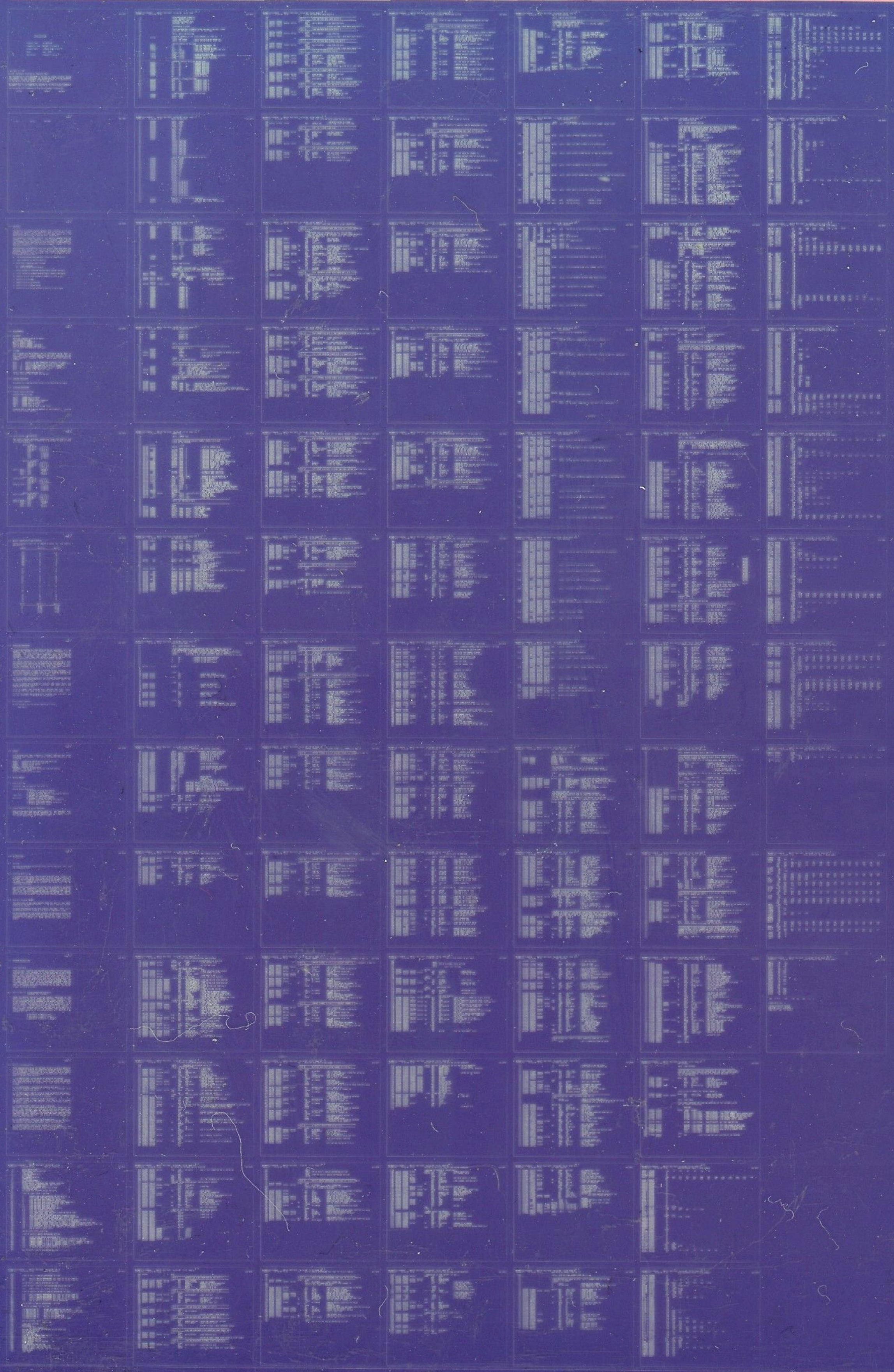
AXV11-C,
ADV11-C

AXV11-C/ADV11-C
CVAXAA0

AH-S895A-MC
FICHE 1 OF 1

OCT 1981



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IDENTIFICATION
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| | |
|---|---|
| Product Code: | AC-S893A-MC |
| Diagnostic Code: | MAINDEC-11-CVAXA-A |
| Product Name: | CVAXAA0 AXV11-C/ADV11-C |
| Date: | Aug. 1981 |
| Maintainer: | Diagnostic Group |

DEC DECUS DECTAPE

## 1.0 ABSTRACT

The ADV11-C is a double height module that contains a 12 bit analog to digital (AD) converter and a 16 channel input multiplexer (MUX). The AXV11-C is the same board with the addition of two digital to analog (DAC) converters.

This diagnostic tests the AXV11-C or ADV11-C module with or without the test fixture. The program also allows interconnection to the AAV11-C D to A and KWV11-C CLOCK modules. The program does not test all the functions of the AAV11-C or KWV11-C. It only uses these devices to supply signals to test the AXV11-C/ADV11-C.

When started, the diagnostic will ask several questions that the operator must answer. A set of tests are listed and this statement is printed out: 'Type the letter or number then depress 'RETURN''. The following chart indicates which letter corresponds to which test:

W: The Analog Wraparound subtests (requires test fixture)

L: Logic Subtests of AXV11-C/ADV11-C

A: Auto test (requires test fixture)

    A. Logic subtests
    B. Analog wraparound subtests

1: Print values of selected analog input channel and gain

2: Print values of scanned analog input channels and gains

3: AXV11-C A to D input echoed to AXV11-C D to A output

4: AXV11-C D to A ramp

5: AXV11-C D to A calibration

6: AXV11-C D to A square waves

7: AXV11-C D to A output echoed to AXV11-C A to D input

## 2.0 REQUIREMENTS

### 2.1 Equipment

PDP11/03 computer with 8K of memory
I/O Console Terminal
AXV11-C Module (A0026) or
ADV11-C Module (A8000)
AAV11-C Module (A6006) <optional>
KWV11-C Module (M4002) <optional>
Test fixture (30-18692-00) <optional>

### 2.2 Storage

This program uses 8K of memory and is ''chainable'' using XXDP or APT. When run in ''CHAIN'' mode, only the LOGIC sub-tests will be executed. If the operator desires to run the wraparound sections under XXDP/APT, location ''$DEVM'' (approx addr 1252) should be changed.

```
BIT0     1    KWV11-C CLK OVF CONNECTED TO AXV11-C RTC TRIG.
BIT1     2    KWV11-C CLK OVF TO AXV11-C EXT TRIG.  (JUMPER ''F2'')
BIT2     4    TEST FIXTURE CONNECTED TO AXV11-C CONNECTOR.
BIT3    10    AAV11-C CONNECTED TO AXV11-C TEST FIXTURE.
BIT4    20    BEVENT CONNECTED TO EXT.  TRIG.  (JUMPER ''F1'')
BIT5    40    MODULE IS AN ''ADV11-C'' TYPE.

(BITS 1 AND 4 CANNOT BOTH BE SET)
(IF BIT 3 IS SET, BIT 2 MUST ALSO BE SET)
```

## 3.0 LOADING PROCEDURE

Procedure for loading normal binary files should be followed.

## 4.0 STARTING PROCEDURE

### 4.1 Control Switch Settings

Standard PDP-11 Format

```
SW15=1    100000 Halt on error
SW14=1    040000 Loop on test
SW13=1    020000 Inhibit error typeouts
SW11=1    004000 Inhibit iterations
SW10=1    002000 Bell on error
SW9 =1    001000 Loop on error
SW8 =1    000400 Loop on test in SWR <7:0>
```

Location 200 is the starting address of the diagnostic. Location 204 is the restart address.

## 4.2 Test Fixture (30-18692-00)

The test fixture provides connection from the KWV11-C for "RTC IN" and "EXT TRIG" in addition to a voltage to each of the A to D input channels.

```
                ADV11-C ONLY
                     CH00,04,10     (+ F.S.)
                     CH01,05,11   (+1/2 F.S.)
                     CH02,06,12   (+1/4 F.S.)
                     CH03,07      (+1/8 F.S.)
                     CH13           (+ F.S.)
                     CH14           (0 VOLTS)
                     CH15           (0 VOLTS)
                     CH16           (0 VOLTS)
                     CH17           (0 VOLTS)

                ADV11-C TO AAV11-C
                     CH00,04,10     (+ F.S.)
                     CH01,05,11   (+1/2 F.S.)
                     CH02,06,12   (+1/4 F.S.)
                     CH03,07      (+1/8 F.S.)
                     CH13           (+ F.S.)
AAV11-C DACA -       CH14           VARIABLE
        DACB -       CH15             WITH
        DACC -       CH16           AAV11-C
        DACD -       CH17            OUTPUT

                AXV11-C ONLY
AXV11-C DACA -       CH00,04,10     (+ F.S.)
                     CH01,05,11   (+1/2 F.S.)
                     CH02,06,12   (+1/4 F.S.)
                     CH03,07      (+1/8 F.S.)
AXV11-C DACB -       CH13           (+ F.S.)
                     CH14           (0 VOLTS)
                     CH15           (0 VOLTS)
                     CH16           (0 VOLTS)
                     CH17           (0 VOLTS)

                AXV11-C TO AAV11-C
AXV11-C DACA -       CH00,04,10     (+ F.S.)
                     CH01,05,11   (+1/2 F.S.)
                     CH02,06,12   (+1/4 F.S.)
                     CH03,07      (+1/8 F.S.)
AXV11-C DACB -       CH13           (+ F.S.)
AAV11-C DACA -       CH14           VARIABLE
        DACB -       CH15             WITH
        DACC -       CH16           AAV11-C
        DACD -       CH17            OUTPUT
```

## 4.3 MODULE JUMPER-POST CONFIGURATION

The folllowing is the list of jumpers or posts for the AXV11-C and ADV11-C.

| JUMPER | AXV11-C | ADV11-C |
|---|---|---|
| A12 | I | I |
| A11 | R | R |
| A10 | R | R |
| A09 | R | R |
| A08 | I | I |
| A07 | R | R |
| A06 | R | R |
| A05 | R | R |
| A04 | R | R |
| A03 | R | R |
| D1 | R | R |
| D4 | I | I |
| D5 | R | R |
| D6 | I | I |
| E1 | R | R |
| E2 | R | R |
| E3 | R | R |
| E4 | R | R |
| E5 | R | R |
| E6 | I | I |
| F1 | R | R |
| F2 | I | I |
| P6 | I | I |
| P7 | I | I |
| V4 | R | R |
| V5 | R | R |
| V6 | R | R |
| V7 | R | R |
| V8 | I | I |

| POSTS | AXV11-C | ADV11-C |
|---|---|---|
| A | A3-A5 | A4-A5 |
| B | B1-B5 | B4-B5 |
| C | C1-C2 | C1-C2 |
| D | D2-D3 | D2-D3 |
| P | P1-P2 | P1-P2 |

## 5.0 OPERATING PROCEDURE

The program heading is typed and a series of questions will be asked. The answers will control certain sub-tests. It is IMPORTANT that the answers are correct or errors will be reported. The list of tests available will be printed out followed by a message "Type letter or number then depress 'RETURN':". Then type the letter or number of the test to be run, according to the table listed and depress 'RETURN'.

The control character, ^C, is set aside for interrupting a test and transferring control to the beginning of the diagnostic (^C). During the logic tests while a reset is being performed, ^C will not be executed until after the RESET has been completed, therefore continue typing ^C until it is successful.

Location SWREG (176) is used as a software switch register. To modify the contents of SWREG, type ^G. The program responds with the current contents of SWREG and a slash. Type the desired new contents of SWREG followed by a carriage return.

If 'W'' is typed, the program will run through the analog sub-test and analog wraparound sub-tests, printing "END PASS'' when it has completed an entire pass.

If ''A'' is typed, the program will execute the logic tests and analog wraparound sub-tests, printing "END PASS'' when it has completed an entire pass.

If 'L'' is typed, the program will execute the logic tests, printing "END PASS'' when it has completed an entire pass.

If "1-7'' is typed, the program will execute the sub-tests and will not stop until terminated by the operator.

## 5.1 End of Pass Typeouts

At end of pass, the following typeout will occur:

```
     'END PASS 1.
```

## 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:

```
Analog Wraparound Test:
                  20 seconds if using only ADV11-C
                   1 minute if using only AXV11-C
                   4 minutes if using AXV11-C connected to AAV11-C
Logic Test:       10 Seconds for first pass
                   1 Minute for additional passes
Auto Test:        30 seconds if using only ADV11-C
                   1 Minute first pass if using only AXV11-C
                   2 Minutes additional passes
                   4 Minutes first pass AXV11-C to AAV11-C
                   5 Minutes additional passes
```

### 7.2 Status Register and Vector Addresses

When testing more than one ADV11-C/AXV11-C, the operator must change the BUS and VECTOR addresses of the program. The ADV11-C/AXV11-C status register address must be in $BASE (1250), its vector address must be in $VECT1 (1244).

## 8.0 RESTRICTIONS

### 8.1 Testing

The test fixture 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(RS) 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(RS) can be set to 200 to avoid receiving the BEVNT interrupt after loading the ABS loader.

### 8.3 Possible Program 'BOMBS''

The first test of the logic subtest check to see if the ADV11 responds to the expected address. If the ADV11 does not respond, a buss error occurs.

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 Sub-tests

These 21 logic subtests run sequentially without further operator intervention. The 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 clock start enable bit, the external start enable bit, the gain select bits, the done flag, the done interrupt enable bit, the error interrupt enable 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 DONE and ERROR interrupt logic. Additional tests are provided to verify that 'RTC IN'' and 'EXT TRIG'' operate correctly. Provision for 'B EVENT'' and Manual Trigger are also provided.

### 9.2 AXV11-C/ADV11-C Analog Wraparound Sub-tests (REQUIRES TEST FIXTURE)

These 14 analog sub-tests verify correct operation of the AXV11-C/ADV11-C A to D input multiplexer. The test fixture delivers a voltage source to each of the input channels. The actual converted value is compared to the expected value. If the actual exceeds the tolerance allowed an error is reported. If an AXV11-C module, the sub-tests will verify the operation of the D to A converters. The DAC outputs are connected to AD channel 0 and 13. The program will load each DAC and verify the D to A output values. If the AAV11-C is present, the program will verify proper operation of the analog outputs are connected to AD channels 14 - 17.

```
 8 sub-tests if ADV11-C only.
 8 sub-tests if AXV11-C only.
11 sub-tests if ADV11-C to AAV11-C
12 sub-tests if AXV11-C to AAV11-C
```

## 9.3 AXV11-C I/O Sub-section

These sub-sections allow the operator to verify correct operation of the module by viewing the converted values and output signals. They provide the necessary handlers to calibrate the A to D and D to A channels. Provision is also made to verify module interconnection and different jumper configurations than what is used in the main test section.

1. I/O SUB-SECTION - Print values of selected A/D channel
The routine enables the operator to convert a selected channel plus gain and report the value. The routine allows the operator to calibrate the A to D converter or just verify the input voltage.

2. I/O SUB-SECTION - Scanning A/D channels and gain
The routine enables the operator to view the converted value across all channels and gains.

3. I/O SUB-SECTION - AXV11-C A to D input to AXV11-C DAC output
The routine converts the voltage on a selected channel and loads the result into the AXV11-C D to A outputs.

4. I/O SUB-SECTION - AXV11-C D to A ramp output
The routine loads a ramp pattern into the D to A output registers. This allows the operator to view the output levels of the AXV11-C DACS.

5. I/O SUB-SECTION - AXV11-C D to A calibration
The routine loads the maximum negative full scale value to the dac's. The operator can then verify with test equipment, the proper output voltage. When the operator has verify the level, he depresses the "RETURN". The program will the load mid-scale code into the DAC. Again once the level has been verified, the operator depresses "RETURN". The program will load maximum full scale code into the DAC.

6. I/O SUB-SECTION - AXV11-C D to A square wave
The routine produces a "SQUARE WAVE" pattern on the DAC outputs. The operator can observe the output levels for distortion.

7. I/O SUB-SECTION - AXV11-C DAC output to A to D input
The routine load a count pattern into the D to A registers. The output is connected to the A to D input. The resulting print out should show the tracking of output to input codes.

```
                            ;DEVELOPED USING SYSMAC.C4
                            .TITLE  MAINDEC-11-CVAXA-A
                            ;*COPYRIGHT (C) 1981
                            ;*DIGITAL EQUIPMENT CORP.
                            ;*MAYNARD, MASS. 01754
                            ;*
                            ;*PROGRAM BY R.SHOOP
                            ;*
                            ;*THIS PROGRAM WAS ASSEMBLED USING THE PDP-11 MAINDEC SYSMAC
                            ;*PACKAGE (MAINDEC-11-DZQAC-C4), 31 JULY 1980.
                            ;*
                            .SBTTL  BASIC DEFINITIONS

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

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

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

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

                            ;*''SWITCH REGISTER'' SWITCH DEFINITIONS
        100000              SW15=   100000
        040000              SW14=   40000
        020000              SW13=   20000
```

```
    (1)            010000                    SW12=   10000
    (1)            004000                    SW11=   4000
    (1)            002000                    SW10=   2000
    (1)            001000                    SW09=   1000
    (1)            000400                    SW08=   400
    (1)            000200                    SW07=   200
    (1)            000100                    SW06=   100
    (1)            000040                    SW05=   40
    (1)            000020                    SW04=   20
    (1)            000010                    SW03=   10
    (1)            000004                    SW02=   4
    (1)            000002                    SW01=   2
    (1)            000001                    SW00=   1
    (1)                                      .EQUIV  SW09,SW9
    (1)                                      .EQUIV  SW08,SW8
    (1)                                      .EQUIV  SW07,SW7
    (1)                                      .EQUIV  SW06,SW6
    (1)                                      .EQUIV  SW05,SW5
    (1)                                      .EQUIV  SW04,SW4
    (1)                                      .EQUIV  SW03,SW3
    (1)                                      .EQUIV  SW02,SW2
    (1)                                      .EQUIV  SW01,SW1
    (1)                                      .EQUIV  SW00,SW0
    (1)
    (1)                                      ;*DATA BIT DEFINITIONS (BIT00 TO BIT15)
    (1)            100000                    BIT15=  100000
    (1)            040000                    BIT14=  40000
    (1)            020000                    BIT13=  20000
    (1)            010000                    BIT12=  10000
    (1)            004000                    BIT11=  4000
    (1)            002000                    BIT10=  2000
    (1)            001000                    BIT09=  1000
    (1)            000400                    BIT08=  400
    (1)            000200                    BIT07=  200
    (1)            000100                    BIT06=  100
    (1)            000040                    BIT05=  40
    (1)            000020                    BIT04=  20
    (1)            000010                    BIT03=  10
    (1)            000004                    BIT02=  4
    (1)            000002                    BIT01=  2
    (1)            000001                    BIT00=  1
    (1)                                      .EQUIV  BIT09,BIT9
    (1)                                      .EQUIV  BIT08,BIT8
    (1)                                      .EQUIV  BIT07,BIT7
    (1)                                      .EQUIV  BIT06,BIT6
    (1)                                      .EQUIV  BIT05,BIT5
    (1)                                      .EQUIV  BIT04,BIT4
    (1)                                      .EQUIV  BIT03,BIT3
    (1)                                      .EQUIV  BIT02,BIT2
    (1)                                      .EQUIV  BIT01,BIT1
    (1)                                      .EQUIV  BIT00,BIT0
    (1)
    (1)                                      ;*BASIC "CPU" TRAP VECTOR ADDRESSES
    (1)            000004                    ERRVEC= 4                ;;TIME OUT AND OTHER ERRORS
    (1)            000010                    RESVEC= 10               ;;RESERVED AND ILLEGAL INSTRUCTIONS
    (1)            000014                    TBITVEC=14               ;;"T" BIT
```

```
   (1)            000014                TRTVEC= 14              ;;TRACE TRAP
   (1)            000014                BPTVEC= 14              ;;BREAKPOINT TRAP (BPT)
   (1)            000020                IOTVEC= 20              ;;INPUT/OUTPUT TRAP (IOT) **SCOPE**
   (1)            000024                PWRVEC= 24              ;;POWER FAIL
   (1)            000030                EMTVEC= 30              ;;EMULATOR TRAP (EMT) **ERROR**
   (1)            000034                TRAPVEC=34              ;;"TRAP" TRAP
   (1)            000060                TKVEC=  60              ;;TTY KEYBOARD VECTOR
   (1)            000064                TPVEC=  64              ;;TTY PRINTER VECTOR
   (1)            000240                PIRQVEC=240             ;;PROGRAM INTERRUPT REQUEST VECTOR
    16                                  .SBTTL  OPERATIONAL SWITCH SETTINGS
   (1)                                  ;*
   (1)                                  ;*      SWITCH                  USE
   (1)                                  ;*      ------          --------------------
   (1)                                  ;*        15            HALT ON ERROR
   (1)                                  ;*        14            LOOP ON TEST
   (1)                                  ;*        13            INHIBIT ERROR TYPEOUTS
   (1)                                  ;*        11            INHIBIT ITERATIONS
   (1)                                  ;*        10            BELL ON ERROR
   (1)                                  ;*         9            LOOP ON ERROR
   (1)                                  ;*         8            LOOP ON TEST IN SWR<7:0>
    17            170400                ABASE=  170400
    18            000400                AVECT1= 400
    19            000200                APRIOR= 200
    20
    21
    22                                  .SBTTL  TRAP CATCHER
   (1)
   (1)            000000                        .=0
   (1)                                  ;*ALL UNUSED LOCATIONS FROM 4 - 776 CONTAIN A ".+2,HALT"
   (1)                                  ;*SEQUENCE TO CATCH ILLEGAL TRAPS AND INTERRUPTS
   (1)                                  ;*LOCATION 0 CONTAINS 0 TO CATCH IMPROPERLY LOADED VECTORS
   (1)            000174                        .=174
   (1)    000174  000000                DISPREG: .WORD  0               ;;SOFTWARE DISPLAY REGISTER
   (1)    000176  000000                SWREG:   .WORD  0               ;;SOFTWARE SWITCH REGISTER
   (1)                                  .SBTTL  STARTING ADDRESS(ES)
   (1)    000200  000137  001522                JMP     @#BEGIN0        ;;JUMP TO STARTING ADDRESS OF PROGRAM
    23    000204  000137  001530                JMP     @#BEGIN2                ;RESTART ADDRESS
    24
    25            000100                        .=100
    26    000100  000104  000340  000002        104,340,2                       ;"B EVENT" HANDLER
    27
    28            000000                        CHAN00= 00
    29            000001                        CHAN01= 01
    30            000002                        CHAN02= 02
    31            000003                        CHAN03= 03
    32            000004                        CHAN04= 04
    33            000005                        CHAN05= 05
    34            000006                        CHAN06= 06
    35            000007                        CHAN07= 07
    36            000010                        CHAN10= 10
    37            000011                        CHAN11= 11
    38            000012                        CHAN12= 12
    39            000013                        CHAN13= 13
    40            000014                        CHAN14= 14
    41            000015                        CHAN15= 15
    42            000016                        CHAN16= 16
```

```
                000017                         CHAN17= 17

                000000                         GAIN00= 00
                000004                         GAIN01= 04
                000010                         GAIN10= 10
                000014                         GAIN11= 14


                                      .SBTTL  ACT11 HOOKS
 (1)
 (2)                                  ;;*****************************************************************
 (1)                                  ;HOOKS REQUIRED BY ACT11
 (1)            000106                         $SVPC=.                 ;SAVE PC
 (1)            000046                         .=46
 (1)    000046  010342                         $ENDAD                  ;;1)SET LOC.46 TO ADDRESS OF $ENDAD IN .$EOP
 (1)            000052                         .=52
 (1)    000052  000000                         .WORD   0               ;;2)SET LOC.52 TO ZERO
 (1)            000106                         .=$SVPC                 ;; RESTORE PC
                001000                .=1000
                                      .SBTTL  APT PARAMETER BLOCK
 (1)
 (2)                                  ;;*****************************************************************
 (1)                                  ;SET LOCATIONS 24 AND 44 AS REQUIRED FOR APT
 (2)                                  ;;*****************************************************************
 (1)            001000                         .$X=.    ;;SAVE CURRENT LOCATION
 (1)            000024                         .=24     ;;SET POWER FAIL TO POINT TO START OF PROGRAM
 (1)    000024  000200                         200      ;;FOR APT START UP
 (1)            000044                         .=44     ;;POINT TO APT INDIRECT ADDRESS PNTR.
 (1)    000044  001000                         $APTHDR ;;POINT TO APT HEADER BLOCK
 (1)            001000                         .=.$X    ;;RESET LOCATION COUNTER
 (2)                                  ;;*****************************************************************
 (1)                                  ;SETUP APT PARAMETER BLOCK AS DEFINED IN THE APT-PDP11 DIAGNOSTIC
 (1)                                  ;INTERFACE SPEC.
 (1)
 (1)    001000                        $APTHD:
 (1)    001000  000000                $HIBTS: .WORD   0         ;;TWO HIGH BITS OF 18 BIT MAILBOX ADDR.
 (1)    001002  001174                $MBADR: .WORD   $MAIL     ;;ADDRESS OF APT MAILBOX (BITS 0-15)
 (1)    001004  000550                $TSTM:  .WORD   360.      ;;RUN TIM OF LONGEST TEST
 (1)    001006  000132                $PASTM: .WORD   90.       ;;RUN TIME IN SECS. OF 1ST PASS ON 1 UNIT (QUICK VERIFY)
 (1)    001010  000550                $UNITM: .WORD   360.      ;;ADDITIONAL RUN TIME (SECS) OF A PASS FOR EACH ADDITIONAL UNIT
 (1)    001012  000031                        .WORD   $ETEND-$MAIL/2 ;;LENGTH MAILBOX-ETABLE(WORDS)
```

```
                                    .SBTTL  COMMON TAGS
 (1)
 (2)                                ;;*************************************************************
 (1)                                ;*THIS TABLE CONTAINS VARIOUS COMMON STORAGE LOCATIONS
 (1)                                ;*USED IN THE PROGRAM.
 (1)
 (1)         001100                         .=1100
 (1)  001100                        $CMTAG:                         ;;START OF COMMON TAGS
 (1)  001100  000000                        .WORD   0
 (1)  001102     000                $TSTNM: .BYTE   0               ;;CONTAINS THE TEST NUMBER
 (1)  001103     000                $ERFLG: .BYTE   0               ;;CONTAINS ERROR FLAG
 (1)  001104  000000                $ICNT:  .WORD   0               ;;CONTAINS SUBTEST ITERATION COUNT
 (1)  001106  000000                $LPADR: .WORD   0               ;;CONTAINS SCOPE LOOP ADDRESS
 (1)  001110  000000                $LPERR: .WORD   0               ;;CONTAINS SCOPE RETURN FOR ERRORS
 (1)  001112  000000                $ERTTL: .WORD   0               ;;CONTAINS TOTAL ERRORS DETECTED
 (1)  001114     000                $ITEMB: .BYTE   0               ;;CONTAINS ITEM CONTROL BYTE
 (1)  001115     001                $ERMAX: .BYTE   1               ;;CONTAINS MAX. ERRORS PER TEST
 (1)  001116  000000                $ERRPC: .WORD   0               ;;CONTAINS PC OF LAST ERROR INSTRUCTION
 (1)  001120  000000                $GDADR: .WORD   0               ;;CONTAINS ADDRESS OF 'GOOD' DATA
 (1)  001122  000000                $BDADR: .WORD   0               ;;CONTAINS ADDRESS OF 'BAD' DATA
 (1)  001124  000000                $GDDAT: .WORD   0               ;;CONTAINS 'GOOD' DATA
 (1)  001126  000000                $BDDAT: .WORD   0               ;;CONTAINS 'BAD' DATA
 (1)  001130  000000                        .WORD   0               ;;RESERVED--NOT TO BE USED
 (1)  001132  000000                        .WORD   0
 (1)  001134     000                $AUTOB: .BYTE   0               ;;AUTOMATIC MODE INDICATOR
 (1)  001135     000                $INTAG: .BYTE   0               ;;INTERRUPT MODE INDICATOR
 (1)  001136  000000                        .WORD   0
 (1)  001140  177570                SWR:    .WORD   DSWR            ;;ADDRESS OF SWITCH REGISTER
 (1)  001142  177570                DISPLAY: .WORD  DDISP           ;;ADDRESS OF DISPLAY REGISTER
 (1)  001144  177560                $TKS:   177560                  ;;TTY KBD STATUS
 (1)  001146  177562                $TKB:   177562                  ;;TTY KBD BUFFER
 (1)  001150  177564                $TPS:   177564                  ;;TTY PRINTER STATUS REG. ADDRESS
 (1)  001152  177566                $TPB:   177566                  ;;TTY PRINTER BUFFER REG. ADDRESS
 (1)  001154     000                $NULL:  .BYTE   0               ;;CONTAINS NULL CHARACTER FOR FILLS
 (1)  001155     002                $FILLS: .BYTE   2               ;;CONTAINS # OF FILLER CHARACTERS REQUIRED
 (1)  001156     012                $FILLC: .BYTE   12              ;;INSERT FILL CHARS. AFTER A "LINE FEED"
 (1)  001157     000                $TPFLG: .BYTE   0               ;;"TERMINAL AVAILABLE" FLAG (BIT<07>=0=YES)
 (1)  001160  000000                $TIMES: 0                       ;;MAX. NUMBER OF ITERATIONS
 (1)  001162  000000                $ESCAPE:0                       ;;ESCAPE ON ERROR ADDRESS
 (1)  001164  177607  000377        $BELL:  .ASCIZ  <207><377><377> ;;CODE FOR BELL
 (1)  001170     077                $QUES:  .ASCII  /?/             ;;QUESTION MARK
 (1)  001171     015                $CRLF:  .ASCII  <15>            ;;CARRIAGE RETURN
 (1)  001172  000012                $LF:    .ASCIZ  <12>            ;;LINE FEED
 (2)                                ;;*************************************************************
 (2)                                .SBTTL  APT MAILBOX-ETABLE
 (2)
 (3)                                ;;*************************************************************
 (2)                                .EVEN
 (2)  001174                        $MAIL:                  ;;APT MAILBOX
 (2)  001174  000000                $MSGTY: .WORD   AMSGTY  ;;MESSAGE TYPE CODE
 (2)  001176  000000                $FATAL: .WORD   AFATAL  ;;FATAL ERROR NUMBER
 (2)  001200  000000                $TESTN: .WORD   ATESTN  ;;TEST NUMBER
 (2)  001202  000000                $PASS:  .WORD   APASS   ;;PASS COUNT
 (2)  001204  000000                $DEVCT: .WORD   ADEVCT  ;;DEVICE COUNT
 (2)  001206  000000                $UNIT:  .WORD   AUNIT   ;;I/O UNIT NUMBER
 (2)  001210  000000                $MSGAD: .WORD   AMSGAD  ;;MESSAGE ADDRESS
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   (2)  001212  000000                   $MSGLG: .WORD    AMSGLG  ;;MESSAGE LENGTH
   (2)  001214                           $ETABLE:                 ;;APT ENVIRONMENT TABLE
   (2)  001214     000                   $ENV:    .BYTE   AENV    ;;ENVIRONMENT BYTE
   (2)  001215     000                   $ENVM:   .BYTE   AENVM   ;;ENVIRONMENT MODE BITS
   (2)  001216  000000                   $SWREG: .WORD    ASWREG  ;;APT SWITCH REGISTER
   (2)  001220  000000                   $USWR:   .WORD   AUSWR   ;;USER SWITCHES
   (2)  001222  000000                   $CPUOP: .WORD    ACPUOP  ;;CPU TYPE,OPTIONS
   (2)                                   ;*                       BITS 15-11=CPU TYPE
   (2)                                   ;*                               11/04=01,11/05=02,11/20=03,11/40=04,11/45=05
   (2)                                   ;*                               11/70=06,PDQ=07,Q=10
   (2)                                   ;*                       BIT 10=REAL TIME CLOCK
   (2)                                   ;*                       BIT  9=FLOATING POINT PROCESSOR
   (2)                                   ;*                       BIT  8=MEMORY MANAGEMENT
   (2)  001224     000                   $MAMS1: .BYTE    AMAMS1  ;;HIGH ADDRESS,M.S. BYTE
   (2)  001225     000                   $MTYP1: .BYTE    AMTYP1  ;;MEM. TYPE,BLK#1
   (2)                                   ;*                       MEM.TYPE BYTE   --  (HIGH BYTE)
   (2)                                   ;*                               900 NSEC CORE=001
   (2)                                   ;*                               300 NSEC BIPOLAR=002
   (2)                                   ;*                               500 NSEC MOS=003
   (2)  001226  000000                   $MADR1: .WORD    AMADR1  ;;HIGH ADDRESS,BLK#1
   (2)                                   ;*                         MEM.LAST ADDR.=3 BYTES,THIS WORD AND LOW OF ''TYPE'' ABOVE
   (2)  001230     000                   $MAMS2: .BYTE    AMAMS2  ;;HIGH ADDRESS,M.S. BYTE
   (2)  001231     000                   $MTYP2: .BYTE    AMTYP2  ;;MEM.TYPE,BLK#2
   (2)  001232  000000                   $MADR2: .WORD    AMADR2  ;;MEM.LAST ADDRESS,BLK#2
   (2)  001234     000                   $MAMS3: .BYTE    AMAMS3  ;;HIGH ADDRESS,M.S.BYTE
   (2)  001235     000                   $MTYP3: .BYTE    AMTYP3  ;;MEM.TYPE,BLK#3
   (2)  001236  000000                   $MADR3: .WORD    AMADR3  ;;MEM.LAST ADDRESS,BLK#3
   (2)  001240     000                   $MAMS4: .BYTE    AMAMS4  ;;HIGH ADDRESS,M.S.BYTE
   (2)  001241     000                   $MTYP4: .BYTE    AMTYP4  ;;MEM.TYPE,BLK#4
   (2)  001242  000000                   $MADR4: .WORD    AMADR4  ;;MEM.LAST ADDRESS,BLK#4
   (2)  001244  000400                   $VECT1: .WORD    AVECT1  ;;INTERRUPT VECTOR#1,BUS PRIORITY#1
   (2)  001246  000000                   $VECT2: .WORD    AVECT2  ;;INTERRUPT VECTOR#2BUS PRIORITY#2
   (2)  001250  170400                   $BASE:   .WORD   ABASE   ;;BASE ADDRESS OF EQUIPMENT UNDER TEST
   (2)  001252  000000                   $DEVM:   .WORD   ADEVM   ;;DEVICE MAP
   (2)  001254  000000                   $CDW1:   .WORD   ACDW1   ;;CONTROLLER DESCRIPTION WORD#1
   (2)  001256                           $ETEND:
   (2)                                   .MEXIT
   (1)                                 .SBTTL  ERROR POINTER TABLE
   (1)
   (1)                                 ;*THIS TABLE CONTAINS THE INFORMATION FOR EACH ERROR THAT CAN OCCUR.
   (1)                                 ;*THE INFORMATION IS OBTAINED BY USING THE INDEX NUMBER FOUND IN
   (1)                                 ;*LOCATION $ITEMB. THIS NUMBER INDICATES WHICH ITEM IN THE TABLE IS PERTINENT.
   (1)                                 ;*NOTE1:        IF $ITEMB IS 0 THE ONLY PERTINENT DATA IS ($ERRPC).
   (1)                                 ;*NOTE2:        EACH ITEM IN THE TABLE CONTAINS 4 POINTERS EXPLAINED AS FOLLOWS:
   (1)
   (1)                                 ;*      EM              ;;POINTS TO THE ERROR MESSAGE
   (1)                                 ;*      DH              ;;POINTS TO THE DATA HEADER
   (1)                                 ;*      DT              ;;POINTS TO THE DATA
   (1)                                 ;*      DF              ;;POINTS TO THE DATA FORMAT
   (1)
   (1)
   (1)  001256                         $ERRTB:
    56
    57
    58
    67                                 ;ITEM   1
    68  001256  013215                         EM1                     ;STATUS REG. ERROR
    69  001260  013335                         DH1                     ;ERRPC STREG EXPECTED ACTUAL
    70  001262  013504                         DT1                     ;$ERRPC, STREG, $GDDAT, $BDDAT
    71  001264  013544                         DF1
    72
    73
    74                                 ;ITEM   2
    75  001266  013237                         EM2                     ;FAILED TO INTERRUPT
    76  001270  013454                         DH3                     ;ERRPC STREG ACTUAL
    77  001272  013534                         DT3                     ;$ERRPC, STREG,  $BDDAT
    78  001274  013544                         DF1
    79
    80                                 ;ITEM   3
    81  001276  013263                         EM3                     ;UNEXPECTED INTERRUPT
    82  001300  013454                         DH3                     ;ERRPC STREG
    83  001302  013534                         DT3                     ;$ERRPC, STREG
    84  001304  013544                         DF1
    85
    86                                 ;ITEM   4
    87  001306  013310                         EM4                     ;ERROR ON A/D CHANNEL
    88  001310  013375                         DH2                     ;ERRPC  STREG  CHAN  NOMINAL  TOL  ACTUAL
    89  001312  013516                         DT2                     ;$ERRPC,STREG,CHANL,$GDDAT,SPREAD,$BDDAT
    90  001314  013544                         DF1
```

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                                        .SBTTL      MISCELLANEOUS, TEMPORARY, AND STORAGE LOCATIONS
    001316  170400                      STREG:   ABASE                         ;ADDRESS OF STATUS REGISTER
    001320  170401                      ADST1:   ABASE+1                       ;UPPER BYTE OF STATUS REG.
    001322  170402                      ADBUFF:  ABASE+2                       ;ADDRESS OF A/D BUFFER
    001324  170404                      DACA:    ABASE+4                       ;ADDRESS OF D TO A ''A''
    001326  170406                      DACB:    ABASE+6                       ;ADDRESS OF D TO A 'B''
    001330  000400                      VECTOR:  AVECT1                        ;VECTOR ADDRESS
    001332  000402                      VECTR1:  AVECT1+2
    001334  000404                      VECTR2:  AVECT1+4                      ;ERROR VECTOR ADDRESS
    001336  000406                      VECTR3:  AVECT1+6
    001340  170420                      KWCSR:   170420                        ;CLOCK STATUS/CONTROL REGISTER
    001342  170422                      KWBPR:   170422                        ;CLOCK PRESET/COUNTER REGISTER
    001344  170440                      DAC0:    170440                        ;AAV11-C DAC ''A'' ADDRESS
    001346  170442                      DAC1:    170442                        ;                 'B''
    001350  170444                      DAC2:    170444                        ;                 ''C''
    001352  170446                      DAC3:    170446                        ;                 'D''
    001354  000020                      VWRAP:   20
    001356  001000                      BARF:    BIT9                          ;DELAY FACTOR
    001360  000000                      TEMP:    0                             ;WORK AREA
    001362  000000                      CHANL:   0                             ;CHANNEL VALUE
    001364  000000                      SPREAD:  0                             ;DEVIATION FROM THE NOMINAL
    001366  000000                      TC1:     0         ;NON-ZERO, AXV11-C TEST FIXTURE IS INSTALLED
    001370  000000                      TC2:     0         ;NON-ZERO, AAV11-C TO AXV11-C CABLE IN INSTALLED
    001372  000000                      ADV11C:  0         ;NON-ZERO, MODULE IS ADV11-C (NO DAC'S ON BOARD)
    001374  000000                      KWAD:    0         ;NON-ZERO, CLOCK CONNECTED TO RTC IN
    001376  000000                      KWEX:    0         ;NON-ZERO, JUMPER F2 IS INSTALLED AND CLOCK CONNECTED TO EXT TRIG
    001400  000000                      MAEX:    0         ;NON-ZERO, JUMPER F2 IS INSTALLED AND MANUAL TRIGGER IS CONNECTED
    001402  000000                      BTEX:    0         ;NON-ZERO, JUMPER F1 IS INSTALLED

    001404                              UNEXP:
(1) 001404  012737  001420  001162               MOV      #1$,$ESCAPE      ;;ESCAPE TO 1$ ON ERROR
    001412  005237  001103                       INC      $ERFLG
    001416  104003                               ERROR    3
    001420  005037  001162              1$:      CLR      $ESCAPE          ;RETURN ESCAPE TO NORMAL
    001424  000002                               RTI                       ;UNEXPECTED INTERRUPT

                                        ;SUBROUTINE TO DELAY AN AMOUNT OF CPU TIME

    001426  013700  001356              STALL:   MOV      BARF,R0          ;GET DELAY FACTOR
    001432  005300                      1$:      DEC      R0               ;DELAY
    001434  001376                               BNE      1$
    001436  000207                               RTS      PC               ;EXIT
```

```

001440  022776  000001  000000  RETURN: CMP     #1,@0(SP)       ;DOES IT RETURN TO A WAIT?
001446  001002                          BNE     1$              ;NO
001450  062716  000002                  ADD     #2,(SP)         ;BUMP RETURN ADDRESS
001454  000002                  1$:     RTI

                                ;SUBROUT.NE TO ASK QUESTIONS OF THE OPERATOR
001456  012537  001470          ASKTA:  MOV     (R5)+,10$       ;GET THE ASCII POINTER
001462  104401  001171                  TYPE    ,$CRLF          ;MAKE A FRESH LINE
001466  104401                          TYPE                    ;TELL THE OPERATOR A MESSAGE
001470  011505                  10$:    MSKWAD
001472  104412                          RDLIN
001474  012600                          MOV     (SP)+,R0        ;GET ANSWER
001476  005075  000000                  CLR     @(R5)           ;IF ANSWER IS NOT A 'Y', CLEAR MESSAGE FLAG
001502  042710  000040                  BIC     #40,(R0)        ;ENSURE UPPER CASE
001506  122710  000131                  CMPB    #'Y,(R0)        ;TEST IF 'Y'
001512  001001                          BNE     1$              ;BR IF NOT
001514  005235                          INC     @(R5)+          ;SET YES FLAG
001516  005725                  1$:     TST     (R5)+           ;BUMP EXIT
001520  000205                          RTS     R5              ;EXIT
```

```
                                      .SBTTL          INITIAL START-UP,HOUSEKEEPING, AND DIALOGUE
001522  005037  001360                BEGIN0: CLR     TEMP                    ;CLEAR RESTART FLAG
001526  000402                                BR      BEGST
001530  005237  001360                BEGIN2: INC     TEMP                    ;SET RESTART FLAG
001534                                BEGST:
                                      .SBTTL  INITIALIZE THE COMMON TAGS
                                      ;;CLEAR THE COMMON TAGS ($CMTAG) AREA
001534  012706  001100                        MOV     #$CMTAG,R6              ;;FIRST LOCATION TO BE CLEARED
001540  005026                                CLR     (R6)+                   ;;CLEAR MEMORY LOCATION
001542  022706  001140                        CMP     #SWR,R6 ;;DONE?
001546  001374                                BNE     .-6                     ;;LOOP BACK IF NO
001550  012706  001100                        MOV     #STACK,SP               ;;SETUP THE STACK POINTER
                                      ;;INITIALIZE A FEW VECTORS
001554  012737  015352  000020                MOV     #$SCOPE,@#IOTVEC ;;IOT VECTOR FOR SCOPE ROUTINE
001562  012737  000340  000022                MOV     #340,@#IOTVEC+2 ;;LEVEL 7
001570  012737  015632  000030                MOV     #$ERROR,@#EMTVEC ;;EMT VECTOR FOR ERROR ROUTINE
001576  012737  000340  000032                MOV     #340,@#EMTVEC+2 ;;LEVEL 7
001604  012737  017516  000034                MOV     #$TRAP,@#TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
001612  012737  000340  000036                MOV     #340,@#TRAPVEC+2;LEVEL 7
001620  012737  015174  000024                MOV     #$PWRDN,@#PWRVEC ;;POWER FAILURE VECTOR
001626  012737  000340  000026                MOV     #340,@#PWRVEC+2 ;;LEVEL 7
001634  013737  010310  010302                MOV     $ENDCT,$EOPCT   ;;SETUP END-OF-PROGRAM COUNTER
001642  005037  001160                        CLR     $TIMES                  ;;INITIALIZE NUMBER OF ITERATIONS
001646  005037  001162                        CLR     $ESCAPE                 ;;CLEAR THE ESCAPE ON ERROR ADDRESS
001652  112737  000001  001115                MOVB    #1,$ERMAX               ;;ALLOW ONE ERROR PER TEST
001660  012737  001660  001106                MOV     #.,$LPADR               ;;INITIALIZE THE LOOP ADDRESS FOR SCOPE
001666  012737  001666  001110                MOV     #.,$LPERR               ;;SETUP THE ERROR LOOP ADDRESS
                                      ;;SIZE FOR A HARDWARE SWITCH REGISTER. IF NOT FOUND OR IT IS
                                      ;;EQUAL TO A "-1", SETUP FOR A SOFTWARE SWITCH REGISTER.
001674  013746  000004                        MOV     @#ERRVEC,-(SP)  ;;SAVE ERROR VECTOR
001700  012737  001734  000004                MOV     #64$,@#ERRVEC   ;;SET UP ERROR VECTOR
001706  012737  177570  001140                MOV     #DSWR,SWR       ;;SETUP FOR A HARDWARE SWICH REGISTER
001714  012737  177570  001142                MOV     #DDISP,DISPLAY  ;;AND A HARDWARE DISPLAY REGISTER
001722  022777  177777  177210                CMP     #-1,@SWR        ;;TRY TO REFERENCE HARDWARE SWR
001730  001012                                BNE     66$             ;;BRANCH IF NO TIMEOUT TRAP OCCURRED
                                                                      ;;AND  THE HARDWARE SWR IS NOT = -1
001732  000403                                BR      65$             ;;BRANCH IF NO TIMEOUT
001734  012716  001742                64$:    MOV     #65$,(SP)       ;;SET UP FOR TRAP RETURN
001740  000002                                RTI
001742  012737  000176  001140        65$:    MOV     #SWREG,SWR      ;;POINT TO SOFTWARE SWR
001750  012737  000174  001142                MOV     #DISPREG,DISPLAY
001756  012637  000004                66$:    MOV     (SP)+,@#ERRVEC  ;;RESTORE ERROR VECTOR

001762  005037  001202                        CLR     $PASS           ;;CLEAR PASS COUNT
001766  132737  000200  001215                BITB    #APTSIZE,$ENVM  ;;TEST USER SIZE UNDER APT
001774  001403                                BEQ     67$             ;;YES,USE NON-APT SWITCH
001776  012737  001216  001140                MOV     #$SWREG,SWR     ;;NO,USE APT SWITCH REGISTER
002004                                67$:
002004  012737  005046  016166                MOV     #5046,$TYPE     ;A WAY TO LOWER
002012  012737  012746  016170                MOV     #12746,$TYPE+2  ; PS FOR
002020  012737  016200  016172                MOV     #$TYPE+12,$TYPE+4
002026  012737  000002  016174                MOV     #RTI,$TYPE+6    ;   TTY OUTPUT
002034  004737  013614                        JSR     PC,$TKINT       ;INIT THE CONSOLE VECTORS
```

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                                            .SBTTL       DIALOGUE TO DETERMINE WHICH TEST TO RUN
                                            .SBTTL  TYPE PROGRAM NAME
(1)                                         ;;TYPE THE NAME OF THE PROGRAM IF FIRST PASS
(1)   002040  005227  177777                        INC     #-1                 ;;FIRST TIME?
(1)   002044  001053                                BNE     68$                 ;;BRANCH IF NO
(1)   002046  022737  010342  000042                CMP     #$ENDAD,@#42        ;;ACT-11?
(1)   002054  001447                                BEQ     68$                 ;;BRANCH IF YES
(1)   002056  104401  002124                        TYPE    ,69$                ;;TYPE ASCIZ STRING
(2)                                         .SBTTL  GET VALUE FOR SOFTWARE SWITCH REGISTER
(2)   002062  005737  000042                        TST     @#42                ;;ARE WE RUNNING UNDER XXDP/ACT?
(2)   002066  001012                                BNE     70$                 ;;BRANCH IF YES
(2)   002070  123727  001214  000001                CMPB    $ENV,#1             ;;ARE WE RUNNING UNDER APT?
(2)   002076  001406                                BEQ     70$                 ;;BRANCH IF YES
(2)   002100  023727  001140  000176                CMP     SWR,#SWREG          ;;SOFTWARE SWITCH REG SELECTED?
(2)   002106  001005                                BNE     71$                 ;;BRANCH IF NO
(2)   002110  104407                                GTSWR                       ;;GET SOFT-SWR SETTINGS
(2)   002112  000403                                BR      71$
(2)   002114  112737  000001  001134        70$:    MOVB    #1,$AUTOB           ;;SET AUTO-MODE INDICATOR
(2)   002122                                71$:
(1)   002122  000424                                BR      68$                 ;;GET OVER THE ASCIZ
(1)                                         ;;69$:  .ASCIZ  <CRLF># CVAXAA  AXV11-C/ADV11-C DIAGNOSTIC  #<CRLF>
(1)   002174                                68$:
      002174  004737  007506                        JSR     PC,FIXONE           ;INITIALIZE ADDRESSES
      002200  005737  001360                77$:    TST     TEMP                ;ARE WE RESTARTING THE PROGRAM
      002204  001062                                BNE     40$                 ;BR IF YES
      002206  005737  001134                        TST     $AUTOB              ;IS IT CHAINED?
      002212  001402                                BEQ     1$
      002214  000137  007360                        JMP     BEGIND  ;RUN ONLY THE LOGIC TEST AND SELECTED WRAPAROUND IF APT/XXDP CHA
      002220  004537  001456                1$:     JSR     R5,ASKTA            ;ASK OPERATOR ABOUT DIFFERENT CONFIG.
      002224  011505                                MSKWAD                      ;IS KWV11-C CONNECTED TO CLOCK START
      002226  001374                                KWAD                        ;
      002230  000240                                NOP
      002232  005037  001400                        CLR     MAEX                ;ENSURE CLEARED FLAG
      002236  004537  001456                        JSR     R5,ASKTA            ;ASK IF KWV11-C CONNECTED TO EXT. START
      002242  011567                                MSKWEX
      002244  001376                                KWEX
      002246  000403                                BR      2$
      002250  000415                                BR      4$                  ;IF ANSWER WAS YES, BYPASS NEXT QUESTION
      002252  005037  001402                        CLR     BTEX                ;ENSURE CLEARED FLAG
      002256  004537  001456                2$:     JSR     R5,ASKTA            ;ASK IF MANUAL TRIGGER IS CONNECTED TO EXT. START
      002262  011676                                MSMAEX
      002264  001400                                MAEX
      002266  000401                                BR      3$
      002270  000405                                BR      4$
      002272  004537  001456                3$:     JSR     R5,ASKTA            ;ASK IF B EVENT IS CONNECTED TO EXT TRIG
      002276  012054                                MSBTEX
      002300  001402                                BTEX
      002302  000240                                NOP
      002304  004537  001456                4$:     JSR     R5,ASKTA            ;ASK IF MODULE IS ADV11-C
      002310  012147                                MSADV
      002312  001372                                ADV11C
      002314  000240                                NOP
      002316  004537  001456                10$:    JSR     R5,ASKTA            ;ASK IF TEST FIXTURE #1 IS INSTALLED
      002322  012176                                MSTC1
      002324  001366                                TC1
      002326  000240                                NOP
```

```
002330  004537  001456            11$:    JSR     R5,ASKTA          ;ASK IF TEST CONNECTOR #2 IS INSTALLED
002334  012255                            MSTC2
002336  001370                            TC2
002340  000240                            NOP
002342  000240                    12$:    NOP
002344  000240                    20$:    NOP
002346  104401  012345            30$:    TYPE,   MSG70             ;TELL THE OPERATOR THE TESTS AVAILABLE
002352  104401  011377            40$:    TYPE    ,MSG71
                                  ;ROUTINE TO ASK OPERATOR WHAT SUB-SECTION TO EXECUTE
002356  104412                    TRYAG:  RDLIN
002360  052777  000100  176556            BIS     #100,@$TKS
002366  005046                            CLR     -(SP)             ;CLEAR PSW
002370  012746  002376                    MOV     #1$,-(SP)
002374  000002                            RTI
002376  012600                    1$:     MOV     (SP)+,R0          ;READ ANSWER
002400  011000                            MOV     (R0),R0           ;GET THE 1ST CHARACTER
002402  042700  177600                    BIC     #177600,R0        ;REMOVE EXTRA BITS
002406  012701  002434                    MOV     #OKCHAR,R1        ;LOAD POINTER TO GOOD CHARACTER LIST
002412  020021                    2$:     CMP     R0,(R1)+          ;CHECK IF VALID CHARACTER
002414  001002                            BNE     3$                ;BR IF NOT
002416  011101                            MOV     (R1),R1           ;GET THE ADDRESS
002420  000111                            JMP     @R1               ;DO THE SELECTED SUB-TEST
002422  005721                    3$:     TST     (R1)+             ;BUMP THE POINTER
002424  001372                            BNE     2$                ;BR IF MORE CHARACTERS
002426  104401  011077            6$:     TYPE    ,QUEST
002432  000751                            BR      TRYAG             ;WAIT FOR CHARACTER

                                  ;TABLE OF VALID MENU CHARACTERS AND STARTING ADDRESS
002434  000141                    OKCHAR: 141                       ;LOWER CASE ''A''
002436  007320                            BEGINA
002440  000154                            154                       ;LOWER CASE 'L''
002442  007302                            BEGINL
002444  000167                            167                       ;LOWER CASE 'W''
002446  007342                            BEGINW
002450  000101                            'A
002452  007320                            BEGINA
002454  000114                            'L
002456  007302                            BEGINL
002460  000127                            'W
002462  007342                            BEGINW
002464  000061  006306                    '1      ,IOTST1
002470  000062  006462                    '2      ,IOTST2
002474  000063  006664                    '3,     IOTST3
002500  000064  006772                    '4,     IOTST4
002504  000065  007062                    '5,     IOTST5
002510  000066  007150                    '6,     IOTST6
002514  000067  007216                    '7,     IOTST7
002520  000000  000000  000000            0,0,0,0
002526  000000
```

```
002530                                  BEGL:
                                        ;;*****************************************************************
                                        ;*TEST 1         ADDRESS THE 4 BUS ADDRESSES OF THE AXV11-C
                                        ;;*****************************************************************
002530  012737  002530  001106          TST1:   MOV     #TST1,$LPADR
002536  012737  000001  001102                  MOV     #$TN-1,$TSTNM   ;LOAD TEST NUMBER
002544  005777  176546                          TST     @STREG          ;ADDRESS A/D STATUS REGISTER
002550  005777  176546                          TST     @ADBUFF         ;ADDRESS A/D DATA BUFFER
002554  005777  176544                          TST     @DACA           ;ADDRESS D TO A ''A''
002560  005777  176542                          TST     @DACB           ;ADDRESS D TO A 'B''
                                        ;;*****************************************************************
                                        ;*TEST 2         FLOAT A ONE THRU MULTIPLEXER (BITS 11-8)
                                        ;;*****************************************************************
002564  000004                          TST2:   SCOPE
002566  012737  000400  001124                  MOV     #BIT8,$GDDAT    ;LOAD FIRST BIT
002574  104415                          2$:     CHKIT
002576  104001                                  ERROR   1               ;FAILED TO LOAD + READ BIT
002600  006337  001124                  1$:     ASL     $GDDAT          ;GET NEXT BIT
002604  023727  001124  010000                  CMP     $GDDAT,#BIT12   ;FINISHED?
002612  001370                                  BNE     2$              ;;NO,GO TO NEXT TEST

                                        ;;*****************************************************************
                                        ;*TEST 3         LOAD AND READ BACK ERROR I.E. BIT14
                                        ;;*****************************************************************
002614  000004                          TST3:   SCOPE
002616  012737  040000  001124                  MOV     #BIT14,$GDDAT
002624  104415                                  CHKIT
002626  104001                                  ERROR   1               ;FAILED TO LOAD + READ ERROR I.E.
                                        ;;*****************************************************************
                                        ;*TEST 4         LOAD AND READ BACK INTERRUPT ENABLE BIT6
                                        ;;*****************************************************************
002630  000004                          TST4:   SCOPE
002632  012777  001404  176470                  MOV     #UNEXP,@VECTOR  ;SETUP FOR UNEXPECTED INTERUPT
002640  012737  000100  001124                  MOV     #BIT6,$GDDAT    ;LOAD EXPECTED DATA
002646  104415                                  CHKIT
002650  104001                                  ERROR   1               ;FAILED TO LOAD + READ INTERRUPT ENABLE

                                        ;;*****************************************************************
                                        ;*TEST 5         LOAD AND READ BACK CLOCK OVERFLOW START ENABLE BIT5
                                        ;;*****************************************************************
002652  000004                          TST5:   SCOPE
002654  012737  000040  001124                  MOV     #BIT5,$GDDAT    ;LOAD EXPECTED DATA
002662  104415                                  CHKIT
002664  104001                                  ERROR   1               ;FAILED TO LOAD + READ CLOCK OVERFLOW START ENABL
                                        ;;*****************************************************************
                                        ;*TEST 6         LOAD AND READ BACK EXTERNAL START ENABLE BIT4
                                        ;;*****************************************************************
002666  000004                          TST6:   SCOPE
002670  012737  000020  001124                  MOV     #BIT4,$GDDAT    ;LOAD EXPECTED DATA
002676  104415                                  CHKIT
002700  104001                                  ERROR   1               ;FAILED TO LOAD + READ EXT. START ENABLE
```

```
                                        ;;*****************************************************************
                                        ;*TEST 7        LOAD AND READ BACK GAIN SELECT 0
                                        ;;*****************************************************************
        002702  000004                  TST7:   SCOPE
        002704  012737  000004  001124          MOV     #BIT2,$GDDAT    ;LOAD EXPECTED DATA
        002712  104415                          CHKIT
        002714  104001                          ERROR   1               ;FAILED TO LOAD + READ BACK GAIN SELECT 0
                                        ;;*****************************************************************
                                        ;*TEST 10       LOAD AND READ BACK GAIN SELECT 1
                                        ;;*****************************************************************
        002716  000004                  TST10:  SCOPE
        002720  012737  000010  001124          MOV     #BIT3,$GDDAT    ;LOAD EXPECTED
        002726  104415                          CHKIT
        002730  104001                          ERROR   1               ;FAILED TO LOAD + READ BACK GAIN SELECT 1

                                        ;;*****************************************************************
                                        ;*TEST 11       LOAD AND READ BACK ERROR FLAG (BIT15)
                                        ;;*****************************************************************
        002732  000004                  TST11:  SCOPE
        002734  012737  100000  001124          MOV     #BIT15,$GDDAT   ;LOAD EXPECTED DATA
        002742  104415                          CHKIT
        002744  104001                          ERROR   1               ;FAILED TO LOAD + READ BACK ERROR FLAG
                                        ;;*****************************************************************
                                        ;*TEST 12       TEST INIT CLEARS BITS 2-6,14
                                        ;;*****************************************************************
        002746  000004                  TST12:  SCOPE
        002750  012737  000300  001160          MOV     #300,$TIMES     ;;DO 300 ITERATIONS
        002756  005037  001124                  CLR     $GDDAT          ;LOAD EXPECTED DATA
        002762  012777  040174  176326          MOV     #40174,@STREG   ;SET STATUS REGISTER
        002770  000005                          RESET                   ;INITIALIZE
        002772  052777  000100  176144          BIS     #100,@$TKS      ;SET INTRPT. ENABLE
        003000  017737  176312  001126          MOV     @STREG,$BDDAT   ;READ STATUS REGISTER
        003006  001401                          BEQ     TST13           ;;NEXT TEST
        003010  104001                          ERROR   1               ;RESET FAILED TO CLEAR AD ST. REG. BITS

                                        ;;*****************************************************************
                                        ;*TEST 13       TEST INIT CLEARS ERROR FLAG
                                        ;;*****************************************************************
        003012  000004                  TST13:  SCOPE
        003014  012737  000300  001160          MOV     #300,$TIMES     ;;DO 300 ITERATIONS
        003022  012777  100000  176266          MOV     #BIT15,@STREG   ;SET BIT 15
        003030  000005                          RESET                   ;ISSUE INIT
        003032  052777  000100  176104          BIS     #100,@$TKS      ;SET INTRPT. EN. FOR KEYBOARD
        003040  104414                          CHECK
        003042  104001                          ERROR   1               ;BUS INIT FAILED TO CLEAR A/D DONE FLAG
                                        ;;*****************************************************************
                                        ;*TEST 14       TEST  DONE FLAG  SETS AND BIT0 CLEARS ON END OF CONV.
                                        ;;*****************************************************************
        003044  000004                  TST14:  SCOPE
        003046  017700  176250                  MOV     @ADBUFF,R0      ;READ DATA
        003052  005277  176240                  INC     @STREG          ;START CONVERSION
        003056  012737  000200  001124          MOV     #BIT7,$GDDAT    ;LOAD EXPECTED
        003064  004737  001426                  JSR     PC,STALL        ;DELAY AN AMOUNT OF TIME
        003070  042777  100000  176220          BIC     #BIT15,@STREG   ;MASK OUT ERROR BIT
        003076  104414                          CHECK
        003100  104001                          ERROR   1               ;A/D DONE FLAG FAILED TO SET
```

```
                                                                   ;  OR BIT0 FAILED TO CLEAR
      003102  017700  176214                      MOV     @ADBUFF,R0     ;CLEAR DONE FLAG FOR ITERATIONS

                                          ;;*****************************************************************
 (3)                                      ;*TEST 15       TEST INIT CLEARS DONE FLAG
 (3)                                      ;;*****************************************************************
 (2)  003106  000004                      TST15:  SCOPE
 (1)  003110  012737  000300  001160              MOV     #300,$TIMES    ;;DO 300 ITERATIONS
      003116  005037  001124                      CLR     $GDDAT         ;CLEAR EXPECTED
      003122  005277  176170                      INC     @STREG         ;START CONVERSION
      003126  105777  176164              2$:     TSTB    @STREG
      003132  100375                              BPL     2$
      003134  000005                              RESET
      003136  104414                              CHECK
      003140  104001                              ERROR   1              ;DONE FLAG FAILED TO CLEAR
      003142  052777  000100  175774              BIS     #100,@$TKS     ;SET INTRPT. EN. BIT

                                          ;;*****************************************************************
 (3)                                      ;*TEST 16       TEST A/D DONE FLAG CLEARS WHEN READ CONVERTED VALUE
 (3)                                      ;;*****************************************************************
 (2)  003150  000004                      TST16:  SCOPE
      003152  005277  176140                      INC     @STREG         ;SET A/D START CONVERSION BIT
      003156  105777  176134              1$:     TSTB    @STREG         ;WAIT FOR FLAG
      003162  100375                              BPL     1$
      003164  017700  176132                      MOV     @ADBUFF,R0     ;READ CONVERTED VALUE
      003170  104414                              CHECK
      003172  104001                              ERROR   1              ;DONE FLAG FAILED TO CLEAR
```

```
                                        ;;*******************************************************************
                                        ;*TEST 17        GENERATE INTERRUPT WHEN DONE FLAG SETS AFTER CONVERSION
                                        ;;*******************************************************************
 003174  000004                         TST17:  SCOPE
                                                ;* "ENTERING TEST 17" 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 "Q BUSS" COULD GET "HUNG" WHILE
                                                ;*EXECUTING TEST "17".
 003176  012700  000017                         MOV     #17,R0          ;GET TE.T NO.
 003202  004737  010112                         JSR     PC,DUMW         ;PRINT MESSAGE
 003206  005046                                 CLR     -(SP)           ;RESET PRIORITY
 003210  012746  003216                         MOV     #3$,-(SP)
 003214  000002                                 RTI
 003216  012777  003272  176104         3$:     MOV     #1$,@VECTOR     ;INTERRUPT VECTOR ADDRESS
 003224  012777  000200  176100                 MOV     #200,@VECTR1    ;SET UP NEW PSW
 003232  012777  000101  176056                 MOV     #BIT6!BIT0,@STREG ;SET INTERRUPT ENABLE BIT + START CONVERSION
 003240  105777  176052                 2$:     TSTB    @STREG          ;WAIT FOR DONE
 003244  100375                                 BPL     2$              ;FLAG TO SET
 003246  017737  176044  001126                 MOV     @STREG,$BDDAT   ;READ STATUS REGISTER
 003254  012737  000300  001124                 MOV     #BIT7!BIT6,$GDDAT ;GOOD DATA
 003262  104002                                 ERROR   2               ;FAILED TO INTERRUPT ON DONE
 003264  004737  010164                         JSR     PC,DUMC       . ;TYPE COMPLETED
 003270  000414                                 BR      TST20           ;;BRANCH TO NEXT TEST
 003272  022626                         1$:     CMP     (SP)+,(SP)+     ;RESET STACK POINTER
 003274  012777  001404  176026                 MOV     #UNEXP,@VECTOR  ;SET UP FOR UNEXPECTED INTERRUPT
 003302  005046                                 CLR     -(SP)           ;CLEAR PSW
 003304  012746  003312                         MOV     #4$,-(SP)
 003310  000002                                 RTI
 003312  004737  010164                 4$:     JSR     PC,DUMC         ;TYPE COMPLETED
 003316  005777  176000                         TST     @ADBUFF         ;CLEAR DONE BIT
                                        ;;*******************************************************************
                                        ;*TEST 20        TEST INTERRUPT OCCURS WHEN ERROR AND I.E.E. IS SET
                                        ;;*******************************************************************
 003322  000004                         TST20:  SCOPE
                                                ;* "ENTERING TEST 20" TYPED OUT TO TELL YOU THE NEXT
                                                ;*TEST THAT IS GOING TO BE EXECUTED. IT IS ONLY TYPED ON PASS 0.
                                                ;*THERE IS DANGER THAT THE "Q BUSS" COULD GET "HUNG" WHILE
                                                ;*EXECUTING TEST "20".
 003324  012700  000020                         MOV     #20,R0          ;GET TEST NO.
 003330  004737  010112                         JSR     PC,DUMW         ;PRINT MESSAGE
 003334  012777  003374  175772                 MOV     #1$,@VECTR2     ;SETUP VECTOR ADDRESS
 003342  012777  140000  175746                 MOV     #BIT15!BIT14,@STREG     ;CAUSE AN INTERRUPT
 003350  017737  175742  001126                 MOV     @STREG,$BDDAT   ;BAD DATA
 003356  012737  140000  001124                 MOV     #BIT15!BIT14,$GDDAT     ;GOOD DATA
 003364  104002                                 ERROR   2
 003366  004737  010164                         JSR     PC,DUMC         ;TYPE COMPLETED
 003372  000753                                 BR      TST20
 003374  022626                         1$:     CMP     (SP)+,(SP)+     ;POP STACK
 003376  004737  010164                         JSR     PC,DUMC
 003402  005077  175710                         CLR     @STREG
```

```
                                        ;;*****************************************************************
                                        ;*TEST 21        TEST ERROR FLAG SETS IF 2ND CONVERSION IS STARTED WHILE A/D DONE IS SET
                                        ;;*****************************************************************
003406  000004                          TST21:  SCOPE
003410  012777  000001  175700                  MOV     #BIT0,@STREG       ;START CONVERSION
003416  105777  175674                  1$:     TSTB    @STREG             ;WAIT FOR
003422  100375                                  BPL     1$
003424  012737  100200  001124                  MOV     #BIT15!BIT7,$GDDAT ;LOAD EXPECTED VALUE
003432  012777  000001  175656                  MOV     #BIT0,@STREG       ;START 2ND CONVERSION
003440  104414                                  CHECK
003442  104001                                  ERROR   1                  ;ERROR FLAG NOT SET WHEN 2ND
                                                        ; CONVERSION WAS STARTED BEFORE READING BUFFER FROM FIRST
003444  017700  175652                          MOV     @ADBUFF,R0         ;CLEAR DONE FLAG


                                        ;;*****************************************************************
                                        ;*TEST 22        TEST CLOCK OVERFLOW STARTS A/D  (IF KWV11-C IS AVAILABLE)
                                        ;;*****************************************************************
003450  000004                          TST22:  SCOPE
003452  005737  001374                          TST     KWAD               ;TEST IF OPERATOR SAID KWV11-C WAS CONNECTED
003456  001424                                  BEQ     TST23              ;;BR IF NO CLOCK THERE
003460  012737  000240  001124                  MOV     #BIT7!BIT5,$GDDAT         ;LOAD EXPECTED A/D STATUS
003466  013777  001124  175622                  MOV     $GDDAT,@STREG      ;ENABLE THE A/D STATUS REGISTER
003474  012777  177776  175640                  MOV     #177776,@KWBPR     ;LOAD KWV11-C CLOCK PRESET REGISTER
003502  012777  000011  175630                  MOV     #11,@KWCSR         ;START CLOCK
003510  004737  001426                          JSR     PC,STALL           ;DELAY FOR A CLOCK TICK
003514  104414                                  CHECK                      ;CHECK A/D STATUS AGAINST EXPECTED
003516  104001                                  ERROR   1                  ;A/D DONE FAILED TO SET WITH CLOCK STARTS
003520  005777  175576                          TST     @ADBUFF            ;CLEAR A/D DONE
003524  005077  175566                          CLR     @STREG             ;CLEAR A/D CONTROL


                                        ;;*****************************************************************
                                        ;*TEST 23        TEST EXTERNAL TRIGGER STARTS A/D (IF KW11-C IS CONNECTED TO EXT START TA
                                        ;;*****************************************************************
003530  000004                          TST23:  SCOPE
003532  005737  001376                          TST     KWEX               ;TEST IF OPERATOR SAID KWV11-C WAS CONNECTED
003536  001424                                  BEQ     TST24              ;;BR IF NO CLOCK THERE
003540  012737  000220  001124                  MOV     #BIT7!BIT4,$GDDAT         ;LOAD EXPECTED A/D STATUS
003546  013777  001124  175542                  MOV     $GDDAT,@STREG      ;ENABLE THE A/D STATUS REGISTER
003554  012777  177776  175560                  MOV     #177776,@KWBPR     ;LOAD KWV11-C CLOCK PRESET REGISTER
003562  012777  000011  175550                  MOV     #11,@KWCSR         ;START CLOCK
003570  004737  001426                          JSR     PC,STALL           ;DELAY FOR CLOCK TICKS
003574  104414                                  CHECK                      ;CHECK A/D STATUS AGAINST EXPECTED
003576  104001                                  ERROR   1                  ;A/D DONE FAILED TO SET WITH EXTERNAL STARTS
003600  005777  175516                          TST     @ADBUFF            ;CLEAR A/D DONE
003604  005077  175506                          CLR     @STREG             ;CLEAR A/D CONTROL

```

```
                                              ;;*****************************************************************
                                              ;*TEST 24        TEST EXTERNAL TRIGGER STARTS A/D (IF MANUAL TRIGGER IS CONNECTED TO EXT
                                              ;;*****************************************************************
003610  000004                                TST24:  SCOPE
003612  005737  001400                                TST     MAEX              ;TEST IF OPERATOR SAID MANUAL TRIGGER IS CONNECTED
003616  001427                                        BEQ     TST25             ;;BR IF NO EXT. TRIGGER AVAILABLE
003620  005737  001202                                TST     $PASS             ;TEST IF FIRST PASS OF PROGRAM
003624  001024                                        BNE     TST25             ;;BR IF NOT FIRST PASS
003626  012737  000220  001124                        MOV     #BIT7!BIT4,$GDDAT         ;LOAD EXPECTED A/D STATUS
003634  013777  001124  175454                        MOV     $GDDAT,@STREG     ;ENABLE THE EXT START SIGNAL
003642  104401  012016                                TYPE    ,MSGNEX           ;TELL OPERATOR TO GENERATE EXT. TRIGGER
003646  104401  011276                                TYPE    ,CRWR             ;TELL OPERATOR ABOUT 'RETURN''
003652  104412                                        RDLIN
003654  012600                                        MOV     (SP)+,R0          ;REMOVE ANSWER OFF OF THE STACK
003656  000240                                        NOP
003660  000240                                        NOP
003662  104414                                        CHECK                     ;CHECK A/D STATUS AGAINST EXPECTED
003664  104001                                        ERROR   1                 ;A/D DONE FAILED TO SET WITH EXTERNAL START
003666  005777  175430                                TST     @ADBUFF           ;CLEAR A/D DONE
003672  005077  175420                                CLR     @STREG            ;CLEAR A/D CONTROL

                                              ;;*****************************************************************
                                              ;*TEST 25        TEST ERROR FLAG SETS IS START 2ND CONV. BEFORE DONE FLAG SETS (KWV11-C)
                                              ;;*****************************************************************
003676  000004                                TST25:  SCOPE
003700  005737  001374                                TST     KWAD              ;TEST IF OPERATOR SAID KWV11-C WAS CONNECTED
003704  001436                                        BEQ     TST26             ;;BR IF NO CLOCK PRESENT
003706  012737  100240  001124                        MOV     #BIT15!BIT7!BIT5,$GDDAT ;LOAD EXPECTED
003714  012777  177776  175420                        MOV     #-2,@KWBPR        ;LOAD CLOCK PRESET
003722  012777  000040  175366                        MOV     #BIT5,@STREG      ;ENABLE CLOCK START
003730  017700  175366                                MOV     @ADBUFF,R0        ;ENSURE CLEARED A/D DONE
003734  012777  000011  175376                        MOV     #11,@KWCSR        ;START CLOCK
003742  105777  175372                        1$:     TSTB    @KWCSR            ;WAIT FOR CLOCK READY
003746  100375                                        BPL     1$
003750  152777  000001  175340                        BISB    #BIT0,@STREG      ;CLOCK OVERFLOW SHOULD HAVE STARTED A/D
                                                                                ;TRY TO START IT AGAIN AND GET AN ERROR
003756  017737  175334  001126                        MOV     @STREG,$BDDAT     ;READ A/D STATUS
003764  023737  001124  001126                        CMP     $GDDAT,$BDDAT     ;COMPARE TO EXPECTED
003772  001401                                        BEQ     2$                ;;BR IF SAME
003774  104001                                        ERROR   1                 ;ERROR FLAG NOT SET WHEN 2ND CONVERT STARTED
                                                                                ; WHILE FIRST IS IN PROGRESS
003776  017700  175320                        2$:     MOV     @ADBUFF,R0        ;READ AND CLEAR A/D DONE
```

```
                                        ;;*****************************************************************
                                        ;;*TEST 26       TEST 'B EVENT'' STARTS A/D (IF JUMPER 'F2'' IS PRESENT)
                                        ;;*****************************************************************
004002  000004                          TST26:  SCOPE
004004  005737  001402                          TST     BTEX            ;TEST IF OPERATOR SAID 'F2'' IS INSTALLED
004010  001416                                  BEQ     TST27           ;;BR IF NOT THERE
004012  012737  000220  001124                  MOV     #BIT7!BIT4,$GDDAT       ;LOAD EXPECTED A/D STATUS
004020  013777  001124  175270                  MOV     $GDDAT,@STREG   ;ENABLE THE A/D STATUS REGISTER
004026  004737  001426                          JSR     PC,STALL        ;DELAY AN AMOUNT OF TIME
004032  104414                                  CHECK                   ;CHECK A/D STATUS AGAINST EXPECTED
004034  104001                                  ERROR   1               ;A/D DONE FAILED TO SET WITH 'B EVENT''
004036  005077  175254                          CLR     @STREG          ;CLEAR A/D CONTROL
004042  005777  175254                          TST     @ADBUFF         ;CLEAR A/D DONE


                                        ;;*****************************************************************
                                        ;;*TEST 27       END OF ADV11-C LOGIC TESTS
                                        ;;*****************************************************************
004046  000004                          TST27:  SCOPE
004050  000207                                  RTS     PC              ;RETURN TO TEST SECTION


                                                .SBTTL
                                                .SBTTL  END OF LOGIC TESTS - SECTION


                                        ;;SUBROUTINE FOR LOGIC TESTS;;
004052  013777  001124  175236          TESTIT: MOV     $GDDAT,@STREG   ;LOAD EXPECTED VALUE
004060  017737  175232  001126          TEST:   MOV     @STREG,$BDDAT   ;READ ST. REG.
004066  023737  001124  001126                  CMP     $GDDAT,$BDDAT   ;COMPARE RESULTS
004074  001002                                  BNE     RETERR          ;;ERROR RETURN
004076  062716  000002                          ADD     #2,(SP)         ;BUMP RETURN ADDRESS TO GET AROUND ERROR
004102  000002                          RETERR: RTI

                                                .SBTTL
                                                .SBTTL  START OF ADV11-C ANALOG WRAPAROUND SECTION
                                                .SBTTL
```

```
004104                                 WRAP:
                                       ;;*****************************************************************
                                       ;*TEST 30        SETUP TO RUN ANALOG WRAPAROUND TEST
                                       ;;*****************************************************************
004104  012737  000030  001102         TST30:  MOV     #$TN,$TSTNM
004112  012737  000001  001160                 MOV     #1,$TIMES       ;;DO 1 ITERATION
                                       ;LOAD AXV11-C DAC TO MAX OUTPUT VOLTAGE
004120  012777  007777  175176                 MOV     #7777,@DACA     ;LOAD DAC ''A''
004126  012777  007777  175172                 MOV     #7777,@DACB     ;LOAD DAC 'B''
004134  012737  004156  001110                 MOV     #1$,$LPERR      ;LOAD ERROR ADDRESS
004142  012737  004156  001106                 MOV     #1$,$LPADR      ;LOAD LOOP ADDRESS
                                       ;DELAY SUFFICIENT TIME TO LET THE DAC'S SETTLE
004150  012700  000002                         MOV     #2,R0           ;LOAD DELAY TIMER
004154  005001                                 CLR     R1              ;CLEAR DELAY COUNT
004156  005301                         1$:     DEC     R1              ;DELAY
004160  001376                                 BNE     1$
004162  005300                                 DEC     R0              ;DELAY
004164  001374                                 BNE     1$

                                       ;;*****************************************************************
                                       ;*TEST 31        COMPARE CHANNEL 0 (F.S.) AGAINST 1 (1/2 FS), 2 (1/4 FS), 3 (1/8)
                                       ;;*****************************************************************
004166  000004                         TST31:  SCOPE
004170  012737  000001  001160                 MOV     #1,$TIMES       ;;DO 1 ITERATION
004176  005737  001366                 1$:     TST     TC1             ;TEST IF TEST FIXTURE IS INSTALLED
004202  001440                                 BEQ     TST32           ;;BR IF NOT
004204  004537  007710                         JSR     R5,CONVRT       ;GET THE AVERAGE VALUE FOR
004210  000000                                 CHAN00                  ;CHANNEL 0
004212  004537  010046                         JSR     R5,COMPAR       ;COMPARE RESULTS
004216  007777                                 7777
004220  001354                                 VWRAP
004222  104004                                 ERROR   4               ;ERROR AN A/D CHANNEL 0 - VALUE DID NOT
                                                                       ;   EQUAL EXPECTED VALUE
004224  004537  007710                         JSR     R5,CONVRT       ;GET THE AVERAGE VALUE FOR
004230  000001                                 CHAN01                  ;CHANNEL 1
004232  004537  010046                         JSR     R5,COMPAR       ;COMPARE RESULTS
004236  006000                                 6000                    ;EXPECTED VALUE
004240  001354                                 VWRAP                   ;USING A KNOWN SPREAD
004242  104004                                 ERROR   4               ;ERROR ON A/D CHANNEL 1 - VALUE DID NOT
                                                                       ;  EQUAL EXPECTED
004244  004537  007710                         JSR     R5,CONVRT       ;GET THE AVERAGE VALUE FOR
004250  000002                                 CHAN02                  ;CHANNEL 2
004252  004537  010046                         JSR     R5,COMPAR       ;COMPARE RESULTS
004256  005000                                 5000                    ;AGAINST THIS VALUE FOR CHANNEL 2
004260  001354                                 VWRAP                   ;USING A KNOWN SPREAD
004262  104004                                 ERROR   4               ;ERROR ON A/D CHANNEL 2 - VALUE DID NOT
                                                                       ;  EQUAL EXPECTED
004264  004537  007710                         JSR     R5,CONVRT       ;GET THE AVERAGE VALUE FOR
004270  000003                                 CHAN03                  ;CHANNEL 03
004272  004537  010046                         JSR     R5,COMPAR       ;COMPARE RESULTS
004276  004400                                 4400                    ;AGAINST THIS VALUE FOR CHANNEL 3
004300  001354                                 VWRAP                   ;USING A KNOWN SPREAD
004302  104004                                 ERROR   4               ;ERROR ON A/D CHANNEL 3 - VALUE DID NOT
                                                                       ;  EQUAL EXPECTED
```

```
                                         ;;*************************************************************
                                         ;*TEST 32      COMPARE CHANNEL 0 (F.S.) AGAINST OTHER F.S. CHANNELS (4 AND 10)
                                         ;;*************************************************************
 004304  000004                          TST32:  SCOPE
 004306  012737  000001  001160                  MOV     #1,$TIMES          ;;DO 1 ITERATION
 004314  005737  001366                          TST     TC1                ;TEST IF TEST FIXTURE IS INSTALLED
 004320  001431                                  BEQ     TST33              ;;BR IF NOT
 004322  004537  007710                          JSR     R5,CONVRT          ;GET THE AVERAGE VALUE FOR
 004326  000000                                  CHAN00                     ;CHANNEL 0
 004330  013737  001360  004356                  MOV     TEMP,4$            ;SAVE CHANNEL 00 CONVERTED VALUE
 004336  013737  001360  004376                  MOV     TEMP,10$           ;

 004344  004537  007710                          JSR     R5,CONVRT          ;GET THE AVERAGE VALUE FOR
 004350  000004                                  CHAN04                     ;CHANNEL 4
 004352  004537  010046                          JSR     R5,COMPAR          ;COMPARE RESULTS
 004356  000000                          4$:     0                          ;AGAINST THIS VALUE FOR CHANNEL 0
 004360  010236                                  V2                         ;USING A SPREAD OF 2 COUNTS
 004362  104004                                  ERROR   4                  ;ERROR ON A/D CHANNEL 4 - VALUE DID NOT
                                                                            ;  EQUAL VALUE OF CHANNEL 0

 004364  004537  007710                          JSR     R5,CONVRT          ;GET THE AVERAGE VALUE FOR
 004370  000010                                  CHAN10                     ;CHANNEL 10
 004372  004537  010046                          JSR     R5,COMPAR          ;COMPARE RESULTS
 004376  000000                          10$:    0                          ;AGAINST THIS VALUE FOR CHANNEL 0
 004400  010236                                  V2                         ;USING A SPREAD OF 2 COUNTS
 004402  104004                                  ERROR   4                  ;ERROR ON A/D CHANNEL 10 - VALUE DID NOT
                                                                            ;  EQUAL VALUE OF CHANNEL 0
```

```


                                            ;;*****************************************************************
(3)                                         ;;*TEST 33        COMPARE CHANNEL 1 (1/2 F.S.) AGAINST OTHER 1/2 F.S. CHANNELS (5 AND 11)
(3)                                         ;;*****************************************************************
(2)  004404  000004                         TST33:  SCOPE
(1)  004406  012737  000001  001160                 MOV     #1,$TIMES           ;;DO 1 ITERATION
     004414  005737  001366                         TST     TC1                 ;TEST IF TEST FIXTURE IS INSTALLED
     004420  001431                                 BEQ     TST34               ;;BR IF NOT
     004422  004537  007710                         JSR     R5,CONVRT           ;GET THE AVERAGE VALUE FOR
     004426  000001                                 CHAN01                      ;CHANNEL 1
     004430  013737  001360  004456                 MOV     TEMP,4$             ;SAVE CHANNEL 1 CONVERTED VALUE
     004436  013737  001360  004476                 MOV     TEMP,10$            ;SAVE IT AGAIN

     004444  004537  007710                         JSR     R5,CONVRT           ;GET THE AVERAGE VALUE FOR
     004450  000005                                 CHAN05                      ;CHANNEL 5
     004452  004537  010046                         JSR     R5,COMPAR           ;COMPARE RESULTS
     004456  000000                         4$:     0                           ;AGAINST THIS VALUE FOR CHANNEL 1
     004460  010236                                 V2                          ;USING A SPREAD OF 2 COUNTS
     004462  104004                                 ERROR   4                   ;ERROR ON A/D CHANNEL 5 - VALUE DID NOT
                                                                                ;  EQUAL VALUE OF CHANNEL 0

     004464  004537  007710                         JSR     R5,CONVRT           ;GET THE AVERAGE VALUE FOR
     004470  000011                                 CHAN11                      ;CHANNEL 11
     004472  004537  010046                         JSR     R5,COMPAR           ;COMPARE RESULTS
     004476  000000                         10$:    0                           ;AGAINST THIS VALUE FOR CHANNEL 1
     004500  010236                                 V2                          ;USING A SPREAD OF 2 COUNTS
     004502  104004                                 ERROR   4                   ;ERROR ON A/D CHANNEL 11 - VALUE DID NOT
                                                                                ;  EQUAL VALUE OF CHANNEL 1

```

```
                                     ;;*************************************************************
                                     ;;*TEST 34       COMPARE CHANNEL 2 (1/4 F.S.) AGAINST OTHER 1/4 F.S. CHANNELS (6 AND 12)
                                     ;;*************************************************************
004504  000004                       TST34:  SCOPE
004506  012737  000001  001160               MOV     #1,$TIMES          ;;DO 1 ITERATION
004514  005737  001366                       TST     TC1                ;TEST IF TEST FIXTURE IS INSTALLED
004520  001431                               BEQ     TST35              ;;BR IF NOT
004522  004537  007710                       JSR     R5,CONVRT          ;GET THE AVERAGE VALUE FOR
004526  000002                               CHAN02                     ,CHANNEL 2
004530  013737  001360  004556               MOV     TEMP,4$            ;SAVE CHANNEL 2 CONVERTED VALUE
004536  013737  001360  004576               MOV     TEMP,10$           ;SAVE IT AGAIN

004544  004537  007710                       JSR     R5,CONVRT          ;GET THE AVERAGE VALUE FOR
004550  000006                               CHAN06                     ;CHANNEL 6
004552  004537  010046                       JSR     R5,COMPAR          ;COMPARE RESULTS
004556  000000                       4$:     0                          ;AGAINST THIS VALUE FOR CHANNEL 2D
004560  010236                               V2                         ;USING A SPREAD OF 2 COUNTS
004562  104004                               ERROR   4                  ;ERROR ON A/D CHANNEL 6 - VALUE DID NOT
                                                                        ;  EQUAL VALUE OF CHANNEL 2

004564  004537  007710                       JSR     R5,CONVRT          ;GET THE AVERAGE VALUE FOR
004570  000012                               CHAN12                     ;CHANNEL 12
004572  004537  010046                       JSR     R5,COMPAR          ;COMPARE RESULTS
004576  000000                       10$:    0                          ;AGAINST THIS VALUE FOR CHANNEL 2
004600  010236                               V2                         ;USING A SPREAD OF 2 COUNTS
004602  104004                               ERROR   4                  ;ERROR ON A/D CHANNEL 12 - VALUE DID NOT
                                                                        ;  EQUAL VALUE OF CHANNEL 2


                                     ;;*************************************************************
                                     ;;*TEST 35       COMPARE CHANNEL 3 (1/8 F.S.) AGAINST CHANNEL 7 (1/8 F.S.)
                                     ;;*************************************************************
004604  000004                       TST35:  SCOPE
004606  012737  000001  001160               MOV     #1,$TIMES          ;;DO 1 ITERATION
004614  005737  001366                       TST     TC1                ;TEST IF TEST FIXTURE IS INSTALLED
004620  001416                               BEQ     TST36              ;;BR IF NOT
004622  004537  007710                       JSR     R5,CONVRT          ;GET THE AVERAGE VALUE FOR
004626  000003                               CHAN03                     ;CHANNEL 3
004630  013737  001360  004650               MOV     TEMP,4$            ;SAVE CHANNEL 3 CONVERTED VALUE

004636  004537  007710                       JSR     R5,CONVRT          ;GET THE AVERAGE VALUE FOR
004642  000007                               CHAN07                     ;CHANNEL 7
004644  004537  010046                       JSR     R5,COMPAR          ;COMPARE RESULTS
004650  000000                       4$:     0                          ;AGAINST THIS VALUE FOR CHANNEL 3
004652  010236                               V2                         ;USING A SPREAD OF 2 COUNTS
004654  104004                               ERROR   4                  ;ERROR ON A/D CHANNEL 7 - VALUE DID NOT
                                                                        ;  EQUAL VALUE OF CHANNEL 3
```

```
                                            ;;*************************************************************
(3)                                         ;*TEST 36       RELATIVE GAIN TEST USING CHANNEL 3 (1/8 F.S.)
(3)                                         ;;*************************************************************
(2)   004656  000004                        TST36:  SCOPE
(1)   004660  012737  000001  001160                MOV     #1,$TIMES           ;;DO 1 ITERATION
      004666  005737  001366                        TST     TC1                 ;TEST IF AXV11 OR ADV11 CONNECTOR INSTALLED
      004672  001454                                BEQ     TST37               ;;BR IF NO CONNECTOR
      004674  012737  000000  010044                MOV     #GAIN00,OTHER       ;SELECT GAIN OF 00
      004702  004537  007714                        JSR     R5,CONVTR           ;GET THE VALUE OF CHANNEL 03
      004706  000003                                CHAN03
      004710  004537  010046                        JSR     R5,COMPAR           ;TEST GAIN
      004714  004400                                4400                        ;EXPECTED VALUE
      004716  001354                                VWRAP                       ; USING KNOWN SPREAD
      004720  104004                                ERROR   4                   ;GAIN SELECT OF 00 FAILED TO EQUAL EXPECTED VALUE

      004722  012737  000004  010044                MOV     #GAIN01,OTHER       ;SELECT GAIN OF 01
      004730  004537  007714                        JSR     R5,CONVTR           ;GET THE VALUE OF CHANNEL 03
      004734  000003                                CHAN03
      004736  004537  010046                        JSR     R5,COMPAR           ;TEST GAIN 01
      004742  005000                                5000                        ;EXPECTED VALUE
      004744  001354                                VWRAP                       ; USING KNOWN SPREAD
      004746  104004                                ERROR   4                   ;GAIN SELECT OF 01 FAILED TO INCREASE
                                                                                ;  CONVERTED VALUE CORRECTLY
      004750  012737  000010  010044                MOV     #GAIN10,OTHER       ;SET GAIN SELECT = 10
      004756  004537  007714                        JSR     R5,CONVTR           ;GET VALUE OF CHANNEL 03
      004762  000003                                CHAN03
      004764  004537  010046                        JSR     R5,COMPAR           ;TEST GAIN 10 VALUE AGAINST 01
      004770  006000                                6000                        ;EXPECTED VALUE
      004772  001354                                VWRAP                       ; USING KNOWN SPREAD
      004774  104004                                ERROR   4                   ;GAIN SELECT OF 10 FAILED TO INCREASE
                                                                                ;  CONVERTED VALUE CORRECTLY
      004776  012737  000014  010044                MOV     #GAIN11,OTHER       ;SET GAIN SELECT = 11
      005004  004537  007714                        JSR     R5,CONVTR           ;GET VALUE OF CHANNEL 03
      005010  000003                                CHAN03
      005012  004537  010046                        JSR     R5,COMPAR           ;TEST GAIN 11 VALUE AGAINST 10
      005016  007777                                7777                        ;EXPECTED VALUE
      005020  001354                                VWRAP                       ;  USING KNOWN SPREAD
      005022  104004                                ERROR   4                   ;GAIN SELECT OF 11 FAILED TO INCREASE
                                                                                ;  CONVERTED VALUE CORRECTLY


                                            ;;*************************************************************
(3)                                         ;*TEST 37       IF ADV11-C VERIFY CH13 IS AT + F.S.
(3)                                         ;;*************************************************************
(2)   005024  000004                        TST37:  SCOPE
(1)   005026  012737  000001  001160                MOV     #1,$TIMES           ;;DO 1 ITERATION
      005034  012777  004000  174264                MOV     #4000,@DACB         ;SET DAC 'B' TO MIDRANGE
      005042  005737  001372                        TST     ADV11C              ;TEST IF ADV11-C
      005046  001410                                BEQ     TST40               ;;BR IF NOT ADV11-C
      005050  004537  007710                        JSR     R5,CONVRT           ;GET THE CONVERTED VALUE FOR CH13
      005054  000013                                CHAN13
      005056  004537  010046                        JSR     R5,COMPAR           ;TEST CH13 AGAINST EXPECTED
      005062  007777                                7777                        ;+ F.S.
      005064  010236                                V2
      005066  104004                                ERROR   4                   ;CH13 WAS NOT PULLED UP TO +F.S.
```

```
                                                .SBTTL
                                                .SBTTL  END OF ADV11-C ANALOG WRAPAROUND SECTION
                                                .SBTTL
                                                .SBTTL  START OF AXV11-C ANALOG WRAPAROUND SECTION
                                                .SBTTL

                                        ;;*****************************************************************
                                        ;*TEST 40        AXV11-C ANALOG WRAPAROUND TEST (DAC ''A'' TO A/D CHAN 0)
                                        ;;*****************************************************************
005070  000004                          TST40:  SCOPE
005072  012737  000001  001160                  MOV     #1,$TIMES       ;;DO 1 ITERATION
                                                ;AXV11-C DAC ''A'' CONNECTED TO AXV11-C A/D CHANNEL 0
                                                ;AXV11-C TEST FIXTURE IS REQUIRED

005100  005737  001366                          TST     TC1             ;TEST IF AXV11-C TEST FIXTURE IS PRESENT
005104  001445                                  BEQ     TST41           ;;BR IF NO TEST FIXTURE
005106  005737  001372                          TST     ADV11C          ;TEST IF THE MODULE IS A ADV11-C
005112  001042                                  BNE     TST41           ;;BR IF NO DAC'S PRESENT
005114  012737  000000  005154                  MOV     #0,2$           ;PRIME THE DAC OUTPUT VALUE
005122  013777  005154  174174                  MOV     2$,@DACA        ;PRIME THE DAC OUTPUT STAGE
005130  012777  000000  174160                  MOV     #0,@STREG       ;INITIILIZE THE A/D STATUS REG
005136  017700  174160                          MOV     @ADBUFF,R0      ;READ A/D VALUE AND CLEAR A/D DONE FLAG
005142  004537  007710                  1$:     JSR     R5,CONVRT       ;GET THE VALUE OF CHANNEL 0
005146  000000                                  CHAN00
005150  004537  010046                          JSR     R5,COMPAR       ;COMPARE AGAINST EXPECTED D/A VALUE
005154  000000                          2$:     0                       ;EXPECTED
005156  001354                                  VWRAP                   ;SPREAD ALLOWED
005160  000413                                  BR      3$              ;CONVERTED VALUE DID NOT EQUAL EXPECTED D/A VALUE
005162  062737  000010  005154                  ADD     #10,2$          ;UPDATE THE D/A OUTPUT VALUE
005170  013777  005154  174126                  MOV     2$,@DACA        ;UPDATE THE D/A OUTPUT VOLTAGE
005176  022737  010000  005154                  CMP     #10000,2$       ;TEST IF LAST STEP
005204  001356                                  BNE     1$
005206  000401                                  BR      4$              ;;BR TO NEXT TEST
005210  104004                          3$:     ERROR   4               ;CONVERTED A/D VALUE DID NOT EQUAL EXPECTED VALUE
005212  012777  007777  174104          4$:     MOV     #7777,@DACA     ;LOAD DAC ''A'' TO +F.S.
```

```
   705
   706                                         ;;*****************************************************************
   (3)                                         ;*TEST 41       AXV11-C ANALOG WRAPAROUND TEST (DAC 'B'' TO A/D CHAN 13)
   (3)                                         ;;*****************************************************************
   (2)  005220  000004                         TST41:  SCOPE
   (1)  005222  012737  000001  001160                 MOV     #1,$TIMES          ;;DO 1 ITERA.ION
   707                                                 ;AXV11-C DAC 'B'' CONNECTED TO AXV11-C A/D CHANNEL 13
   708                                                 ;AXV11-C TEST CABLE IS REQUIRED
   709
   710  005230  005737  001366                         TST     TC1                ;TEST IF AXV11-C TEST FIXTURE IS PRESENT
   711  005234  001445                                 BEQ     TST42              ;;BR IF NO TEST FIXTURE
   712  005236  005737  001372                         TST     ADV11C             ;TEST IF MODULE IS AN ADV11-C
   713  005242  001042                                 BNE     TST42              ;;BR IF NO DAC'A PRESENT
   714  005244  012737  000000  005304                 MOV     #0,2$              ;PRIME THE DAC OUTPUT VALUE
   715  005252  013777  005304  174046                 MOV     2$,@DACB           ;PRIME THE DAC OUTPUT STAGE
   716  005260  012777  000000  174030                 MOV     #0,@STREG          ;INITIILIZE THE A/D STATUS REG
   717  005266  017700  174030                         MOV     @ADBUFF,R0         ;READ A/D VALUE AND CLEAR A/D DONE FLAG
   718  005272  004537  007710                 1$:     JSR     R5,CONVRT          ;GET THE VALUE OF CHANNEL 13
   719  005276  000013                                 CHAN13
   720  005300  004537  010046                         JSR     R5,COMPAR          ;COMPARE AGAINST EXPECTED D/A VALUE
   721  005304  000000                         2$:     0                          ;EXPECTED
   722  005306  001354                                 VWRAP                      ;SPREAD ALLOWED
   723  005310  000413                                 BR      3$                 ;CONVERTED VALUE DID NOT EQUAL EXPECTED D/A VALUE
   724  005312  062737  000010  005304                 ADD     #10,2$             ;UPDATE THE D/A OUTPUT VALUE
   725  005320  013777  005304  174000                 MOV     2$,@DACB           ;UPDATE THE D/A OUTPUT VOLTAGE
   726  005326  022737  010000  005304                 CMP     #10000,2$          ;TEST IF LAST STEP
   727  005334  001356                                 BNE     1$
   728  005336  000401                                 BR      4$                 ;;BR TO NEXT TEST
   729  005340  104004                         3$:     ERROR   4                  ;CONVERTED D/A VALUE DID NOT EQUAL EXPECTED
   730  005342  012777  007777  173756         4$:     MOV     #7777,@DACB        ;SET DAC 'B'' TO + F.S.
   731
   732                                                 .SBTTL
   733                                                 .SBTTL  END OF AXV11-C ANALOG WRAPAROUND SECTION
```

```


                                                    .SBTTL
                                                    .SBTTL  START OF AXV11-C/ADV11-C NON-WRAPAROUND ANALOG SECTION
                                                    .SBTTL

                                         ;;**********************************************************************
  (3)                                    ;;*TEST 42        VERIFY CH14, 15, 16 AND 17 ARE AT +-0 F.S.
  (3)                                    ;;**********************************************************************
  (2)  005350  000004                    TST42:     SCOPE
  (1)  005352  012737  000001  001160               MOV     #1,$TIMES               ;;DO 1 ITERATION
                                                    ;AAV11-C TEST CONNECTOR IS NOT REQUIRED (IN FACT WILL ERROR IF PRESENT)

       005360  005737  001370                       TST     TC2                     ;TEST IF AAV11-C TEST CONNECTOR IS PRESENT
       005364  001045                               BNE     TST43                   ;;BR IF TEST CONNECTOR
       005366  012777  000000  173722               MOV     #0,@STREG               ;INITIILIZE THE A/D STATUS REG
       005374  017700  173722                       MOV     @ADBUFF,R0              ;READ A/D VALUE AND CLEAR A/D DONE FLAG
       005400  004537  007710                       JSR     R5,CONVRT               ;GET THE VALUE OF CHANNEL 14
       005404  000014                               CHAN14
       005406  004537  010046                       JSR     R5,COMPAR               ;COMPARE AGAINST EXPECTED VALUE
       005412  004000                               4000                            ;EXPECTED
       005414  010236                               V2                              ;SPREAD ALLOWED
       005416  104004                               ERROR   4                       ;CONVERTED VALUE DID NOT EQUAL EXPECTED VALUE

       005420  004537  007710                       JSR     R5,CONVRT               ;GET THE VALUE OF CHANNEL 15
       005424  000015                               CHAN15
       005426  004537  010046                       JSR     R5,COMPAR               ;COMPARE AGAINST EXPECTED VALUE
       005432  004000                               4000
       005434  010236                               V2                              ;SPREAD ALLOWED
       005436  104004                               ERROR   4                       ;CONVERTED VALUE DID NOT EQUAL EXPECTED VALUE

       005440  004537  007710                       JSR     R5,CONVRT               ;GET THE VALUE OF CHANNEL 16
       005444  000016                               CHAN16
       005446  004537  010046                       JSR     R5,COMPAR               ;COMPARE AGAINST EXPECTED VALUE
       005452  004000                               4000
       005454  010236                               V2                              ;SPREAD ALLOWED
       005456  104004                               ERROR   4                       ;CONVERTED VALUE DID NOT EQUAL EXPECTED VALUE

       005460  004537  007710                       JSR     R5,CONVRT               ;GET THE VALUE OF CHANNEL 17
       005464  000017                               CHAN17
       005466  004537  010046                       JSR     R5,COMPAR               ;COMPARE AGAINST EXPECTED VALUE
       005472  004000                               4000
       005474  010236                               V2                              ;SPREAD ALLOWED
       005476  104004                               ERROR   4                       ;CONVERTED VLAUE DID NOT EQUAL EXPECTED VALUE

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                                                 .SBTTL
                                                 .SBTTL  START OF AAV11-C TO AXV11-C ANALOG WRAPAROUND SECTION
                                                 .SBTTL

                                         ;;*************************************************************
                                         ;*TEST 43          AAV11-C ANALOG WRAPAROUND TEST (DAC ''A'' TO A/D CHAN 14)
                                         ;;*************************************************************
005500  000004                           TST43:  SCOPE
005502  012737  000001  001160                   MOV     #1,$TIMES          ;;DO 1 ITERATION
                                                 ;AAV11-C TEST CONNECTOR IS REQUIRED

005510  005737  001370                           TST     TC2                ;TEST IF AAV11-C TEST CONNECTOR IS PRESENT
005514  001452                                   BEQ     TST44              ;;BR IF NO TEST CONNECTOR
005516  012737  000000  005562                   MOV     #0,2$              ;PRIME THE DAC OUTPUT VALUE
005524  012777  007777  173612                   MOV     #7777,@DACO        ;PRIME THE DAC OUTPUT STAGE
005532  012777  000000  173556                   MOV     #0,@STREG          ;INITIILIZE THE A/D STATUS REG
005540  017700  173556                           MOV     @ADBUFF,R0         ;READ A/D VALUE AND CLEAR A/D DONE FLAG
005544  000240                                   NOP
005546  000240                                   NOP

005550  004537  007710                   1$:     JSR     R5,CONVRT          ;GET THE VALUE OF CHANNEL 14
005554  000014                                   CHAN14
005556  004537  010046                           JSR     R5,COMPAR          ;COMPARE AGAINST EXPECTED D/A VALUE
005562  000000                           2$:     0
005564  001354                                   VWRAP                      ;SPREAD ALLOWED
005566  000424                                   BR      10$                ;CONVERTED VLAUE DID NOT EQUAL EXPECTED D/A VALUE
005570  062737  000010  005562                   ADD     #10,2$             ;UPDATE THE D/A OUTPUT VALUE
005576  013737  005562  005636                   MOV     2$,7$              ;COPY VALUE
005604  005137  005636                           COM     7$                 ;INVERT DATA
005610  042737  170000  005636                   BIC     #170000,7$         ;REMOVE EXTRA BITS
005616  013777  005636  173520                   MOV     7$,@DACO           ;UPDATE THE D/A OUTPUT VOLTAGE
005624  022737  010000  005562                   CMP     #10000,2$          ;TEST IF LAST STEP
005632  001346                                   BNE     1$
005634  000402                                   BR      TST44              ;;BR TO NEXT TEST
005636  000000                           7$:     0
005640  104004                           10$:    ERROR   4                  ;CONVERTED D/A VALUE DID NOT EQUAL EXPECTED

```

```
                                        ;;*******************************************************************
                                        ;*TEST 44        AAV11-C ANALOG WRAPAROUND TEST (DAC 'B'' TO A/D CHAN 15)
                                        ;;*******************************************************************
005642  000004                          TST44:  SCOPE
005644  012737  000001  001160                  MOV     #1,$TIMES          ;;DO 1 ITERATION
                                                ;AAV11-C TEST CONNECTOR IS REQUIRED

005652  005737  001370                          TST     TC2                ;TEST IF AAV11-C TEST CONNECTOR IS PRESENT
005656  001450                                  BEQ     TST45              ;;BR IF NO TEST CONNECTOR
005660  012737  000000  005720                  MOV     #0,2$              ;PRIME THE DAC OUTPUT VALUE
005666  012777  007777  173452                  MOV     #7777,@DAC1        ;PRIME THE DAC OUTPUT STAGE
005674  012777  000000  173414                  MOV     #0,@STREG          ;INITIILIZE THE A/D STATUS REG
005702  017700  173414                          MOV     @ADBUFF,R0         ;READ A/D VALUE AND CLEAR A/D DONE FLAG

005706  004537  007710                  1$:     JSR     R5,CONVRT          ;GET THE VALUE OF CHANNEL 15
005712  000015                                  CHAN15
005714  004537  010046                          JSR     R5,COMPAR          ;COMPARE AGAINST EXPECTED D/A VALUE
005720  000000                          2$:     0
005722  001354                                  VWRAP                      ;SPREAD ALLOWED
005724  000424                                  BR      10$                ;CONVERTED VLAUE DID NOT EQUAL EXPECTED D/A VALUE
005726  062737  000010  005720                  ADD     #10,2$             ;UPDATE THE D/A OUTPUT VALUE
005734  013737  005720  005774                  MOV     2$,7$              ;COPY VALUE
005742  005137  005774                          COM     7$                 ;INVERT DATA
005746  042737  170000  005774                  BIC     #170000,7$         ;REMOVE EXTRA BITS
005754  013777  005774  173364                  MOV     7$,@DAC1           ;UPDATE THE D/A OUTPUT VOLTAGE
005762  022737  010000  005720                  CMP     #10000,2$          ;TEST IF LAST STEP
005770  001346                                  BNE     1$
005772  000402                                  BR      TST45              ;;BR TO NEXT TEST
005774  000000                          7$:     0
005776  104004                          10$:    ERROR   4                  ;CONVERTED D/A VALUE NOT EQUAL TO EXPECTED
```

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                                               ;;*******************************************************************
                                               ;*TEST 45        AAV11-C ANALOG WRAPAROUND TEST (DAC ''C'' TO A/D CHAN 16)
                                               ;;*******************************************************************
 006000  000004                                TST45:  SCOPE
 006002  012737  000001  001160                        MOV     #1,$TIMES           ;;DO 1 ITERATION
                                                       ;AAV11-C TEST CONNECTOR IS REQUIRED

 006010  005737  001370                                TST     TC2                 ;TEST IF AAV11-C TEST CONNECTOR IS PRESENT
 006014  001450                                        BEQ     TST46               ;;BR IF NO TEST CONNECTOR
 006016  012737  000000  006056                        MOV     #0,2$               ;PRIME THE DAC OUTPUT VALUE
 006024  012777  007777  173316                        MOV     #7777,@DAC2         ;PRIME THE DAC OUTPUT STAGE
 006032  012777  000000  173256                        MOV     #0,@STREG           ;INITIILIZE THE A/D STATUS REG
 006040  017700  173256                                MOV     @ADBUFF,R0          ;READ A/D VALUE AND CLEAR A/D DONE FLAG

 006044  004537  007710                        1$:     JSR     R5,CONVRT           ;GET THE VALUE OF CHANNEL 16
 006050  000016                                        CHAN16
 006052  004537  010046                                JSR     R5,COMPAR           ;COMPARE AGAINST EXPECTED D/A VALUE
 006056  000000                                2$:     0
 006060  001354                                        VWRAP                       ;SPREAD ALLOWED
 006062  000424                                        BR      10$                 ;CONVERTED VLAUE DID NOT EQUAL EXPECTED D/A VALUE
 006064  062737  000010  006056                        ADD     #10,2$              ;UPDATE THE D/A OUTPUT VALUE
 006072  013737  006056  006132                        MOV     2$,7$               ;COPY VALUE
 006100  005137  006132                                COM     7$                  ;INVERT DATA
 006104  042737  170000  006132                        BIC     #170000,7$          ;REMOVE EXTRA B.TS
 006112  013777  006132  173230                        MOV     7$,@DAC2            ;UPDATE THE D/A OUTPUT VOLTAGE
 006120  022737  010000  006056                        CMP     #10000,2$           ;TEST IF LAST STEP
 006126  001346                                        BNE     1$
 006130  000402                                        BR      TST46               ;;BR TO NEXT TEST
 006132  000000                                7$:     0
 006134  104004                                10$:    ERROR   4                   ;CONVERTED D/A VALUE NOT EQUAL TO EXPECTED

```

```
                                            ;;*****************************************************************
                                            ;*TEST 46       AAV11-C ANALOG WRAPAROUND TEST (DAC ''D'' TO A/D CHAN 17)
                                            ;;*****************************************************************
006136  000004                              TST46:  SCOPE
006140  012737  000001  001160                      MOV     #1,$TIMES          ;;DO 1 ITERATION
                                                    ;AAV11-C TEST CONNECTOR IS REQUIRED
006146  005737  001370                              TST     TC2                ;TEST IF AAV11-C TEST CONNECTOR IS PRESENT
006152  001450                                      BEQ     TST47              ;;BR IF NO TEST CONNECTOR
006154  012737  000000  006214                      MOV     #0,2$              ;PRIME THE DAC OUTPUT VALUE
006162  012777  007777  173162                      MOV     #7777,@DAC3        ;PRIME THE DAC OUTPUT STAGE
006170  012777  000000  173120                      MOV     #0,@STREG          ;INITIILIZE THE A/D STATUS REG
006176  017700  173120                              MOV     @ADBUFF,R0         ;READ A/D VALUE AND CLEAR A/D DONE FLAG

006202  004537  007710                      1$:     JSR     R5,CONVRT          ;GET THE VALUE OF CHANNEL 17
006206  000017                                      CHAN17
006210  004537  010046                              JSR     R5,COMPAR          ;COMPARE AGAINST EXPECTED D/A VALUE
006214  000000                              2$:     0
006216  001354                                      VWRAP                      ;SPREAD ALLOWED
006220  000424                                      BR      10$                ;CONVERTED VLAUE DID NOT EQUAL EXPECTED D/A VALUE
006222  062737  000010  006214                      ADD     #10,2$             ;UPDATE THE D/A OUTPUT VALUE
006230  013737  006214  006270                      MOV     2$,7$              ;COPY DATA
006236  005137  006270                              COM     7$                 ;INVERT DATA
006242  042737  170000  006270                      BIC     #170000,7$         ;REMOVE EXTRA BITS
006250  013777  006270  173074                      MOV     7$,@DAC3           ;UPDATE THE D/A OUTPUT VOLTAGE
006256  022737  010000  006214                      CMP     #10000,2$          ;TEST IF LAST STEP
006264  001346                                      BNE     1$
006266  000402                                      BR      TST47              ;;BR TO NEXT TEST
006270  000000                              7$:     0
006272  104004                              10$:    ERROR   4                  ;CONVERTED D/A VALUE NOT EQUAL TO EXPECTED
                                            ;;*****************************************************************
                                            ;*TEST 47       END OF AAV11-C TO AXV11-C ANALOG WRAPAROUND
                                            ;;*****************************************************************
006274  000004                              TST47:  SCOPE
006276  012737  000001  001160                      MOV     #1,$TIMES          ;;DO 1 ITERATION
006304  000207                                      RTS     PC                 ;EXIT AND RETURN TO CALLING ROUTINE
```

```
                                                .SBTTL  I/O SUB-SECTION "1"     REPORT THE CONVERTED A/D VALUES

      006306  005077  173004          IOTST1:  CLR     @STREG            ;CLEAR STATUS REGISTER
      006312  104401  010376                   TYPE    ,MSI01            ;TYPE OUT HEADING
      006316  005046                           CLR     -(SP)             ;CLEAR PSW
      006320  012746  006326                   MOV     #77$,-(SP)
      006324  000002                           RTI
      006326  104401  011122          77$:     TYPE    ,CCHAN            ;ASK OPERATOR FOR CHANNEL
      006332  104413                           RDOCT
      006334  012637  006422                   MOV     (SP)+,10$         ;GET ANSWER
      006340  042737  177760  006422           BIC     #177760,10$       ;REMOVE EXTRA BITS
      006346  104401  011162                   TYPE    ,GCHAN            ;ASK OPERATOR FOR GAIN
      006352  104413                           RDOCT
      006354  012637  010044                   MOV     (SP)+,OTHER       ;GET ANSWER
      006360  006137  010044                   ROL     OTHER             ;MOVE TO BITS
      006364  006137  010044                   ROL     OTHER             ;2 + 3
      006370  042737  177763  010044           BIC     #177763,OTHER     ;REMOVE ANY UNWANTED BITS
      006376  104401  011067          1$:      TYPE    ,CH
      006402  013746  006422                   MOV     10$,-(SP)         ;;SAVE 10$ FOR TYPEOUT
(1)                                                                      ;;TYPE CHANNEL
(1)   006406  104403                           TYPOS                     ;;GO TYPE--OCTAL ASCII
(1)   006410     002                           .BYTE   2                 ;;TYPE 2 DIGIT(S)
(1)   006411     000                           .BYTE   0                 ;;SUPPRESS LEADING ZEROS
      006412  012702  000010          2$:      MOV     #10,R2            ;TYPEOUT COUNTER
      006416  004537  007714          3$:      JSR     R5,CONVTR         ;GET AN AVERAGED VALUE FOR THIS CHANNEL
      006422  000000                  10$:     0
      006424  104401  011072          4$:      TYPE    ,SPACE
      006430  013746  001360                   MOV     TEMP,-(SP)        ;;SAVE TEMP FOR TYPEOUT
(1)                                                                      ;;PRINT OCTAL CONVERTED VALUE
(1)   006434  104403                           TYPOS                     ;;GO TYPE--OCTAL ASCII
(1)   006436     004                           .BYTE   4                 ;;TYPE 4 DIGIT(S)
(1)   006437     001                           .BYTE   1                 ;;TYPE LEADING ZEROS
      006440  012701  010000                   MOV     #10000,R1
      006444  005301                  5$:      DEC     R1
      006446  001376                           BNE     5$
      006450  005302                           DEC     R2                ;DECREMENT THE COUNTER
      006452  001361                           BNE     3$                ;NO CARRIAGE RETURN
      006454  104401  001171                   TYPE    ,$CRLF            ;CARRIAGE RETURN
      006460  000746                           BR      1$                ;REPEAT CONVERSION
```

```
                                        .SBTTL  I/O SUB-SECTION ''2''    SCANNING CHANNELS AND GAIN SELECT - SECTION

006462  104401  010454           IOTST2: TYPE    ,MSI02          ;TELL OPERATOR THE SECTION NAME

006466  005002                           CLR     R2              ;INITILIZE THE CHANNEL SCANNER
006470  005003                           CLR     R3              ;INITILIZE THE GAIN SELECT VALUE

006472  104401  001171           1$:     TYPE    ,$CRLF          ;MAKE A FRESH OUTPUT LINE
006476  012704  000007                   MOV     #7,R4           ;LOAD LINE WIDTH COUNTER

006502  104401  011067                   TYPE    ,CH             ;SHOW ''CH'' TEXT

006506  010246                           MOV     R2,-(SP)        ;LOAD THE CHANNEL CODE
006510  104403                           TYPOS
006512     002     001                   .BYTE   2,1

006514  104401  011114                   TYPE    ,ADOT           ;SEPERATE CH FROM GS

006520  112737  000060  011116           MOVB    #'0,AZERO       ;LOAD ASCII 0
006526  132703  000010                   BITB    #10,R3          ;TEST IF GS1 = 1
006532  001402                           BEQ     2$              ;BR IF NOT SET
006534  105237  011116                   INCB    AZERO           ;MAKE IT A ONE
006540  104401  011116           2$:     TYPE    ,AZERO          ;REPORT GS1 STATUS

006544  112737  000060  011116           MOVB    #'0,AZERO       ;LOAD ASCII 0
006552  132703  000004                   BITB    #4,R3           ;TEST IF GS0 = 1
006556  001402                           BEQ     3$              ;BR IF NOT SET
006560  105237  011116                   INCB    AZERO           ;MAKE IT A ONE
006564  104401  011116           3$:     TYPE    ,AZERO          ;REPORT GS0 STATUS

006570  010200                           MOV     R2,R0           ;GET CURRENT CHANNEL VALUE
006572  000300                           SWAB    R0              ;MOVE TO MUX POSITION
006574  050300                           BIS     R3,R0           ;ADD THE GAIN SELECT BITS
006576  010077  172514                   MOV     R0,@STREG       ;SELECT MUX AND GAIN BITS
006602  105277  172510           4$:     INCB    @STREG          ;START CONVERSION
006606  105777  172504           5$:     TSTB    @STREG          ;WAIT FOR A/D DONE
006612  100375                           BPL     5$

006616  104401  011072                   TYPE    ,SPACE          ;ENSURE SOME OUTPUT ROOM
006620  017746  172476                   MOV     @ADBUFF,-(SP)   ;READ CONVERTED VALUE AND SAVE FOR TYPOUT
006624  104403                           TYPOS
006626     004     001                   .BYTE   4,1

006630  105304                           DECB    R4              ;FINISHED A LINE ACROSS THE PAGE
006632  001363                           BNE     4$              ;BR AND CONVERT WITH CURRENT GAIN AND CHANNEL

006634  005202                           INC     R2              ;BUMP CHANNEL VALUE
006636  062703  000004                   ADD     #4,R3           ;BUMP GAIN SELECT VALUE
006642  042703  177763                   BIC     #177763,R3      ;REMOVE EXTRA BITS
006646  122702  000020                   CMPB    #20,R2          ;TEST IS LAST CHANNEL
006652  001307                           BNE     1$              ;BR IF NOT
006654  005002                           CLR     R2              ;INITILIZE THE CHANNEL
006656  104401  001171                   TYPE    ,$CRLF          ;INSERT ANOTHER FRESH OUTPUT LINE
006662  000703                           BR      1$              ;AND DO IT OVER AND OVER AND OVER AGAIN

```

```
                                            .SBTTL  I/O SUB-SECTION "3"    AXV11-C A/D INPUT ECHO TO AXV11-C D/A OUTPUT

 006664  104401  010514           IOTST3:  TYPE    ,MSI03          ;TELL OPERATOR THE NAME
 006670  104401  011122                    TYPE    ,CCHAN          ;ASK OPER. FOR THE CHANNEL
 006674  104413                            RDOCT
 006676  012637  006744                    MOV     (SP)+,10$
 006702  042737  177760  006744            BIC     #177760,10$     ;REMOVE EXTRA BITS
 006710  104401  011162                    TYPE    ,GCHAN          ;ASK OPER FOR THE GAIN SELECT VALUE
 006714  104413                            RDOCT
 006716  012637  010044                    MOV     (SP)+,OTHER     ;GET THE ANSWER
 006722  006337  010044                    ASL     OTHER           ;MOVE INTO
 006726  006337  010044                    ASL     OTHER           ;GAIN SELECT POSITION
 006732  042737  177763  010044            BIC     #177763,OTHER   ;REMOVE EXTRA BITS

 006740  004537  007714           4$:      JSR     R5,CONVTR       ;CONVERT SELECTED CHANNEL AND GAIN
 006744  000000                   10$:     0

 006746  042737  170000  001360            BIC     #170000,TEMP    ;REMOVE EXTRA BITS
 006754  013777  001360  172342            MOV     TEMP,@DACA      ;LOAD DAC "A"
 006762  013777  001360  172336            MOV     TEMP,@DACB      ;LOAD DAC "B"

 006770  000763                            BR      4$              ;LOOP BACK AND REPEAT

                                           .SBTTL  I/O SUB-SECTION "4"    AXV11-C D/A RAMPS

 006772  104401  010557           IOTST4:  TYPE    ,MSI04          ;TELL OPERATOR THE NAME
 006776  012703  000000                    MOV     #0,R3           ;LOAD DAC - F.S. VALUE
 007002  012704  007777                    MOV     #7777,R4        ;LOAD DAC + F.S. VALUE

 007006  012705  010000           1$:      MOV     #BIT12,R5       ;LOAD LOOP COUNT
 007012  010377  172306           2$:      MOV     R3,@DACA        ;LOAD DAC "A"
 007016  010477  172304                    MOV     R4,@DACB        ;LOAD DAC "B"
 007022  005305                            DEC     R5              ;FINISHED ALL BITS ?
 007024  001403                            BEQ     3$              ;BR IF DONE
 007026  005304                            DEC     R4              ;LOWER DAC "B" VALUE
 007030  005203                            INC     R3              ;RAISE DAC "A" VALUE
 007032  000767                            BR      2$              ;DO NEXT COUNT

 007034  012705  010000           3$:      MOV     #BIT12,R5       ;LOAD LOOP COUNT
 007040  010377  172260           4$:      MOV     R3,@DACA        ;LOAD DAC "A"
 007044  010477  172256                    MOV     R4,@DACB        ;LOAD DAC "B"
 007050  005305                            DEC     R5              ;FINISHED ALL BITS ?
 007052  001755                            BEQ     1$
 007054  005303                            DEC     R3              ;LOWER DAC "A" VALUE
 007056  005204                            INC     R4              ;RAISE DAC "B" VALUE
 007060  000767                            BR      4$              ;DO NEXT COUNT
```

```
                                        .SBTTL  I/O SUB-SECTION "5"     AXV11-C D/A CALIBRATION

007062  104401  010632          IOTST5: TYPE    ,MSI05          ;TELL OPERATOR THE NAME
007066  012703  000000                  MOV     #0,R3           ;LOAD DAC - F.S. VALUE
007072  012704  007777                  MOV     #7777,R4        ;LOAD DAC + F.S. VALUE
007076  012705  004000                  MOV     #4000,R5        ;LOAD 0.0 F.S. VALUE

007102  010377  172216          1$:     MOV     R3,@DACA        ;LOAD DAC "A" TO - F.S.
007106  010377  172214                  MOV     R3,@DACB        ;LOAD DAC "B" TO - F.S.
007112  104412                          RDLIN
007114  012600                          MOV     (SP)+,R0        ;REMOVE CHARACTER
007116  010477  172202                  MOV     R4,@DACA        ;LOAD DAC "A" TO + F.S.
007122  010477  172200                  MOV     R4,@DACB        ;LOAD DAC "B" TO + F.S.
007126  104412                          RDLIN
007130  012600                          MOV     (SP)+,R0        ;REMOVE CHARACTER
007132  010577  172166                  MOV     R5,@DACA        ;LOAD DAC "A" TO MID POINT
007136  010577  172164                  MOV     R5,@DACB        ;LOAD DAC "B" TO MID POINT
007142  104412                          RDLIN
007144  012600                          MOV     (SP)+,R0        ;REMOVE CHARACTER
007146  000755                          BR      1$

                                        .SBTTL  I/O SUB-SECTION "6"     AXV11-C D/A SQUARE WAVE

007150  104401  010677          IOTST6: TYPE    ,MSI06          ;TELL OPERATOR THE NAME
007154  012703  000000                  MOV     #0,R3           ;LOAD DAC - F.S.
007160  012704  007777                  MOV     #7777,R4        ;LOAD DAC + F.S.

007164  010377  172134          1$:     MOV     R3,@DACA        ;LOAD DAC "A" TO MIN LEVEL
007170  010377  172132                  MOV     R3,@DACB        ;LOAD DAC "B" TO MIN LEVEL
007174  004737  001426                  JSR     PC,STALL        ;DELAY
007200  010477  172120                  MOV     R4,@DACA        ;LOAD DAC "A" TO MAX LEVEL
007204  010477  172116                  MOV     R4,@DACB        ;LOAD DAC "B" TO MAX LEVEL
007210  004737  001426                  JSR     PC,STALL        ;DELAY
007214  000763                          BR      1$              ;LOOP BACK AND DO AGAIN

                                        .SBTTL  I/O SUB-SECTION "7"     AXV11-C D/A OUTPUT TO A/D INPUT

007216  104401  010770          IOTST7: TYPE    ,MSI07          ;TELL OPERATOR THE SUB-SECTION NAME
007222  005003                          CLR     R3              ;INITILIZE THE DAC VALUE
007224  104401  001171          1$:     TYPE    ,$CRLF          ;ENSURE FRESH OUTPUT LINE
007230  012705  000010                  MOV     #10,R5          ;LOAD LINE WIDTH COUNTER

007234  105277  172056          2$:     INCB    @STREG          ;START CONVERSION
007240  105777  172052          3$:     TSTB    @STREG          ;WAIT FOR A/D DONE
007244  100375                          BPL     3$
007246  010377  172052                  MOV     R3,@DACA        ;LOAD "DAC A" OUTPUT VALUE
007252  017746  172044                  MOV     @ADBUFF,-(SP)   ;READ AND STORE A/D VALUE
007256  104403                          TYPOS
007260     004     001                  .BYTE   4,1
007262  005203                          INC     R3              ;UPDATE TO NEXT D/A VALUE
007264  042703  170000                  BIC     #170000,R3      ;ENSURE ONLY 12 BITS LONG
007270  005305                          DEC     R5              ;IS THE WIDTH FINISHED ?
007272  001754                          BEQ     1$              ;BR AND START FRESH OUTPUT LINE
007274  104401  011072                  TYPE    ,SPACE          ;ENSURE SOME ROOM
007300  000755                          BR      2$              ;AND DO ANOTHER CONVERSION
```

```

                                                 .SBTTL
                                                 .SBTTL  END OF EXTERNAL TESTS SECTION
                                                 .SBTTL
                                                 .SBTTL        LOGIC TEST SECTION

 007302                               BEGINL:
 007302  004737  002530               1$:        JSR     PC,BEGL                 ;LOGIC TESTS
 007306  012737  007302  010252                  MOV     #1$,AGTST               ;ADDRESS FOR EOP
 007314  000137  010254                          JMP     $EOP                    ;TYPE END OF PASS

                                      .SBTTL         AUTO TEST
 007320                               BEGINA:
 007320  004737  002530               1$:        JSR     PC,BEGL                 ;LOGIC TESTS
 007324  004737  004104                          JSR     PC,WRAP
 007330  012737  007320  010252                  MOV     #1$,AGTST               ;ADDRESS FOR EOP
 007336  000137  010254                          JMP     $EOP                    ;TYPE END OF PASS

                                      .SBTTL         WRAPAROUND TEST
 007342                               BEGINW:
 007342  004737  004104               1$:        JSR     PC,WRAP                 ;WRAPAROUND TESTS
 007346  012737  007342  010252                  MOV     #1$,AGTST
 007354  000137  010254                          JMP     $EOP                    ;INCREMENTS $PASS

                                      .SBTTL             DMT TEST STARTUP
 007360  032737  000001  001252       BEGIND:    BIT     #BIT0,$DEVM      ;TEST IF KWV11-C CONNECTED TO RTC TRIGGER
 007366  001402                                  BEQ     1$               ;BR IF NOT
 007370  005237  001374                          INC     KWAD             ;SET KW CONNECTED TO AD RTC TRIG - FLAG
 007374  032737  000002  001252       1$:        BIT     #BIT1,$DEVM      ;TEST IF KWV11-C CONNECTED TO EXT TRIG AND 'F2''
 007402  001402                                  BEQ     2$               ;BR IF NOT
 007404  005237  001376                          INC     KWEX             ;SET KW CONNECTED TO AD EXT TRIG - FLAG
 007410  032737  000004  001252       2$:        BIT     #BIT2,$DEVM      ;TEST IF TEST FIXTURE CONNECTED
 007416  001402                                  BEQ     3$               ;BR IF NOT
 007420  005237  001366                          INC     TC1              ;SET TEST FIXTURE PRESENT FLAG
 007424  032737  000010  001252       3$:        BIT     #BIT3,$DEVM      ;TEST IF AAV11-C CONNECTED TO TEST FIXTURE
 007432  001402                                  BEQ     4$               ;BR IF NOT
 007434  005237  001370                          INC     TC2              ;SET AAV11-C ANALOG WRAPAROUND FLAG
 007440  032737  000020  001252       4$:        BIT     #BIT4,$DEVM      ;TEST IF BEVENT AND 'F1'' CONNECTED
 007446  001402                                  BEQ     5$               ;BR IF NOT
 007450  005237  001402                          INC     BTEX             ;SET BEVENT AND 'F1'' FLAG
 007454  032737  000040  001252       5$:        BIT     #BIT5,$DEVM      ;TEST IF MODULE IS AN ''ADV11-C''
 007462  001402                                  BEQ     6$               ;BR IF NOT
 007464  005237  001372                          INC     ADV11C           ;SET ''ADV11-C'' FLAG
 007470  000240                       6$:        NOP
 007472  000240                                  NOP
 007474  000240                                  NOP
 007476  000240                                  NOP
 007500  000240                                  NOP
 007502  000137  007320                          JMP     BEGINA           ;RUN THE ''AUTO-MODE'' TESTS
```

```
                                        .SBTTL  ROUTINE TO INITILIZE THE BUS AND VECTOR ADDRESSES
007506  012737  000006  000004  FIXONE: MOV     #6,@#ERRVEC                     ;SET UP ERRVEC
007514  013737  001250  001316          MOV     $BASE,STREG                     ;RELOAD INITIAL ADDRESSES
007522  013737  001250  001320          MOV     $BASE,ADST1
007530  013737  001250  001322          MOV     $BASE,ADBUFF
007536  013737  001250  001324          MOV     $BASE,DACA                      ;PRIME DAC ''A'' ADDRESS
007544  013737  001250  001326          MOV     $BASE,DACB                      ;            'B''
007552  005237  001320                  INC     ADST1
007556  062737  000002  001322          ADD     #2,ADBUFF
007564  062737  000004  001324          ADD     #4,DACA
007572  062737  000006  001326          ADD     #6,DACB
007600  013737  001244  001330          MOV     $VECT1,VECTOR
007606  042737  170000  001330          BIC     #170000,VECTOR
007614  013737  001330  001332          MOV     VECTOR,VECTR1
007622  062737  000002  001332          ADD     #2,VECTR1
007630  013737  001330  001334          MOV     VECTOR,VECTR2
007636  062737  000004  001334          ADD     #4,VECTR2
007644  013737  001330  001336          MOV     VECTOR,VECTR3
007652  062737  000006  001336          ADD     #6,VECTR3
                                ;;LOAD .+2 AND HALT TRAP CATCH;;
007660  012700  000216                  MOV     #216,R0                         ;FILL .+2
007664  012701  000214                  MOV     #214,R1                         ;LOAD HALT
007670  010021                  1$:     MOV     R0,(R1)+
007672  005021                          CLR     (R1)+
007674  010100                          MOV     R1,R0
007676  005720                          TST     (R0)+
007700  020027  001002                  CMP     R0,#1002
007704  001371                          BNE     1$
007706  000207                          RTS     PC                              ;TEST NEXT A/D
```

```
                                        ;;ROUTINE TO AVERAGE 8 CONVERSIONS;;
007710  005037  010044                  CONVRT: CLR     OTHER           ;REMOVE EXTRA BITS
007714  012500                          CONVTR: MOV     (R5)+,R0        ;GET CHANNEL VALUE
007716  010037  001362                          MOV     R0,CHANL
007722  000300                                  SWAB    R0
007724  053700  010044                          BIS     OTHER,R0        ;ADD GAIN SELECT IF NEEDED
007730  005037  001360                          CLR     TEMP
007734  010077  171356                          MOV     R0,@STREG       ;LOAD CHANNEL INTO MIX BITS
007740  012700  010000                          MOV     #10000,R0
007744  005300                          2$:     DEC     R0
007746  001376                                  BNE     2$
007750  012777  001440  171352                  MOV     #RETURN,@VECTOR ;LOAD VECTOR
007756  012700  000010                          MOV     #10,R0          ;SET UP COUNTER
007762  152777  000101  171326  1$:     BISB    #101,@STREG     ;SET INTRPT. EN., START CONV.
007770  000001                                  WAIT                    ;WAIT FOR CONVERSION
007772  017737  171324  010042                  MOV     @ADBUFF,77$     ;READ CONVERTED VALUE
010000  042737  170000  010042                  BIC     #170000,77$     ;REMOVE HIGH BITS
010006  063737  010042  001360                  ADD     77$,TEMP        ;READ BUFFER
010014  005300                                  DEC     R0
010016  001361                                  BNE     1$              ;DO 8 TIMES
010020  006237  001360                          ASR     TEMP            ;AVERAGE VALUE
010024  006237  001360                          ASR     TEMP
010030  006237  001360                          ASR     TEMP
010034  005537  001360                          ADC     TEMP
010040  000205                                  RTS     R5              ;RETURN
010042  000000                          77$:    0
010044  000000                          OTHER:  0

                                        ;COMPARE $GDDAT AND $BDDAT;;
010046  012537  001124                  COMPAR: MOV     (R5)+,$GDDAT    ;GET GOOD DATA
010052  013537  001364                          MOV     @(R5)+,SPREAD   ;GET SPREAD
010056  013737  001360  001126                  MOV     TEMP,$BDDAT     ;GET BAD(ACTUAL) DATA
010064  013700  001124                          MOV     $GDDAT,R0
010070  163700  001126                          SUB     $BDDAT,R0       ;GET DIFFERENCE
010074  100001                                  BPL     7$
010076  005400                                  NEG     R0
010100  020037  001364                  7$:     CMP     R0,SPREAD       ;COMPARE IT TO SPREAD
010104  003001                                  BGT     10$             ;GO TO ERROR PRINTOUT
010106  005725                                  TST     (R5)+           ;BUMP RETURN POINTER AROUND ERROR CALL
010110  000205                          10$:    RTS     R5
```

```
                                            ;;SUBROUTINE TO TYPE INTRPT. TST MSG.;;
      010112  005737  001202                DUMW:   TST     $PASS
      010116  001021                                BNE     20$
      010120  012737  010162  001110                MOV     #20$,$LPERR
      010126  012737  010162  001106                MOV     #20$,$LPADR
      010134  104401  011463                        TYPE    ,METST          ;TYPE ASCIZ STRING
      010140  010046                                MOV     R0,-(SP)        ;;SAVF R0 FOR TYPEOUT
 (1)                                                                        ;;TYPE TEST NO.
 (1)  010142  104403                                TYPOS                   ;;GO TYPE--OCTAL ASCII
 (1)  010144     002                                .BYTE   2               ;;TYPE 2 DIGIT(S)
 (1)  010145     000                                .BYTE   0               ;;SUPPRESS LEADING ZEROS
      010146  104401  011336                        TYPE    ,ONAD
      010152  013746  001316                        MOV     STREG,-(SP)     ;;SAVE STREG FOR TYPEOUT
 (1)                                                                        ;;TYPE BUS ADDRESS
 (1)  010156  104403                                TYPOS                   ;;GO TYPE--OCTAL ASCII
 (1)  010160     006                                .BYTE   6               ;;TYPE 6 DIGITS
 (1)  010161     001                                .BYTE   1               ;;TYPE LEADING ZEROS
      010162  000207                        20$:    RTS     PC

      010164  005737  001202                DUMC:   TST     $PASS
      010170  001010                                BNE     30$
      010172  012737  010212  001110                MOV     #30$,$LPERR
      010200  012737  010212  001106                MOV     #30$,$LPADR
      010206  104401  011101                        TYPE    ,DONE
      010212  000207                        30$:    RTS     PC

                                            ;SUBROUTINE TO RESET & SET INTRPT. EN.;
      010214  000005                        RST:    RESET
      010216  052777  000100  170720                BIS     #100,@$TKS
      010224  005046                                CLR     -(SP)           ;CLEAR PSW
      010226  012746  010234                        MOV     #1$,-(SP)
      010232  000002                                RTI
      010234  000207                        1$:     RTS     PC


      010236  000002                        V2:     2
      010240  000012                        V12:    12

      010242  052777  000100  170674        AGATST: BIS     #100,@$TKS
      010250  000137                                JMP     @(PC)+
      010252  001522                        AGTST:  BEGIN0
 1254                                  .SBTTL  END OF PASS ROUTINE
  (1)
  (2)                                  ;;*****************************************************************
  (1)                                  ;*INCREMENT THE PASS NUMBER ($PASS)
  (1)                                  ;*TYPE 'END PASS #XXXXX'' (WHERE XXXXX IS A DECIMAL NUMBER)
  (1)                                  ;*IF THERES A MONITOR GO TO IT
  (1)                                  ;*IF THERE ISN'T JUMP TO AGATST
  (1)
  (1)  010254                          $EOP:
  (2)  010254  000240                          NOP
  (1)  010256  005037  001102                  CLR     $TSTNM          ;;ZERO THE TEST NUMBER
  (1)  010262  005037  001160                  CLR     $TIMES          ;;ZERO THE NUMBER OF ITERATIONS
  (1)  010266  005237  001202                  INC     $PASS           ;;INCREMENT THE PASS NUMBER
  (1)  010272  042737  100000  001202          BIC     #100000,$PASS   ;;DON'T ALLOW A NEG. NUMBER
  (1)  010300  005327                          DEC     (PC)+           ;;LOOP?
  (1)  010302  000001                  $EOPCT: .WORD   1
  (1)  010304  003022                          BGT     $DOAGN          ;;YES
  (1)  010306  012737                          MOV     (PC)+,@(PC)+    ;;RESTORE COUNTER
  (1)  010310  000001                  $ENDCT: .WORD   1
  (1)  010312  010302                          $EOPCT
  (1)  010314  104401  010361                  TYPE    ,$ENDMG         ;;TYPE 'END PASS #''
  (2)  010320  013746  001202                  MOV     $PASS,-(SP)     ;;SAVE $PASS FOR TYPEOUT
  (2)  010324  104405                          TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
  (1)  010326  104401  010356                  TYPE    ,$ENULL         ;;TYPE A NULL CHARACTER
  (1)  010332  013700  000042          $GET42: MOV     @#42,R0         ;;GET MONITOR ADDRESS
  (1)  010336  001405                          BEQ     $DOAGN          ;;BRANCH IF NO MONITOR
  (1)  010340  000005                          RESET                   ;;CLEAR THE WORLD
  (1)  010342  004710                  $ENDAD: JSR     PC,(R0)         ;;GO TO MONITOR
  (1)  010344  000240                          NOP                     ;;SAVE ROOM
  (1)  010346  000240                          NOP                     ;;FOR
  (1)  010350  000240                          NOP                     ;;ACT11
  (1)  010352                          $DOAGN:
  (1)  010352  000137                          JMP     @(PC)+          ;;RETURN
  (1)  010354  010242                  $RTNAD: .WORD   AGATST
  (1)  010356     377     377     000  $ENULL: .BYTE   -1,-1,0         ;;NULL CHARACTER STRING
  (1)  010361     015  042412  042116  $ENDMG: .ASCIZ  <15><12>/END PASS #/
  (1)  010366  050040  051501  020123
  (1)  010374  000043
 1256                                          .SBTTL          ASCII MESSAGES
 1257  010376  020200  042522  047520  MSI01:  .ASCIZ  <200>\ REPORTING CONVERTED A TO D CHANNEL VALUES \<200>
       010404  052122  047111  020107
       010412  047503  053116  051105
       010420  042524  020104  020101
       010426  047524  042040  041440
       010434  040510  047116  046105
       010442  053040  046101  042525
       010450  020123  000200
 1258  010454  020200  041523  047101  MSI02:  .ASCIZ  <200>\ SCANNING CHANNELS AND GAINS \<200>
       010462  044516  043516  041440
       010470  040510  047116  046105
       010476  020123  047101  020104
       010504  040507  047111  020123
       010512  000200
 1259  010514  020200  027501  020104  MSI03:  .ASCIZ  <200>\ A/D INPUT ECHOED TO D/A OUTPUTS\<200>
       010522  047111  052520  020124
       010530  041505  047510  042105
       010536  052040  020117  027504
       010544  020101  052517  050124
       010552  052125  100123     000
 1260  010557     200  047440  052125  MSI04:  .ASCIZ  <200>\ OUTPUT A RAMP ON DAC ''A'' AND 'B'' OUTPUT\<200>
       010564  052520  020124  020101
       010572  040522  050115  047440
       010600  020116  040504  020103
       010606  040442  020042  047101
       010614  020104  041042  020042
       010622  052517  050124  052125
       010630  000200
 1261  010632  020200  040503  044514  MSI05:  .ASCIZ  <200>\ CALIBRATE THE AXV11-C D/A OUTPUTS\<200>
       010640  051102  052101  020105
       010646  044124  020105  054101
       010654  030526  026461  020103
       010662  027504  020101  052517
       010670  050124  052125  100123
       010676     000
 1262  010677     200  047440  052125  MSI06:  .ASCIZ  <200>\ OUTPUT SQUARE WAVES ON AXV11-C DAC ''A'' AND 'B'' OUTPUT\<200>
       010704  052520  020124  050523
       010712  040525  042522  053440
       010720  053101  051505  047440
       010726  020116  054101  030526
       010734  026461  020103  040504
       010742  020103  040442  020042
       010750  047101  020104  041042
       010756  020042  052517  050124
       010764  052125  000200
 1263  010770  020200  054101  030526  MSI07:  .ASCIZ  <200>\ AXV11-C D/A OUTPUT ECHOED TO A/D INPUT\<200>
       010776  026461  020103  027504
       011004  020101  052517  050124
       011012  052125  042440  044103
       011020  042517  020104  047524
       011026  040440  042057  044440
       011034  050116  052125  000200
 1264  011042     136     103     040  CMSG:   .BYTE   136,103,40,40,0         ;CONTROL C ECHO
       011045     040     000
 1265  011047     136     101     040  AMSG:   .BYTE   136,101,40,40,0         ;CONTROL A ECHO
```

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        011052     040    000
  1266  011054     136    107     015  GMSG:    .BYTE   136,107,15,12,123,127,122,105,107,72,0  ;CONTROL G ECHO
        011057     012    123     127
        011062     122    105     107
        011065     072    000
  1267  011067     103  000110         CH:      .ASCIZ  /CH/
  1268  011072     040    040     040  SPACE:   .BYTE   40,40,40,40,0
        011075     040    000
  1269  011077     077    000          QUEST:   .BYTE   77,0
  1270  011101     040  020040  042040  DONE:    .ASCIZ  /    DONE/<15><12>
        011106  047117  006505  000012
  1271  011114  000056                 ADOT:    .ASCIZ  \.\
  1272  011116  000060                 AZERO:   .ASCIZ  \0\
  1273  011120  000057                 SLASH:   .ASCIZ  #/#
  1274  011122  005015  051525  047111  CCHAN:   .ASCIZ  <15><12>/USING OCTAL CHANNEL (0-17) ? /
        011130  020107  041517  040524
        011136  020114  044103  047101
        011144  042516  020114  030050
        011152  030455  024467  037440
        011160  000040
  1275  011162  005015  051525  047111  GCHAN:   .ASCIZ  <15><12>/USING GAIN SELECT VALUE OF (0-3) ? /
        011170  020107  040507  047111
        011176  051440  046105  041505
        011204  020124  040526  052514
        011212  020105  043117  024040
        011220  026460  024463  037440
        011226  000040
  1276  011230  005015  047105  044504  ECHAN:   .ASCIZ  <15><12>/ENDING WITH OCTAL CHANNEL (0-17) ? /
        011236  043516  053440  052111
        011244  020110  041517  040524
        011252  020114  044103  047101
        011260  042516  020114  030050
        011266  030455  024467  037440
        011274  000040
  1277  011276  005015  042504  051120  CRWR:    .ASCIZ  <15><12>/DEPRESS 'RETURN' WHEN READY/<15><12>
        011304  051505  020123  051042
        011312  052105  051125  021116
        011320  053440  042510  020116
        011326  042522  042101  006531
        011334  000012
  1278  011336  047440  020116  054101  ONAD:    .ASCIZ  \ ON AXV/ADV11-C AT BUS ADDRESS  \
        011344  027526  042101  030526
        011352  026461  020103  052101
        011360  041040  051525  040440
        011366  042104  042522  051523
        011374  020040     000
  1279  011377     015  052012  050131  MSG71:   .ASCIZ  <15><12>/TYPE LETTER AND DEPRESS 'RETURN' /
        011404  020105  042514  052124
        011412  051105  040440  042116
        011420  042040  050105  042522
        011426  051523  021040  042522
        011434  052524  047122  020042
        011442     000
  1280  011443     015  050012  044522  HEAD5:   .ASCII  <15><12>/PRINT VALUES--/
        011450  052116  053040  046101
        011456  042525  026523     055
```

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011463     015  020012  047105  METST:  .ASCIZ  <15><12>/ ENTERING TEST /
011470  042524  044522  043516
011476  052040  051505  020124
011504     000
011505     015     012          MSKWAD: .BYTE   15,12
011507     111  020123  053513          .ASCIZ  \IS KWV11-C CONNECTED TO 'RTC IN'' (J1-PIN 21) ? \
011514  030526  026461  020103
011522  047503  047116  041505
011530  042524  020104  047524
011536  021040  052122  020103
011544  047111  020042  045050
011552  026461  044520  020116
011560  030462  020051  020077
011566     000
011567     015     012          MSKWEX: .BYTE   15,12
011571     111  020123  053513          .ASCIZ  \IS KWV11-C CONNECTED TO 'EXT TRIG'' (J1-PIN 19 AND 'F2'' INSTALLED) ? \
011576  030526  026461  020103
011604  047503  047116  041505
011612  042524  020104  047524
011620  021040  054105  020124
011626  051124  043511  020042
011634  045050  026461  044520
011642  020116  034461  040440
011650  042116  021040  031106
011656  020042  047111  052123
011664  046101  042514  024504
011672  037440  000040
011676     015     012          MSMAEX: .BYTE   15,12
011700  051511  040440  046440          .ASCIZ  \IS A MANUAL TRIGGER CONNECTED TO 'EXT TRIG'' (J1-PIN 19 AND 'F2'' INSTALL
011706  047101  040525  020114
011714  051124  043511  042507
011722  020122  047503  047116
011730  041505  042524  020104
011736  047524  021040  054105
011744  020124  051124  043511
011752  020042  045050  026461
011760  044520  020116  034461
011766  040440  042116  021040
011774  031106  020042  047111
012002  052123  046101  042514
012010  024504  037440  000040
012016     015     012          MSGNEX: .BYTE   15,12
012020  042507  042516  040522          .ASCIZ  \GENERATE ONE TRIGGER SIGNAL\
012026  042524  047440  042516
012034  052040  044522  043507
012042  051105  051440  043511
012050  040516  000114
012054     015     012          MSBTEX: .BYTE   15,12
012056  051511  021040  020102          .ASCIZ  \IS 'B EVENT'' CONNECTED TO 'EXT TRIG'' ('F1'' INSTALLED) ? \
012064  053105  047105  021124
012072  041440  047117  042516
012100  052103  042105  052040
012106  020117  042442  052130
012114  052040  044522  021107
012122  024040  043042  021061
012130  044440  051516  040524
```

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     012136  046114  042105  020051
     012144  020077     000
     012147     200  051511  052040  MSADV:  .ASCIZ  <200>\IS THIS AN ADV11-C ? \
     012154  044510  020123  047101
     012162  040440  053104  030461
     012170  041455  037440  000040
     012176     015     012           MSTC1:  .BYTE   15,12
     012200  051511  052040  042510          .ASCIZ  \IS THE AXV/ADV11-C TEST FIXTURE INSTALLED ? \
     012206  040440  053130  040457
     012214  053104  030461  041455
     012222  052040  051505  020124
     012230  044506  052130  051125
     012236  020105  047111  052123
     012244  046101  042514  020104
     012252  020077     000
     012255     015     012           MSTC2:  .BYTE   15,12
     012257     111  020123  044124          .ASCIZ  \IS THE AAV11-C TO AXV/ADV11-C TEST CABLE INSTALLED ? \
     012264  020105  040501  030526
     012272  026461  020103  047524
     012300  040440  053130  040457
     012306  053104  030461  041455
     012314  052040  051505  020124
     012322  040503  046102  020105
     012330  047111  052123  046101
     012336  042514  020104  020077
     012344     000
     012345     015     012           MSG70:  .BYTE   15,12
     012347     015  040412  020072          .ASCII  <15><12>/A: AUTOMATED RUNNING OF LOGIC AND ANALOG WRAPAROUND TESTS/
     012354  052501  047524  040515
     012362  042524  020104  052522
     012370  047116  047111  020107
     012376  043117  046040  043517
     012404  041511  040440  042116
     012412  040440  040516  047514
     012420  020107  051127  050101
     012426  051101  052517  042116
     012434  052040  051505  051524
     012442  005015  035114  046040          .ASCII  <15><12>/L: LOGIC TESTS ONLY/
     012450  043517  041511  052040
     012456  051505  051524  047440
     012464  046116     131
     012467     015  053412  020072          .ASCII  <15><12>/W: WRAPAROUND OF ANALOG TESTS ONLY/
     012474  051127  050101  051101
     012502  052517  042116  047440
     012510  020106  047101  046101
     012516  043517  052040  051505
     012524  051524  047440  046116
     012532     131
     012533     015  030412  020072          .ASCII  <15><12>/1: PRINT VALUES OF SELECTED CHANNEL/
     012540  051120  047111  020124
     012546  040526  052514  051505
     012554  047440  020106  042523
     012562  042514  052103  042105
     012570  041440  040510  047116
     012576  046105
     012600  005015  035062  050040          .ASCII  <15><12>/2: PRINT VALUES OF SCANNED CHANNEL AND GAIN/
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         012606  044522  052116  053040
         012614  046101  042525  020123
         012622  043117  051440  040503
         012630  047116  042105  041440
         012636  040510  047116  046105
         012644  040440  042116  043440
         012652  044501     116
  1303   012655     015  031412  020072            .ASCII  <15><12>/3: AXV11-C A TO D INPUT ECHOED TO D TO A OUTPUT/
         012662  054101  030526  026461
         012670  020103  020101  047524
         012676  042040  044440  050116
         012704  052125  042440  044103
         012712  042517  020104  047524
         012720  042040  052040  020117
         012726  020101  052517  050124
         012734  052125
  1304   012736  005015  035064  040440            .ASCII  <15><12>/4: AXV11-C D TO A RAMP/
         012744  053130  030461  041455
         012752  042040  052040  020117
         012760  020101  040522  050115
  1305   012766  005015  035065  040440            .ASCII  <15><12>/5: AXV11-C D TO A CALIBRATION/
         012774  053130  030461  041455
         013002  042040  052040  020117
         013010  020101  040503  044514
         013016  051102  052101  047511
         013024     116
  1306   013025     015  033012  020072            .ASCII  <15><12>/6: AXV11-C D TO A SQUARE WAVES/
         013032  054101  030526  026461
         013040  020103  020104  047524
         013046  040440  051440  052521
         013054  051101  020105  040527
         013062  042526     123
  1307   013065     015  033412  020072            .ASCII  <15><12>/7: AXV11-C D TO A OUTPUT TO A TO D INPUT/
         013072  054101  030526  026461
         013100  020103  020104  047524
         013106  040440  047440  052125
         013114  052520  020124  047524
         013122  040440  052040  020117
         013130  020104  047111  052520
         013136     124
  1308   013137     015  020012  000040            .ASCIZ  <15><12>/  /
  1309   013144  005015  051511  045440  HEAD2:    .ASCIZ  <15><12>\IS KWV11-C CONNECTED TO AXV/ADV11-C ? \
         013152  053127  030461  041455
         013160  041440  047117  042516
         013166  052103  042105  052040
         013174  020117  054101  027526
         013202  042101  030526  026461
         013210  020103  020077     000
  1310   013215     123  040524  052524  EM1:      .ASCIZ  /STATUS REG. ERROR/
         013222  020123  042522  027107
         013230  042440  051122  051117
         013236     000
  1311   013237     106  044501  042514  EM2:      .ASCIZ  /FAILED TO INTERRUPT/
         013244  020104  047524  044440
         013252  052116  051105  052522
         013260  052120     000
```

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 1312  013263     125  042516  050130  EM3:    .ASCIZ  /UNEXPECTED INTERRUPT/
       013270  041505  042524  020104
       013276  047111  042524  051122
       013304  050125  000124
 1313  013310  051105  047522  020122  EM4:    .ASCIZ  #ERROR ON A/D CHANNEL#
       013316  047117  040440  042057
       013324  041440  040510  047116
       013332  046105     000
 1314  013335     105  051122  041520  DH1:    .ASCIZ  /ERRPC   STREG   EXPECTED ACTUAL/
       013342  020040  051440  051124
       013350  043505  020040  042440
       013356  050130  041505  042524
       013364  020104  041501  052524
       013372  046101     000
 1315  013375     105  051122  041520  DH2:    .ASCIZ  /ERRPC   STREG   CHANNEL NOMINAL SPREAD  ACTUAL/
       013402  020040  051440  051124
       013410  043505  020040  041440
       013416  040510  047116  046105
       013424  047040  046517  047111
       013432  046101  051440  051120
       013440  040505  020104  040440
       013446  052103  040525  000114
 1316  013454  051105  050122  020103  DH3:    .ASCIZ  /ERRPC   STREG    ACTUAL/
       013462  020040  052123  042522
       013470  020107  020040  040440
       013476  052103  040525  000114
 1317                                          .EVEN
 1318
 1319  013504  001116  001316  001124  DT1:    $ERRPC, STREG, $GDDAT, $BDDAT,0
       013512  001126  000000
 1320  013516  001116  001316  001362  DT2:    $ERRPC,STREG,CHANL,$GDDAT,SPREAD,$BDDAT,0
       013524  001124  001364  001126
       013532  000000
 1321  013534  001116  001316  001126  DT3:    $ERRPC,STREG,$BDDAT,0
       013542  000000
 1322  013544  000000                  DF1:    0
```

```
                                          .SBTTL  TTY INPUT ROUTINE
 (1)
 (2)                                      ;;**********************************************************
 (1)                                      .ENABL  LSB
 (1)  013546  000000                      $TKCNT: .WORD   0               ;;NUMBER OF ITEMS IN QUEUE
 (1)  013550  000000                      $TKQIN: .WORD   0               ;;INPUT POINTER
 (1)  013552  000000                      $TKQOUT: .WORD  0               ;;OUTPUT POINTER
 (1)  013554  000040                      $TKQSRT: .BLKB  32.             ;;TTY KEYBOARD QUEUE
 (1)          013614                      $TKQEND=.
 (1)
 (1)                                      ;*TK INITIALIZE ROUTINE
 (1)                                      ;*THIS ROUTINE WILL INITIALIZE THE TTY KEYBOARD INPUT QUEUE
 (1)                                      ;*SETUP THE INTERRUPT VECTOR AND TURN ON THE KEYBOARD INTERRUPT
 (1)                                      ;
 (1)                                      ;*CALL:
 (1)                                      ;*      JSR     PC,$TKINT
 (1)                                      ;*      RETURN
 (1)                                      ;
 (1)  013614  005037  013546              $TKINT: CLR     $TKCNT          ;;CLEAR COUNT OF ITEMS IN QUEUE
 (1)  013620  012737  013554  013550              MOV     #$TKQSRT,$TKQIN ;;MOVE THE STARTING ADDRESS OF THE
 (1)  013626  013737  013550  013552              MOV     $TKQIN,$TKQOUT  ;;QUEUE INTO THE INPUT & OUTPUT POINTERS.
 (1)  013634  012737  013664  000060              MOV     #$TKSRV,@#TKVEC ;;INITIALIZE THE KEYBOARD VECTOR
 (1)  013642  012737  000200  000062              MOV     #200,@#TKVEC+2  ;;'BR' LEVEL 4
 (1)  013650  005777  165272                      TST     @$TKB           ;;CLEAR DONE FLAG
 (1)  013654  012777  000100  165262              MOV     #100,@$TKS      ;;ENABLE TTY KEYBOARD INTERRUPT
 (1)  013662  000207                              RTS     PC              ;;RETURN TO CALLER
 (1)
 (1)                                      ;*TK SERVICE ROUTINE
 (1)                                      ;*THIS ROUTINE WILL SERVICE THE TTY KEYBOARD INTERRUPT
 (1)                                      ;*BY READING THE CHARACTER FROM THE INPUT BUFFER AND PUTTING
 (1)                                      ;*IT IN THE QUEUE.
 (1)                                      ;*IF THE CHARACTER IS A "CONTROL-C" (^C) $TKINT IS CALLED AND
 (1)                                      ;*UPON RETURN EXIT IS MADE TO THE "CONTROL-C" RESTART ADDRESS (BEGIN2)
 (1)                                      ;
 (1)  013664  117746  165256              $TKSRV: MOVB    @$TKB,-(SP)     ;;PICKUP THE CHARACTER
 (1)  013670  042716  177600                      BIC     #^C177,(SP)     ;;STRIP THE JUNK
 (1)  013674  021627  000003                      CMP     (SP),#3         ;;IS IT A CONTROL C?
 (1)  013700  001007                              BNE     1$              ;;BRANCH IF NO
 (1)  013702  104401  015030                      TYPE    ,$CNTLC         ;;TYPE A CONTROL-C (^C)
 (1)  013706  004737  013614                      JSR     PC,$TKINT       ;;INIT THE KEYBOARD
 (1)  013712  005726                              TST     (SP)+           ;;CLEAN UP STACK
 (1)  013714  000137  001530                      JMP     BEGIN2          ;;CONTROL C RESTART
 (1)  013720  021627  000007              1$:     CMP     (SP),#7         ;;IS IT A CONTROL G?
 (1)  013724  001004                              BNE     2$              ;;BRANCH IF NO
 (1)  013726  022737  000176  001140              CMP     #SWREG,SWR      ;;IS SOFT-SWR SELECTED?
 (1)  013734  001500                              BEQ     6$              ;;GO TO SWR CHANGE
 (1)
 (1)  013736                              2$:
 (1)  013736  022737  000040  013546              CMP     #32.,$TKCNT     ;;IS THE QUEUE FULL?
 (1)  013744  001004                              BNE     3$              ; BRANCH IF NO
 (1)  013746  104401  001164                      TYPE    ,$BELL          ;;RING THE TTY BELL
 (1)  013752  005726                              TST     (SP)+           ;;CLEAN CHARACTER OFF OF STACK
 (1)  013754  000451                              BR      5$              ;;EXIT
 (1)  013756  021627  000023              3$:     CMP     (SP),#23        ;;IS IT A CONTROL-S?
 (1)  013762  001021                              BNE     32$             ;;BRANCH IF NO
 (1)  013764  005077  165154                      CLR     @$TKS           ;;DISABLE TTY KEYBOARD INTERRUPTS
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(1)  013770  005726                          TST     (SP)+              ;;CLEAN CHAR OFF STACK
(1)  013772  105777  165146          31$:    TSTB    @$TKS              ;;WAIT FOR A CHAR
(1)  013776  100375                          BPL     31$                ;;LOOP UNTIL ITS THERE
(1)  014000  117746  165142                  MOVB    @$TKB,-(SP)        ;;GET THE CHARACTER
(1)  014004  042716  177600                  BIC     #^C177,(SP)        ;;MAKE IT 7-BIT ASCII
(1)  014010  022627  000021                  CMP     (SP)+,#21          ;;IS IT A CONTROL-Q?
(1)  014014  001366                          BNE     31$                ;;BRANCH IF NO
(1)  014016  012777  000100  165120          MOV     #100,@$TKS         ;;REENABLE TTY KEYBOARD INTERRUPTS
(1)  014024  000002                          RTI                        ;;RETURN
(1)  014026  005237  013546          32$:    INC     $TKCNT             ;;COUNT THIS CHARACTER
(1)  014032  021627  000140                  CMP     (SP),#140          ;;IS IT UPPER CASE?
(1)  014036  002405                          BLT     4$                 ;;BRANCH IF YES
(1)  014040  021627  000175                  CMP     (SP),#175          ;;IS IT A SPECIAL CHAR?
(1)  014044  003002                          BGT     4$                 ;;BRANCH IF YES
(1)  014046  042716  000040                  BIC     #40,(SP)           ;;MAKE IT UPPER CASE
(1)  014052  112677  177472          4$:     MOVB    (SP)+,@$TKQIN      ;;AND PUT IT IN QUEUE
(1)  014056  005237  013550                  INC     $TKQIN             ;;UPDATE THE POINTER
(1)  014062  023727  013550  013614          CMP     $TKQIN,#$TKQEND    ;;GO OFF THE END?
(1)  014070  001003                          BNE     5$                 ;;BRANCH IF NO
(1)  014072  012737  013554  013550          MOV     #$TKQSRT,$TKQIN    ;;RESET THE POINTER
(1)  014100  000002                  5$:     RTI                        ;;RETURN
(1)
(2)                                  ;;*******************************************************************
(1)                                  ;*SOFTWARE SWITCH REGISTER CHANGE ROUTINE.
(1)                                  ;*ROUTINE IS ENTERED  FROM THE TRAP HANDLER, AND WILL
(1)                                  ;*SERVICE THE TEST FOR CHANGE IN SOFTWARE SWITCH REGISTER TRAP
(1)                                  ;*CALL WHEN OPERATING IN TTY INTERRUPT MODE.
(1)  014102  022737  000176  001140  $CKSWR: CMP     #SWREG,SWR         ;;IS THE SOFT-SWR SELECTED
(1)  014110  001124                          BNE     15$                ;;EXIT IF NOT
(1)  014112  105777  165026                  TSTB    @$TKS              ;;IS A CHAR WAITING?
(1)  014116  100121                          BPL     15$                ;;IF NOT, EXIT
(1)  014120  117746  165022                  MOVB    @$TKB,-(SP)        ;;YES
(1)  014124  042716  177600                  BIC     #^C177,(SP)        ;;MAKE IT  7-BIT ASCII
(1)  014130  021627  000007                  CMP     (SP),#7            ;;IS IT A CONTROL-G?
(1)  014134  001300                          BNE     2$                 ;;IF NOT, PUT IT IN THE TTY QUEUE
(1)                                                                     ;;AND EXIT
(1)
(2)                                  ;;*******************************************************************
(1)                                  ;*CONTROL IS PASSED TO THIS POINT FROM EITHER THE TTY INTERRUPT SERVICE
(1)                                  ;*ROUTINE OR FROM THE SOFTWARE SWITCH REGISTER TRAP CALL, AS A RESULT OF A
(1)                                  ;*CONTROL-G BEING TYPED, AND THE SOFTWARE SWITCH REGISTER BEING SELECTED.
(1)  014136  123727  001134  000001  6$:     CMPB    $AUTOB,#1          ;;ARE WE RUNNING IN AUTO-MODE?
(1)  014144  001674                          BEQ     2$                 ;;BRANCH IF YES
(1)  014146  005726                          TST     (SP)+              ;;CLEAR CONTROL-G OFF STACK
(1)  014150  004737  013614                  JSR     PC,$TKINT          ;;FLUSH THE TTY INPUT QUEUE
(1)  014154  005077  164764                  CLR     @$TKS              ;;DISABLE TTY KEYBOARD INTERRUPTS
(1)  014160  112737  000001  001135          MOVB    #1,$INTAG          ;;SET INTERRUPT MODE INDICATOR
(1)
(1)  014166  104401  015042                  TYPE    ,$CNTLG            ;;ECHO THE CONTROL-G (^G)
(1)  014172  104401  015047          $GTSWR: TYPE    ,$MSWR             ;;TYPE CURRENT CONTENTS
(2)  014176  013746  000176                  MOV     SWREG,-(SP)        ;;SAVE SWREG FOR TYPEOUT
(2)  014202  104402                          TYPOC                      ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
(1)  014204  104401  015060                  TYPE    ,$MNEW             ;;PROMPT FOR NEW SWR
(1)  014210  005046                  19$:    CLR     -(SP)              ;;CLEAR COUNTER
(1)  014212  005046                          CLR     -(SP)              ;;THE NEW SWR
(1)  014214  105777  164724          7$:     TSTB    @$TKS              ;;CHAR THERE?
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(1)  014220  100375                          BPL     7$                ;;IF NOT TRY AGAIN
(1)
(1)  014222  117746  164720                  MOVB    @$TKB,-(SP)       ;;PICK UP CHAR
(1)  014226  042716  177600                  BIC     #^C177,(SP)       ;;MAKE IT 7-BIT ASCII
(1)
(1)  014232  021627  000003                  CMP     (SP),#3           ;;IS IT A CONTROL-C?
(1)  014236  001015                          BNE     9$                ;;BRANCH IF NOT
(1)  014240  104401  015030                  TYPE    ,$CNTLC           ;;YES, ECHO CONTROL-C (^C)
(1)  014244  062706  000006                  ADD     #6,SP             ;;CLEAN UP STACK
(1)  014250  123727  001135  000001          CMPB    $INTAG,#1         ;;REENABLE TTY KEYBOARD INTERRUPTS?
(1)  014256  001003                          BNE     8$                ;;BRANCH IF NO
(1)  014260  012777  000100  164656          MOV     #100,@$TKS        ;;ALLOW TTY KEYBOARD INTERRUPTS
(1)  014266  000137  001530          8$:     JMP     BEGIN2            ;;CONTROL-C RESTART
(1)
(1)
(1)  014272  021627  000025          9$:     CMP     (SP),#25          ;;IS IT A CONTROL-U?
(1)  014276  001005                          BNE     10$               ;;BRANCH IF NOT
(1)  014300  104401  015035                  TYPE    ,$CNTLU           ;;YES, ECHO CONTROL-U (^U)
(1)  014304  062706  000006          20$:    ADD     #6,SP             ;;IGNORE PREVIOUS INPUT
(1)  014310  000737                          BR      19$               ;;LET'S TRY IT AGAIN
(1)
(1)
(1)  014312  021627  000015          10$:    CMP     (SP),#15          ;;IS IT A <CR>?
(1)  014316  001022                          BNE     16$               ;;BRANCH IF NO
(1)  014320  005766  000004                  TST     4(SP)             ;;YES, IS IT THE FIRST CHAR?
(1)  014324  001403                          BEQ     11$               ;;BRANCH IF YES
(1)  014326  016677  000002  164604          MOV     2(SP),@SWR        ;;SAVE NEW SWR
(1)  014334  062706  000006          11$:    ADD     #6,SP             ;;CLEAR UP STACK
(1)  014340  104401  001171          14$:    TYPE    ,$CRLF            ;;ECHO <CR> AND <LF>
(1)  014344  123727  001135  000001          CMPB    $INTAG,#1         ;;RE-ENABLE TTY KBD INTERRUPTS?
(1)  014352  001003                          BNE     15$               ;;BRANCH IF NOT
(1)  014354  012777  000100  164562          MOV     #100,@$TKS        ;;RE-ENABLE TTY KBD INTERRUPTS
(1)  014362  000002                  15$:    RTI                       ;;RETURN
(1)  014364  004737  016400          16$:    JSR     PC,$TYPEC         ;;ECHO CHAR
(1)  014370  021627  000060                  CMP     (SP),#60          ;;CHAR < 0?
(1)  014374  002420                          BLT     18$               ;;BRANCH IF YES
(1)  014376  021627  000067                  CMP     (SP),#67          ;;CHAR > 7?
(1)  014402  003015                          BGT     18$               ;;BRANCH IF YES
(1)  014404  042726  000060                  BIC     #60,(SP)+         ;;STRIP-OFF ASCII
(1)  014410  005766  000002                  TST     2(SP)             ;;IS THIS THE FIRST CHAR
(1)  014414  001403                          BEQ     17$               ;;BRANCH IF YES
(1)  014416  006316                          ASL     (SP)              ;;NO, SHIFT PRESENT
(1)  014420  006316                          ASL     (SP)              ;;   CHAR OVER TO MAKE
(1)  014422  006316                          ASL     (SP)              ;;   ROOM FOR NEW ONE.
(1)  014424  005266  000002          17$:    INC     2(SP)             ;;KEEP COUNT OF CHAR
(1)  014430  056616  177776                  BIS     -2(SP),(SP)       ;;SET IN NEW CHAR
(1)  014434  000667                          BR      7$                ;;GET THE NEXT ONE
(1)  014436  104401  001170          18$:    TYPE    ,$QUES            ;;TYPE ?<CR><LF>
(1)  014442  000720                          BR      20$               ;;SIMULATE CONTROL-U
(1)                                  .DSABL  LSB
(1)
(1)
(2)                                  ;;*************************************************************
(1)                                  ;*THIS ROUTINE WILL INPUT A SINGLE CHARACTER FROM THE TTY
(1)                                  ;*CALL:
(1)                                  ;*      RDCHR                     ;;GET A CHARACTER FROM THE QUEUE
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(1)                                         ;*      RETURN HERE             ;;CHARACTER IS ON THE STACK
(1)                                         ;*                              ;;WITH PARITY BIT STRIPPED OFF
(1)                                         ;
(1)
(1)  014444  011646                         $RDCHR: MOV     (SP),-(SP)      ;;PUSH DOWN THE PC AND
(1)  014446  016666  000004  000002                 MOV     4(SP),2(SP)     ;;THE PS
(1)  014454  005066  000004                         CLR     4(SP)           ;;GET READY FOR A CHARACTER
(2)  014460  005046                                 CLR     -(SP)           ;;PUT NEW PS ON STACK
(2)  014462  012746  014470                         MOV     #64$,-(SP)      ;;PUT NEW PC ON  STACK
(2)  014466  000002                                 RTI                     ;;POP NEW PC AND PS
(2)  014470                                 64$:
(1)  014470  005737  013546                 1$:     TST     $TKCNT          ;;WAIT ON A CHARACTER
(1)  014474  001775                                 BEQ     1$
(1)  014476  005337  013546                         DEC     $TKCNT          ;;DECREMENT THE COUNTER
(1)  014502  117766  177044  000004                 MOVB    @$TKQOUT,4(SP)  ;;GET ONE CHARACTER
(1)  014510  005237  013552                         INC     $TKQOUT         ;;UPDATE THE POINTER
(1)  014514  023727  013552  013614                 CMP     $TKQOUT,#$TKQEND ;;DID IT GO OFF OF THE END?
(1)  014522  001003                                 BNE     2$              ;;BRANCH IF NO
(1)  014524  012737  013554  013552                 MOV     #$TKQSRT,$TKQOUT ;;RESET THE POINTER
(1)  014532  000002                         2$:     RTI                     ;;RETURN
(2)                                         ;;*************************************************************
(1)                                         ;*THIS ROUTINE WILL INPUT A STRING FROM THE TTY
(1)                                         ;*CALL:
(1)                                         ;*      RDLIN                   ;;INPUT A STRING FROM THE TTY
(1)                                         ;*      RETURN HERE             ;;ADDRESS OF FIRST CHARACTER WILL BE ON THE STACK
(1)                                         ;*                              ;;TERMINATOR WILL BE A BYTE OF ALL 0'S
(1)
(1)  014534  010346                         $RDLIN: MOV     R3,-(SP)        ;;SAVE R3
(1)  014536  005046                                 CLR     -(SP)           ;;CLEAR THE RUBOUT KEY
(1)  014540  012703  014770                 1$:     MOV     #$TTYIN,R3      ;;GET ADDRESS
(1)  014544  022703  015030                 2$:     CMP     #$TTYIN+32.,R3  ;;BUFFER FULL?
(1)  014550  101456                                 BLOS    4$              ;;BR IF YES
(1)  014552  104411                                 RDCHR                   ;;GO READ ONE CHARACTER FROM THE TTY
(1)  014554  112613                                 MOVB    (SP)+,(R3)      ;;GET CHARACTER
(1)  014556  122713  000177                 10$:    CMPB    #177,(R3)       ;;IS IT A RUBOUT
(1)  014562  001022                                 BNE     5$              ;;BR IF NO
(1)  014564  005716                                 TST     (SP)            ;;IS THIS THE FIRST RUBOUT?
(1)  014566  001007                                 BNE     6$              ;;BR IF NO
(1)  014570  112737  000134  014766                 MOVB    #'\,9$          ;;TYPE A BACK SLASH
(1)  014576  104401  014766                         TYPE    ,9$
(1)  014602  012716  177777                         MOV     #-1,(SP)        ;;SET THE RUBOUT KEY
(1)  014606  005303                         6$:     DEC     R3              ;;BACKUP BY ONE
(1)  014610  020327  014770                         CMP     R3,#$TTYIN      ;;STACK EMPTY?
(1)  014614  103434                                 BLO     4$              ;;BR IF YES
(1)  014616  111337  014766                         MOVB    (R3),9$         ;;SETUP TO TYPEOUT THE DELETED CHAR.
(1)  014622  104401  014766                         TYPE    ,9$             ;;GO TYPE
(1)  014626  000746                                 BR      2$              ;;GO READ ANOTHER CHAR.
(1)  014630  005716                         5$:     TST     (SP)            ;;RUBOUT KEY SET?
(1)  014632  001406                                 BEQ     7$              ;;BR IF NO
(1)  014634  112737  000134  014766                 MOVB    #'\,9$          ;;TYPE A BACK SLASH
(1)  014642  104401  014766                         TYPE    ,9$
(1)  014646  005016                                 CLR     (SP)            ;;CLEAR THE RUBOUT KEY
(1)  014650  122713  000025                 7$:     CMPB    #25,(R3)        ;;IS CHARACTER A CTRL U?
(1)  014654  001003                                 BNE     8$              ;;BR IF NO
(1)  014656  104401  015035                         TYPE    ,$CNTLU         ;;TYPE A CONTROL 'U'
(1)  014662  000726                                 BR      1$              ;;GO START OVER
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 (1)  014664  122713  000022          8$:     CMPB    #22,(R3)          ;;IS CHARACTER A ''^R''?
 (1)  014670  001011                          BNE     3$                ;;BRANCH IF NO
 (1)  014672  105013                          CLRB    (R3)              ;;CLEAR THE CHARACTER
 (1)  014674  104401  001171                  TYPE    ,$CRLF            ;;TYPE A ''CR'' & ''LF''
 (1)  014700  104401  014770                  TYPE    ,$TTYIN           ;;TYPE THE INPUT STRING
 (1)  014704  000717                          BR      2$                ;;GO PICKUP ANOTHER CHACTER
 (1)  014706  104401  001170          4$:     TYPE    ,$QUES            ;;TYPF A '?'
 (1)  014712  000712                          BR      1$                ;;CLEAR THE BUFFER AND LOOP
 (1)  014714  111337  014766          3$:     MOVB    (R3),9$           ;;ECHO THE CHARACTER
 (1)  014720  104401  014766                  TYPE    ,9$
 (1)  014724  122723  000015                  CMPB    #15,(R3)+         ;;CHECK FOR RETURN
 (1)  014730  001305                          BNE     2$                ;;LOOP IF NOT RETURN
 (1)  014732  105063  177777                  CLRB    -1(R3)            ;;CLEAR RETURN (THE 15)
 (1)  014736  104401  001172                  TYPE    ,$LF              ;;TYPE A LINE FEED
 (1)  014742  005726                          TST     (SP)+             ;;CLEAN RUBOUT KEY FROM THE STACK
 (1)  014744  012603                          MOV     (SP)+,R3          ;;RESTORE R3
 (1)  014746  011646                          MOV     (SP),-(SP)        ;;ADJUST THE STACK AND PUT ADDRESS OF THE
 (1)  014750  016666  000004  000002          MOV     4(SP),2(SP)       ;;      FIRST ASCII CHARACTER ON IT
 (1)  014756  012766  014770  000004          MOV     #$TTYIN,4(SP)
 (1)  014764  000002                          RTI                       ;;RETURN
 (1)  014766     000                  9$:     .BYTE   0                 ;;STORAGE FOR ASCII CHAR. TO TYPE
 (1)  014767     000                          .BYTE   0                 ;;TERMINATOR
 (1)  014770  000040                  $TTYIN: .BLKB   32.               ;;RESERVE 32. BYTES FOR TTY INPUT
 (1)  015030  041536  005015     000  $CNTLC: .ASCIZ  /^C/<15><12>      ;;CONTROL 'C'
 (1)  015035     136  006525  000012  $CNTLU: .ASCIZ  /^U/<15><12>      ;;CONTROL 'U'
 (1)  015042  043536  005015     000  $CNTLC: .ASCIZ  /^G/<15><12>      ;;CONTROL 'G'
 (1)  015047     015  051412  051127  $MSWR:  .ASCIZ  <15><12>/SWR = /
 (1)  015054  036440  000040
 (1)  015060  020040  042516  020127  $MNEW:  .ASCIZ  /  NEW = /
 (1)  015066  020075     000
 (1)          015072                  .EVEN
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  1326                                        .SBTTL . READ AN OCTAL NUMBER FROM THE TTY
   (1)
   (2)                                        ;;************************* *************************************
   (1)                                        ;*THIS ROUTINE WILL READ AN OCTAL (ASCII) NUMBER FROM THE TTY AND
   (1)                                        ;*CHANGE IT TO BINARY.
   (1)                                        ;*CALL:
   (1)                                        ;*      RDOCT                          ;;READ AN OCTAL NUMBER
   (1)                                        ;*      RETURN HERE                    ;;LOW ORDER BITS ARE ON TOP OF THE STACK
   (1)                                        ;*                                     ;;HIGH ORDER BITS ARE IN $HIOCT
   (1)
   (1) 015072  011646                         $RDOCT: MOV     (SP),-(SP)             ;;PROVIDE SPACE FOR THE
   (1) 015074  016666  000004  000002                 MOV     4(SP),2(SP)            ;;INPUT NUMBER
   (3) 015102  010046                                 MOV     R0,-(SP)               ;;PUSH R0 ON STACK
   (3) 015104  010146                                 MOV     R1,-(SP)               ;;PUSH R1 ON STACK
   (3) 015106  010246                                 MOV     R2,-(SP)               ;;PUSH R2 ON STACK
   (1) 015110  104412                         1$:     RDLIN                          ;;READ AN ASCIZ LINE
   (1) 015112  012600                                 MOV     (SP)+,R0               ;;GET ADDRESS OF 1ST CHARACTER
   (1) 015114  005001                                 CLR     R1                     ;;CLEAR DATA WORD
   (1) 015116  005002                                 CLR     R2
   (1) 015120  112046                         2$:     MOVB    (R0)+,-(SP)            ;;PICKUP THIS CHARACTER
   (1) 015122  001412                                 BEQ     3$                     ;;IF ZERO GET OUT
   (1) 015124  006301                                 ASL     R1                     ;;*2
   (1) 015126  006102                                 ROL     R2
   (1) 015130  006301                                 ASL     R1                     ;;*4
   (1) 015132  006102                                 ROL     R2
   (1) 015134  006301                                 ASL     R1                     ;;*8
   (1) 015136  006102                                 ROL     R2
   (1) 015140  042716  177770                         BIC     #^C7,(SP)              ;;STRIP THE ASCII JUNK
   (1) 015144  062601                                 ADD     (SP)+,R1               ;;ADD IN THIS DIGIT
   (1) 015146  000764                                 BR      2$                     ;;LOOP
   (1) 015150  005726                         3$:     TST     (SP)+                  ;;CLEAN TERMINATOR FROM STACK
   (1) 015152  010166  000012                         MOV     R1,12(SP)              ;;SAVE THE RESULT
   (1) 015156  010237  015172                         MOV     R2,$HIOCT
   (3) 015162  012602                                 MOV     (SP)+,R2               ;;POP STACK INTO R2
   (3) 015164  012601                                 MOV     (SP)+,R1               ;;POP STACK INTO R1
   (3) 015166  012600                                 MOV     (SP)+,R0               ;;POP STACK INTO R0
   (1) 015170  000002                                 RTI                            ;;RETURN
   (1) 015172  000000                         $HIOCT: .WORD   0                      ;;HIGH ORDER BITS GO HERE
```

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 1328                                     .SBTTL  POWER DOWN AND UP ROUTINES
  (1)
  (2)                                     ;;*****************************************************************
  (1)                                     ;POWER DOWN ROUTINE
  (1)  015174  012737  015334  000024     $PWRDN: MOV     #$ILLUP,@#PWRVEC ;;SET FOR FAST UP
  (1)  015202  012737  000340  000026             MOV     #340,@#PWRVEC+2 ;;PRIO:7
  (3)  015210  010046                             MOV     R0,-(SP)         ;;PUSH R0 ON STACK
  (3)  015212  010146                             MOV     R1,-(SP)         ;;PUSH R1 ON STACK
  (3)  015214  010246                             MOV     R2,-(SP)         ;;PUSH R2 ON STACK
  (3)  015216  010346                             MOV     R3,-(SP)         ;;PUSH R3 ON STACK
  (3)  015220  010446                             MOV     R4,-(SP)         ;;PUSH R4 ON STACK
  (3)  015222  010546                             MOV     R5,-(SP)         ;;PUSH R5 ON STACK
  (3)  015224  017746  163710                     MOV     @SWR,-(SP)       ;;PUSH @SWR ON STACK
  (1)  015230  010637  015340                     MOV     SP,$SAVR6        ;;SAVE SP
  (1)  015234  012737  015246  000024             MOV     #$PWRUP,@#PWRVEC ;;SET UP VECTOR
  (1)  015242  000000                             HALT
  (1)  015244  000776                             BR      .-2              ;;HANG UP
  (1)
  (2)                                     ;;*****************************************************************
  (1)                                     ;POWER UP ROUTINE
  (1)  015246  012737  015334  000024     $PWRUP: MOV     #$ILLUP,@#PWRVEC ;;SET FOR FAST DOWN
  (1)  015254  013706  015340                     MOV     $SAVR6,SP        ;;GET SP
  (1)  015260  005037  015340                     CLR     $SAVR6           ;;WAIT LOOP FOR THE TTY
  (1)  015264  005237  015340             1$:     INC     $SAVR6           ;;WAIT FOR THE INC
  (1)  015270  001375                             BNE     1$               ;;OF  WORD
  (3)  015272  012677  163642                     MOV     (SP)+,@SWR       ;;POP STACK INTO @SWR
  (3)  015276  012605                             MOV     (SP)+,R5         ;;POP STACK INTO R5
  (3)  015300  012604                             MOV     (SP)+,R4         ;;POP STACK INTO R4
  (3)  015302  012603                             MOV     (SP)+,R3         ;;POP STACK INTO R3
  (3)  015304  012602                             MOV     (SP)+,R2         ;;POP STACK INTO R2
  (3)  015306  012601                             MOV     (SP)+,R1         ;;POP STACK INTO R1
  (3)  015310  012600                             MOV     (SP)+,R0         ;;POP STACK INTO R0
  (1)  015312  012737  015174  000024             MOV     #$PWRDN,@#PWRVEC ;;SET UP THE POWER DOWN VECTOR
  (1)  015320  012737  000340  000026             MOV     #340,@#PWRVEC+2 ;;PRIO:7
  (1)  015326  104401                             TYPE                     ;REPORT THE POWER FAILURE
  (1)  015330  015342                     $PWRMG: .WORD   $POWER           ;;POWER FAIL MESSAGE POINTER
  (1)  015332  000002                             RTI
  (1)  015334  000000                     $ILLUP: HALT                     ;;THE POWER UP SEQUENCE WAS STARTED
  (1)  015336  000776                             BR      .-2              ;; BEFORE THE POWER DOWN WAS COMPLETE
  (1)  015340  000000                     $SAVR6: 0                        ;;PUT THE SP HERE
  (1)  015342  005015  047520  042527     $POWER: .ASCIZ  <15><12>'POWER'
  (1)  015350  000122
  (1)                                             .EVEN
 1330                                          .SBTTL  SCOPE HANDLER ROUTINE
  (1)
  (2)                                          ;;*************************************************************************
  (1)                                          ;*THIS ROUTINE CONTROLS THE LOOPING OF SUBTESTS. IT WILL INCREMENT
  (1)                                          ;*AND LOAD THE TEST NUMBER($TSTNM) INTO THE DISPLAY REG.(DISPLAY<7:0>)
  (1)                                          ;*AND LOAD THE ERROR FLAG ($ERFLG) INTO DISPLAY<15:08>
  (1)                                          ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
  (1)                                          ;*SW14=1         LOOP ON TEST
  (1)                                          ;*SW11=1         INHIBIT ITERATIONS
  (1)                                          ;*SW09=1         LOOP ON ERROR
  (1)                                          ;*SW08=1         LOOP ON TEST IN SWR<7:0>
  (1)                                          ;*CALL
  (1)                                          ;*       SCOPE               ;;SCOPE=IOT
  (1)
  (1)   015352                                 $SCOPE:
  (1)   015352  104410                                 CKSWR                   ;;TEST  FOR CHANGE IN SOFT-SWR
  (1)   015354  032777  040000  163556         1$:     BIT     #BIT14,@SWR     ;;LOOP ON PRESENT TEST?
  (1)   015362  001114                                 BNE     $OVER           ;;YES IF SW14=1
  (1)                                          ;#####START OF CODE FOR THE XOR TESTER#####
  (1)   015364  000416                         $XTSTR: BR      6$              ;;IF RUNNING ON THE ''XOR'' TESTER CHANGE
  (1)                                                                          ;;THIS INSTRUCTION TO A ''NOP'' (NOP=240)
  (1)   015366  013746  000004                         MOV     @#ERRVEC,-(SP)  ;;SAVE THE CONTENTS OF THE ERROR VECTOR
  (1)   015372  012737  015412  000004                 MOV     #5$,@#ERRVEC    ;;SET FOR TIMEOUT
  (1)   015400  005737  177060                         TST     @#177060        ;;TIME OUT ON XOR?
  (1)   015404  012637  000004                         MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
  (1)   015410  000463                                 BR      $SVLAD          ;;GO TO THE NEXT TEST
  (1)   015412  022626                         5$:     CMP     (SP)+,(SP)+     ;;CLEAR THE STACK AFTER A TIME OUT
  (1)   015414  012637  000004                         MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
  (1)   015420  000423                                 BR      7$              ;;LOOP ON THE PRESENT TEST
  (1)   015422                                 6$:;#####END OF CODE FOR THE XOR TESTER#####
  (1)   015422  032777  000400  163510                 BIT     #BIT08,@SWR     ;;LOOP ON SPEC. TEST?
  (1)   015430  001404                                 BEQ     2$              ;;BR IF NO
  (1)   015432  127737  163502  001102                 CMPB    @SWR,$TSTNM     ;;ON THE RIGHT TEST?    SWR<7:0>
  (1)   015440  001465                                 BEQ     $OVER           ;;BR IF YES
  (1)   015442  105737  001103                 2$:     TSTB    $ERFLG          ;;HAS AN ERROR OCCURRED?
  (1)   015446  001421                                 BEQ     3$              ;;BR IF NO
  (1)   015450  123737  001115  001103                 CMPB    $ERMAX,$ERFLG   ;;MAX. ERRORS FOR THIS TEST OCCURRED?
  (1)   015456  101015                                 BHI     3$              ;;BR IF NO
  (1)   015460  032777  001000  163452                 BIT     #BIT09,@SWR     ;;LOOP ON ERROR?
  (1)   015466  001404                                 BEQ     4$              ;;BR IF NO
  (1)   015470  013737  001110  001106         7$:     MOV     $LPERR,$LPADR   ;;SET LOOP ADDRESS TO LAST SCOPE
  (1)   015476  000446                                 BR      $OVER
  (1)   015500  105037  001103                 4$:     CLRB    $ERFLG          ;;ZERO THE ERROR FLAG
  (1)   015504  005037  001160                         CLR     $TIMES          ;;CLEAR THE NUMBER OF ITERATIONS TO MAKE
  (1)   015510  000415                                 BR      1$              ;;ESCAPE TO THE NEXT TEST
  (1)   015512  032777  004000  163420         3$:     BIT     #BIT11,@SWR     ;;INHIBIT ITERATIONS?
  (1)   015520  001011                                 BNE     1$              ;;BR IF YES
  (1)   015522  005737  001202                         TST     $PASS           ;;IF FIRST PASS OF PROGRAM
  (1)   015526  001406                                 BEQ     1$              ;;         INHIBIT ITERATIONS
  (1)   015530  005237  001104                         INC     $ICNT           ;;INCREMENT ITERATION COUNT
  (1)   015534  023737  001160  001104                 CMP     $TIMES,$ICNT    ;;CHECK THE NUMBER OF ITERATIONS MADE
  (1)   015542  002024                                 BGE     $OVER           ;;BR IF MORE ITERATION REQUIRED
  (1)   015544  012737  000001  001104         1$:     MOV     #1,$ICNT        ;;REINITIALIZE THE ITERATION COUNTER
  (1)   015552  013737  015630  001160                 MOV     $MXCNT,$TIMES   ;;SET NUMBER OF ITERATIONS TO DO
  (1)   015560  105237  001102                 $SVLAD: INCB    $TSTNM          ;;COUNT TEST NUMBERS
  (1)   015564  113737  001102  001200                 MOVB    $TSTNM,$TESTN   ;;SET TEST NUMBER IN APT MAILBOX
  (1)  015572  011637  001106                    MOV     (SP),$LPADR       ;;SAVE SCOPE LOOP ADDRESS
  (1)  015576  011637  001110                    MOV     (SP),$LPERR       ;;SAVE ERROR LOOP ADDRESS
  (1)  015602  005037  001162                    CLR     $ESCAPE           ;;CLEAR THE ESCAPE FROM ERROR ADDRESS
  (1)  015606  112737  000001  001115            MOVB    #1,$ERMAX         ;;ONLY ALLOW ONE(1) ERROR ON NEXT TEST
  (1)  015614  013777  001102  163320  $OVER:    MOV     $TSTNM,@DISPLAY   ;;DISPLAY TEST NUMBER
  (1)  015622  013716  001106                    MOV     $LPADR,(SP)       ;;FUDGE RETURN ADDRESS
  (1)  015626  000002                            RTI                       ;;FIXES PS
  (1)  015630  003720                  $MXCNT:   2000.                     ;;MAX. NUMBER OF ITERATIONS
 1331                                  .SBTTL    ERROR HANDLER ROUTINE
  (1)
  (2)                                  ;;*************************************************************
  (1)                                  ;*THIS ROUTINE WILL INCREMENT THE ERROR FLAG AND THE ERROR COUNT,
  (1)                                  ;*SAVE THE ERROR ITEM NUMBER AND THE ADDRESS OF THE ERROR CALL
  (1)                                  ;*AND GO TO $ERRTYP ON ERROR
  (1)                                  ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
  (1)                                  ;*SW15=1          HALT ON ERROR
  (1)                                  ;*SW13=1          INHIBIT ERROR TYPEOUTS
  (1)                                  ;*SW10=1          BELL ON ERROR
  (1)                                  ;*SW09=1          LOOP ON ERROR
  (1)                                  ;*CALL
  (1)                                  ;*        ERROR   N         ;;ERROR=EMT AND N=ERROR ITEM NUMBER
  (1)
  (1)  015632                          $ERROR:
  (1)  015632  104410                            CKSWR                     ;;TEST FOR CHANGE IN SOFT-SWR
  (1)  015634  105237  001103          7$:       INCB    $ERFLG            ;;SET THE ERROR FLAG
  (1)  015640  001775                            BEQ     7$                ;;DON'T LET THE FLAG GO TO ZERO
  (1)  015642  013777  001102  163272            MOV     $TSTNM,@DISPLAY   ;;DISPLAY TEST NUMBER AND ERROR FLAG
  (1)  015650  032777  002000  163262            BIT     #BIT10,@SWR       ;;BELL ON ERROR?
  (1)  015656  001402                            BEQ     1$                ;;NO - SKIP
  (1)  015660  104401  001164                    TYPE    ,$BELL            ;;RING BELL
  (1)  015664  005237  001112          1$:       INC     $ERTTL            ;;COUNT THE NUMBER OF ERRORS
  (1)  015670  011637  001116                    MOV     (SP),$ERRPC       ;;GET ADDRESS OF ERROR INSTRUCTION
  (1)  015674  162737  000002  001116            SUB     #2,$ERRPC
  (1)  015702  117737  163210  001114            MOVB    @$ERRPC,$ITEMB    ;;STRIP AND SAVE THE ERROR ITEM CODE
  (1)  015710  032777  020000  163222            BIT     #BIT13,@SWR       ;;SKIP TYPEOUT IF SET
  (1)  015716  001004                            BNE     20$               ;;SKIP TYPEOUTS
  (1)  015720  004737  016032                    JSR     PC,$ERRTYP        ;;GO TO USER ERROR ROUTINE
  (1)  015724  104401  001171                    TYPE    ,$CRLF
  (1)  015730                          20$:
  (1)  015730  122737  000001  001214            CMPB    #APTENV,$ENV      ;;RUNNING IN APT MODE
  (1)  015736  001007                            BNE     2$                ;;NO,SKIP APT ERROR REPORT
  (1)  015740  113737  001114  015752            MOVB    $ITEMB,21$        ;;SET ITEM NUMBER AS ERROR NUMBER
  (1)  015746  004737  016540                    JSR     PC,$ATY4          ;;REPORT FATAL ERROR TO APT
  (1)  015752     000                  21$:      .BYTE   0
  (1)  015753     000                            .BYTE   0
  (1)  015754  000777                  22$:      BR      22$               ;;APT ERROR LOOP
  (1)  015756  005777  163156          2$:       TST     @SWR              ;;HALT ON ERROR
  (1)  015762  100002                            BPL     3$                ;;SKIP IF CONTINUE
  (1)  015764  000000                            HALT                      ;;HALT ON ERROR!
  (1)  015766  104410                            CKSWR                     ;;TEST FOR CHANGE IN SOFT-SWR
  (1)  015770  032777  001000  163142  3$:       BIT     #BIT09,@SWR       ;;LOOP ON ERROR SWITCH SET?
  (1)  015776  001402                            BEQ     4$                ;;BR IF NO
  (1)  016000  013716  001110                    MOV     $LPERR,(SP)       ;;FUDGE RETURN FOR LOOPING
  (1)  016004  005737  001162          4$:       TST     $ESCAPE           ;;CHECK FOR AN ESCAPE ADDRESS
  (1)  016010  001402                            BEQ     5$                ;;BR IF NONE
  (1)  016012  013716  001162                    MOV     $ESCAPE,(SP)      ;;FUDGE RETURN ADDRESS FOR ESCAPE
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   (1)  016016                              5$:
   (1)  016016  022737  010342  000042              CMP     #$ENDAD,@#42        ;;ACT-11 AUTO-ACCEPT?
   (1)  016024  001001                              BNE     6$                  ;;BRANCH IF NO
   (1)  016026  000000                              HALT                        ;;YES
   (1)  016030                              6$:
   (1)  016030  000002                              RTI                         ;;RETURN
   1332                                     .SBTTL  ERROR MESSAGE TYPEOUT ROUTINE
   (1)
   (2)                                      ;;*****************************************************************
   (1)                                      ;*THIS ROUTINE USES THE "ITEM CONTROL BYTE" ($ITEMB) TO DETERMINE WHICH
   (1)                                      ;*ERROR IS TO BE REPORTED. IT THEN OBTAINS, FROM THE 'ERROR TABLE" ($ERRTB),
   (1)                                      ;*AND REPORTS THE APPROPRIATE INFORMATION CONCERNING THE ERROR.
   (1)
   (1)  016032                              $ERRTYP:
   (1)  016032  104401  001171                      TYPE    ,$CRLF              ;;"CARRIAGE RETURN" & 'LINE FEED"
   (1)  016036  010046                              MOV     R0,-(SP)            ;;SAVE R0
   (1)  016040  005000                              CLR     R0                  ;;PICKUP THE ITEM INDEX
   (1)  016042  153700  001114                      BISB    @#$ITEMB,R0
   (1)  016046  001004                              BNE     1$                  ;;IF ITEM NUMBER IS ZERO, JUST
   (1)                                                                          ;;TYPE THE PC OF THE ERROR
   (2)  016050  013746  001116                      MOV     $ERRPC,-(SP)        ;;SAVE $ERRPC FOR TYPEOUT
   (2)                                                                          ;;ERROR ADDRESS
   (2)  016054  104402                              TYPOC                       ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
   (1)  016056  000426                              BR      6$                  ;;GET OUT
   (1)  016060  005300                      1$:     DEC     R0                  ;;ADJUST THE INDEX SO THAT IT WILL
   (1)  016062  006300                              ASL     R0                  ;;       WORK FOR THE ERROR TABLE
   (1)  016064  006300                              ASL     R0
   (1)  016066  006300                              ASL     R0
   (1)  016070  062700  001256                      ADD     #$ERRTB,R0          ;;FORM TABLE POINTER
   (1)  016074  012037  016104                      MOV     (R0)+,2$            ;;PICKUP 'ERROR MESSAGE" POINTER
   (1)  016100  001404                              BEQ     3$                  ;;SKIP TYPEOUT IF NO POINTER
   (1)  016102  104401                              TYPE                        ;;TYPE THE 'ERROR MESSAGE"
   (1)  016104  000000                      2$:     .WORD   0                   ;;"ERROR MESSAGE" POINTER GOES HERE
   (1)  016106  104401  001171                      TYPE    ,$CRLF              ;;"CARRIAGE RETURN" & 'LINE FEED"
   (1)  016112  012037  016122              3$:     MOV     (R0)+,4$            ;;PICKUP 'DATA HEADER" POINTER
   (1)  016116  001404                              BEQ     5$                  ;;SKIP TYPEOUT IF 0
   (1)  016120  104401                              TYPE                        ;;TYPE THE 'DATA HEADER"
   (1)  016122  000000                      4$:     .WORD   0                   ;;"DATA HEADER" POINTER GOES HERE
   (1)  016124  104401  001171                      TYPE    ,$CRLF              ;;"CARRIAGE RETURN" & 'LINE FEED"
   (1)  016130  011000                      5$:     MOV     (R0),R0             ;;PICKUP 'DATA TABLE" POINTER
   (1)  016132  001004                              BNE     7$                  ;;GO TYPE THE DATA
   (1)  016134  012600                      6$:     MOV     (SP)+,R0            ;;RESTORE R0
   (1)  016136  104401  001171                      TYPE    ,$CRLF              ;;"CARRIAGE RETURN" & 'LINE FEED"
   (1)  016142  000207                              RTS     PC                  ;;RETURN
   (1)  016144                              7$:
   (2)  016144  013046                              MOV     @(R0)+,-(SP)        ;;SAVE @(R0)+ FOR TYPEOUT
   (2)  016146  104402                              TYPOC                       ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
   (1)  016150  005710                              TST     (R0)                ;;IS THERE ANOTHER NUMBER?
   (1)  016152  001770                              BEQ     6$                  ;;BR IF NO
   (1)  016154  104401  016162                      TYPE    ,8$                 ;;TYPE TWO(2) SPACES
   (1)  016160  000771                              BR      7$                  ;;LOOP
   (1)  016162  020040     000              8$:     .ASCIZ  /  /                ;;TWO(2) SPACES
   (1)          016166                              .EVEN
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                                               .SBTTL  TYPE ROUTINE
 (1)
 (2)                                           ;;*******************************************************************
 (1)                                           ;*ROUTINE TO TYPE ASCIZ MESSAGE. MESSAGE MUST TERMINATE WITH A 0 BYTE.
 (1)                                           ;*THE ROUTINE WILL INSERT A NUMBER OF NULL CHARACTERS AFTER A LINE FEED.
 (1)                                           ;*NOTE1:         $NULL CONTAINS THE CHARACTER TO BE USED AS THE FILLER CHARACTER.
 (1)                                           ;*NOTE2:         $FILLS CONTAINS THE NUMBER OF FILLER CHARACTERS REQUIRED.
 (1)                                           ;*NOTE3:         $FILLC CONTAINS THE CHARACTER TO FILL AFTER.
 (1)                                           ;*
 (1)                                           ;*CALL:
 (1)                                           ;*1) USING A TRAP INSTRUCTION
 (1)                                           ;*       TYPE     ,MESADR            ;;MESADR IS FIRST ADDRESS OF AN ASCIZ STRING
 (1)                                           ;*OR
 (1)                                           ;*       TYPE
 (1)                                           ;*       MESADR
 (1)                                           ;*
 (1)
 (1)  016166  105737  001157                   $TYPE:  TSTB    $TPFLG            ;;IS THERE A TERMINAL?
 (1)  016172  100002                                   BPL     1$                ;;BR IF YES
 (1)  016174  000000                                   HALT                      ;;HALT HERE IF NO TERMINAL
 (1)  016176  000430                                   BR      3$                ;;LEAVE
 (1)  016200  010046                           1$:     MOV     R0,-(SP)          ;;SAVE R0
 (1)  016202  017600  000002                           MOV     @2(SP),R0         ;;GET ADDRESS OF ASCIZ STRING
 (1)  016206  122737  000001  001214                   CMPB    #APTENV,$ENV      ;;RUNNING IN APT MODE
 (1)  016214  001011                                   BNE     62$               ;;NO,GO CHECK FOR APT CONSOLE
 (1)  016216  132737  000100  001215                   BITB    #APTSPOOL,$ENVM   ;;SPOOL MESSAGE TO APT
 (1)  016224  001405                                   BEQ     62$               ;;NO,GO CHECK FOR CONSOLE
 (1)  016226  010037  016236                           MOV     R0,61$            ;;SETUP MESSAGE ADDRESS FOR APT
 (1)  016232  004737  016530                           JSR     PC,$ATY3          ;;SPOOL MESSAGE TO APT
 (1)  016236  000000                           61$:    .WORD   0                 ;;MESSAGE ADDRESS
 (1)  016240  132737  000040  001215           62$:    BITB    #APTCSUP,$ENVM    ;;APT CONSOLE SUPPRESSED
 (1)  016246  001003                                   BNE     60$               ;;YES,SKIP TYPE OUT
 (1)  016250  112046                           2$:     MOVB    (R0)+,-(SP)       ;;PUSH CHARACTER TO BE TYPED ONTO STACK
 (1)  016252  001005                                   BNE     4$                ;;BR IF IT ISN'T THE TERMINATOR
 (1)  016254  005726                                   TST     (SP)+             ;;IF TERMINATOR POP IT OFF THE STACK
 (1)  016256  012600                           60$:    MOV     (SP)+,R0          ;;RESTORE R0
 (1)  016260  062716  000002                   3$:     ADD     #2,(SP)           ;;ADJUST RETURN PC
 (1)  016264  000002                                   RTI                       ;;RETURN
 (1)  016266  122716  000011                   4$:     CMPB    #HT,(SP)          ;;BRANCH IF <HT>
 (1)  016272  001430                                   BEQ     8$
 (1)  016274  122716  000200                           CMPB    #CRLF,(SP)        ;;BRANCH IF NOT <CRLF>
 (1)  016300  001006                                   BNE     5$
 (1)  016302  005726                                   TST     (SP)+             ;;POP  <CR><LF> EQUIV
 (1)  016304  104401                                   TYPE                      ;;TYPE A CR AND LF
 (1)  016306  001171                                   $CRLF
 (1)  016310  105037  016516                           CLRB    $CHARCNT          ;;CLEAR CHARACTER COUNT
 (1)  016314  000755                                   BR      2$                ;;GET NEXT CHARACTER
 (1)  016316  004737  016400                   5$:     JSR     PC,$TYPEC         ;;GO TYPE THIS CHARACTER
 (1)  016322  123726  001156                   6$:     CMPB    $FILLC,(SP)+      ;;IS IT TIME FOR FILLER CHARS.?
 (1)  016326  001350                                   BNE     2$                ;;IF NO GO GET NEXT CHAR.
 (1)  016330  013746  001154                           MOV     $NULL,-(SP)       ;;GET # OF FILLER CHARS. NEEDED
 (1)                                                                             ;;AND THE NULL CHAR.
 (1)  016334  105366  000001                   7$:     DECB    1(SP)             ;;DOES A NULL NEED TO BE TYPED?
 (1)  016340  002770                                   BLT     6$                ;;BR IF NO--GO POP THE NULL OFF OF STACK
 (1)  016342  004737  016400                           JSR     PC,$TYPEC         ;;GO TYPE A NULL
 (1)  016346  105337  016516                           DECB    $CHARCNT          ;;DO NOT COUNT AS A COUNT
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   (1)  016352  000770                              BR      7$              ;;LOOP
   (1)
   (1)                                     ;HORIZONTAL TAB PROCESSOR
   (1)
   (1)  016354  112716  000040             8$:      MOVB    #' ,(SP)        ;;REPLACE TAB WITH SPACE
   (1)  016360  004737  016400             9$:      JSR     PC,$TYPEC       ;;TYPE A SPACE
   (1)  016364  132737  000007  016516              BITB    #7,$CHARCNT     ;;BRANCH IF NOT AT
   (1)  016372  001372                              BNE     9$              ;;TAB STOP
   (1)  016374  005726                              TST     (SP)+           ;;POP SPACE OFF STACK
   (1)  016376  000724                              BR      2$              ;;GET NEXT CHARACTER
   (1)  016400                             $TYPEC:
   (1)  016400  105777  162540                      TSTB    @$TKS           ;;CHAR IN KYBD BUFFER?                  ;MJD001
   (1)  016404  100022                              BPL     10$             ;;BR IF NOT                             ;MJD001
   (1)  016406  017746  162534                      MOV     @$TKB,-(SP)     ;;GET CHAR                              ;MJD001
   (1)  016412  042716  177600                      BIC     #177600,(SP)    ;;STRIP EXTRANEOUS BITS                 ;MJD001
   (1)  016416  122716  000023                      CMPB    #$XOFF,(SP)     ;;WAS CHAR XOFF                         ;MJD001
   (1)  016422  001012                              BNE     102$            ;;BR IF NOT                             ;MJD001
   (1)  016424                             101$:                                                                ;MJD001
   (1)  016424  105777  162514                      TSTB    @$TKS           ;;WAIT FOR CHAR                         ;MJD001
   (1)  016430  100375                              BPL     101$                                                    ;MJD001
   (1)  016432  117716  162510                      MOVB    @$TKB,(SP)      ;;GET CHAR                              ;MJD001
   (1)  016436  042716  177600                      BIC     #177600,(SP)    ;;STRIP IT                              ;MJD001
   (1)  016442  122716  000021                      CMPB    #$XON,(SP)      ;;WAS IT XON?                           ;MJD001
   (1)  016446  001366                              BNE     101$            ;;BR IF NOT                             ;MJD001
   (1)  016450                             102$:                                                                ;MJD001
   (1)  016450  005726                              TST     (SP)+           ;;FIX STACK                             ;MJD001
   (1)  016452                             10$:                                                                 ;MJD001
   (1)  016452  105777  162472                      TSTB    @$TPS           ;;WAIT UNTIL PRINTER IS READY
   (1)  016456  100375                              BPL     10$                                                     ;MJD001
   (1)  016460  116677  000002  162464              MOVB    2(SP),@$TPB     ;;LOAD CHAR TO BE TYPED INTO DATA REG.
   (1)  016466  122766  000015  000002              CMPB    #CR,2(SP)       ;;IS CHARACTER A CARRIAGE RETURN?
   (1)  016474  001003                              BNE     1$              ;;BRANCH IF NO
   (1)  016476  105037  016516                      CLRB    $CHARCNT        ;;YES--CLEAR CHARACTER COUNT
   (1)  016502  000406                              BR      $TYPEX          ;;EXIT
   (1)  016504  122766  000012  000002      1$:     CMPB    #LF,2(SP)       ;;IS CHARACTER A LINE FEED?
   (1)  016512  001402                              BEQ     $TYPEX          ;;BRANCH IF YES
   (1)  016514  105227                              INCB    (PC)+           ;;COUNT THE CHARACTER
   (1)  016516  000000                     $CHARCNT:.WORD   0               ;;CHARACTER COUNT STORAGE
   (1)  016520  000207                     $TYPEX:  RTS     PC
   (1)
  1335                                     .SBTTL  APT COMMUNICATIONS ROUTINE
   (1)
   (2)                                     ;;*******************************************************************
   (1)  016522  112737  000001  016766     $ATY1:   MOVB    #1,$FFLG        ;;TO REPORT FATAL ERROR
   (1)  016530  112737  000001  016764     $ATY3:   MOVB    #1,$MFLG        ;;TO TYPE A MESSAGE
   (1)  016536  000403                              BR      $ATYC
   (1)  016540  112737  000001  016766     $ATY4:   MOVB    #1,$FFLG        ;;TO ONLY REPORT FATAL ERROR
   (1)  016546                             $ATYC:
   (3)  016546  010046                              MOV     R0,-(SP)        ;;PUSH R0 ON STACK
   (3)  016550  010146                              MOV     R1,-(SP)        ;;PUSH R1 ON STACK
   (1)  016552  105737  016764                      TSTB    $MFLG           ;;SHOULD TYPE A MESSAGE?
   (1)  016556  001450                              BEQ     5$              ;;IF NOT:  BR
   (1)  016560  122737  000001  001214              CMPB    #APTENV,$ENV    ;;OPERATING UNDER APT?
   (1)  016566  001031                              BNE     3$              ;;IF NOT:  BR
   (1)  016570  132737  000100  001215              BITB    #APTSPOOL,$ENVM ;;SHOULD SPOOL MESSAGES?
   (1)  016576  001425                              BEQ     3$              ;;IF NOT:  BR
   (1)  016600  017600  000004                      MOV     @4(SP),R0           ;;GET MESSAGE ADDR.
   (1)  016604  062766  000002  000004              ADD     #2,4(SP)                    ;;BUMP RETURN ADDR.
   (1)  016612  005737  001174          1$:         TST     $MSGTYPE            ;;SEE IF DONE W/ LAST XMISSION?
   (1)  016616  001375                              BNE     1$                  ;;IF NOT:  WAIT
   (1)  016620  010037  001210                      MOV     R0,$MSGAD           ;;PUT ADDR IN MAILBOX
   (1)  016624  105720                  2$:         TSTB    (R0)+               ;;FIND END OF MESSAGE
   (1)  016626  001376                              BNE     2$
   (1)  016630  163700  001210                      SUB     $MSGAD,R0           ;;SUB START OF MESSAGE
   (1)  016634  006200                              ASR     R0                  ;;GET MESSAGE LNGTH IN WORDS
   (1)  016636  010037  001212                      MOV     R0,$MSGLGT          ;;PUT LENGTH IN MAILBOX
   (1)  016642  012737  000004  001174              MOV     #4,$MSGTYPE         ;;TELL APT TO TAKE MSG.
   (1)  016650  000413                              BR      5$
   (1)  016652  017637  000004  016676  3$:         MOV     @4(SP),4$           ;;PUT MSG ADDR IN JSR LINKAGE
   (1)  016660  062766  000002  000004              ADD     #2,4(SP)                    ;;BUMP RETURN ADDRESS
   (3)  016666  013746  177776                      MOV     177776,-(SP)        ;;PUSH 177776 ON STACK
   (1)  016672  004737  016166                      JSR     PC,$TYPE            ;;CALL TYPE MACRO
   (1)  016676  000000                  4$:         .WORD   0
   (1)  016700                          5$:
   (1)  016700  105737  016766          10$:        TSTB    $FFLG               ;;SHOULD REPORT FATAL ERROR?
   (1)  016704  001416                              BEQ     12$                 ;;IF NOT:  BR
   (1)  016706  005737  001214                      TST     $ENV                ;;RUNNING UNDER APT?
   (1)  016712  001413                              BEQ     12$                 ;;IF NOT:  BR
   (1)  016714  005737  001174          11$:        TST     $MSGTYPE            ;;FINISHED LAST MESSAGE?
   (1)  016720  001375                              BNE     11$                 ;;IF NOT:  WAIT
   (1)  016722  017637  000004  001176              MOV     @4(SP),$FATAL       ;;GET ERROR #
   (1)  016730  062766  000002  000004              ADD     #2,4(SP)                    ;;BUMP RETURN ADDR.
   (1)  016736  005237  001174                      INC     $MSGTYPE            ;;TELL APT TO TAKE ERROR
   (1)  016742  105037  016766          12$:        CLRB    $FFLG               ;;CLEAR FATAL FLAG
   (1)  016746  105037  016765                      CLRB    $LFLG               ;;CLEAR LOG FLAG
   (1)  016752  105037  016764                      CLRB    $MFLG               ;;CLEAR MESSAGE FLAG
   (3)  016756  012601                              MOV     (SP)+,R1            ;;POP STACK INTO R1
   (3)  016760  012600                              MOV     (SP)+,R0            ;;POP STACK INTO R0
   (1)  016762  000207                              RTS     PC                  ;;RETURN
   (1)  016764     000                  $MFLG:      .BYTE   0                   ;;MESSG. FLAG
   (1)  016765     000                  $LFLG:      .BYTE   0                   ;;LOG FLAG
   (1)  016766     000                  $FFLG:      .BYTE   0                   ;;FATAL FLAG
   (1)          016770                              .EVEN
   (1)          000200                  APTSIZE=200
   (1)          000001                  APTENV=001
   (1)          000100                  APTSPOOL=100
   (1)          000040                  APTCSUP=040
```

```
 1337                                    .SBTTL  BINARY TO OCTAL (ASCII) AND TYPE
  (1)
  (2)                                    ;;*******************************************************************
  (1)                                    ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 6-DIGIT
  (1)                                    ;*OCTAL (ASCII) NUMBER AND TYPE IT.
  (1)                                    ;*$TYPOS---ENTER HERE TO SETUP SUPPRESS ZEROS AND NUMBER OF DIGITS TO TYPE
  (1)                                    ;*CALL:
  (1)                                    ;*      MOV     NUM,-(SP)          ;;NUMBER TO BE TYPED
  (1)                                    ;*      TYPOS                      ;;CALL FOR TYPEOUT
  (1)                                    ;*      .BYTE   N                  ;;N=1 TO 6 FOR NUMBER OF DIGITS TO TYPE
  (1)                                    ;*      .BYTE   M                  ;;M=1 OR 0
  (1)                                    ;*                                         ;;1=TYPE LEADING ZEROS
  (1)                                    ;*                                         ;;0=SUPPRESS LEADING ZEROS
  (1)                                    ;*
  (1)                                    ;*$TYPON----ENTER HERE TO TYPE OUT WITH THE SAME PARAMETERS AS THE LAST
  (1)                                    ;*$TYPOS OR $TYPOC
  (1)                                    ;*CALL:
  (1)                                    ;*      MOV     NUM,-(SP)          ;;NUMBER TO BE TYPED
  (1)                                    ;*      TYPON                      ;;CALL FOR TYPEOUT
  (1)                                    ;*
  (1)                                    ;*$TYPOC---ENTER HERE FOR TYPEOUT OF A 16 BIT NUMBER
  (1)                                    ;*CALL:
  (1)                                    ;*      MOV     NUM,-(SP)          ;;NUMBER TO BE TYPED
  (1)                                    ;*      TYPOC                      ;;CALL FOR TYPEOUT
  (1)
  (1)  016770  017646  000000            $TYPOS: MOV     @(SP),-(SP)        ;;PICKUP THE MODE
  (1)  016774  116637  000001  017213            MOVB    1(SP),$0FILL       ;;LOAD ZERO FILL SWITCH
  (1)  017002  112637  017215                    MOVB    (SP)+,$OMODE+1     ;;NUMBER OF DIGITS TO TYPE
  (1)  017006  062716  000002                    ADD     #2,(SP)            ;;ADJUST RETURN ADDRESS
  (1)  017012  000406                            BR      $TYPON
  (1)  017014  112737  000001  017213    $TYPOC: MOVB    #1,$0FILL          ;;SET THE ZERO FILL SWITCH
  (1)  017022  112737  000006  017215            MOVB    #6,$OMODE+1        ;;SET FOR SIX(6) DIGITS
  (1)  017030  112737  000005  017212    $TYPON: MOVB    #5,$OCNT           ;;SET THE ITERATION COUNT
  (1)  017036  010346                            MOV     R3,-(SP)           ;;SAVE R3
  (1)  017040  010446                            MOV     R4,-(SP)           ;;SAVE R4
  (1)  017042  010546                            MOV     R5,-(SP)           ;;SAVE R5
  (1)  017044  113704  017215                    MOVB    $OMODE+1,R4        ;;GET THE NUMBER OF DIGITS TO TYPE
  (1)  017050  005404                            NEG     R4
  (1)  017052  062704  000006                    ADD     #6,R4              ;;SUBTRACT IT FOR MAX. ALLOWED
  (1)  017056  110437  017214                    MOVB    R4,$OMODE          ;;SAVE IT FOR USE
  (1)  017062  113704  017213                    MOVB    $0FILL,R4          ;;GET THE ZERO FILL SWITCH
  (1)  017066  016605  000012                    MOV     12(SP),R5          ;;PICKUP THE INPUT NUMBER
  (1)  017072  005003                            CLR     R3                 ;;CLEAR THE OUTPUT WORD
  (1)  017074  006105                    1$:     ROL     R5                 ;;ROTATE MSB INTO "C"
  (1)  017076  000404                            BR      3$                 ;;GO DO MSB
  (1)  017100  006105                    2$:     ROL     R5                 ;;FORM THIS DIGIT
  (1)  017102  006105                            ROL     R5
  (1)  017104  006105                            ROL     R5
  (1)  017106  010503                            MOV     R5,R3
  (1)  017110  006103                    3$:     ROL     R3                 ;;GET LSB OF THIS DIGIT
  (1)  017112  105337  017214                    DECB    $OMODE             ;;TYPE THIS DIGIT?
  (1)  017116  100016                            BPL     7$                 ;;BR IF NO
  (1)  017120  042703  177770                    BIC     #177770,R3         ;;GET RID OF JUNK
  (1)  017124  001002                            BNE     4$                 ;;TEST FOR 0
  (1)  017126  005704                            TST     R4                 ;;SUPPRESS THIS 0?
  (1)  017130  001403                            BEQ     5$                 ;;BR IF YES
```

```
   (1)  017132  005204                        4$:     INC     R4                  ;;DON'T SUPPRESS ANYMORE 0'S
   (1)  017134  052703  000060                        BIS     #'0,R3              ;;MAKE THIS DIGIT ASCII
   (1)  017140  052703  000040                5$:     BIS     #' ,R3              ;;MAKE ASCII IF NOT ALREADY
   (1)  017144  110337  017210                        MOVB    R3,8$               ;;SAVE FOR TYPING
   (1)  017150  104401  017210                        TYPE    ,8$                 ;;GO TYPE THIS DIGIT
   (1)  017154  105337  017212                7$:     DECB    $OCNT               ;;COUNT BY 1
   (1)  017160  003347                                BGT     2$                  ;;BR IF MORE TO DO
   (1)  017162  002402                                BLT     6$                  ;;BR IF DONE
   (1)  017164  005204                                INC     R4                  ;;INSURE LAST DIGIT ISN'T A BLANK
   (1)  017166  000744                                BR      2$                  ;;GO DO THE LAST DIGIT
   (1)  017170  012605                        6$:     MOV     (SP)+,R5            ;;RESTORE R5
   (1)  017172  012604                                MOV     (SP)+,R4            ;;RESTORE R4
   (1)  017174  012603                                MOV     (SP)+,R3            ;;RESTORE R3
   (1)  017176  016666  000002  000004                MOV     2(SP),4(SP)         ;;SET THE STACK FOR RETURNING
   (1)  017204  012616                                MOV     (SP)+,(SP)
   (1)  017206  000002                                RTI                         ;;RETURN
   (1)  017210     000                        8$:     .BYTE   0                   ;;STORAGE FOR ASCII DIGIT
   (1)  017211     000                                .BYTE   0                   ;;TERMINATOR FOR TYPE ROUTINE
   (1)  017212     000                        $OCNT:  .BYTE   0                   ;;OCTAL DIGIT COUNTER
   (1)  017213     000                        $OFILL: .BYTE   0                   ;;ZERO FILL SWITCH
   (1)  017214  000000                        $OMODE: .WORD   0                   ;;NUMBER OF DIGITS TO TYPE
  1338                                        .SBTTL  BINARY TO ASCII AND TYPE ROUTINE
   (1)
   (2)                                        ;;*****************************************************************
   (1)                                        ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 16-BIT
   (1)                                        ;*BINARY-ASCII NUMBER AND TYPE IT.
   (1)                                        ;*CALL:
   (1)                                        ;*      MOV     NUMBER,-(SP)        ;;NUMBER TO BE TYPED
   (1)                                        ;*      TYPBN                       ;;TYPE IT
   (1)
   (1)  017216  010146                        $TYPBN: MOV     R1,-(SP)            ;;SAVE R1 ON THE STACK
   (1)  017220  016601  000006                        MOV     6(SP),R1            ;;GET THE INPUT NUMBER
   (1)  017224  000261                                SEC                         ;;SET "C" SO CAN KEEP TRACK OF THE NUMBER OF BITS
   (1)  017226  112737  000060  017270        1$:     MOVB    #'0,$BIN            ;;SET CHARACTER TO AN ASCII "0".
   (1)  017234  006101                                ROL     R1                  ;;GET THIS BIT
   (1)  017236  001406                                BEQ     2$                  ;;DONE?
   (1)  017240  105537  017270                        ADCB    $BIN                ;;NO--SET THE CHARACTER EQUAL TO THIS BIT
   (1)  017244  104401  017270                        TYPE    ,$BIN               ;;GO TYPE THIS BIT
   (1)  017250  000241                                CLC                         ;;CLEAR "C" SO CAN KEEP TRACK OF BITS
   (1)  017252  000765                                BR      1$                  ;;GO DO THE NEXT BIT
   (1)  017254  012601                        2$:     MOV     (SP)+,R1            ;;POP THE STACK INTO R1
   (1)  017256  016666  000002  000004                MOV     2(SP),4(SP)         ;;ADJUST THE STACK
   (1)  017264  012616                                MOV     (SP)+,(SP)
   (1)  017266  000002                                RTI                         ;;RETURN TO USER
   (1)  017270     000     000                $BIN:   .BYTE   0,0                 ;;STORAGE FOR ASCII CHAR. AND TERMINATOR
  1339                                        .SBTTL  CONVERT BINARY TO DECIMAL AND TYPE ROUTINE
   (1)
   (2)                                        ;;*****************************************************************
   (1)                                        ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 5-DIGIT
   (1)                                        ;*SIGNED DECIMAL (ASCII) NUMBER AND TYPE IT. DEPENDING ON WHETHER THE
   (1)                                        ;*NUMBER IS POSITIVE OR NEGATIVE A SPACE OR A MINUS SIGN WILL BE TYPED
   (1)                                        ;*BEFORE THE FIRST DIGIT OF THE NUMBER. LEADING ZEROS WILL ALWAYS BE
   (1)                                        ;*REPLACED WITH SPACES.
   (1)                                        ;*CALL:
   (1)                                        ;*      MOV     NUM,-(SP)           ;;PUT THE BINARY NUMBER ON THE STACK
   (1)                                        ;*      TYPDS                       ;;GO TO THE ROUTINE
```

```
(1)
(1)  017272                           $TYPDS:
(3)  017272  010046                            MOV     R0,-(SP)        ;;PUSH R0 ON STACK
(3)  017274  010146                            MOV     R1,-(SP)        ;;PUSH R1 ON STACK
(3)  017276  010246                            MOV     R2,-(SP)        ;;PUSH R2 ON STACK
(3)  017300  010346                            MOV     R3,-(SP)        ;;PUSH R3 ON STACK
(3)  017302  010546                            MOV     R5,-(SP)        ;;PUSH R5 ON STACK
(1)  017304  012746  020200                    MOV     #20200,-(SP)    ;;SET BLANK SWITCH AND SIGN
(1)  017310  016605  000020                    MOV     20(SP),R5       ;;GET THE INPUT NUMBER
(1)  017314  100004                            BPL     1$              ;;BR IF INPUT IS POS.
(1)  017316  005405                            NEG     R5              ;;MAKE THE BINARY NUMBER POS.
(1)  017320  112766  000055  000001            MOVB    #'-,1(SP)       ;;MAKE THE ASCII NUMBER NEG.
(1)  017326  005000                   1$:      CLR     R0              ;;ZERO THE CONSTANTS INDEX
(1)  017330  012703  017506                    MOV     #$DBLK,R3       ;;SETUP THE OUTPUT POINTER
(1)  017334  112723  000040                    MOVB    #' ,(R3)+       ;;SET THE FIRST CHARACTER TO A BLANK
(1)  017340  005002                   2$:      CLR     R2              ;;CLEAR THE BCD NUMBER
(1)  017342  016001  017476                    MOV     $DTBL(R0),R1    ;;GET THE CONSTANT
(1)  017346  160105                   3$:      SUB     R1,R5           ;;FORM THIS BCD DIGIT
(1)  017350  002402                            BLT     4$              ;;BR IF DONE
(1)  017352  005202                            INC     R2              ;;INCREASE THE BCD DIGIT BY 1
(1)  017354  000774                            BR      3$
(1)  017356  060105                   4$:      ADD     R1,R5           ;;ADD BACK THE CONSTANT
(1)  017360  005702                            TST     R2              ;;CHECK IF BCD DIGIT=0
(1)  017362  001002                            BNE     5$              ;;FALL THROUGH IF 0
(1)  017364  105716                            TSTB    (SP)            ;;STILL DOING LEADING 0'S?
(1)  017366  100407                            BMI     7$              ;;BR IF YES
(1)  017370  106316                   5$:      ASLB    (SP)            ;;MSD?
(1)  017372  103003                            BCC     6$              ;;BR IF NO
(1)  017374  116663  000001  177777            MOVB    1(SP),-1(R3)    ;;YES--SET THE SIGN
(1)  017402  052702  000060           6$:      BIS     #'0,R2          ;;MAKE THE BCD DIGIT ASCII
(1)  017406  052702  000040           7$:      BIS     #' ,R2          ;;MAKE IT A SPACE IF NOT ALREADY A DIGIT
(1)  017412  110223                            MOVB    R2,(R3)+        ;;PUT THIS CHARACTER IN THE OUTPUT BUFFER
(1)  017414  005720                            TST     (R0)+           ;;JUST INCREMENTING
(1)  017416  020027  000010                    CMP     R0,#10          ;;CHECK THE TABLE INDEX
(1)  017422  002746                            BLT     2$              ;;GO DO THE NEXT DIGIT
(1)  017424  003002                            BGT     8$              ;;GO TO EXIT
(1)  017426  010502                            MOV     R5,R2           ;;GET THE LSD
(1)  017430  000764                            BR      6$              ;;GO CHANGE TO ASCII
(1)  017432  105726                   8$:      TSTB    (SP)+           ;;WAS THE LSD THE FIRST NON-ZERO?
(1)  017434  100003                            BPL     9$              ;;BR IF NO
(1)  017436  116663  177777  177776            MOVB    -1(SP),-2(R3)   ;;YES--SET THE SIGN FOR TYPING
(1)  017444  105013                   9$:      CLRB    (R3)            ;;SET THE TERMINATOR
(3)  017446  012605                            MOV     (SP)+,R5        ;;POP STACK INTO R5
(3)  017450  012603                            MOV     (SP)+,R3        ;;POP STACK INTO R3
(3)  017452  012602                            MOV     (SP)+,R2        ;;POP STACK INTO R2
(3)  017454  012601                            MOV     (SP)+,R1        ;;POP STACK INTO R1
(3)  017456  012600                            MOV     (SP)+,R0        ;;POP STACK INTO R0
(1)  017460  104401  017506                    TYPE    ,$DBLK          ;;NOW TYPE THE NUMBER
(1)  017464  016666  000002  000004            MOV     2(SP),4(SP)     ;;ADJUST THE STACK
(1)  017472  012616                            MOV     (SP)+,(SP)
(1)  017474  000002                            RTI                     ;;RETURN TO USER
(1)  017476  023420                   $DTBL:   10000.
(1)  017500  001750                            1000.
(1)  017502  000144                            100.
(1)  017504  000012                            10.
(1)  017506  000004                   $DBLK:   .BLKW   4
```

```
 1341                                     .SBTTL  TRAP DECODER
  (1)
  (2)                                     ;;*****************************************************************
  (1)                                     ;*THIS ROUTINE WILL PICKUP THE LOWER BYTE OF THE "TRAP" INSTRUCTION
  (1)                                     ;*AND USE IT TO INDEX THROUGH THE TRAP TABLE FOR THE STARTING ADDRESS
  (1)                                     ;*OF THE DESIRED ROUTINE. THEN USING THE ADDRESS OBTAINED IT WILL
  (1)                                     ;*GO TO THAT ROUTINE.
  (1)
  (1)  017516  010046                     $TRAP:  MOV     R0,-(SP)         ;;SAVE R0
  (1)  017520  016600  000002                     MOV     2(SP),R0         ;;GET TRAP ADDRESS
  (1)  017524  005740                             TST     -(R0)            ;;BACKUP BY 2
  (1)  017526  111000                             MOVB    (R0),R0          ;;GET RIGHT BYTE OF TRAP
  (1)  017530  006300                             ASL     R0               ;;POSITION FOR INDEXING
  (1)  017532  016000  017552                     MOV     $TRPAD(R0),R0    ;;INDEX TO TABLE
  (1)  017536  000200                             RTS     R0               ;;GO TO ROUTINE
  (1)
  (1)
  (1)                                     ;;THIS IS USE TO HANDLE THE "GETPRI" MACRO
  (1)
  (1)  017540  011646                     $TRAP2: MOV     (SP),-(SP)       ;;MOVE THE PC DOWN
  (1)  017542  016666  000004  000002             MOV     4(SP),2(SP)      ;;MOVE THE PSW DOWN
  (1)  017550  000002                             RTI                      ;;RESTORE THE PSW
  (1)
  (3)                                     .SBTTL  TRAP TABLE
  (3)
  (3)                                     ;*THIS TABLE CONTAINS THE STARTING ADDRESSES OF THE ROUTINES CALLED
  (3)                                     ;*BY THE "TRAP" INSTRUCTION.
  (3)
  (3)                                     ;       ROUTINE
  (3)                                     ;       -------
  (3)  017552  017540                     $TRPAD: .WORD   $TRAP2
  (3)  017554  016166                             $TYPE   ;;CALL=TYPE     TRAP+1(104401)  TTY TYPEOUT ROUTINE
  (3)  017556  017014                             $TYPOC  ;;CALL=TYPOC    TRAP+2(104402)  TYPE OCTAL NUMBER (WITH LEADING ZEROS)
  (3)  017560  016770                             $TYPOS  ;;CALL=TYPOS    TRAP+3(104403)  TYPE OCTAL NUMBER (NO LEADING ZEROS)
  (3)  017562  017030                             $TYPON  ;;CALL=TYPON    TRAP+4(104404)  TYPE OCTAL NUMBER (AS PER LAST CALL)
  (3)  017564  017272                             $TYPDS  ;;CALL=TYPDS    TRAP+5(104405)  TYPE DECIMAL NUMBEP (WITH SIGN)
  (3)  017566  017216                             $TYPBN  ;;CALL=TYPBN    TRAP+6(104406)  TYPE BINARY (ASCII) NUMBER
  (1)
  (3)  017570  014172                             $GTSWR  ;;CALL=GTSWR    TRAP+7(104407)  GET SOFT-SWR SETTING
  (1)
  (3)  017572  014102                             $CKSWR  ;;CALL=CKSWR    TRAP+10(104410) TEST FOR CHANGE IN SOFT-SWR
  (3)  017574  014444                             $RDCHR  ;;CALL=RDCHR    TRAP+11(104411) TTY TYPEIN CHARACTER ROUTINE
  (3)  017576  014534                             $RDLIN  ;;CALL=RDLIN    TRAP+12(104412) TTY TYPEIN STRING ROUTINE
  (3)  017600  015072                             $RDOCT  ;;CALL=RDOCT    TRAP+13(104413) READ AN OCTAL NUMBER FROM TTY
 1342  017602  004060                             TEST    ;;CALL=CHECK    TRAP+14(104414)
 1343  017604  004052                             TESTIT  ;;CALL=CHKIT    TRAP+15(104415)
 1344                                     .EVEN
 1345  017606  000240                             NOP             ;JUST TO FIND THE LAST LOCATION OF THE PROGRAM
 1346          000001                     .END
```

```
ABASE  = 170400        17#     54      93      94      95      96      97
ACDW1  = 000000        54
ACDW2  = 000000        54
ACPUOP= 000000         54
ADBUFF   001322        95#    260     319     327     343     368     391     403     416     435     444     455     466
                      689     717     746     789     820     849     877     977    1087    1151*   1155*   1194
ADDW0  = 000000        54
ADDW1  = 000000        54
ADDW10= 000000         54
ADDW11= 000000         54
ADDW12= 000000         54
ADDW13= 000000         54
ADDW14= 000000         54
ADDW15= 000000         54
ADDW2  = 000000        54
ADDW3  = 000000        54
ADDW4  = 000000        54
ADDW5  = 000000        54
ADDW6  = 000000        54
ADDW7  = 000000        54
ADDW8  = 000000        54
ADDW9  = 000000        54
ADEVCT= 000000         54
ADEVM  = 000000        54
ADOT     011114       954    1271#
ADST1    001320        94#   1150*   1154*
ADV11C   001372       115#    196     663     684     712    1139*
AENV   = 000000        54
AENVM  = 000000        54
AFATAL= 000000         54
AGATST   010242      1250#   1254
ACTST    010252      1105*   1112*   1118*   1252#
AMADR1= 000000         54
AMADR2= 000000         54
AMADR3= 000000         54
AMADR4= 000000         54
AMAMS1= 000000         54
AMAMS2= 000000         54
AMAMS3= 000000         54
AMAMS4= 000000         54
AMSG     011047      1265#
AMSGAD= 000000         54
AMSGLG= 000000         54
AMSGTY= 000000         54
AMTYP1= 000000         54
AMTYP2= 000000         54
AMTYP3= 000000         54
AMTYP4= 000000         54
APASS  = 000000        54
APRIOR= 000200         19#     54
APTCSU= 000040       1334    1335#
APTENV= 000001       1331    1334    1335#
APTSIZ= 000200        159    1335#
APTSPO= 000100       1334    1335#
ASKTA    001456       141#    174     179     185     190     194     198     202
ASWREG= 000000         54
```

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                                                                  N 6
MAINDEC-11-CVAXA-A      MACY11 30G(1063)  14-JUL-81  15:10  PAGE 41-1
CVAXAA.P11    10-JUL-81 14:32          CROSS REFERENCE TABLE -- USER SYMBOLS                              SEQ 0078

ATESTN= 000000          54
AUNIT = 000000          54
AUSWR = 000000          54
AVECT1= 000400          18#     54      98      99      100     101
AVECT2= 000000          54
AZERO   011116         956*    959*    960     962*    965*    966     1272#
BARF    001356         109#    129
BEGINA  007320         231     237     1109#   1145
BEGIND  007360         173     1122#
BEGINL  007302         233     239     1103#
BEGINW  007342         235     241     1116#
BEGIN0  001522          22     156#    1252
BEGIN2  001530          23     158#    1324
BEGL    002530         256#    1104    1110
BEGST   001534         157     159#
BIT0  = 000001          15#    354     383     387     448     1122
BIT00 = 000001          15#
BIT01 = 000002          15#
BIT02 = 000004          15#
BIT03 = 000010          15#
BIT04 = 000020          15#
BIT05 = 000040          15#
BIT06 = 000100          15#
BIT07 = 000200          15#
BIT08 = 000400          15#    1330
BIT09 = 001000          15#    1330    1331
BIT1  = 000002          15#    1125
BIT10 = 002000          15#    1331
BIT11 = 004000          15#    1330
BIT12 = 010000          15#    268     1023    1032
BIT13 = 020000          15#    1331
BIT14 = 040000          15#    272     372     374     1330
BIT15 = 100000          15#    300     313     323     372     374     386     441
BIT2  = 000004          15#    291     1128
BIT3  = 000010          15#    295     1131
BIT4  = 000020          15#    286     409     425     460     1134
BIT5  = 000040          15#    282     396     441     443     1137
BIT6  = 000100          15#    277     354     358
BIT7  = 000200          15#    321     358     386     396     409     425     441     460
BIT8  = 000400          15#    264
BIT9  = 001000          15#    109
BPTVEC= 000014          15#
BTEX    001402         119#    184*    192     458     1136*
CCHAN   011122         913     997     1274#
CH      011067         923     948     1267#
CHANL   001362         111#    1182*   1320
CHAN00= 000000          28#    507     539     691
CHAN01= 000001          29#    514     564
CHAN02= 000002          30#    521     589
CHAN03= 000003          31#    528     613     630     638     646     654
CHAN04= 000004          32#    544
CHAN05= 000005          33#    569
CHAN06= 000006          34#    594
CHAN07= 000007          35#    617
CHAN10= 000010          36#    552
CHAN11= 000011          37#    577
```

```
CHAN12= 000012         38#     602
CHAN13= 000013         39#     666     719
CHAN14= 000014         40#     748     794
CHAN15= 000015         41#     755     823
CHAN16= 000016         42#     762     852
CHAN17= 000017         43#     769     880
CHECK = 104414         316     324     335     344     388     401     414     433     463   1342#
CHKIT = 104415         265     273     278     283     287     292     296     301   1343#
CKSWR = 104410        1330    1331   1341#
CMSG    011042       1264#
COMPAR  010046         508     515     522     529     545     553     570     578     595     603     618     631     639
                       647     655     667     692     720     749     756     763     770     795     824     853     881
                     1208#
CONVRT  007710         506     513     520     527     538     543     551     563     568     576     588     593     601
                       612     616     665     690     718     747     754     761     768     793     822     851     879
                     1180#
CONVTR  007714         629     637     645     653     926    1008   1181#
CR    = 000015         15#    1334
CRLF  = 000200         15#     167    1334
CRWR    011276         428   1277#
DACA    001324         96#     261    491*    687*    697*    702*   1012*   1024*   1033*   1048*   1052*   1056*   1068*
                     1071*   1086*   1152*   1156*
DACB    001326         97#     262    492*    662*    715*    725*    730*   1013*   1025*   1034*   1049*   1053*   1057*
                     1069*   1072*   1153*   1157*
DAC0    001344        104#    787*    803*
DAC1    001346        105#    818*    832*
DAC2    001350        106#    847*    861*
DAC3    001352        107#    875*    889*
DDISP = 177570         15#      54     159
DF1     013544          71      78      84      90   1322#
DH1     013335          69   1314#
DH2     013375          88   1315#
DH3     013454          76      82   1316#
DISPLA  001142         54#    159*   1330*   1331*
DISPRE  000174         22#     159
DONE    011101        1235   1270#
DSWR  = 177570         15#      54     159
DT1     013504          70   1319#
DT2     013516          89   1320#
DT3     013534          77      83   1321#
DUMC    010164         360     367     376     379   1231#
DUMW    010112         348     370   1221#
ECHAN   011230       1276#
EMTVEC= 000030         15#    159*
EM1     013215          68   1310#
EM2     013237          75   1311#
EM3     013263          81   1312#
EM4     013310          87   1313#
ERRVEC= 000004         15#    159*   1148*   1330*
FIXONE  007506         168   1148#
GAIN00= 000000         45#     628
GAIN01= 000004         46#     636
GAIN10= 000010         47#     644
GAIN11= 000014         48#     652
GCHAN   011162         917    1001   1275#
GMSG    011054       1266#
```

```
GNS    = ****** U          22      167     1341     1342     1343
GTSWR  = 104407           167     1341#
HEAD2    013144          1309#
HEAD5    011443          1280#
HT     = 000011            15#    1334
IOTST1   006306           242      908#
IOTST2   006462           243      940#
IOTST3   006664           244      996#
IOTST4   006772           245     1019#
IOTST5   007062           246     1043#
IOTST6   007150           247     1064#
IOTST7   007216           248     1078#
IOTVEC=  000020            15#     159*
KWAD     001374           116#     176      394      439     1124*
KWBPR    001342           103#     398*     411*     442*
KWCSR    001340           102#     399*     412*     445*     446
KWEX     001376           117#     181      407     1127*
LF     = 000012            15#    1334
MAEX     001400           118#     178*     187      421
METST    011463          1225     1281#
MSADV    012147           195     1292#
MSBTEX   012054           191     1290#
MSGNEX   012016           427     1288#
MSG70    012345           208     1297#
MSG71    011377           209     1279#
MSIO1    010376           909     1257#
MSIO2    010454           940     1258#
MSIO3    010514           996     1259#
MSIO4    010557          1019     1260#
MSIO5    010632          1043     1261#
MSIO6    010677          1064     1262#
MSIO7    010770          1078     1263#
MSKWAD   011505           144      175     1282#
MSKWEX   011567           180     1284#
MSMAEX   011676           186     1286#
MSTC1    012176           199     1293#
MSTC2    012255           203     1295#
OKCHAR   002434           219      230#
ONAD     011336          1227     1278#
OTHER    010044           628*     636*     644*     652*     919*     920*     921*     922*    1003*    1004*    1005*    1006*    1180*
                         1184     1205#
PIRQ   = 177772            15#
PIRQVE=  000240            15#
PR0    = 000000            15#
PR1    = 000040            15#
PR2    = 000100            15#
PR3    = 000140            15#
PR4    = 000200            15#
PR5    = 000240            15#
PR6    = 000300            15#
PR7    = 000340            15#
PS     = 177776            15#
PSW    = 177776            15#
PWRVEC=  000024            15#     159*    1328*
QUEST    011077           226     1269#
RDCHR  = 104411          1324     1341#
```

```
RDLIN = 104412      145     211     429     1050    1054    1058    1326    1341#
RDOCT = 104413      914     918     998     1002    1341#
RESVEC= 000010       15#
RETERR  004102      481     483#
RETURN  001440      135#    1190
RST     010214     1239#
SLASH   011120     1273#
SPACE   011072      928     976     1094    1268#
SPREAD  001364      112#    1209*   1215    1320
STACK = 001100       15#    159
STALL   001426      129#    322     400     413     462     1070    1073
STKLMT= 177774       15#
STREG   001316       93#    259     305*    308     313*    320*    323*    331*    332     340*    341     354*    355
                    357     372*    373     380*    383*    384     387*    397*    404*    410*    417*    426*    436*
                    443*    448*    450     461*    465*    478*    479     688*    716*    745*    788*    819*    848*
                    876*    908*    971*    972*    973     1083*   1084    1149*   1186*   1192*   1228    1319    1320
                   1321
SWR     001140       54#    159*    167     1324*   1328*   1330    1331
SWREG   000176       22#    159     167     1324
SW0   = 000001       15#
SW00  = 000001       15#
SW01  = 000002       15#
SW02  = 000004       15#
SW03  = 000010       15#
SW04  = 000020       15#
SW05  = 000040       15#
SW06  = 000100       15#
SW07  = 000200       15#
SW08  = 000400       15#
SW09  = 001000       15#
SW1   = 000002       15#
SW10  = 002000       15#
SW11  = 004000       15#
SW12  = 010000       15#
SW13  = 020000       15#
SW14  = 040000       15#
SW15  = 100000       15#
SW2   = 000004       15#
SW3   = 000010       15#
SW4   = 000020       15#
SW5   = 000040       15#
SW6   = 000100       15#
SW7   = 000200       15#
SW8   = 000400       15#
SW9   = 001000       15#
TBITVE= 000014       15#
TC1     001366      113#    200     504     536     561     586     610     626     682     710     1130*
TC2     001370      114#    204     743     784     815     844     872     1133*
TEMP    001360      110#    156*    158*    169     540     541     565     566     590     591     614     929     1011*
                   1012     1013    1185*   1196*   1199*   1200*   1201*   1202*   1210
TEST    004060      479#    1342
TESTIT  004052      478#    1343
TKVEC = 000060       15#    1324*
TPVEC = 000064       15#
TRAPVE= 000034       15#    159*
TRTVEC= 000014       15#
```

```
TRYAG    002356            211#     227
TST1     002530            257#
TST10    002716            294#
TST11    002732            299#
TST12    002746            303#
TST13    003012            309      312#
TST14    003044            318#
TST15    003106            329#
TST16    003150            339#
TST17    003174            347#
TST2     002564            263#
TST20    003322            361      369#     377
TST21    003406            382#
TST22    003450            393#
TST23    003530            395      406#
TST24    003610            408      420#
TST25    003676            422      424      438#
TST26    004002            440      457#
TST27    004046            459      469#
TST3     002614            271#
TST30    004104            489#
TST31    004166            503#
TST32    004304            505      535#
TST33    004404            537      560#
TST34    004504            562      585#
TST35    004604            587      609#
TST36    004656            611      625#
TST37    005024            627      661#
TST4     002630            275#
TST40    005070            664      678#
TST41    005220            683      685      706#
TST42    005350            711      713      740#
TST43    005500            744      781#
TST44    005642            785      806      812#
TST45    006000            816      835      841#
TST46    006136            845      864      870#
TST47    006274            873      892      895#
TST5     002652            281#
TST6     002666            285#
TST7     002702            290#
TYPBN  = 104406           1341#
TYPDS  = 104405           1254     1341#
TYPE   = 104401            142      143      167      208      209      226      427      428      909      913      917      923      928
                           935      940      945      948      954      960      966      976      990      996      997     1001     1019
                          1043     1064     1078     1080     1094     1225     1227     1235     1254     1324     1328     1331     1332
                          1334     1337     1338     1339     1341#
TYPOC  = 104402           1324     1332     1341#
TYPON  = 104404           1341#
TYPOS  = 104403            924      929      951      978     1088     1226     1228     1341#
UNEXP    001404            121#     276      363
VECTOR   001330             98#     276*     352*     363*    1158*    1159*    1160     1162     1164     1190*
VECTR1   001332             99#     353*    1160*    1161*
VECTR2   001334            100#     371*    1162*    1163*
VECTR3   001336            101#    1164*    1165*
VWRAP    001354            108#     510      517      524      531      633      641      649      657      694      722      797      826
                           855      883
```

```
V12       010240          1248#
V2        010236           547     555     572     580     597     605     620     669     751     758     765     772    1247#
WRAP      004104           489#   1111    1117
$APTHD    001000            53#
$ASTAT= ****** U          1335
$ATYC     016546          1335#
$ATY1     016522          1335#
$ATY3     016530          1334    1335#
$ATY4     016540          1331    1335#
$AUTOB    001134            54#    167*    171    1324
$BASE     001250            54#   1149    1150    1151    1152    1153
$BDADR    001122            54#
$BDDAT    001126            54#    308*    357*    373*    450*    451     479*    480    1210*   1212    1319    1320    1321
$BELL     001164            54#   1324    1331
$BIN      017270          1338#*
$CDW1     001254            54#
$CHARC    016516          1334#*
$CKSWR    014102          1324#   1341
$CMTAG    001100            54#    159
$CM3    = 000000            54#
$CNTLC    015030          1324#
$CNTLG    015042          1324#
$CNTLU    015035          1324#
$CPUOP    001222            54#
$CRLF     001171            54#    142     935     945     990    1080    1324    1331    1332    1334
$DBLK     017506          1339#
$DEVCT    001204            54#
$DEVM     001252            54#   1122    1125    1128    1131    1134    1137
$DOAGN    010352          1254#
$DTBL     017476          1339#
$ENDAD    010342            51     167    1254#   1331
$ENDCT    010310           159    1254#
$ENDMG    010361          1254#
$ENULL    010356          1254#
$ENV      001214            54#    167    1331    1334    1335
$ENVM     001215            54#    159    1334    1335
$EOP      010254          1106    1113    1119    1254#
$EOPCT    010302           159*   1254#
$ERFLG    001103            54#    122*   1330*   1331*
$ERMAX    001115            54#    159*   1330*
$ERROR    015632           159    1331#
$ERRPC    001116            54#   1319    1320    1321    1331*   1332
$ERRTB    001256            54#   1332
$ERRTY    016032          1331    1332#
$ERTTL    001112            54#   1331*
$ESCAP    001162            54#    121*    124*    159*   1330*   1331
$ETABL    001214            54#
$ETEND    001256            53      54#
$FATAL    001176            54#   1335*
$FFLG     016766          1335#*
$FILLC    001156            54#   1334
$FILLS    001155            54#   1334
$GDADR    001120            54#
$GDDAT    001124            54#    264*    267*    268     272*    277*    282*    286*    291*    295*    300*    304*    321*
                           330*    358*    374*    386*    396*    397     409*    410     425*    426     441*    451     460*
                           461     478     480    1208*   1211    1319    1320
```

```
$GET42  010332          1254#
$GTSWR  014172          1324#   1341
$HD   = 000000            14
$HIBTS  001000            53#
$HIOCT  015172          1326#*
$ICNT   001104            54#   1330*
$ILLUP  015334          1328#
$INTAG  001135            54#   1324*
$ITEMB  001114            54#   1331*   1332
$LF     001172            54#   1324    1331    1334
$LFLG   016765          1335#*
$LPADR  001106            54#    159*    257*    494*   1224*   1234*   1330*
$LPERR  001110            54#    159*    493*   1223*   1233*   1330*   1331
$MADR1  001226            54#
$MADR2  001232            54#
$MADR3  001236            54#
$MADR4  001242            54#
$MAIL   001174            53      54#    159     167    1330    1331    1334
$MAMS1  001224            54#
$MAMS2  001230            54#
$MAMS3  001234            54#
$MAMS4  001240            54#
$MBADR  001002            53#
$MFLG   016764          1335#*
$MNEW   015060          1324#
$MSGAD  001210            54#   1335*
$MSGLG  001212            54#   1335*
$MSGTY  001174            54#   1335*
$MSWR   015047          1324#
$MTYP1  001225            54#
$MTYP2  001231            54#
$MTYP3  001235            54#
$MTYP4  001241            54#
$MXCNT  015630          1330#
$NULL   001154            54#   1334
$NWTST= 000001           257#    263#    271#    275#    281#    285#    290#    294#    299#    303#    312#    318#    329#
                         339#    347#    369#    382#    393#    406#    420#    438#    457#    469#    489#    503#    535#
                         560#    585#    609#    625#    661#    678#    706#    740#    781#    812#    841#    870#    895#
$OCNT   017212          1337#*
$OMODE  017214          1337#*
$OVER   015614          1330#
$PASS   001202            54#    159*    423    1221    1231    1254*   1330
$PASTM  001006            53#
$POWER  015342          1328#
$PWRDN  015174           159    1328#
$PWRMG  015330          1328#
$PWRUP  015246          1328#
$QUES   001170            54#   1324    1331    1334
$RDCHR  014444          1324#   1341
$RDDEC= ****** U        1341
$RDLIN  014534          1324#   1341
$RDOCT  015072          1326#   1341
$RDSZ = 000040          1324#
$RTNAD  010354          1254#
$R2A  = ****** U        1341
$SAVRE= ****** U        1341
```

```
$SAVR6  015340          1328#*
$SCOPE  015352           159     1330#
$SETUP= 000137            55#     159      167     1254     1324     1330     1331
$STUP = 177777            55#
$SVLAD  015560          1330#
$SVPC = 000106            51#
$SWR  = 167400             6#      14       16       54      159      257      263      271      275      281      285      290      294
                         299      303      312      318      329      339      347      369      382      393      406      420      438
                         457      469      489      503      535      560      585      609      625      661      678      706      740
                         781      812      841      870      895     1254     1328     1330     1331
$SWREG  001216            54#     159
$SWRMK= 000000            16     1330
$TESTN  001200            54#    1330*
$TIMES  001160            54#     159*     303*     312*     329*     489*     503*     535*     560*     585*     609*     625*     661*
                         678*     706*     740*     781*     812*     841*     870*     895*    1254*    1330*
$TKB    001146            54#    1324     1334
$TKCNT  013546          1324#*
$TKINT  013614           164     1324#
$TKQEN= 013614          1324#
$TKQIN  013550          1324#*
$TKQOU  013552          1324#*
$TKQSR  013554          1324#
$TKS    001144            54#     212*     307*     315*     337*    1240*    1250*    1324*    1334
$TKSRV  013664          1324#
$TN   = 000050             7#      14      257#     258      263#     271#     275#     281#     285#     290#     294#     299#     303#
                         309      312#     318#     329#     339#     347#     348      361      369#     370      382#     393#     395
                         406#     408      420#     422      424      438#     440      457#     459      469#     489#     503#     505
                         535#     537      560#     562      585#     587      609#     611      625#     627      661#     664      678#
                         683      685      706#     711      713      740#     744      781#     785      806      812#     816      835
                         841#     845      864      870#     873      892      895#
$TPB    001152            54#    1334*
$TPFLG  001157            54#    1334
$TPS    001150            54#    1334
$TRAP   017516           159     1341#
$TRAP2  017540          1341#
$TRP  = 000016          1341#    1342#    1343#
$TRPAD  017552          1341#
$TSTM   001004            53#
$TSTNM  001102            54#     258*     489*    1254*    1330*    1331
$TTYIN  014770          1324#
$TYPBN  017216          1338#    1341
$TYPDS  017272          1339#    1341
$TYPE   016166           160*     161*     162*     163*    1334#    1335     1341
$TYPEC  016400          1324     1334#
$TYPEX  016520          1334#
$TYPOC  017014          1337#    1341
$TYPON  017030          1337#    1341
$TYPOS  016770          1337#    1341
$UNIT   001206            54#
$UNITM  001010            53#
$USWR   001220            54#
$VECT1  001244            54#    1158
$VECT2  001246            54#
$XOFF = 000023          1334
$XON  = 000021          1334
$XTSTR  015364          1330#
```

```
$$GET4= 000000          1254#
$OFILL  017213          1337#*
$4OCAT= ****** U        1330    1331
.     = 017610            22#     25#     51#     52#     53#     54#    159    1254    1324#   1328    1330    1331    1332#
                        1334    1335#   1339#
.$ASTA= ****** U        1335
.$X   = 001000            53#
```

```
                                                                 J  7
MAINDEC-11-CVAXA-A      MACY11 30G(1063)  14-JUL-81  15:10  PAGE 42                                              SEQ 0087
CVAXAA.P11     10-JUL-81 14:32            CROSS REFERENCE TABLE -- MACRO NAMES

COMMEN     15#
DUMWRN     59#     348     370
ENDCOM     15#
ERROR      15#     123     266     274     279     284     288     293     297     302     310     317     325     336     345
          359      375     389     402     415     434     453     464     511     518     525     532     548     556     573
          581      598     606     621     634     642     650     658     670     701     729     752     759     766     773
          808      837     866     894
ESCAPE     15#     121
GETPRI     15#
GETSWR     15#     167#
MULT       15#
NEWTST     15#     257     263     271     275     281     285     290     294     299     303     312     318     329     339
          347      369     382     393     406     420     438     457     469     489     503     535     560     585     609
          625      661     678     706     740     781     812     841     870     895
POP        15#    1326    1328    1335    1339
PUSH       15#    1326    1328    1335    1339
REPORT     15#
SCOPE      15#     263     271     275     281     285     290     294     299     303     312     318     329     339     347
          369      382     393     406     420     438     457     469     503     535     560     585     609     625     661
          678      706     740     781     812     841     870     895
SETPRI     15#    1324
SETTRA   1341#    1342    1343
SETUP      15#     159
SKIP       15#     269     309     361     395     408     422     424     440     452     459     481     505     537     562
          587      611     627     664     683     685     700     711     713     728     744     785     806     816     835
          845      864     873     892
SLASH      15#
SPACE      15#
STARS      15#      51      53      54     257     263     271     275     281     285     290     294     299     303     312
          318      329     339     347     369     382     393     406     420     438     457     469     489     503     535
          560      585     609     625     661     678     706     740     781     812     841     870     895    1254    1324
         1326     1328    1330    1331    1332    1334    1335    1337    1338    1339    1341
SWRSU      15#     159#
TRMTRP   1341#
TYPBIN     15#
TYPDEC     15#    1254
TYPNAM     15#     167
TYPNUM     15#
TYPOCS     15#     924     929    1226    1228
TYPOCT     15#    1324    1332
TYPTXT     15#
$$CMRE     54#
$$CMTM     54#
$$ESCA     15#
$$NEWT     15#     257     263     271     275     281     285     290     294     299     303     312     318     329     339
          347      369     382     393     406     420     438     457     469     489     503     535     560     585     609
          625      661     678     706     740     781     812     841     870     895
$$SET    1341#    1342    1343
$$SETM    159#
$$SKIP     15#     309     361     395     408     422     424     440     459     505     537     562     587     611     627
          664      683     685     711     713     744     785     806     816     835     845     864     873     892
.EQUAT      8#      15
.HEADE      8#      14
.SETUP     10#      55
.SWRHI     10#      16
.SWRLO     16#
```

```
.$ACT1      11#      51
.$APTB      11#      54#
.$APTH      11#      53
.$APTY      11#    1335
.$CATC       8#      22
.$CMTA       8#      54
.$EOP        8#    1254
.$ERRO       8#    1331
.$ERRT      10#    1332
.$PARM       9#
.$POWE       9#    1328
.$RAND      11#
.$RDOC      11#    1326
.$READ       9#    1324
.$SAVE       9#
.$SCOP       9#    1330
.$SPAC      10#
.$SWDO      10#
.$TRAP      10#    1341
.$TYPB       9#    1338
.$TYPD      11#    1339
.$TYPE      10#    1334
.$TYPO       9#    1337

. ABS.  017610     000      CON    RW     ABS     LCL     D

 ERRORS DETECTED:  0

 CVAXAA,CVAXAA/CRF=CVAXAA
 RUN-TIME: 23 10 1 SECONDS
 RUN-TIME RATIO: 955/34=27.3
 CORE USED:  26K  (51 PAGES)
```