIT01 = 000002           515#    525
BIT02 = 000004           514#    524
BIT03 = 000010           513#    523
BIT04 = 000020           512#    522
BIT05 = 000040           511#    521
BIT06 = 000100           510#    520
BIT07 = 000200           509#    519
BIT08 = 000400           508#    518     2678
BIT09 = 001000           507#    517     2686    2753
BIT1  = 000002           525#
BIT10 = 002000           506#    2731
BIT11 = 004000           505#    2693
BIT12 = 010000           504#    989     1044    1055    2020
BIT13 = 020000           503#    1527    1543    2738
BIT14 = 040000           502#    996     1195    1197    2664
BIT15 = 100000           501#    1063    1084    1098    1195    1197    1211    1224    2195
BIT2  = 000004           524#    1027
BIT3  = 000010           523#    1034    1052
BIT4  = 000020           522#    1020
BIT5  = 000040           521#    1012
BIT6  = 000100           520#    1004    1169    1173    1537
BIT7  = 000200           519#    1095    1173    1211
BIT8  = 000400           518#    985
BIT9  = 001000           517#    1093    1213
BPTVEC= 000014           533#
BUFFER  017754          1769    1814*   1816*   1832    1860    1928    1940    1942    1970    1981    1982    1983    2005
                        2008    3088#
BUFF1   014006          1912    2447#
BUFF2   014034          2004    2455#
BUMPAD  006206          1564    1580    1589    1594#
BYPASS  006456          1606    1627#
B10     011354          2140#   2141
B11     011410          2150#   2151
```

```
CCHAN   012236          1469    2279*
CH      012111          1529    2261*
CHAN    012173          2047    2271*
CHANL   001372           764*   1131*   1145*   1322*   1371*   1372    1390*   1391    1393*   1394    1404*   1471*   1472
                        1689    1748    2048    2064*   2531
CHANNL  007370          1785*
CHECK = 104410          1087    1099    1112    1124    1216    3083*
CH*IT = 104411           986     997    1005    1013    1021    1028    1035    1064    3084*
CH1     001360           759*   1402*   1414    1416    1417*   1651    1657    1679
CH2     001362           760*   1403*   1404    1417    1418*   1643    1675
CLEAR1  007316          1771*   1773
CLEAR2  007362          1782*   1784
CMSG    012036           797    2249*
COMPAR  011130          1258    1269    1281    1293    1313    1327    1356    1361    1462    2085*
CONV    006766          1699*   1703
CONVR   007466          1804    1807*
CONVRT  011016          1256    1267    1279    1291    1306    1310    1660    2062*
CR    = 000015           441*   2881    2891
CRLF  = 000200           443*   2852    2891
CRMR    012436          1486    1496    1501    2304*
CO      013724           878    2436*
C2      013727          1921    2010    2437*
C3      013734          2007    2438*
DAC     001414           773*   1378    1381    1384    1387    1434    1438    1506    1510    1678    1682    1738*   1740*
                        1741    1760*
DASH    012065          1867    2257*
DDISP = 177570           448*    634     857
DECPNT  014554          1872*   1901*   2524*
DECTYP  011424          2156*   3085
DELAY   001416           774*   1453*   1457*
DELAY1  007530          1810    1818*
DELAY2  007536          1812    1819    1820*
DELAY3  007462          1805*   1806
DELCLR  010626          1910    1922    2011    2020*
DF1     014620           721     728     734     740    2536*
DH1     014401           719    2507*
DH2     014435           738    2509*
DH3     014520           726     732    2518*
DIFLIN  007266          1428    1765*
DISPLA  001142           634*    857*    865*   1545*   2708*   2730*
DISPRE  000174           567*    865
DIST    017134          1774    1843*   1913    3087*
DONE    012210          2120    2274*
DSWR  = 177570           447*    633     856
DT1     014560           720    2529*
DT2     014572           739    2531*
DT3     014610           727     733    2534*
DUMC    011250          1175    1182    1199    1202    2116*
DUMMY   001370           763*   1323*   1372*   1472*   1675*   1679*   1743
DUMW    011176          1163    1193    2098*
EDGE    001420           775*   1431*   1435*   1503*   1507*   1696*   1701*   1704*   1705*   1706*   1707*   1711    1753
EDGFLG  007072          1388*   1412*   1727*
EMTVEC= 000030           536*    842*    843*
EM1     014261           718    2498*
EM2     014303           725    2492*
EM3     014327           731    2496*
```

```
EMT     014354            737    2500#
ER      011010           2054    2056    2059#
ERMSG   012547           1332    1671    1878    1893    1905    1965    2059    2319#
ERR     006644           1668    1671#
ERRVEC= 000004            529#    854     855#    866#    955     956#    976#    2669    2670#   2672#   2675#
FIRST   001352            756#   1780#   1855    1857#
FIXADR  006304           1595    1607#
FIXONE  006310            894    1608#
FLAG    001410            771#    873#    890#   1908    1968
GETDAT  010404           1972#   1980
GETEDG  006714           1373    1405    1688#
GMSG    012043            811    2251#
GNS     ****** U          566    2221    3073    3074    3075    3076    3077    3080    3081    3082    3083    3084    3085
GUNITS  001436            762#    945#    960#   2223    2727#
HAFMSG  012737           1902    2342#
HALF    010070           1894    1896#
HEAD1   014067            892    2465#
HEAD5   013645           1521    2427#
HT    = 000011            439#   2850    2891
HUNS    014553           2165#   2177#   2179#   2182    2523#
IGND    012377           1482    2298#
I...NGE 007626           1839    1842#
IOTVEC= 000020            534#    840#    841#
ISERV   001464            792#    896
IVOLT   012465           1495    2308#
KBVECT  001344            753#    895    1629
LAST    007742           1853    1870#
LEND    005156           1427    1429#
LESS    011342           2135    2137#
LF    = 000012            440#   2885    2891
LINEA   013624           1950    2124#
LOAD    010804           2006    2009    2013#
LOADY   011322           1916    1918    2016    2131#
LOADO   010610           2014#   2018
LO2     010602           1969    2012#
LSB     012121           1642    2263#
LSBMSG  012056           1869    2255#
MAT     013757           1648    2443#
MAX     001430            779#   1988#   1993    1995#   1999
MAXTST  010502           1991    1993#
MEND    013037           1573    2354#
MESP    013021           2045    2351#
MESR    013006           2042    2349#
METST   013764           2102    2444#
MIN     001424            777#   1987#   1990    1992#   1998
MINUS   012025           1720    2158    2245#
MLSB    013751           1445    2441#
M...SET 013736           1325    2439#
MS...16 013214           1911    2377#
MS...18 013122           2003    2364#
T...20  013162           1765    2372#
M...21  013377           1927    2420#
T...50  013101            973    2361#
T...1   013541            908    2414#
M...SB  012353           1520    2294#
MSR     010006           1879    1881#
```

DVADAA.CMB CROSS REFERENCE TABLE -- USER SYMBOLS

```
NARMSG  012606          1893    2325#
NARROW  001350           755#   1779*   1847*   1881    1896
NBEXT   001364           761#    957*    959*    968     974*    975    1594    1605*   1625*
NEXT    007430          1793#   1825
NM3EXT  001366           762#    975*   1625
NOI     012163          2033    2269#
NOIMSG  011764          1370    2238#
NONE    001636           808     810     825#
NOTNAR  007662          1846    1852#
NOTNEW  010276          1937    1942#
NOTOK   007556          1822    1827#
NOVTSS  002212           881     884     889     892#    939
NXTCMP  010466          1989#   1997
NXTCVT  007154          1743#   1757
NXTSTA  010240          1929#   1943
NXTY1   010174          1915#   1920
NXTB    010450          1985#   2002
OFFERR  004464          1330    1332#
OFFOK   004472          1331    1334#
OFFSET  005160          1324    1431#   1488
OKAY    007546          1815    1817    1823#   1828
OKAYD   011450          2161    2163#
OKMSG   012225          1334    1669    1880    1895    1907    1967    2057    2277#
ONAD    013063          2108    2358#
ONES    014556          2163*   2169*   2170    2172*   2181*   2526#
OUT     001434           781#   1777*   1840*   1885    1888    1891    1898
OUTMSG  012704          1890    2337#
PC      =X000007         460#    799*    805*    879*    882*    885*    894*    942*    978*   1163*   1175*   1182*   1193*
                        1199*   1202*   1237*   1324*   1326*   1373*   1389*   1405*   1407*   1408*   1413*   1428*   1429*
                        1440*   1446*   1468*   1488*   1489*   1490*   1512*   1513*   1562*   1563*   1564*   1571*   1572*
                        1579*   1580*   1587*   1588*   1589*   1637*   1649*   1670*   1672*   1683*   1708*   1726*   1910*
                        1916*   1918*   1922*   2006*   2009*   2011*   2012*   2016*   2019*   2031*   2046*   2058*   2060*
                        2114*   2121*   2128*   2153*   2198    2213*   2216*   2228*   2233    2740*   2746*   2802*   2840*
                        2859*   2866*   2873*   2887*   2889*   2922*   2939#
PEAK    001406           770#   1375*   1384*   1387*   2037    2039*   2043    2055
PERCNT  001432           780#   1732*   1733*   1734*   1735*   1736*   1738
PIRQ    = 177772         446#
PIRQVE= 000240           540#
PLUS    010260          1934    1936#
PLUSR2  011330          2132    2134#
POPAD   001616           820#    826
POS     011436          2157    2160#
POSITV  012545          1443    2318#
POSPEA  010716          2038    2040#
POSRMS  010704          2035    2037#
PR0     = 000000         463#
PR1     = 000040         464#
PR2     = 000100         465#
PR3     = 000140         466#
PR4     = 000200         467#
PR5     = 000240         468#
PR6     = 000300         469#
PR7     = 000340         470#
PS      = 177776         443#    444
PSW     = 177776         444#
PWRVEC= 000024           535#
```

```
QUEST   012027            825     931    2246#
RBEG    001660            829     831#
RDCHR = 104405           2585    3080#
RDLIN = 104406            909    1474    1483    1497    2626    3081#
RDOCT = 104407            818    1470    3082#
READ    007500           1833#   1871
RELACC  C10224           1909    1925#
REST1   002216            875     893#
RESVEC= 000010            530#
RET     007070           1718    1726#
RETERR  004124           1244    1246#
RETURN  001620            821#   1535    1698    1744    1791    2071
RMS     001404            769#   1374*   1378*   1381*   2034    2036*   2040    2053
RMA     001376            766#    898*   1766
RMB     001400            767#    899*   1767
RMC     001402            768#    900*   1768
RST     011300            799     805    2123#
R0    =X000000            451#    792     793*    794*    795     801     807     820*    880     883     886     888     895*
                          896*    897*    914*    915*    916     919     922     925     928     933*    936*    940*    941*
                         1093*   1096*   1101*   1123*   1162*   1192*   1213*   1214*   1219*   1234*   1475*   1476    1478
                         1525*   1526*   1530    1536*   1537*   1538    1542*   1545    1548    1627*   1631    1633*   1634
                         1635    1638    1639    1689*   1690*   1691*   1692    1693*   1694*   1697*   1702*   1739*   1755*
                         1758    1769*   1771*   1774*   1782*   1785*   1786*   1787*   1788*   1789    1790*   1829*   1831*
                         1870*   1893*   1903    1913*   1915    1928*   1929    1932*   1939    1942    1970*   1972    1978*
                         1981*   1986    1989    2005*   2008*   2014    2015    2024*   2026*   2062*   2063*   2064    2065*
                         2067    2068*   2069*   2072*   2076*   2089*   2090*   2092*   2093    2103    2225*   2228    2623
                         2627*   2630    2646*   2774    2775*   2776*   2783*   2784*   2785*   2786*   2787*   2788    2793
                         2798*   2800*   2804    2806    2833    2834*   2839    2844    2847*   2839    2907*   2911    2912
                         2914*   2915*   2916    2938*   3057    3058*   3059    3060*   3061*   3062*   3063*
R1    =%000001            452#    1553*   1554*   1628*   1629    1631*   1632*   1633    1638    1639    1742*   1756*   1770*
                         1772*   1775*   1783*   1792*   1820*   1824*   1832*   1833    1859    1914*   1919*   1925*   1931*
                         1932    1933    1971*   1979*   1984*   2001*   2013*   2017*   2025*   2028*   2083*   2090    2624
                         2628*   2632*   2634*   2636*   2639*   2642    2645*   2900    2937*   3024    3035*   3038*   3044*
R2    =%000002            453#    1343*   1353*   1406*   1410*   1411    1416*   1418    1441*   1539*   1556*   1678*   1682*
                         1766*   1793*   1794*   1795*   1796    1799    1802    1803*   1805*   1809*   1811    1813*   1814*
                         1816*   1818    1820*   1833*   1834*   1835*   1836*   1837*   1838    1842*   1843*   1844*   1845
                         1848    1852    1873*   1881*   1884*   1885*   1698*   1896*   1897*   1898*   1899    1915*   1917*
                         1929*   1930*   1931    1948*   1972*   1973*   1974*   1975*   1976*   1977*   1978    1985*   1996*
                         2014*   2040*   2043*   2131    2133*   2134    2136*   2137    2138*   2139*   2142    2158    2159*
                         2160    2162*   2166    2168*   2625    2629*   2633*   2635*   2637*   2643    2644*
R3    =%000003            454#    1340*   1350    1352*   1355    1447*   1449*   1487*   1502*   1711*   1712    1719*   1721
                         1776*   1821*   1859*   1860*   1861*   1862    1926*   1936    1938*   1944*   1945*   1946*   1947*
                         1948    1963    1986*   1987    1988    1989*   1990    1992    1993    1995    2137*   2143*   2144*
                         2145*   2146*   2147*   2148*   2149*   2152    2581    2582*   2583    2586*   2587    2591    2593
                         2595*   2597*   2981    2990*   2996*   2997*   3000*   3005*   3006*   3007    3016*
R4    =%000004            455#    1308*   1312    1341*   1347    1349*   1360    1411*   1667    1747*   1748*   1749*   1750*
                         1751    1767*   1793    1796*   1737*   1798*   1800    1933*   1935*   1936    1938    1982*   1998*
                         2000    2982    2984*   2995*   2986*   2987    2388*   3002    3004*   3012*   3015*
R5    =%000005            456#    1256*   1258*   1267*   1269*   1279*   1281*   1291*   1293*   1306*   1310*   1313*   1327*
                         1356*   1361*   1376*   1379*   1382*   1385*   1432*   1436*   1462*   1504*   1508*   1660*   1676*
                         1680*   1732    1763*   1768*   1794    1797    1799*   1800*   1801*   1939*   1940*   1941*   1951
                         1957*   1958    1983*   1999*   2000    2062    2082*   2085    2086    2095    2096*   2983    2989*
                         2991*   2993*   2994*   2995*   2996    3014*
R6    =%000006            457#     459     834*    835*    836
R7    =%000007            458#     460
SWRSUB  007074           1376    1379    1382    1385    1432    1436    1504    1508    1676    1680    1732#
```

```
SAR1    007120          1737#
SEL     012264          1473    2283#
SETCH   012134          1650    2265#
SETMSG  012003          1401    2241#
SETIA   006E52          1407    1408    1675#
SHIFT   007256          1759    1761#
SKIPST  001354           757#   1781*   1850*   1873    1876
SKPMSG  012564          1875    2322#
SLASH   012223           817    1956    2276#
SP      =X000006         459#    792*    798*    804*    812*    819     820     821     823*    838*    854*    862*    866
                         901*    911*    912*    914     938     955*    966     968*    976     1164*   1165*   1177    1179*
                        1180*   1201    1245*   1466*   1467*   1471    1475    1484    1498    1522*   1523*   1530*   1548*
                        1574*   1607*   1643*   1651*   1662*   1712*   1721*   1802*   1823    1862*   1951*   1958*   2048*
                        2103*   2109*   2125*   2126*   2223*   2553*   2554*   2557*   2558*   2559    2563*   2564*   2565
                        2568    2570    2572*   2581*   2586    2597    2598*   2599*   2600*   2621*   2622*   2623*   2624*
                        2625*   2627    2630*   2638*   2639    2641    2642*   2644    2645    2646    2669*   2672    2674
                        2675    2704    2705    2709*   2735    2755*   2758*   2774*   2779*   2800    2804*   2833*   2834
                        2844*   2846    2847    2848*   2850    2852    2854    2860    2862*   2864*   2872*   2876    2880
                        2881    2885    2899*   2900*   2907    2908*   2919    2920*   2921*   2931    2932*   2937    2938
                        2973*   2974    2975    2976*   2981*   2982*   2983*   2989    3014    3015    3016    3017*   3018*
                        3034*   3035    3044    3045*   3046*   3057*   3058
SPACE   012114          1452    1547    2262#
SPREAD  001412           772#   1132*   1146*   2086*   2093    2531
STACK = 001100           434#    798     804     838     901
STATE   012071          1858    2258#
STKLMT= 177774           445#
STREG   001316           742#   1041*   1042    1052*   1053    1072*   1075    1084*   1094*   1098*   1108*   1109    1120*
                        1121    1133*   1134    1147*   1148    1169*   1170    1172    1195*   1196    1203*   1208*   1209
                        1212*   1225*   1226*   1227*   1228    1235*   1241*   1242    1342*   1344*   1345    1520*   1538*
                        1540*   1574    1597*   1609*   1692*   1699*   1745*   1751*   1789*   1807*   2067*   2073*   2109
                        2529    2531    2534
SWDIST  010142          1906    1908#
SWR     001140           633#    809     812     819*    836     856*    858     864*    871*    1525    1527    1543    2020
                        2664    2678    2680    2686    2693    2731    2738    2750    2753
SWREG   000176           568#    864
SW0     =000001          468#
SW00    =000001          468#    498
SW01    =000002          487#    497
SW02    =000004          486#    496
SW03    =000010          485#    495
SW04    =000020          484#    494
SW05    =000040          483#    493
SW06    =000100          482#    492
SW07    =000200          481#    491
SW08    =000400          480#    490
SW09    =001000          479#    489
SW1     =000002          497#
SW10    =002000          478#
SW11    =004000          477#
SW12    =010000          476#
SW13    =020000          475#
SW14    =040000          474#
SW15    =100000          473#
SW2     =000004          496#
SW3     =000010          495#
SW4     =000020          494#
```

```
SW5    = 000040            493#
SW6    = 000100            492#
SW7    = 000200            491#
SW8    = 000400            490#
SW9    = 001000            489#
TADDR    001374            765#    806    1519*  1561*  1570*  1586*
TBITVE= 000014             531#
TCHK     005256           1447#   1490    1513
TEMP     001356            758#    947*    950*   953*   962*  1308   1312*  1355*  1360*  1434*  1438*  1439*  1441
                          1506*   1510*   1511*  1662   1821*  1827*  2066*  2075*  2078*  2079*  2080*  2081*  2087
TENS     014555           2164#   2173*   2174   2176*  2180*  2525#
TEST     004102           1242#   3083
TESTAD   002464            944#   1562    1571   1587
TESTIT   004074           1241#   3084
TESTR2   011464           2166#   2171    2175   2178
TKVEC  = 000060            538#
TOFF     005234           1326    1441#   1489   1512
TPVEC  = 000064            539#
TRAPVE= 000034             537#    844*    845*
TRTVEC= 000014             532#
TRY      007132           1739#   1762
TRYAG    002314            909#    932
TSTBIT   001440            783#    946*    960    961*   977*   1596*  1608*  2727
TST1     002670            983#    984
TST10    003050           1040#
TST11    003100           1045    1051#
TST12    003130           1056    1062#
TST13    003144           1069#
TST14    003210           1076    1082#
TST15    003242           1092#
TST16    003304           1105#
TST17    003346           1119#
TST2     002732            995#
TST20    003372           1129#   1200
TST21    003436           1137    1143#
TST22    003514           1152    1157#
TST23    003642           1176    1187#
TST24    003726           1207#
TST25    004000           1223#
TST26    004126           1252#   1254    1255
TST27    004176           1265#
TST3     002746           1002#
TST30    004226           1277#
TST31    004256           1288#
TST32    004330           1303#
TST33    004410           1320#
TST34    004476           1333    1338#
TST35    004624           1368#
TST36    005010           1399#
TST37    005134           1415    1424#
TST4     002770           1011#
TST5     003004           1019#
TST6     003020           1026#
TST7     003034           1033#
TST8     010514           1994    1996#
TYPBAD   007674           1841    1851    1855#
```

F07


```
TYPBN = 104404          2224    3077#
TYPDC = 104412          1444    1641    1868    1874    1882    1896    1889    1900    1949    2041    2044    3085#
TYPE  = 104400           797     803     811     817     825     878     892     908     931     973    1325    1332    1334
                        1370    1401    1443    1445    1450    1452    1469    1473    1480    1482    1485    1486    1495
                        1496    1499    1500    1501    1521    1529    1547    1558    1573    1578    1642    1648    1650
                        1656    1669    1671    1720    1765    1858    1867    1869    1875    1878    1880    1883    1887
                        1890    1893    1895    1902    1905    1907    1911    1912    1921    1927    1950    1956    1965
                        1967    2003    2004    2007    2010    2030    2033    2042    2045    2047    2057    2059    2102
                        2108    2120    2158    2182    2219    2589    2592    2596    2733    2741    2773    2790    2792
                        2795    2797    2801    2808    2855    3008    3041    3073#
TYPEDG  007030          1649    1711#   2046
TYPOC = 104401          2781    2805    3074#
TYPON = 104403          3076#
TYPOS = 104402           814     970    1532    1550    1575    1645    1653    1664    1714    1723    1864    1953    1960
                        2050    2105    2111    3075#
TYPOUT  011540          2167    2179#
TYPRP   010666          1389    2033#
TYPSET  006522          1413    1641#
UNEXP   001442           785#    1003    1178
VAOR    001336           750#     964    1597    1598    1599
VECTOR  001324           745#    1003#   1167#   1178#   1535#   1600#   1614#   1615#   1618    1620    1622    1698#   1744#
                        1791#   2071#
VECTR1  001330           747#    1168#   1601#   1604#   1618#   1619#   1624#
VECTR2  001332           748#    1194#   1602#   1620#   1621#
VECTR3  001334           749#    1603#   1622#   1623#
VLIN    011612          1963    2194#
VMP     011606          2055    2192#
VMR     011604          2053    2191#
VSET    011610          1667    2193#
VTFLG   002432           879     932     885     933#
VTINIT  014054          2030    2461#
VTSS    002206           887     890#
VVCT    001340           751#    1600    1601    1602    1603
VW      011570          1358    1363    2184#
VW2     011576          1260    1295    2187#
VW2     011572          1315    2185#
VW36    011502          1271    1283    2189#
VW      011574          1464    2186#
VWOD    011600          1329    2188#
WFTEST  001426           778#    828#    830#    906     951
WIDE    001346           754#   1778#   1854#   1884    1897
WIDMSG  012645          1837    2331#
WRAP    004126          1248#   1579    1588
XADJ    012337          1485    2291#
YADJ    012531          1499    2315#
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$ATY1   016314          2894#
$ATY3   016322          2840    2895#
$ATY4   016332          2746    2897#
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$BAUDAT 001126           627#    954#    958     964#   1075#   1136#   1150#   1151   1172#   1196#   1228#   1229#   1230
                        1242#   1243    2087#   2088    2529    2531    2534
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$CNTLU  015060           2605#
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$MADR2  001232            685#
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$MAIL   001174            601    605    654#   868   2703   2743   2835
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$MSGLG  001212            662#  2916*
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$MSWR   015072           2607#
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$MTYP2  001231            684#
$MTYP3  001235            687#
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                         1317#  1335#  1365#  1396#  1421#
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$OMODE  017006           2975*  2979*  2984   2987*  2998*  3024#
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$SAVRE= ****** U         3083
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                         2727   2753   2760
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$SVPC = 000214            577#   582
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                          847    848    850    851    984    996   1003   1012   1020   1027   1034   1041   1052
                         1063   1070   1083   1093   1106   1120   1130   1144   1158   1188   1208   1224   1253
                         1266   1278   1289   1304   1321   1339   1369   1400   1425   2204   2210   2227   2233
                         2235   2655   2656   2657   2658   2659   2664   2676   2678   2679   2682   2683   2684
                         2691   2692   2693   2705   2708   2711   2718   2719   2720   2721   2722   2731   2738
                         2750   2753   2765
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                         1400#  1425#  2210#  2691#  2698   2701#  2711
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                    1144#  1152   1154   1158#  1176   1184   1188#  1204   1208#  1220   1224#  1249   1252
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$VECT2  001246       693#
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.$ASTA= ****** U    2895   2898
.$X   = 001000       589#   594
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J07


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COMMEN      1#   541#
DUMMRN    717#  1158  1188
ENDCOM      1#   541#
ENDPAS    421#  2219
ERROR     435#   788   987   998  1006  1014  1022  1029  1036  1046  1057  1065  1077  1088  1100
         1113  1125  1138  1153  1174  1198  1217  1232  1261  1272  1284  1296  1316  1359  1364
ESCAPE      1#   541#   785
GETPRI      1#   541#
GETSWR      1#   541#
MULT        1#   541#
NEXTST      1#   541#   980   992   999  1008  1016  1023  1030  1037  1048  1059  1066  1079  1089
         1102  1116  1126  1140  1154  1184  1204  1220  1249  1262  1274  1285  1300  1317  1335
         1365  1396  1421
POP         1#   541#  2644  2937  2938
PUSH        1#   541#  2623  2898  2900  2921
REPORT      1#   541#
SCOPE     436#   995  1002  1011  1019  1026  1033  1040  1051  1062  1069  1082  1092  1105  1119
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         1424
SETPRI      1#   541#
SETTRA   3065#  3074  3075  3076  3077  3080  3081  3082  3083  3084  3085
SETUP       1#   541#   832
SKIP        1#   541#   907   917   920   923   926   929   935   937   939   949   952   963   965
          990  1043  1045  1054  1056  1076  1137  1152  1176  1231  1244  1299  1333  1392  1395
         1415  1419  1442  1448  1451  1456  1458  1459  1465  1477  1479  1481  1491  1492  1514
         1515  1528  2021  2023
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SPACE     541#
STARS       1#   541#   575   586   588   595   608   649   652   980   982   992   994   999  1001
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         1068  1079  1081  1089  1091  1102  1104  1116  1118  1126  1128  1140  1142  1154  1156
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SWRSU       1#   541#   852#
TRMTRP    3065#
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TYPOCT      1#   541#
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TYPOCT      1#   541#  2779  2803
TYPTXT      1#   541#  2219
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         1365  1396  1421
$$SET     3065#  3074  3075  3076  3077  3080  3081  3082  3083  3084  3085
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.EQUAT      1#   421#   431
.HEADE      1#   421#
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.SWRHI       1#     421#     541
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.$ASTA       1#
.$CATC       1#     421#     560
.$CMTA       1#     421#     606
.$D82D       1#
.$D820       1#
.$DIV        1#
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.$ERRT       1#     421#    2765
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        1799  1800  1885  1897  1898  1931  1977  2063  2075  2639  2787  2848  2908  2920  2932
        2976  2986
ASL      961   988  1596  1733  1734  1735  1736  1813  1842  2632  2634  2636  2784  2785  2786
        3061
ASR     1704  1705  1706  1761  1834  1835  1836  1844  1861  1941  1944  1945  1946  1973  1974
        1975  2078  2079  2080  2143  2144  2145  2146  2147  2915
BEQ      810   870   887   904   952   963  1045  1076  1137  1152  1231  1415  1427  1477  1479
        1544  1595  1630  1718  1804  1810  1812  1819  1877  1892  1909  1969  2021  2167  2226
        2631  2679  2681  2683  2687  2696  2729  2732  2754  2757  2789  2794  2807  2838  2851
        2896  2902  2906  2926  2928  3003  3039
BGE     1351  1754  1846  1991  2699
BGT     1668  1759  2054  2056  2094  2215  2571  3010
BHI     2635
BIC      794   877   941  1098  1229  1526  1615  1803  2138  2148  2212  2558  2564  2572  2638
        2727  3000
BICB     915
BIS      910   960  1074  1086  1114  1537  1691  1745  1750  1788  2124  2139  2149  2197  3005
        3006
BISB    2073  2179  2180  2181  2776
BIT     1044  1055  1527  1543  2020  2664  2678  2686  2693  2731  2738  2753
BITB     869  2837  2842  2874  2905
BLE     1348  1853  1904  1937  1964  1994  2161
BLOS    2584
BLT     1839  2135  2569  2865  3011
BMI      935   949  1442  1456  1822
BNE      796   802   808   822   837   859   875   881   884   889   907   917   920   923   926
         929   937   990  1056  1097  1215  1244  1299  1354  1392  1395  1448  1458  1528  1555
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        2892  2904  2910  2913  2930  3001
BPL     1043  1054  1110  1122  1135  1149  1171  1210  1346  1409  1815  1934  2035  2038  2041
        2132  2141  2151  2157  2556  2562  2751  2830  2879  2999
BR       826   829   861   932   939   965  1176  1200  1330  1331  1333  1419  1451  1459  1465
        1481  1491  1492  1514  1515  1546  1559  1565  1581  1590  1606  1640  1817  1826  1829
        1841  1851  1879  1894  1906  1966  2023  2178  2220  2567  2590  2640  2667  2673  2676
        2689  2692  2749  2782  2809  2832  2858  2868  2877  2884  2896  2918  2977  2992  3013
        3043
CLC     3042
CLR      789   828   835   847   848   868   873   911   933   944   945   957  1071  1107  1130
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        2691  2706  2775  2990
CLRB    1617  2163  2164  2165  2172  2176  2595  2690  2857  2883  2934  2935  2936
CMP      809   821   836   858   880   883   896   898   966   989  1151  1177  1201  1230  1243
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        1818  1838  1845  1852  1903  1936  1942  1963  1990  1993  2000  2053  2055  2093  2134
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CMPB     795   801   807   916   919   922   925   928  1476  1478  2170  2174  2587  2593  2680
        2684  2743  2635  2850  2852  2860  2881  2885  2903
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M07

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TRAP    3065  3074  3075  3076  3077  3080  3081  3082  3083  3084  3085
TST      874   903   906   938   951   958  1183  1426  1460  1484  1498  1594  1634  1848  1855
        1876  1891  1908  1968  2015  2034  2037  2095  2098  2116  2131  2156  2166  2671  2671
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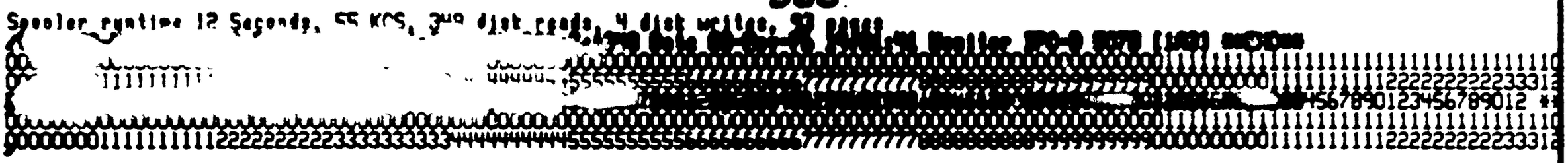
D08



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