MINC-11

SIZER PROGRAM

CVMNFA0

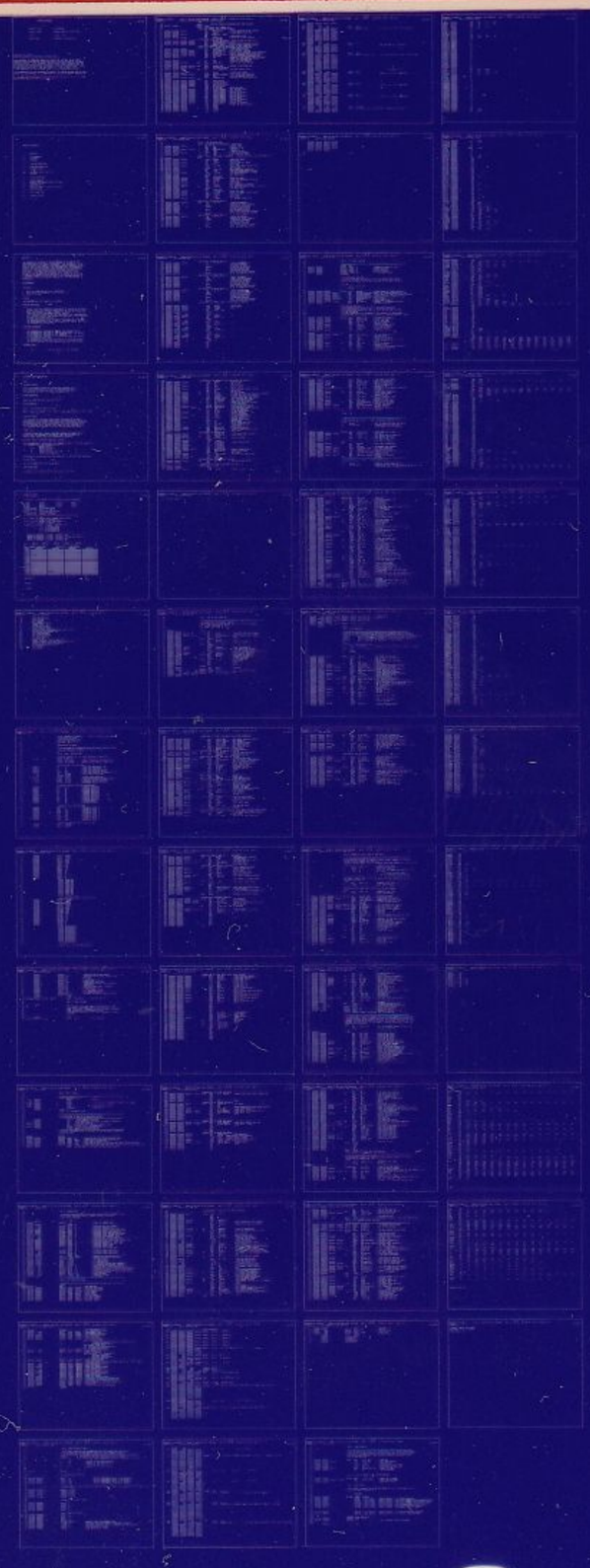
AH-B101A-MC

FICHE 1 OF 1

DEC 1978

digital

MADE IN USA



IDENTIFICATION

PRODUCT CODE:	AC-B100A-MC
PRODUCT NAME:	CVMNFA0 MINC-11 SIZER PROG
DATE:	AUGUST 1978
MAINTAINER:	DIAGNOSTIC ENGINEERING

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1.0 ABSTRACT

THE PURPOSE OF THE MINC-11 SIZER PROGRAM IS TO VERIFY THE CONFIGURATION OF THE MINC-11 HARDWARE. THE PROGRAM IS TO BE USED TO VERIFY THE CORRECT POSITION OF ANALOG CHANNELS, DEVICE ADDRESS AND VECTOR SWITCHES. THE PROGRAM SIZES THE MUNBER OF MINC-11 OPTIONS AND REPORTS THEIR EXISTANCE, BUS AND VECTOR ADDRESSES. TWO ADDITIONAL REPORTS ARE MADE IF REQUESTED. THE FIRST IS THE MODE OF THE MNCAD (A/D) CHANNELS. THE SECOND IS THE ADDRESS USAGE MAP WHICH IS USEFUL IN DETECTING A INCORRECT ADDRESS SWITCH SETTING. TOTAL PROGRAM CONTROL IS ACCOMPLISHED THRU THE CONSOLE TERMINAL VIA THE PROVISIONS OF SECTION 5.

2.0 REQUIREMENTS

2.1 EQUIPMENT

1. PDP11/03 COMPUTER OR LSI-11 PROCESSOR
2. DLV11 WITH I/O TERMINAL (LA36, VT100, ETC.)
3. MINC-11 SYSTEM

2.2 STORAGE

THE PROGRAM USES THE LOWER 4K OF MEMORY.

3.0 LOADING PROCEDURE <XXDP>

1. ENSURE THAT THE DIAGNOSTIC LOAD MEDIA IS INSTALLED IN DRIVE 0.
2. BOOT THE MEDIA BY TYPING "173000G" IF IN THE ODT MICRO-CODE STATE OR CYCLING THE POWER "ON-OFF" SWITCH.
3. UPON SUCCESSFUL BOOTING OF THE LOAD MEDIA, THE XXDP MONITOR WILL IDENTIFY ITSELF AND INFORM THE OPERATOR OF THE OPERATING OPTIONS THAT MAYBE SELECTED.
4. THE OPERATOR SHOULD TYPE "R VMNF??" FOLLOWED BY A "RETURN" THE XXDP MONITOR WILL LOAD THE PROGRAM INTO MEMORY AND START THE PROGRAM AT LOCATION 200.

4.0 STARTING PROCEDURE

1. THE PROGRAM WILL RESPOND BY TYPING THE PROGRAM TITLE.
2. THE PROGRAM WILL NOW ASK IF THE OPERATOR WANTS THE REPORT OF THE MODES OF THE MNCAD (A/D) CHANNELS.
3. THE PROGRAM WILL NOW ASK IF THE OPERATOR WANTS THE REPORT OF THE ADDRESS USAGE MAP.
4. THE PROGRAM WILL THEN SIZE THE MINC-11 SYSTEM AND REPORT THE DEVICE BUS AND VECTOR ADDRESSES AND SELECTED REPORTS.

4.1 PROGRAM START

200 STARTING ADDRESS OF THE PROGRAM

5.0 SOFTWARE SWITCH REGISTER

NONE

5.1 PROGRAM CONTROL

THE SIZING MAYBE STOPPED BY TYPING THE ''CONTROL & C''
KEYS. THIS OPERATION WILL STOP THE PROGRAM AND ENABLE
THE OPERATOR TO SELECT DIFFERENT PROGRAM REPORT'S.

6.0 ERROR REPORTING

NONE, NO ERROR MESSAGES ARE REPORTED.

7.0 MISCELLANEOUS

7.1 MINC-11 BUS ADDRESS MODIFICATION

MODIFY LOCATION '$BASE' (LOC. 1240) IF BASE BUS ADDRESS IS NOT 171000.

7.2 XXDP/APT NOTES

THIS PROGRAM IS CHAINABLE UNDER XXDP (REQUIRES 8K OR MORE).
WHEN RUN IN ''CHAIN'' MODE, THE PROGRAM WILL REQUIRE THE OPERATOR
TO PERFORM INITIAL SETUP OPERATIONS. THE SIZER PROGRAM SHOULD
NOT BE INCLUDED IN A ''CHAIN'' THAT LOOPS TO THE STARTING FILE.
THIS PROGRAM DOES SUPPORT ''APT'' BUT HAS NOT BEEN RUN UNDER IT.

7.3 POWER FAIL

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

7.4 MULTIPLE MINC-11 OPTION INTERFACE TESTING

THIS PROGRAM DOES ''AUTO-SIZE'' THE NUMBER OF MINC-11 OPTIONS CONNECTED.
THE PROGRAM WILL SIZE SEQUENTIALLY UP TO:

4	MNCAD (A/D)'S
8	MNCKW (CLOCK)'S
8	MNCAA (D/A)'S
8	MNCDO (DIGITAL OUT)'S
8	MNCDI (DIGITAL IN)'S

EACH MINC-11 OPTION MUST BE CONFIGURED WITH CONTIGUOUS BUS ADDRESSES.

7.5 RESTRICTIONS

ALL USER CONNECTIONS MUST BE REMOVED.

8.0 EXECUTION TIME

DEPENDANT UPON TERMINAL SPEED AND REPORTS SELECTED.

9.0 EXAMPLE REPORT


```
A 'TYPICAL'' SIZER REPORT FOR A SYSTEM WITH THE FOLLOWING:

171000          MNCAD           171020          MNCKW
171060          MNCAA           171160          MNCDI
171260          MNCDO           171420          IBV-11
173000-173776   BOOT-STRAP PROM
176500-176526   SLU 0, 1, AND 2
177170          RX01 DISK SUB-SYSTEM
177560-177566   CONSOLE TERMINAL
************************************************************

DO YOU WANT THE MNCAD (A/D) CHANNEL MODE REPORT ?
                TYPE 'Y'' FOR YES = Y
DO YOU WANT THE MEMORY USAGE MAP REPORT ?
                TYPE 'Y'' FOR YES = Y
  ;MNCAD AT ADDRESS = 171000    VECTOR = 400
                  0 -  7 SINGLE ENDED
                 10 - 13 DIFFERENTIAL
                 14 - 17 DIFFERENTIAL
                 20 - 23 DIFFERENTIAL

   ;MNCKW AT ADDRESS = 171020   VECTOR = 400
   ;MNCAA AT ADDRESS = 171060   VECTOR = ** DOES NOT EXIST **
   ;MNCDI AT ADDRESS = 171160   VECTOR = 130
   ;MNCDO AT ADDRESS = 171260   VECTOR = 340

# OF    ;MNCAD 1  ;MNCKW  1  ;MNCAA  1  ;MNCDI  1  ;MNCDO  1

MNC11 MEMORY USAGE MAP          (EACH BIT = 2 ADDRESSES)
 ADDR        000/400          100/500          200/600          300/700
170000 0000000000000000 0000000000000000 0000000000000000 0000000000000000
170400 0000000000000000 0000000000000000 0000000000000000 0000000000000000
171000 1000100000001100 0000000000001100 0000000000001000 0000000000000000
171400 0000110000000000 0000000000000000 0000000000000000 0000000000000000
172000 0000000000000000 0000000000000000 0000000000000000 0000000000000000
172400 0000000000000000 0000000000000000 0000000000000000 0000000000000000
173000 1111111111111111 1111111111111111 1111111111111111 1111111111111111
173400 1111111111111111 1111111111111111 1111111111111111 1111111111111111
174000 0000000000000000 0000000000000000 0000000000000000 0000000000000000
174400 0000000000000000 0000000000000000 0000000000000000 0000000000000000
175000 0000000000000000 0000000000000000 0000000000000000 0000000000000000
175400 0000000000000000 0000000000000000 0000000000000000 0000000000000000
176000 0000000000000000 0000000000000000 0000000000000000 0000000000000000
176400 0000000000000000 1111110000000000 0000000000000000 0000000000000000
177000 0000000000000000 0000000000000010 0000000000000000 0000000000000000
177400 0000000000000000 0000000000001100 0000000000000000 0000000000000000

END PASS #     1
```

10. LISTING

ATTACHED

```
                                .TITLE  MAINDEC-11-DVMNF-A      MINC-11 OPTION SIZER PROGRAM
                                ;*COPYRIGHT (C) 1978
                                ;*DIGITAL EQUIPMENT CORP.
                                ;*MAYNARD, MASS. 01754
                                ;*
                                ;*PROGRAM BY R SHOOP
                                ;*
                                ;*THIS PROGRAM WAS ASSEMBLED USING THE PDP-11 MAINDEC SYSMAC
                                ;*PACKAGE (MAINDEC-11-DZQAC-C3), JAN 19, 1977.
                                ;*
                                .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
```

```
(1)             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
 14           171000                  ABASE=  171000
 15           000100                          .=100
 16  000100  000104  000200  000002          .WORD   104,200,2       ;B EVENT VECTOR
 17
 18                                           .SBTTL  TRAP CATCHER
 19
 20           000000                          .=0
 21                                           ;*ALL UNUSED LOCATIONS FROM 4-776 CONTAIN A ".+2"
 22                                           ;*AND "JSR PC,R0" SEQUENCE TO CATCH ILLEGAL INTERRUPTS.
 23                                           ;*AND INTERRUPTS TO THE WRONG VECTOR.
 24                                           ;*LOCATION 0 CONTAINS A 0 TO CATCH IMPROPERLY LOADED
 25                                           ;*VECTORS.
 35
 36           000200                          .=200
 37  000200  000137  001324                  JMP     BEGIN           ;START ADDRESS
```

```
                                .SBTTL  ACT11 HOOKS

                                ;;******************************************************************
                                ;HOOKS REQUIRED BY ACT11
000204                                  $SVPC=.                 ;SAVE PC
000046                                  .=46
000046  002644                          $ENDAD                  ;;1)SET LOC.46 TO ADDRESS OF $ENDAD IN .$EOP
000052                                  .=52
000052  000000                          .WORD   0               ;;2)SET LOC.52 TO ZERO
000204                                  .=$SVPC                 ;; RESTORE PC
001000                          .=1000
                                .SBTTL  APT PARAMETER BLOCK

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

001000                          $APTHD:
001000  000000                  $HIBTS: .WORD   0       ;;TWO HIGH BITS OF 18 BIT MAILBOX ADDR.
001002  001164                  $MBADR: .WORD   $MAIL   ;;ADDRESS OF APT MAILBOX (BITS 0-15)
001004  002260                  $TSTM:  .WORD   1200.   ;;RUN TIM OF LONGEST TEST
001006  000764                  $PASTM: .WORD   500.    ;;RUN TIME IN SECS. OF 1ST PASS ON 1 UNIT (QUICK VERIFY)
001010  003244                  $UNITM: .WORD   1700.   ;;ADDITIONAL RUN TIME (SECS) OF A PASS FOR EACH ADDITIONAL UNIT
001012  000031                          .WORD   $ETEND-$MAIL/2 ;;LENGTH MAILBOX-ETABLE(WORDS)
```

```
 42                                  .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     077                  $QUES:  .ASCII  /?/             ;;QUESTION MARK
(1)  001161     015                  $CRLF:  .ASCII  <15>            ;;CARRIAGE RETURN
(1)  001162  000012                  $LF:    .ASCIZ  <12>            ;;LINE FEED
(2)                                  ;;*****************************************************************
(2)                                  .SBTTL  APT MAILBOX-ETABLE
(2)
(3)                                  ;;*****************************************************************
(2)                                  .EVEN
(2)  001164                          $MAIL:                          ;;APT MAILBOX
(2)  001164  000000                  $MSGTY: .WORD   AMSGTY          ;;MESSAGE TYPE CODE
(2)  001166  000000                  $FATAL: .WORD   AFATAL          ;;FATAL ERROR NUMBER
(2)  001170  000000                  $TESTN: .WORD   ATESTN          ;;TEST NUMBER
(2)  001172  000000                  $PASS:  .WORD   APASS           ;;PASS COUNT
(2)  001174  000000                  $DEVCT: .WORD   ADEVCT          ;;DEVICE COUNT
(2)  001176  000000                  $UNIT:  .WORD   AUNIT           ;;I/O UNIT NUMBER
(2)  001200  000000                  $MSGAD: .WORD   AMSGAD          ;;MESSAGE ADDRESS
(2)  001202  000000                  $MSGLG: .WORD   AMSGLG          ;;MESSAGE LENGTH
```

```
(2)  001204                    $ETABLE:                    ;;APT ENVIRONMENT TABLE
(2)  001204      000           $ENV:    .BYTE   AENV       ;;ENVIRONMENT BYTE
(2)  001205      000           $ENVM:   .BYTE   AENVM      ;;ENVIRONMENT MODE BITS
(2)  001206  000000            $SWREG:  .WORD   ASWREG     ;;APT SWITCH REGISTER
(2)  001210  000000            $USWR:   .WORD   AUSWR      ;;USER SWITCHES
(2)  001212  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)  001214      000           $MAMS1:  .BYTE   AMAMS1     ;;HIGH ADDRESS,M.S. BYTE
(2)  001215      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)  001216  000000            $MADR1:  .WORD   AMADR1     ;;HIGH ADDRESS,BLK#1
(2)                            ;*                            MEM.LAST ADDR.=3 BYTES,THIS WORD AND LOW OF ''TYPE'' ABOVE
(2)  001220      000           $MAMS2:  .BYTE   AMAMS2     ;;HIGH ADDRESS,M.S. BYTE
(2)  001221      000           $MTYP2:  .BYTE   AMTYP2     ;;MEM.TYPE,BLK#2
(2)  001222  000000            $MADR2:  .WORD   AMADR2     ;;MEM.LAST ADDRESS,BLK#2
(2)  001224      000           $MAMS3:  .BYTE   AMAMS3     ;;HIGH ADDRESS,M.S.BYTE
(2)  001225      000           $MTYP3:  .BYTE   AMTYP3     ;;MEM.TYPE,BLK#3
(2)  001226  000000            $MADR3:  .WORD   AMADR3     ;;MEM.LAST ADDRESS,BLK#3
(2)  001230      000           $MAMS4:  .BYTE   AMAMS4     ;;HIGH ADDRESS,M.S.BYTE
(2)  001231      000           $MTYP4:  .BYTE   AMTYP4     ;;MEM.TYPE,BLK#4
(2)  001232  000000            $MADR4:  .WORD   AMADR4     ;;MEM.LAST ADDRESS,BLK#4
(2)  001234  000000            $VECT1:  .WORD   AVECT1     ;;INTERRUPT VECTOR#1,BUS PRIORITY#1
(2)  001236  000000            $VECT2:  .WORD   AVECT2     ;;INTERRUPT VECTOR#2BUS PRIORITY#2
(2)  001240  171000            $BASE:   .WORD   ABASE      ;;BASE ADDRESS OF EQUIPMENT UNDER TEST
(2)  001242  000000            $DEVM:   .WORD   ADEVM      ;;DEVICE MAP
(2)  001244  000000            $CDW1:   .WORD   ACDW1      ;;CONTROLLER DESCRIPTION WORD#1
(2)  001246                    $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)  001246                         $ERRTB:
 43
 44                                 ;NO ERRORS ARE REPORTED
 45
 46  001246  000020                 KWOFF:  20                      ;OFFSET FROM $BASE VALUE TO KW ADDRESS.
 47  001250  000060                 AAOFF:  60                      ;OFFSET FROM $BASE VALUE TO AA ADDRESS
 48  001252  000160                 DIOFF:  160                     ;OFFSET FROM $BASE VALUE TO DI ADDRESS
 49  001254  000260                 DOOFF:  260                     ;OFFSET FROM $BASE VALUE TO DO ADDRESS
 50
 51                                 ;PROGRAM CREATES THESE ADDRESSES FROM THE VALUE OF $BASE PLUS THE OFFSET FOR THAT DEVICE
 52
 53  001256  171000                 ADBASE: 171000
 54  001260  171020                 KWBASE: 171020
 55  001262  171060                 AABASE: 171060
 56  001264  171160                 DIBASE: 171160
 57  001266  171260                 DOBASE: 171260
 58
 59                                 ;COUNT OF EACH UNIT FOUND
 60
 61  001270  000000                 ADCNT:  0
 62  001272  000000                 KWCNT:  0
 63  001274  000000                 AACNT:  0
 64  001276  000000                 DICNT:  0
 65  001300  000000                 DOCNT:  0
 66
 67                                 ;MISC. TEMP LOCATIONS
 68  001302  000000                 VADR:   0
 69  001304  000000                 VECT:   0
 70  001306  000000                 TEMP:   0
 71  001310  000000                 NBEXT:  0
 72  001312  010114                 OUTADR: ADRPOK          ;ADDRESS VALUE FOR MEMORY USAGE
 73  001314  000000                 FLAGMP: 0               ;NON-ZERO INDICATES MEMORY USAGE MAP IS WANTED
 74  001316  000000                 FLAGAD: 0               ;NON-ZERO INDICATES THE A/D CHANNEL MODES BE REPORTED
 75  001320  000000                 SWREG:  0               ;HERE BECAUSE OF SYSMAC
 76  001322  000000                 DISPRE: 0               ;HERE BECAUSE OF SYSMAC
```

```
 79                                          .SBTTL      INITIAL START-UP,HOUSEKEEPING, AND DIALOGUE
 80  001324  000005                         BEGIN:  RESET
 81                                          .SBTTL  INITIALIZE THE COMMON TAGS
(1)                                          ;;CLEAR THE COMMON TAGS ($CMTAG) AREA
(1)  001326  012706  001100                         MOV     #$CMTAG,R6      ;;FIRST LOCATION TO BE CLEARED
(1)  001332  005026                                 CLR     (R6)+           ;;CLEAR MEMORY LOCATION
(1)  001334  022706  001140                         CMP     #SWR,R6 ;;DONE?
(1)  001340  001374                                 BNE     .-6             ;;LOOP BACK IF NO
(1)  001342  012706  001100                         MOV     #STACK,SP       ;;SETUP THE STACK POINTER
(1)                                          ;;INITIALIZE A FEW VECTORS
(1)  001346  012737  010036  000034                 MOV     #$TRAP,@#TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
(1)  001354  012737  000340  000036                 MOV     #340,@#TRAPVEC+2;LEVEL 7
(1)  001362  013737  002612  002604                 MOV     $ENDCT,$EOPCT   ;;SETUP END-OF-PROGRAM COUNTER
(2)                                          ;;SIZE FOR A HARDWARE SWITCH REGISTER. IF NOT FOUND OR IT IS
(2)                                          ;;EQUAL TO A "-1", SETUP FOR A SOFTWARE SWITCH REGISTER.
(2)  001370  013746  000004                         MOV     @#ERRVEC,-(SP)  ;;SAVE ERROR VECTOR
(2)  001374  012737  001430  000004                 MOV     #64$,@#ERRVEC   ;;SET UP ERROR VECTOR
(2)  001402  012737  177570  001140                 MOV     #DSWR,SWR       ;;SETUP FOR A HARDWARE SWICH REGISTER
(2)  001410  012737  177570  001142                 MOV     #DDISP,DISPLAY  ;;AND A HARDWARE DISPLAY REGISTER
(2)  001416  022777  177777  177514                 CMP     #-1,@SWR        ;;TRY TO REFERENCE HARDWARE SWR
(2)  001424  001012                                 BNE     66$             ;;BRANCH IF NO TIMEOUT TRAP OCCURRED
(2)                                                                         ;;AND  THE HARDWARE SWR IS NOT = -1
(2)  001426  000403                                 BR      65$             ;;BRANCH IF NO TIMEOUT
(2)  001430  012716  001436                 64$:    MOV     #65$,(SP)       ;;SET UP FOR TRAP RETURN
(2)  001434  000002                                 RTI
(2)  001436  012737  001320  001140         65$:    MOV     #SWREG,SWR      ;;POINT TO SOFTWARE SWR
(2)  001444  012737  001322  001142                 MOV     #DISPREG,DISPLAY
(2)  001452  012637  000004                 66$:    MOV     (SP)+,@#ERRVEC  ;;RESTORE ERROR VECTOR
(1)
(2)  001456  005037  001172                         CLR     $PASS           ;;CLEAR PASS COUNT
(2)  001462  132737  000200  001205                 BITB    #APTSIZE,$ENVM  ;;TEST USER SIZE UNDER APT
(2)  001470  001403                                 BEQ     67$             ;;YES,USE NON-APT SWITCH
(2)  001472  012737  001206  001140                 MOV     #$SWREG,SWR     ;;NO,USE APT SWITCH REGISTER
(2)  001500                                 67$:
 82  001500  012737  005046  006560                 MOV     #5046,$TYPE     ;
 83  001506  012737  012746  006562                 MOV     #12746,$TYPE+2
 84  001514  012737  006572  006564                 MOV     #$TYPE+12,$TYPE+4
 85  001522  012737  000002  006566                 MOV     #RTI,$TYPE+6
 86  001530  004737  005656                         JSR     PC,$TKINT       ;INIT THE TKB
 87  001534  013737  001240  001256                 MOV     $BASE,ADBASE    ;GET INITIAL BASE
 88  001542  013737  001256  001260                 MOV     ADBASE,KWBASE   ;GET KW BASE
 89  001550  063737  001246  001260                 ADD     KWOFF,KWBASE    ;UPDATE KW ADDRESS
 90  001556  013737  001256  001262                 MOV     ADBASE,AABASE   ;GET AA BASE
 91  001564  063737  001250  001262                 ADD     AAOFF,AABASE    ;UPDATE AA ADDRESS
 92  001572  013737  001256  001264                 MOV     ADBASE,DIBASE   ;GET DI BASE
 93  001600  063737  001252  001264                 ADD     DIOFF,DIBASE    ;UPDATE DI ADDRESS
 94  001606  013737  001256  001266                 MOV     ADBASE,DOBASE   ;GET DO BASE
 95  001614  063737  001254  001266                 ADD     DOOFF,DOBASE    ;UPDATE DO ADDRESS
 96  001622  005037  001270                         CLR     ADCNT           ;CLEAR THE UNIT COUNTERS
 97  001626  005037  001272                         CLR     KWCNT
 98  001632  005037  001274                         CLR     AACNT
 99  001636  005037  001276                         CLR     DICNT
100  001642  005037  001300                         CLR     DOCNT
```

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                                        .SBTTL  TYPE PROGRAM NAME
                                        ;;TYPE THE NAME OF THE PROGRAM IF FIRST PASS
(1)  001646  005227  177777                     INC     #-1                 ;;FIRST TIME?
(1)  001652  001036                             BNE     68$                 ;;BRANCH IF NO
(1)  001654  022737  002644  000042             CMP     #$ENDAD,@#42        ;;ACT-11?
(1)  001662  001432                             BEQ     68$                 ;;BRANCH IF YES
(1)  001664  104401  001672                     TYPE    ,69$                ;;TYPE ASCIZ STRING
(1)  001670  000427                             BR      68$                 ;;GET OVER THE ASCIZ
(1)                                     ;;69$:  .ASCIZ  <CRLF>#MD-11-DVMNF-A    MINC-11 OPTION SIZER PROGRAM#<CRLF>
(1)  001750                             68$:
103  001750  105737  001205                     TSTB    $ENVM               ;CHECK APT MODE?
104  001754  001042                             BNE     LOOP                ;BR IF YES
105  001756  005737  000042                     TST     CHAIN               ;CHECK XXDP/ACT MODE?
106  001762  001405                             BEQ     1$                  ;BR IF NOT
107  001764  104401  004664                     TYPE    ,SETMNC             ;TELL OPER. ABOUT SETUP STUFF
108  001770  104407                             RDCHR                       ;GET A CHAR
109  001772  012600                             MOV     (SP)+,R0            ;READ WHATEVER CHARACTER
110  001774  000432                             BR      LOOP                ;RUN TEST WHEN OPER IS READY
111  001776  104401  004262             1$:     TYPE    ,QUESAD             ;ASK OPERATOR ABOUT A/D MODE
112  002002  104407                             RDCHR                       ;GET OPER INPUT
113  002004  012600                             MOV     (SP)+,R0            ;
114  002006  042700  177600                     BIC     #177600,R0          ;MASK OFF JUNK
115  002012  005037  001316                     CLR     FLAGAD              ;INIT THE EXPANDED A/D REPORT
116  002016  122700  000131                     CMPB    #'Y,R0              ;CHECK IF 'Y'
117  002022  001002                             BNE     2$                  ;BR IF NOT
118  002024  005237  001316                     INC     FLAGAD              ;SET EXPANDED A/D REPORT
119  002030  104401  004373             2$:     TYPE    ,QUESMP             ;ASK OPERATOR ABOUT MEMORY USAGE MAP
120  002034  104407                             RDCHR                       ;GET OPER INPUT
121  002036  012600                             MOV     (SP)+,R0            ;
122  002040  042700  177600                     BIC     #177600,R0          ;MASK OFF JUNK
123  002044  005037  001314                     CLR     FLAGMP              ;INIT THE MEMORY USAGE REPORT
124  002050  122700  000131                     CMPB    #'Y,R0              ;CHECK IF 'Y'
125  002054  001002                             BNE     LOOP                ;BR IF NOT
126  002056  005237  001314                     INC     FLAGMP              ;SET MEMORY USAGE FLAG
127
128                                     ;NOW VERIFY THE MNCAD MODULES
129  002062  004537  002700             LOOP:   JSR     R5,TEST             ;CHECK THE MNCAD'S
130  002066  003456                             ADGO                        ;ADDRESS OF INTR. STARTUP
131  002070  001256                             ADBASE                      ;STARTING A/D ADDRESS
132  002072  000004                             4                           ;OFFSET TO NEXT UNIT
133  002074  004030                             ADPRI                       ;A/D MESSAGE POINTER
134  002076  000004                             4                           ;MAX. # OF A/D'S ON A SYSTEM
135  002100  001270                             ADCNT                       ;# OF A/D'S FOUND ON SYSTEM
136                                     ;NOW VERIFY THE MNCKW MODULES
137  002102  004537  002700                     JSR     R5,TEST             ;CHECK THE MNCKW'S
138  002106  003474                             KWGO                        ;ADDRESS OF INTR. STARTUP
139  002110  001260                             KWBASE                      ;STARTING K/W ADDRESS
140  002112  000004                             4                           ;OFFSET TO NEXT UNIT
141  002114  004042                             KWPRI                       ;KW MESSAGE POINTER
142  002116  000010                             8.                          ;MAX. # OF KW ON A SYSTEM
143  002120  001272                             KWCNT                       ;# OF KW FOUND ON SYSTEM
```

```
                                ;NOW VERIFY THE MNCAA MODULES
002122  004537  002700                JSR     R5,TEST         ;CHECK THE MNCAA
002126  000000                        0                       ;NO INTR. STARTUP
002130  001262                        AABASE                  ;STARTING AA ADDRESS
002132  000010                        10                      ;OFFSET TO NEXT UNIT
002134  004054                        AAPRI                   ;AA MESSAGE POINTER
002136  000010                        8.                      ;MAX. # OF AA ON A SYSTEM
002140  001274                        AACNT                   ;# OF AA FOUND ON SYSTEM
                                ;NOW VERIFY THE MNCDI MODULES
002142  004537  002700                JSR     R5,TEST         ;CHECK THE MNCDI
002146  003534                        DIGO                    ;INTR. STARTUP ADDRESS
002150  001264                        DIBASE                  ;STARTING DI ADDRESS
002152  000010                        10                      ;OFFSET TO NEXT UNIT
002154  004066                        DIPRI                   ;DI MESSAGE POINTER
002156  000010                        8.                      ;MAX. # OF DI ON A SYSTEM
002160  001276                        DICNT                   ;# OF DI FOUND ON SYSTEM
                                ;NOW VERIFY THE MNCDO MODULES
002162  004537  002700                JSR     R5,TEST         ;CHECK THE MNCDO
002166  003560                        DOGO                    ;INTR. STARTUP ADDRESS
002170  001266                        DOBASE                  ;STARTING DO ADDRESS
002172  000004                        4                       ;OFFSET TO NEXT UNIT
002174  004100                        DOPRI                   ;DO MESSAGE POINTER
002176  000010                        8.                      ;MAX. # OF DO ON A SYSTEM
002200  001300                        DOCNT                   ;# OF DO FOUND ON SYSTEM
                                ;NOW REPORT THE TOTAL COUNT OF EACH MINC-11 MODULE

002202  104401  001161                TYPE    ,$CRLF          ;FRESH LINE
002206  104401  004141                TYPE    ,NIPRI          ;TELL THE #
002212  104401  004030                TYPE    ,ADPRI          ;A/D
002216  013746  001270                MOV     ADCNT,-(SP)
002222  104403                        TYPOS
002224     001     000                .BYTE   1,0
002226  104401  004042                TYPE    ,KWPRI          ;KW
002232  013746  001272                MOV     KWCNT,-(SP)
002236  104403                        TYPOS
002240     002     000                .BYTE   2,0
002242  104401  004054                TYPE    ,AAPRI          ;AA
002246  013746  001274                MOV     AACNT,-(SP)
002252  104403                        TYPOS
002254     002     000                .BYTE   2,0
002256  104401  004066                TYPE    ,DIPRI          ;DI
002262  013746  001276                MOV     DICNT,-(SP)
002266  104403                        TYPOS
002270     002     000                .BYTE   2,0
002272  104401  004100                TYPE    ,DOPRI          ;DO
002276  013746  001300                MOV     DOCNT,-(SP)
002302  104403                        TYPOS
002304     002     000                .BYTE   2,0
002306  000240                        NOP
002310  000240                        NOP
002312  000240                        NOP
002314  000240                        NOP
```

```
                                        ;DETERMINE IF THE MEMORY USAGE MAP SHOULD BE REPORTED
002316  105737  001205                        TSTB    $ENVM           ;TEST IF APT
002322  001006                                BNE     1$              ;BR IF YES
002324  005737  000042                        TST     @#42            ;TEST IF XXDP
002330  001003                                BNE     1$              ;BR IF YES
002332  005737  001314                        TST     FLAGMP          ;TEST IF OPER. ASKED FOR MAP
002336  001002                                BNE     2$              ;BR IF YES
002340  000137  002566                1$:     JMP     $EOP            ;BYPASS REPORT
002344  005037  001314                2$:     CLR     FLAGMP          ;ENSURE ONLY THE 1ST PASS IT'S REPORTED
002350  104401  004474                        TYPE    ,MNCMAP         ;INFORM THE OPER. THE HEADER
002354  013746  000004                        MOV     ERRVEC,-(SP)    ;SAVE CURRENT BUS TRAP VALUE
002360  012700  170000                        MOV     #170000,R0      ;GET 1ST ADDRESS TO MAP
002364  010037  001312                        MOV     R0,OUTADR       ;AND SAVE FOR TYPEOUT
002370  012701  100000                        MOV     #BIT15,R1       ;PRIME THE ROTATING POINTER
002374  005002                                CLR     R2              ;CLEAR TEMP MASK
002376  012703  010114                        MOV     #ADRP0K,R3      ;LOAD MAP BLOCK POINTER
002402  012737  002546  000004                MOV     #4$,ERRVEC      ;LOAD ADDRESS TIMEOUT RETURN
002410  005710                        3$:     TST     (R0)            ;TEST THE ADDRESS
002412  050102                                BIS     R1,R2           ;IF NO TIMEOUT-MARK A 1
002414  062700  000002                        ADD     #2,R0           ;UPDATE ADDRESS
002420  005710                                TST     (R0)            ;TEST THE ADDRESS
002422  050102                                BIS     R1,R2           ;IF NO TIMEOUT-MARK A 1
002424  062700  000002                        ADD     #2,R0           ;UPDATE ADDRESS
002430  000257                                CCC                     ;ENSURE CLEAR CARRY
002432  006001                                ROR     R1              ;MOVE RIGHT
002434  103365                                BCC     3$              ;BR IF MORE BITS LEFT
002436  010223                                MOV     R2,(R3)+        ;SAVE IN MAP BLOCKS
002440  005002                                CLR     R2              ;CLEAR MASK
002442  012701  100000                        MOV     #BIT15,R1       ;LOAD ROTATING BIT
002446  022703  010314                        CMP     #ADRTOP,R3      ;CHECK IF MAP BLOCKS FILLED
002452  001356                                BNE     3$              ;BR IF NOT
                                        ;NOW REPORT THE MEMORY MAP
002454  012700  010114                        MOV     #ADRP0K,R0      ;LOAD MEMORY MAP POINTER
002460  104401  001161                5$:     TYPE    ,$CRLF
002464  013746  001312                        MOV     OUTADR,-(SP)    ;REPORT ADDRESS
002470  104402                                TYPOC
002472  104401  004205                        TYPE    ,SPACE1
002476  004737  002554                        JSR     PC,OUTBIN       ;OUTPUT BINARY BITS
002502  004737  002554                        JSR     PC,OUTBIN
002506  004737  002554                        JSR     PC,OUTBIN
002512  004737  002554                        JSR     PC,OUTBIN
002516  062737  000400  001312                ADD     #400,OUTADR     ;UPDATE ADDRESS VALUE
002524  022700  010314                        CMP     #ADRTOP,R0      ;TEST IF FINISHED
002530  001353                                BNE     5$              ;BR IF NOT
002532  012637  000004                        MOV     (SP)+,ERRVEC    ;RESTORE BUS TRAP VECTOR
002536  104401  001161                        TYPE    ,$CRLF
002542  000137  002566                        JMP     $EOP
                                        ;RETURN TO HERE UPON MEMORY TIME-OUT
002546  062716  000002                4$:     ADD     #2,(SP)         ;ADJUST RETURN ADDRESS
002552  000002                                RTI
                                        ;SUBROUTINE TO REPORT I/O FORMAT MESSAGES
002554  012046                        OUTBIN: MOV     (R0)+,-(SP)
002556  104406                                TYPBN
002560  104401  004205                        TYPE    ,SPACE1         ;INSERT A SPACE
```

252 002564 000207 RTS PC

```
                        .SBTTL  END OF PASS ROUTINE

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

002566                  $EOP:
002566  000240                  NOP
002570  005237  001172          INC     $PASS           ;;INCREMENT THE PASS NUMBER
002574  042737  100000  001172  BIC     #100000,$PASS   ;;DON'T ALLOW A NEG. NUMBER
002602  005327                  DEC     (PC)+           ;;LOOP?
002604  000001          $EOPCT: .WORD   1
002606  003022                  BGT     $DOAGN          ;;YES
002610  012737                  MOV     (PC)+,@(PC)+    ;;RESTORE COUNTER
002612  000001          $ENDCT: .WORD   1
002614  002604                  $EOPCT
002616  104401  002663          TYPE    ,$ENDMG         ;;TYPE 'END PASS #''
002622  013746  001172          MOV     $PASS,-(SP)     ;;SAVE $PASS FOR TYPEOUT
002626  104405                  TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
002630  104401  002660          TYPE    ,$ENULL         ;;TYPE A NULL CHARACTER
002634  013700  000042  $GET42: MOV     @#42,R0         ;;GET MONITOR ADDRESS
002640  001405                  BEQ     $DOAGN          ;;BRANCH IF NO MONITOR
002642  000005                  RESET                   ;;CLEAR THE WORLD
002644  004710          $ENDAD: JSR     PC,(R0)         ;;GO TO MONITOR
002646  000240                  NOP                     ;;SAVE ROOM
002650  000240                  NOP                     ;;FOR
002652  000240                  NOP                     ;;ACT11
002654                  $DOAGN:
002654  000137                  JMP     @(PC)+          ;;RETURN
002656  002062          $RTNAD: .WORD   LOOP
002660     377     377     000  $ENULL: .BYTE   -1,-1,0        ;;NULL CHARACTER STRING
002663     015  042412  042116  $ENDMG: .ASCIZ  <15><12>/END PASS #/
002670  050040  051501  020123
002676  000043
```

```
                                        ;SUBROUTINE TO VERIFY THE BASE AND VECTOR ADDRESSES

002700  012537  003222          TEST:   MOV     (R5)+,67$       ;GET INTR. STARTUP ADDRESS
002704  013537  001126                  MOV     @(R5)+,$BDDAT   ;GET ADDRESS
002710  012537  001302                  MOV     (R5)+,VADR      ;GET ADDRESS OFFSET
002714  012537  003036                  MOV     (R5)+,70$       ;GET NAME POINTER
002720  012537  001306                  MOV     (R5)+,TEMP      ;GET MAX # OF UNITS
002724  013746  000004                  MOV     @#ERRVEC,-(SP)  ;SAVE ERRVEC
002730  005037  001310                  CLR     NBEXT           ;CLEAR COUNTER
                                        ;ADDRESS THE DEVICE TO VERIFY IT EXISTS
002734  012737  003140  000004  1$:     MOV     #2$,ERRVEC      ;SET UP TIME-OUT RETURN
002742  005777  176160                  TST     @$BDDAT         ;ADDRESS THE UNIT
                                        ;NOW CAUSE AN INTR. AND FIND THE VECTOR
002746  005037  001304          60$:    CLR     VECT            ;CLEAR VECTOR FLAG
002752  012737  003224  000004          MOV     #IOTRD,ERRVEC   ;SET UP INTELL. TRAP RETURN
002760  005737  003222                  TST     67$             ;TEST IF NON-INTR DEVICE
002764  001414                          BEQ     65$             ;BR IF NOT INTR. DEVICE
002766  004737  003306                  JSR     PC,FIXVCT       ;LOAD VECTOR TRAP
002772  004777  000224                  JSR     PC,@67$         ;GO PRIME THE DEVICE
002776  012700  000000                  MOV     #0,R0           ;PRIME A COUNTER
003002  005046                          CLR     -(SP)           ;LOWER
003004  012746  003012                  MOV     #66$,-(SP)      ;PS
003010  000002                          RTI
003012  005300          66$:    DEC     R0              ;DELAY
003014  001376                  BNE     66$             ;SOME TIME
003016  005077  176104          65$:    CLR     @$BDDAT         ;LONG ENOUGH DELAY
                                        ;REPORT THE ADDRESS AND VECTOR VALUES ON FIRST PASS
003022  005737  001172                  TST     $PASS           ;CHECK IF FIRST
003026  001033                          BNE     73$             ;BR IF NOT
003030  104401  001161                  TYPE    ,$CRLF          ;ENSURE FRESH LINE
003034  104401                          TYPE                    ;REPORT THE NAME
003036  000000          70$:    0                               ;ADDRESS OF MESSAGE POINTER
003040  104401  004147                  TYPE    ,ATPRI          ;TYPE ADDRESS STARTUP
003044  013746  001126                  MOV     $BDDAT,-(SP)    ;GET ADDRESS
003050  104403                          TYPOS                   ;REPORT IT
003052     006     001                  .BYTE   6,1
003054  104401  004165                  TYPE    ,VTPRI          ;TYPE VECTOR STATUP
003060  005737  001304                  TST     VECT            ;CHECH IF INTR OCCURRED
003064  001003                          BNE     71$             ;BR IF YES
003066  104401  004112                  TYPE    ,NOPRI          ;TELL OPER. NONE
003072  000404                          BR      72$
003074  013746  001304          71$:    MOV     VECT,-(SP)      ;GET VECTOR VALUE
003100  104403                          TYPOS                   ;REPORT IT
003102     003     001                  .BYTE   3,1
                                        ;SENSE IF A/D IF SO CHECK OPERATOR INPUT ABOUT CHANNEL MODE REPORT
003104  005737  001316          72$:    TST     FLAGAD          ;IS CHANNEL MODE REPORT ENABLED?
003110  001402                          BEQ     73$             ;BR IF NOT
003112  004737  003620                  JSR     PC,TCHANL       ;REPORT THE CONFIGURATION
```

```
                                                ;BUMP THE COUNTER AND TEST IF FINISHED?
003116  005237  001310          73$:    INC     NBEXT           ;INCREMENT UNIT COUNTER
003122  005337  001306                  DEC     TEMP            ;REACHED MAX?
003126  001424                          BEQ     4$              ;;REACHED MAX NO OF UNIT'S
003130  063737  001302  001126          ADD     VADR,$BDDAT     ;GET NEXT UNIT
003136  000676                          BR      1$              ;;TRY NEXT UNIT
                                        ;COME HERE UPON ADDRESS TIME-OUT
003140  022626                  2$:     CMP     (SP)+,(SP)+     ;POP 2 WORDS OFF STACK
003142  005737  001310                  TST     NBEXT           ;CHECK IF ANY UNITS
003146  001014                          BNE     4$              ;BR IF SOME
003150  005737  001172                  TST     $PASS           ;TEST IF FIRST PASS
003154  001011                          BNE     4$              ;BR IF NOT FIRST
003156  013737  003036  003172          MOV     70$,76$         ;GET DEVICE MESSAGE POINTER
003164  104401  001161                  TYPE    ,$CRLF
003170  104401                          TYPE                    ;TELL OPER. IT'S NOT THERE
003172  000000                  76$:    0
003174  104401  004112                  TYPE    ,NOPRI          ;TELL OPER. NONE FOUND
003200  000240                  4$:     NOP
003202  000240                          NOP
003204  013735  001310                  MOV     NBEXT,@(R5)+    ;SAVE THE # OF UNITS FOUND
003210  012637  000004                  MOV     (SP)+,ERRVEC    ;RESTORE ERRVEC
003214  005037  001316                  CLR     FLAGAD          ;CLEAR EXPANDED A/D REPORT FLAG
003220  000205                          RTS     R5
003222  003456                  67$:    ADGO                    ;ADDRESS TO DEVICE PRIMER

                                        ;INTELLIGENT INTERRUPT HANDLER
003224  011637  003304          IOTRD:  MOV     (SP),TRTO       ;GET ADDRESS
003230  162737  000004  003304          SUB     #4,TRTO         ;ADJUST VALUE
003236  023727  003304  001000          CMP     TRTO,#1000      ;CHECK IF VECTOR OR FATAL TRAP
003244  003402                          BLE     2$              ;BR IF VECTOR
003246  000000                  1$:     HALT    ;FATAL BUS TRAP IN PROGRAM
003250  000776                          BR      1$
003252  013737  003304  001304  2$:     MOV     TRTO,VECT       ;LOAD VECTOR
003260  005077  175642                  CLR     @$BDDAT         ;CLEAR CURRENT UNIT STATUS
003264  022626                          CMP     (SP)+,(SP)+
003266  000240                          NOP
003270  000240                          NOP
003272  000002                          RTI                     ;EXIT
003274  000240                          NOP
003276  000240                          NOP
003300  000240                          NOP
003302  000240                          NOP
003304  000000                  TRTO:   0
```

```
                                ;SUBROUTINE TO LOAD INTELLIGENT TRAP CATCHER
003306  012700  000020  FIXVCT: MOV     #20,R0          ;LOAD STARTING ADDRESS
003312  012701  000022         MOV     #22,R1          ;LOAD STARTING POINTER
003316  012702  004700         MOV     #4700,R2        ;LOAD 'BAD INSTR''
003322  005037  000000         CLR     @#0             ;CLEAR LOC. 0
003326  005037  000002         CLR     @#2             ;CLEAR LOC. 2
003332  005037  000010         CLR     @#10            ;CLEAR LOC. 10
003336  005037  000012         CLR     @#12            ;CLEAR LOC. 12
003342  022700  000060  1$:    CMP     #60,R0          ;TEST IF TKB VECTOR
003346  001432                 BEQ     3$              ;BR IF YES
003350  022700  000100         CMP     #100,R0         ;TEST IF LINE INTR. <B EVENT>
003354  001425                 BEQ     2$              ;BR IF YES
003356  022700  000040         CMP     #40,R0          ;TEST FOR XXDP FLAG VECTOR
003362  001422                 BEQ     2$              ;BR IF YES
003364  022700  000200         CMP     #200,R0         ;TEST IF STARTING ADDRESS
003370  001421                 BEQ     3$              ;BR IF YES
003372  022700  000034         CMP     #34,R0          ;TEST IF TRAP VECTOR
003376  001414                 BEQ     2$              ;BR IF YES
003400  000240                 NOP
003402  000240                 NOP
003404  000240                 NOP
003406  000240                 NOP
003410  000240                 NOP
003412  010120                 MOV     R1,(R0)+        ;LOAD POINTER
003414  010220                 MOV     R2,(R0)+        ;LOAD 'BAD''
003416  022121                 CMP     (R1)+,(R1)+     ;BUMP POINTER
003420  020027  001000         CMP     R0,#1000        ;DONE ?
003424  001346                 BNE     1$              ;BR IF NOT
003426  000207                 RTS     PC              ;RETURN
003430  022020  2$:    CMP     (R0)+,(R0)+     ;BUMP
003432  022121         CMP     (R1)+,(R1)+
003434  022020  3$:    CMP     (R0)+,(R0)+
003436  022121         CMP     (R1)+,(R1)+
003440  000740         BR      1$
003442  000240         NOP
003444  000240         NOP
003446  000240         NOP
003450  000240         NOP
003452  000240         NOP
003454  000240         NOP
```

```
                                        ;SUBROUTINE TO PRIME THE MNCAD
003456  012777  000101  175442  ADGO:   MOV     #101,@$BDDAT    ;ENABLE INTR. AND START CONVERSION
003464  000240                  NOP
003466  000240                  NOP
003470  000240                  NOP
003472  000207                  RTS     PC              ;EXIT
                                        ;SUBROUTINE TO  PRIME THE MNCKW
003474  013700  001126          KWGO:   MOV     $BDDAT,R0       ;GET ADDR.
003500  005200                  INC     R0
003502  005200                  INC     R0              ;MAKE ADDRESS OF CLOCK PRESET BUFFER
003504  012710  177777          MOV     #-1,(R0)        ;LOAD CLOCK PRESET
003510  012777  000161  175410  MOV     #161,@$BDDAT    ;LOAD RATE, INTR ENABLE AND GO
003516  052777  000400  175402  BIS     #BIT8,@$BDDAT   ;LOAD MAINT CLOCK
003524  000207                  RTS     PC              ;EXIT
003526  000240                  NOP
003530  000240                  NOP
003532  000240                  NOP
                                        ;SUBROUTINE TO PRIME THE MNCDI
003534  012777  000102  175364  DIGO:   MOV     #102,@$BDDAT    ;LOAD INTR. ENABLE AND MODE
003542  052777  004200  175356  BIS     #4200,@$BDDAT   ;LOAD MAINT. STROBE
003550  000207                  RTS     PC              ;EXIT
003552  000240                  NOP
003554  000240                  NOP
003556  000240                  NOP
                                        ;SUBROUTINE TO PRIME THE MNCDO
003560  013700  001126          DOGO:   MOV     $BDDAT,R0       ;GET ADDRESS
003564  062700  000003                  ADD     #3,R0   ;MAKE OUTPUT DATA POINTER
003570  105010                  CLRB    (R0)    ;ENABLE MAINT. STROBE
003572  162700  000002          SUB     #2,R0   ;MAKE HIGH BYTE STATUS ADDRESS
003576  112710  000001          MOVB    #BIT0,(R0)      ;MAINT. STROBE
003602  052777  000100  175316  BIS     #BIT6,@$BDDAT   ;ENABLE INTR.
003610  000207                  RTS     PC              ;EXIT
003612  000240                  NOP
003614  000240                  NOP
003616  000240                  NOP
```

```
                                ;SUB-ROUTINE TO TYPE OUT A/D CONFIGURATION
                                
003620  104401  001161  TCHANL: TYPE    ,$CRLF
003624  000240                 NOP
003626  000240                 NOP
003630  000240                 NOP
003632  013702  001126         MOV     $BDDAT,R2
003636  062702  000002         ADD     #2,R2           ;MAKE CONVERTED VALUE ADDRESS
003642  011201                 MOV     (R2),R1         ;ENSURE A/D FLAG IS CLEARED
003644  005001                 CLR     R1
003646  000240                 NOP
003650  005277  175252  2$:    INC     @$BDDAT         ;START A CONVERSION
003654  105777  175246  3$:    TSTB    @$BDDAT         ;WAIT FOR CONVERSION TO FINISH
003660  100375                 BPL     3$
003662  011200                 MOV     (R2),R0         ;GET RESULTS
003664  104401  004202         TYPE    ,$SPACE         ;MOVE IT OVER SOME
003670  010146                 MOV     R1,-(SP)        ;;SAVE R1 FOR TYPEOUT
(1) 003672  104403             TYPOS                   ;;GO TYPE--OCTAL ASCII
(1) 003674     002             .BYTE   2               ;;TYPE 2 DIGIT(S)
(1) 003675     000             .BYTE   0               ;;SUPPRESS LEADING ZEROS
003676  104401  004207         TYPE    ,MDASH          ;TYPE A DASH
003702  062701  000003         ADD     #3,R1           ;ADD 3 TO CHANNEL FOR DIFFERENTIAL
003706  042700  007777         BIC     #7777,R0        ;IS CHANNEL SINGLE ENDED
003712  001002                 BNE     5$              ;;CHANNEL IS NOT SINGLE ENDED
003714  062701  000004         ADD     #4,R1           ;ADD 4 CHANNELS FOR SINGLE ENDED
003720  022701  000100  5$:    CMP     #100,R1         ;IS CHANNEL > LAST POSSIBLE CHANNEL
003724  101002                 BHI     6$              ;;NO
003726  012701  000077         MOV     #77,R1          ;YES, SET TO LAST CHANNEL
003732                 6$:
(1) 003732  010146             MOV     R1,-(SP)        ;;SAVE R1 FOR TYPEOUT
(1) 003734  104403             TYPOS                   ;;GO TYPE--OCTAL ASCII
(1) 003736     002             .BYTE   2               ;;TYPE 2 DIGIT(S)
(1) 003737     000             .BYTE   0               ;;SUPPRESS LEADING ZEROS
003740  005700                 TST     R0              ;IS CHANNEL SINGLE ENDED?
003742  001003                 BNE     7$              ;;NO
003744  104401  004213         TYPE    ,MSE            ;TYPE SINGLE ENDED MESSAGE
003750  000410                 BR      9$              ;;GO TEST MORE CHANNELS
003752  022700  020000  7$:    CMP     #BIT13,R0       ;IS CHANNEL DIFFERENTIAL?
003756  001003                 BNE     8$              ;;NO, MUST HAVE PREAMP
003760  104401  004232         TYPE    ,MDIF           ;TYPE DIFFERENTIAL MESSAGE
003764  000402                 BR      9$              ;;GO TEST MORE CHANNELS
003766  104401  004251  8$:    TYPE    ,MPRMP          ;TYPE PREAMP MESSAGE
003772  005201         9$:     INC     R1              ;SET CHANNEL TO NEXT SET OF CHANNELS
003774  022701  000100         CMP     #100,R1         ;DONE?
004000  001412                 BEQ     10$             ;;YES
004002  010100                 MOV     R1,R0           ;GET CHANNEL
004004  000300                 SWAB    R0              ;PUT CHANNEL NUMBER IN HIGH BYTE
004006  052700  000010         BIS     #BIT3,R0        ;SET STATUS ENABLE BIT
004012  010077  175110         MOV     R0,@$BDDAT      ;LOAD INTO A/D STATUS REGISTER
004016  032777  000002  175102 BIT     #BIT1,@$BDDAT   ;IS NON-EXSISTENT CHANNEL BIT SET?
004024  001711                 BEQ     2$              ;;NO
004026  000207         10$:    RTS     PC
```

```
                                                    ;ASCII MESSAGES
004030  020040  046473  041516  ADPRI:  .ASCIZ  /  ;MNCAD /
004036  042101  000040
004042  020040  046473  041516  KWPRI:  .ASCIZ  /  ;MNCKW /
004050  053513  000040
004054  020040  046473  041516  AAPRI:  .ASCIZ  /  ;MNCAA /
004062  040501  000040
004066  020040  046473  041516  DIPRI:  .ASCIZ  /  ;MNCDI /
004074  044504  000040
004100  020040  046473  041516  DOPRI:  .ASCIZ  /  ;MNCDO /
004106  047504  000040
004112  025040  020052  042040  NOPRI:  .ASCIZ  / **  DOES NOT EXIST **/
004120  042517  020123  047516
004126  020124  054105  051511
004134  020124  025052     000
004141     043  047440  020106  NIPRI:  .ASCIZ  /# OF /
004146     000
004147     101  020124  042101  ATPRI:  .ASCIZ  /AT ADDRESS = /
004154  051104  051505  020123
004162  020075     000
004165     040  020040  042526  VTPRI:  .ASCIZ  /   VECTOR = /
004172  052103  051117  036440
004200  000040
004202  004411     000          SSPACE: .ASCIZ  /                /
004205     040     000          SPACE1: .ASCIZ  / /
004207     040  020055     000  MDASH:  .ASCIZ  / - /
004213     040  044523  043516  MSE:    .ASCIZ  / SINGLE ENDED/<200>
004220  042514  042440  042116
004226  042105  000200
004232  042040  043111  042506  MDIF:   .ASCIZ  / DIFFERENTIAL/<200>
004240  042522  052116  040511
004246  100114     000
004251     040  051120  040505  MPRMP:  .ASCIZ  / PREAMP/<200>
004256  050115  000200
004262  042200  020117  047531  QUESAD: .ASCII  <200>\DO YOU WANT THE MNCAD (A/D) CHANNEL MODE REPORT ?\
004270  020125  040527  052116
004276  052040  042510  046440
004304  041516  042101  024040
004312  027501  024504  041440
004320  040510  047116  046105
004326  046440  042117  020105
004334  042522  047520  052122
004342  037440
004344  004600  052011  050131          .ASCIZ  <200>\          TYPE 'Y' FOR YES = \
004352  020105  054442  020042
004360  047506  020122  042531
004366  020123  020075     000
004373     200  047504  054440  QUESMP: .ASCII  <200>\DO YOU WANT THE MEMORY USAGE MAP REPORT ?\  .
004400  052517  053440  047101
004406  020124  044124  020105
004414  042515  047515  054522
004422  052440  040523  042507
004430  046440  050101  051040
004436  050105  051117  020124
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                004444    077
491             004445    200   004411  054524          .ASCIZ  <200>\          TYPE 'Y'' FOR YES = \
                004452  042520  021040  021131
                004460  043040  051117  054440
                004466  051505  036440  000040
492             004474  046600  047111  026503  MNCMAP: .ASCII  <200>\MINC-11 MEMORY USAGE MAP  (EACH BIT = 2 ADDRESSES)\<200>
                004502  030461  046440  046505
                004510  051117  020131  051525
                004516  043501  020105  040515
                004524  004520  042450  041501
                004532  020110  044502  020124
                004540  020075  020062  042101
                004546  051104  051505  042523
                004554  024523    200
493             004557    040   042101  051104          .ASCII  \ ADDR      000/400          100/500\
                004564  020011  020040  030040
                004572  030060  032057  030060
                004600  020040  020040  020040
                004606  020040  020040  030061
                004614  027460  030065    060
494             004621    040   020040  020040          .ASCIZ  \          200/600          300/700\
                004626  020040  020040  031040
                004634  030060  033057  030060
                004642  020040  020040  020040
                004650  020040  020040  030063
                004656  027460  030067  000060
495             004664    015     012     012   SETMNC: .BYTE   15,12,12
496             004667    117   042520  040522          .ASCII  /OPERATOR       -       PLEASE DO THE FOLLOWING:/
                004674  047524  004522  004455
                004702  046120  040505  042523
                004710  042040  020117  044124
                004716  020105  047506  046114
                004724  053517  047111  035107
497             004732    015     012     012           .BYTE   15,12,12
498             004735    122   046505  053117          .ASCII  /REMOVE THE CUSTOMER CONNECTIONS FROM EACH 'MINC-11'' OPTION/
                004742  020105  044124  020105
                004750  052503  052123  046517
                004756  051105  041440  047117
                004764  042516  052103  047511
                004772  051516  043040  047522
                005000  020115  040505  044103
                005006  021040  044515  041516
                005014  030455  021061  047440
                005022  052120  047511    116
499             005027    015     012           .BYTE   15,12
500             005031    115   041516  042101          .ASCII  \MNCAD (A/D)          SET FRONT PANEL SWITCHES TO THE ''TEST'' POSITION\
                005036  024040  027501  024504
                005044  004411  042523  020124
                005052  051106  047117  020124
                005060  040520  042516  020114
                005066  053523  052111  044103
                005074  051505  052040  020117
                005102  044124  020105  052042
                005110  051505  021124  050040
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                005116  051517  052111  047511
                005124     116
501             005125     015     012                  .BYTE   15,12
502             005127     115  041516  053513          .ASCII  \MNCKW (CLOCK)          PULL OUT ''ST1'' AND ''ST2'' SWITCHES\
                005134  024040  046103  041517
                005142  024513  004411  052520
                005150  046114  047440  052125
                005156  021040  052123  021061
                005164  040440  042116  021040
                005172  052123  021062  051440
                005200  044527  041524  042510
                005206     123
503             005207     015     012                  .BYTE   15,12
504             005211     011  004411  047101          .ASCII  \                       AND ROTATE FULLY CLOCKWISE\
                005216  020104  047522  040524
                005224  042524  043040  046125
                005232  054514  041440  047514
                005240  045503  044527  042523
505             005246     015     012                  .BYTE   15,12
506             005250  047115  042103  020111          .ASCII  \MNCDI (DIGITAL IN)     SET ''DATA'' SWITCH TO THE ''-'' POSITION\
                005256  042050  043511  052111
                005264  046101  044440  024516
                005272  051411  052105  021040
                005300  040504  040524  020042
                005306  053523  052111  044103
                005314  052040  020117  044124
                005322  020105  026442  020042
                005330  047520  044523  044524
                005336  047117
507             005340     015     012                  .BYTE   15,12
508             005342  046123  020125  004460          .ASCII  \SLU 0                  INSTALL ''SLU TEST CONNECTOR''\
                005350  004411  047111  052123
                005356  046101  020114  051442
                005364  052514  052040  051505
                005372  020124  047503  047116
                005400  041505  047524  021122
509             005406     015     012                  .BYTE   15,12
510             005410  046123  020125  004461          .ASCII  \SLU 1                  INSTALL ''SLU TEST CONNECTOR''\
                005416  004411  047111  052123
                005424  046101  020114  051442
                005432  052514  052040  051505
                005440  020124  047503  047116
                005446  041505  047524  021122
511             005454     015     012                  .BYTE   15,12
512             005456  046123  020125  004462          .ASCII  \SLU 2                  INSTALL ''SLU TEST CONNECTOR''\
                005464  004411  047111  052123
                005472  046101  020114  051442
                005500  052514  052040  051505
                005506  020124  047503  047116
                005514  041505  047524  021122
513             005522     015     012     012          .BYTE   15,12,12
514             005525     104  050105  042522          .ASCIZ  \DEPRESS A KEY ON THE CONSOLE TERMINAL WHEN READY. \
                005532  051523  040440  045440
                005540  054505  047440  020116
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        005546  044124  020105  047503
        005554  051516  046117  020105
        005562  042524  046522  047111
        005570  046101  053440  042510
        005576  020116  042522  042101
        005604  027131  000040
   515
   516                                          .EVEN
   517
```

```
519                                     .SBTTL  TTY INPUT ROUTINE
(1)
(2)                                     ;;**********************************************************************
(1)                                     .ENABL  LSB
(1)  005610  000000                     $TKCNT: .WORD   0               ;;NUMBER OF ITEMS IN QUEUE
(1)  005612  000000                     $TKQIN: .WORD   0               ;;INPUT POINTER
(1)  005614  000000                     $TKQOUT: .WORD  0               ;;OUTPUT POINTER
(1)  005616  000040                     $TKQSRT: .BLKB  32.             ;;TTY KEYBOARD QUEUE
(1)          005656                     $TKQEND=.
(1)
(1)                                     ;*TK INITIALIZE ROUTINE
(1)                                     ;*THIS ROUTINE WILL INITIALIZE THE TTY KEYBOARD INPUT QUEUE
(1)                                     ;*SETUP THE INTERRUPT VECTOR AND TURN ON THE KEYBOARD INTERRUPT
(1)                                     ;
(1)                                     ;*CALL:
(1)                                     ;*      JSR     PC,$TKINT
(1)                                     ;*      RETURN
(1)                                     ;
(1)  005656  005037  005610             $TKINT: CLR     $TKCNT          ;;CLEAR COUNT OF ITEMS IN QUEUE
(1)  005662  012737  005616  005612             MOV     #$TKQSRT,$TKQIN ;;MOVE THE STARTING ADDRESS OF THE
(1)  005670  013737  005612  005614             MOV     $TKQIN,$TKQOUT  ;;QUEUE INTO THE INPUT & OUTPUT POINTERS.
(1)  005676  012737  005726  000060             MOV     #$TKSRV,@#TKVEC ;;INITIALIZE THE KEYBOARD VECTOR
(1)  005704  012737  000200  000062             MOV     #200,@#TKVEC+2  ;;'BR' LEVEL 4
(1)  005712  005777  173230                     TST     @$TKB           ;;CLEAR DONE FLAG
(1)  005716  012777  000100  173220             MOV     #100,@$TKS      ;;ENABLE TTY KEYBOARD INTERRUPT
(1)  005724  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 (BEGIN)
(1)                                     ;
(1)  005726  117746  173214             $TKSRV: MOVB    @$TKB,-(SP)     ;;PICKUP THE CHARACTER
(1)  005732  042716  177600                     BIC     #^C177,(SP)     ;;STRIP THE JUNK
(1)  005736  021627  000003                     CMP     (SP),#3         ;;IS IT A CONTROL C?
(1)  005742  001007                             BNE     1$              ;;BRANCH IF NO
(1)  005744  104401  006516                     TYPE    ,$CNTLC         ;;TYPE A CONTROL-C (^C)
(1)  005750  004737  005656                     JSR     PC,$TKINT       ;;INIT THE KEYBOARD
(1)  005754  005726                             TST     (SP)+           ;;CLEAN UP STACK
(1)  005756  000137  001324                     JMP     BEGIN           ;;CONTROL C RESTART
(1)
(1)  005762                             1$:
(1)  005762  022737  000040  005610             CMP     #32.,$TKCNT     ;;IS THE QUEUE FULL?
(1)  005770  001004                             BNE     3$              ;;BRANCH IF NO
(1)  005772  104401  006512                     TYPE    ,$BELL          ;;RING THE TTY BELL
(1)  005776  005726                             TST     (SP)+           ;;CLEAN CHARACTER OFF OF STACK
(1)  006000  000451                             BR      5$              ;;EXIT
(1)  006002  021627  000023             3$:     CMP     (SP),#23        ;;IS IT A CONTROL-S?
(1)  006006  001021                             BNE     32$             ;;BRANCH IF NO
(1)  006010  005077  173130                     CLR     @$TKS           ;;DISABLE TTY KEYBOARD INTERRUPTS
(1)  006014  005726                             TST     (SP)+           ;;CLEAN CHAR OFF STACK
(1)  006016  105777  173122             31$:    TSTB    @$TKS           ;;WAIT FOR A CHAR
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(1)  006022  100375                          BPL     31$             ;;LOOP UNTIL ITS THERE
(1)  006024  117746  173116                 MOVB    @$TKB,-(SP)     ;;GET THE CHARACTER
(1)  006030  042716  177600                 BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII
(1)  006034  022627  000021                 CMP     (SP)+,#21       ;;IS IT A CONTROL-Q?
(1)  006040  001366                         BNE     31$             ;;BRANCH IF NO
(1)  006042  012777  000100  173074         MOV     #100,@$TKS      ;;REENABLE TTY KEYBOARD INTERRUPTS
(1)  006050  000002                         RTI                     ;;RETURN
(1)  006052  005237  005610         32$:    INC     $TKCNT          ;;COUNT THIS CHARACTER
(1)  006056  021627  000140                 CMP     (SP),#140       ;;IS IT UPPER CASE?
(1)  006062  002405                         BLT     4$              ;;BRANCH IF YES
(1)  006064  021627  000175                 CMP     (SP),#175       ;;IS IT A SPECIAL CHAR?
(1)  006070  003002                         BGT     4$              ;;BRANCH IF YES
(1)  006072  042716  000040                 BIC     #40,(SP)        ;;MAKE IT UPPER CASE
(1)  006076  112677  177510         4$:     MOVB    (SP)+,@$TKQIN   ;;AND PUT IT IN QUEUE
(1)  006102  005237  005612                 INC     $TKQIN          ;;UPDATE THE POINTER
(1)  006106  023727  005612  005656         CMP     $TKQIN,#$TKQEND ;;GO OFF THE END?
(1)  006114  001003                         BNE     5$              ;;BRANCH IF NO
(1)  006116  012737  005616  005612         MOV     #$TKQSRT,$TKQIN ;;RESET THE POINTER
(1)  006124  000002                 5$:     RTI                     ;;RETURN
(1)
(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
(1)                                  ;*      RETURN HERE             ;;CHARACTER IS ON THE STACK
(1)                                  ;*                              ;;WITH PARITY BIT STRIPPED OFF
(1)                                  ;
(1)
(1)  006126  011646          $RDCHR: MOV     (SP),-(SP)      ;;PUSH DOWN THE PC AND
(1)  006130  016666  000004  000002         MOV     4(SP),2(SP)     ;;THE PS
(1)  006136  005066  000004                 CLR     4(SP)           ;;GET READY FOR A CHARACTER
(2)  006142  005046                         CLR     -(SP)           ;;PUT NEW PS ON STACK
(2)  006144  012746  006152                 MOV     #64$,-(SP)      ;;PUT NEW PC ON  STACK
(2)  006150  000002                         RTI                     ;;POP NEW PC AND PS
(2)  006152                          64$:
(1)  006152  005737  005610         1$:     TST     $TKCNT          ;;WAIT ON A CHARACTER
(1)  006156  001775                         BEQ     1$
(1)  006160  005337  005610                 DEC     $TKCNT          ;;DECREMENT THE COUNTER
(1)  006164  117766  177424  000004         MOVB    @$TKQOUT,4(SP)  ;;GET ONE CHARACTER
(1)  006172  005237  005614                 INC     $TKQOUT         ;;UPDATE THE POINTER
(1)  006176  023727  005614  005656         CMP     $TKQOUT,#$TKQEND ;;DID IT GO OFF OF THE END?
(1)  006204  001003                         BNE     2$              ;;BRANCH IF NO
(1)  006206  012737  005616  005614         MOV     #$TKQSRT,$TKQOUT ;;RESET THE POINTER
(1)  006214  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)
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```
(1)  006216  010346                    $RDLIN: MOV     R3,-(SP)        ;;SAVE R3
(1)  006220  005046                            CLR     -(SP)           ;;CLEAR THE RUBOUT KEY
(1)  006222  012703  006452            1$:     MOV     #$TTYIN,R3      ;;GET ADDRESS
(1)  006226  022703  006512            2$:     CMP     #$TTYIN+32.,R3  ;;BUFFER FULL?
(1)  006232  101456                            BLOS    4$              ;;BR IF YES
(1)  006234  104407                            RDCHR                   ;;GO READ ONE CHARACTER FROM THE TTY
(1)  006236  112613                            MOVB    (SP)+,(R3)      ;;GET CHARACTER
(1)  006240  122713  000177            10$:    CMPB    #177,(R3)       ;;IS IT A RUBOUT
(1)  006244  001022                            BNE     5$              ;;BR IF NO
(1)  006246  005716                            TST     (SP)            ;;IS THIS THE FIRST RUBOUT?
(1)  006250  001007                            BNE     6$              ;;BR IF NO
(1)  006252  112737  000134  006450            MOVB    #'\,9$          ;;TYPE A BACK SLASH
(1)  006260  104401  006450                    TYPE    ,9$
(1)  006264  012716  177777                    MOV     #-1,(SP)        ;;SET THE RUBOUT KEY
(1)  006270  005303                    6$:     DEC     R3              ;;BACKUP BY ONE
(1)  006272  020327  006452                    CMP     R3,#$TTYIN      ;;STACK EMPTY?
(1)  006276  103434                            BLO     4$              ;;BR IF YES
(1)  006300  111337  006450                    MOVB    (R3),9$         ;;SETUP TO TYPEOUT THE DELETED CHAR.
(1)  006304  104401  006450                    TYPE    ,9$             ;;GO TYPE
(1)  006310  000746                            BR      2$              ;;GO READ ANOTHER CHAR.
(1)  006312  005716                    5$:     TST     (SP)            ;;RUBOUT KEY SET?
(1)  006314  001406                            BEQ     7$              ;;BR IF NO
(1)  006316  112737  000134  006450            MOVB    #'\,9$          ;;TYPE A BACK SLASH
(1)  006324  104401  006450                    TYPE    ,9$
(1)  006330  005016                            CLR     (SP)            ;;CLEAR THE RUBOUT KEY
(1)  006332  122713  000025            7$:     CMPB    #25,(R3)        ;;IS CHARACTER A CTRL U?
(1)  006336  001003                            BNE     8$              ;;BR IF NO
(1)  006340  104401  006523                    TYPE    ,$CNTLU         ;;TYPE A CONTROL 'U'
(1)  006344  000726                            BR      1$              ;;GO START OVER
(1)  006346  122713  000022            8$:     CMPB    #22,(R3)        ;;IS CHARACTER A '^R'?
(1)  006352  001011                            BNE     3$              ;;BRANCH IF NO
(1)  006354  105013                            CLRB    (R3)            ;;CLEAR THE CHARACTER
(1)  006356  104401  001161                    TYPE    ,$CRLF          ;;TYPE A 'CR' & 'LF'
(1)  006362  104401  006452                    TYPE    ,$TTYIN         ;;TYPE THE INPUT STRING
(1)  006366  000717                            BR      2$              ;;GO PICKUP ANOTHER CHACTER
(1)  006370  104401  001160            4$:     TYPE    ,$QUES          ;;TYPE A '?'
(1)  006374  000712                            BR      1$              ;;CLEAR THE BUFFER AND LOOP
(1)  006376  111337  006450            3$:     MOVB    (R3),9$         ;;ECHO THE CHARACTER
(1)  006402  104401  006450                    TYPE    ,9$
(1)  006406  122723  000015                    CMPB    #15,(R3)+       ;;CHECK FOR RETURN
(1)  006412  001305                            BNE     2$              ;;LOOP IF NOT RETURN
(1)  006414  105063  177777                    CLRB    -1(R3)          ;;CLEAR RETURN (THE 15)
(1)  006420  104401  001162                    TYPE    ,$LF            ;;TYPE A LINE FEED
(1)  006424  005726                            TST     (SP)+           ;;CLEAN RUBOUT KEY FROM THE STACK
(1)  006426  012603                            MOV     (SP)+,R3        ;;RESTORE R3
(1)  006430  011646                            MOV     (SP),-(SP)      ;;ADJUST THE STACK AND PUT ADDRESS OF THE
(1)  006432  016666  000004  000002            MOV     4(SP),2(SP)     ;;       FIRST ASCII CHARACTER ON IT
(1)  006440  012766  006452  000004            MOV     #$TTYIN,4(SP)
(1)  006446  000002                            RTI                     ;;RETURN
(1)  006450      000                    9$:     .BYTE   0               ;;STORAGE FOR ASCII CHAR. TO TYPE
(1)  006451      000                            .BYTE   0               ;;TERMINATOR
(1)  006452  000040                    $TTYIN: .BLKB   32.             ;;RESERVE 32. BYTES FOR TTY INPUT
(1)  006512  177607  000377            $BELL:  .ASCIZ  <207><377><377> ;;CODE FOR BELL
(1)  006516  041536  005015      000   $CNTLC: .ASCIZ  /^C/<15><12>    ;;CONTROL 'C'
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(1)  006523  136     006525  000012  $CNTLU: .ASCIZ  /^U/<15><12>     ;;CONTROL 'U'
(1)  006530  043536  005015  000     $CNTLG: .ASCIZ  /^G/<15><12>     ;;CONTROL 'G'
(1)  006535  015     051412  051127  $MSWR:  .ASCIZ  <15><12>/SWR = /
(1)  006542  036440  000040
(1)  006546  020040  042516  020127  $MNEW:  .ASCIZ  /  NEW = /
(1)  006554  020075  000
(1)          006560                  .EVEN
520                                  .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)  006560  105737  001157          $TYPE:  TSTB    $TPFLG          ;;IS THERE A TERMINAL?
(1)  006564  100002                          BPL     1$              ;;BR IF YES
(1)  006566  000000                          HALT                    ;;HALT HERE IF NO TERMINAL
(1)  006570  000430                          BR      3$              ;;LEAVE
(1)  006572  010046                  1$:     MOV     R0,-(SP)        ;;SAVE R0
(1)  006574  017600  000002                  MOV     @2(SP),R0       ;;GET ADDRESS OF ASCIZ STRING
(1)  006600  122737  000001  001204          CMPB    #APTENV,$ENV    ;;RUNNING IN APT MODE
(1)  006606  001011                          BNE     62$             ;;NO,GO CHECK FOR APT CONSOLE
(1)  006610  132737  000100  001205          BITB    #APTSPOOL,$ENVM ;;SPOOL MESSAGE TO APT
(1)  006616  001405                          BEQ     62$             ;;NO,GO CHECK FOR CONSOLE
(1)  006620  010037  006630                  MOV     R0,61$          ;;SETUP MESSAGE ADDRESS FOR APT
(1)  006624  004737  007576                  JSR     PC,$ATY3        ;;SPOOL MESSAGE TO APT
(1)  006630  000000                  61$:    .WORD   0               ;;MESSAGE ADDRESS
(1)  006632  132737  000040  001205  62$:    BITB    #APTCSUP,$ENVM  ;;APT CONSOLE SUPPRESSED
(1)  006640  001003                          BNE     60$             ;;YES,SKIP TYPE OUT
(1)  006642  112046                  2$:     MOVB    (R0)+,-(SP)     ;;PUSH CHARACTER TO BE TYPED ONTO STACK
(1)  006644  001005                          BNE     4$              ;;BR IF IT ISN'T THE TERMINATOR
(1)  006646  005726                          TST     (SP)+           ;;IF TERMINATOR POP IT OFF THE STACK
(1)  006650  012600                  60$:    MOV     (SP)+,R0        ;;RESTORE R0
(1)  006652  062716  000002          3$:     ADD     #2,(SP)         ;;ADJUST RETURN PC
(1)  006656  000002                          RTI                     ;;RETURN
(1)  006660  122716  000011          4$:     CMPB    #HT,(SP)        ;;BRANCH IF <HT>
(1)  006664  001430                          BEQ     8$
(1)  006666  122716  000200                  CMPB    #CRLF,(SP)      ;;BRANCH IF NOT <CRLF>
(1)  006672  001006                          BNE     5$
(1)  006674  005726                          TST     (SP)+           ;;POP  <CR><LF> EQUIV
(1)  006676  104401                          TYPE                    ;;TYPE A CR AND LF
(1)  006700  001161                          $CRLF
(1)  006702  105037  007036                  CLRB    $CHARCNT        ;;CLEAR CHARACTER COUNT
(1)  006706  000755                          BR      2$              ;;GET NEXT CHARACTER
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(1)  006710  004737  006772          5$:    JSR     PC,$TYPEC       ;;GO TYPE THIS CHARACTER
(1)  006714  123726  001156          6$:    CMPB    $FILLC,(SP)+    ;;IS IT TIME FOR FILLER CHARS.?
(1)  006720  001350                         BNE     2$              ;;IF NO GO GET NEXT CHAR.
(1)  006722  013746  001154                 MOV     $NULL,-(SP)     ;;GET # OF FILLER CHARS. NEEDED
(1)                                                                 ;;AND THE NULL CHAR.
(1)  006726  105366  000001          7$:    DECB    1(SP)           ;;DOES A NULL NEED TO BE TYPED?
(1)  006732  002770                         BLT     6$              ;;BR IF NO--GO POP THE NULL OFF OF STACK
(1)  006734  004737  006772                 JSR     PC,$TYPEC       ;;GO TYPE A NULL
(1)  006740  105337  007036                 DECB    $CHARCNT        ;;DO NOT COUNT AS A COUNT
(1)  006744  000770                         BR      7$              ;;LOOP
(1)
(1)                                 ;HORIZONTAL TAB PROCESSOR
(1)
(1)  006746  112716  000040          8$:    MOVB    #' ,(SP)        ;;REPLACE TAB WITH SPACE
(1)  006752  004737  006772          9$:    JSR     PC,$TYPEC       ;;TYPE A SPACE
(1)  006756  132737  000007  007036         BITB    #7,$CHARCNT     ;;BRANCH IF NOT AT
(1)  006764  001372                         BNE     9$              ;;TAB STOP
(1)  006766  005726                         TST     (SP)+           ;;POP SPACE OFF STACK
(1)  006770  000724                         BR      2$              ;;GET NEXT CHARACTER
(1)  006772  105777  172152          $TYPEC: TSTB    @$TPS           ;;WAIT UNTIL PRINTER IS READY
(1)  006776  100375                         BPL     $TYPEC
(1)  007000  116677  000002  172144         MOVB    2(SP),@$TPB     ;;LOAD CHAR TO BE TYPED INTO DATA REG.
(1)  007006  122766  000015  000002         CMPB    #CR,2(SP)       ;;IS CHARACTER A CARRIAGE RETURN?
(1)  007014  001003                         BNE     1$              ;;BRANCH IF NO
(1)  007016  105037  007036                 CLRB    $CHARCNT        ;;YES--CLEAR CHARACTER COUNT
(1)  007022  000406                         BR      $TYPEX          ;;EXIT
(1)  007024  122766  000012  000002  1$:    CMPB    #LF,2(SP)       ;;IS CHARACTER A LINE FEED?
(1)  007032  001402                         BEQ     $TYPEX          ;;BRANCH IF YES
(1)  007034  105227                         INCB    (PC)+           ;;COUNT THE CHARACTER
(1)  007036  000000          $CHARCNT:.WORD  0               ;;CHARACTER COUNT STORAGE
(1)  007040  000207          $TYPEX: RTS     PC
(1)
```

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

007042  017646  000000          $TYPOS: MOV     @(SP),-(SP)     ;;PICKUP THE MODE
007046  116637  000001  007265          MOVB    1(SP),$OFILL    ;;LOAD ZERO FILL SWITCH
007054  112637  007267                  MOVB    (SP)+,$OMODE+1  ;;NUMBER OF DIGITS TO TYPE
007060  062716  000002                  ADD     #2,(SP)         ;;ADJUST RETURN ADDRESS
007064  000406                          BR      $TYPON
007066  112737  000001  007265  $TYPOC: MOVB    #1,$OFILL       ;;SET THE ZERO FILL SWITCH
007074  112737  000006  007267          MOVB    #6,$OMODE+1     ;;SET FOR SIX(6) DIGITS
007102  112737  000005  007264  $TYPON: MOVB    #5,$OCNT        ;;SET THE ITERATION COUNT
007110  010346                          MOV     R3,-(SP)        ;;SAVE R3
007112  010446                          MOV     R4,-(SP)        ;;SAVE R4
007114  010546                          MOV     R5,-(SP)        ;;SAVE R5
007116  113704  007267                  MOVB    $OMODE+1,R4     ;;GET THE NUMBER OF DIGITS TO TYPE
007122  005404                          NEG     R4
007124  062704  000006                  ADD     #6,R4           ;;SUBTRACT IT FOR MAX. ALLOWED
007130  110437  007266                  MOVB    R4,$OMODE       ;;SAVE IT FOR USE
007134  113704  007265                  MOVB    $OFILL,R4       ;;GET THE ZERO FILL SWITCH
007140  016605  000012                  MOV     12(SP),R5       ;;PICKUP THE INPUT NUMBER
007144  005003                          CLR     R3              ;;CLEAR THE OUTPUT WORD
007146  006105                  1$:     ROL     R5              ;;ROTATE MSB INTO "C"
007150  000404                          BR      3$              ;;GO DO MSB
007152  006105                  2$:     ROL     R5              ;;FORM THIS DIGIT
007154  006105                          ROL     R5
007156  006105                          ROL     R5
007160  010503                          MOV     R5,R3
007162  006103                  3$:     ROL     R3              ;;GET LSB OF THIS DIGIT
007164  105337  007266                  DECB    $OMODE          ;;TYPE THIS DIGIT?
007170  100016                          BPL     7$              ;;BR IF NO
007172  042703  177770                  BIC     #177770,R3      ;;GET RID OF JUNK
007176  001002                          BNE     4$              ;;TEST FOR 0
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(1)  007200  005704                          TST     R4              ;;SUPPRESS THIS 0?
(1)  007202  001403                          BEQ     5$              ;;BR IF YES
(1)  007204  005204                  4$:     INC     R4              ;;DON'T SUPPRESS ANYMORE 0'S
(1)  007206  052703  000060                  BIS     #'0,R3          ;;MAKE THIS DIGIT ASCII
(1)  007212  052703  000040          5$:     BIS     #' ,R3          ;;MAKE ASCII IF NOT ALREADY
(1)  007216  110337  007262                  MOVB    R3,8$           ;;SAVE FOR TYPING
(1)  007222  104401  007262                  TYPE    ,8$             ;;GO TYPE THIS DIGIT
(1)  007226  105337  007264          7$:     DECB    $OCNT           ;;COUNT BY 1
(1)  007232  003347                          BGT     2$              ;;BR IF MORE TO DO
(1)  007234  002402                          BLT     6$              ;;BR IF DONE
(1)  007236  005204                          INC     R4              ;;INSURE LAST DIGIT ISN'T A BLANK
(1)  007240  000744                          BR      2$              ;;GO DO THE LAST DIGIT
(1)  007242  012605                  6$:     MOV     (SP)+,R5        ;;RESTORE R5
(1)  007244  012604                          MOV     (SP)+,R4        ;;RESTORE R4
(1)  007246  012603                          MOV     (SP)+,R3        ;;RESTORE R3
(1)  007250  016666  000002  000004          MOV     2(SP),4(SP)     ;;SET THE STACK FOR RETURNING
(1)  007256  012616                          MOV     (SP)+,(SP)
(1)  007260  000002                          RTI                     ;;RETURN
(1)  007262     000                  8$:     .BYTE   0               ;;STORAGE FOR ASCII DIGIT
(1)  007263     000                          .BYTE   0               ;;TERMINATOR FOR TYPE ROUTINE
(1)  007264     000                  $OCNT:  .BYTE   0               ;;OCTAL DIGIT COUNTER
(1)  007265     000                  $OFILL: .BYTE   0               ;;ZERO FILL SWITCH
(1)  007266  000000                  $OMODE: .WORD   0               ;;NUMBER OF DIGITS TO TYPE
 523                                 .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)
 (2)  007270                         $TYPDS:
 (3)  007270  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
 (3)  007272  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
 (3)  007274  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
 (3)  007276  010346                          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
 (3)  007300  010546                          MOV     R5,-(SP)        ;;PUSH R5 ON STACK
 (1)  007302  012746  020200                  MOV     #20200,-(SP)    ;;SET BLANK SWITCH AND SIGN
 (1)  007306  016605  000020                  MOV     20(SP),R5       ;;GET THE INPUT NUMBER
 (1)  007312  100004                          BPL     1$              ;;BR IF INPUT IS POS.
 (1)  007314  005405                          NEG     R5              ;;MAKE THE BINARY NUMBER POS.
 (1)  007316  112766  000055  000001          MOVB    #'-,1(SP)       ;;MAKE THE ASCII NUMBER NEG.
 (1)  007324  005000                  1$:     CLR     R0              ;;ZERO THE CONSTANTS INDEX
 (1)  007326  012703  007504                  MOV     #$DBLK,R3       ;;SETUP THE OUTPUT POINTER
 (1)  007332  112723  000040                  MOVB    #' ,(R3)+       ;;SET THE FIRST CHARACTER TO A BLANK
 (1)  007336  005002                  2$:     CLR     R2              ;;CLEAR THE BCD NUMBER
 (1)  007340  016001  007474                  MOV     $DTBL(R0),R1    ;;GET THE CONSTANT
 (1)  007344  160105                  3$:     SUB     R1,R5           ;;FORM THIS BCD DIGIT
 (1)  007346  002402                          BLT     4$              ;;BR IF DONE
 (1)  007350  005202                          INC     R2              ;;INCREASE THE BCD DIGIT BY 1
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(1)  007352  000774                        BR      3$
(1)  007354  060105                4$:     ADD     R1,R5           ;;ADD BACK THE CONSTANT
(1)  007356  005702                        TST     R2              ;;CHECK IF BCD DIGIT=0
(1)  007360  001002                        BNE     5$              ;;FALL THROUGH IF 0
(1)  007362  105716                        TSTB    (SP)            ;;STILL DOING LEADING 0'S?
(1)  007364  100407                        BMI     7$              ;;BR IF YES
(1)  007366  106316                5$:     ASLB    (SP)            ;;MSD?
(1)  007370  103003                        BCC     6$              ;;BR IF NO
(1)  007372  116663  000001 177777        MOVB    1(SP),-1(R3)    ;;YES--SET THE SIGN
(1)  007400  052702  000060        6$:     BIS     #'0,R2          ;;MAKE THE BCD DIGIT ASCII
(1)  007404  052702  000040        7$:     BIS     #' ,R2          ;;MAKE IT A SPACE IF NOT ALREADY A DIGIT
(1)  007410  110223                        MOVB    R2,(R3)+        ;;PUT THIS CHARACTER IN THE OUTPUT BUFFER
(1)  007412  005720                        TST     (R0)+           ;;JUST INCREMENTING
(1)  007414  020027  000010                CMP     R0,#10          ;;CHECK THE TABLE INDEX
(1)  007420  002746                        BLT     2$              ;;GO DO THE NEXT DIGIT
(1)  007422  003002                        BGT     8$              ;;GO TO EXIT
(1)  007424  010502                        MOV     R5,R2           ;;GET THE LSD
(1)  007426  000764                        BR      6$              ;;GO CHANGE TO ASCII
(1)  007430  105726                8$:     TSTB    (SP)+           ;;WAS THE LSD THE FIRST NON-ZERO?
(1)  007432  100003                        BPL     9$              ;;BR IF NO
(1)  007434  116663  177777 177776        MOVB    -1(SP),-2(R3)   ;;YES--SET THE SIGN FOR TYPING
(1)  007442  105013                9$:     CLRB    (R3)            ;;SET THE TERMINATOR
(3)  007444  012605                        MOV     (SP)+,R5        ;;POP STACK INTO R5
(3)  007446  012603                        MOV     (SP)+,R3        ;;POP STACK INTO R3
(3)  007450  012602                        MOV     (SP)+,R2        ;;POP STACK INTO R2
(3)  007452  012601                        MOV     (SP)+,R1        ;;POP STACK INTO R1
(3)  007454  012600                        MOV     (SP)+,R0        ;;POP STACK INTO R0
(1)  007456  104401  007504                TYPE    ,$DBLK          ;;NOW TYPE THE NUMBER
(1)  007462  016666  000002 000004         MOV     2(SP),4(SP)     ;;ADJUST THE STACK
(1)  007470  012616                        MOV     (SP)+,(SP)
(1)  007472  000002                        RTI                     ;;RETURN TO USER
(1)  007474  023420                $DTBL:  10000.
(1)  007476  001750                        1000.
(1)  007500  000144                        100.
(1)  007502  000012                        10.
(1)  007504  000004                $DBLK:  .BLKW   4
524                                .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)  007514  010146                $TYPBN: MOV     R1,-(SP)        ;;SAVE R1 ON THE STACK
(1)  007516  016601  000006                MOV     6(SP),R1        ;;GET THE INPUT NUMBER
(1)  007522  000261                        SEC                     ;;SET "C" SO CAN KEEP TRACK OF THE NUMBER OF BITS
(1)  007524  112737  000060 007566 1$:     MOVB    #'0,$BIN        ;;SET CHARACTER TO AN ASCII "0".
(1)  007532  006101                        ROL     R1              ;;GET THIS BIT
(1)  007534  001406                        BEQ     2$              ;;DONE?
(1)  007536  105537  007566                ADCB    $BIN            ;;NO--SET THE CHARACTER EQUAL TO THIS BIT
(1)  007542  104401  007566                TYPE    ,$BIN           ;;GO TYPE THIS BIT
(1)  007546  000241                        CLC                     ;;CLEAR "C" SO CAN KEEP TRACK OF BITS
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(1)  007550  000765                          BR      1$                ;;GO DO THE NEXT BIT
(1)  007552  012601                  2$:     MOV     (SP)+,R1          ;;POP THE STACK INTO R1
(1)  007554  016666  000002  000004         MOV     2(SP),4(SP)       ;;ADJUST THE STACK
(1)  007562  012616                          MOV     (SP)+,(SP)
(1)  007564  000002                          RTI                       ;;RETURN TO USER
(1)  007566     000     000          $BIN:   .BYTE   0,0               ;;STORAGE FOR ASCII CHAR. AND TERMINATOR
525                                  .SBTTL  APT COMMUNICATIONS ROUTINE
(1)
(2)                                  ;;**********************************************************************
(1)  007570  112737  000001  010034  $ATY1:  MOVB    #1,$FFLG          ;;TO REPORT FATAL ERROR
(1)  007576  112737  000001  010032  $ATY3:  MOVB    #1,$MFLG          ;;TO TYPE A MESSAGE
(1)  007604  000403                          BR      $ATYC
(1)  007606  112737  000001  010034  $ATY4:  MOVB    #1,$FFLG          ;;TO ONLY REPORT FATAL ERROR
(2)  007614                          $ATYC:
(3)  007614  C10046                          MOV     R0,-(SP)          ;;PUSH R0 ON STACK
(3)  007616  010146                          MOV     R1,-(SP)          ;;PUSH R1 ON STACK
(1)  007620  105737  010032                  TSTB    $MFLG             ;;SHOULD TYPE A MESSAGE?
(1)  007624  001450                          BEQ     5$                ;;IF NOT:  BR
(1)  007626  122737  000001  001204         CMPB    #APTENV,$ENV      ;;OPERATING UNDER APT?
(1)  007634  001031                          BNE     3$                ;;IF NOT:  BR
(1)  007636  132737  000100  001205         BITB    #APTSPOOL,$ENVM   ;;SHOULD SPOOL MESSAGES?
(1)  007644  001425                          BEQ     3$                ;;IF NOT:  BR
(1)  007646  017600  000004                  MOV     @4(SP),R0         ;;GET MESSAGE ADDR.
(1)  007652  062766  000002  000004         ADD     #2,4(SP)                  ;;BUMP RETURN ADDR.
(1)  007660  005737  001164          1$:     TST     $MSGTYPE          ;;SEE IF DONE W/ LAST XMISSION?
(1)  007664  001375                          BNE     1$                ;;IF NOT:  WAIT
(1)  007666  010037  001200                  MOV     R0,$MSGAD         ;;PUT ADDR IN MAILBOX
(1)  007672  105720                  2$:     TSTB    (R0)+             ;;FIND END OF MESSAGE
(1)  007674  001376                          BNE     2$
(1)  007676  163700  001200                  SUB     $MSGAD,R0         ;;SUB START OF MESSAGE
(1)  007702  006200                          ASR     R0                ;;GET MESSAGE LNGTH IN WORDS
(1)  007704  010037  001202                  MOV     R0,$MSGLGT        ;;PUT LENGTH IN MAILBOX
(1)  007710  012737  000004  001164         MOV     #4,$MSGTYPE       ;;TELL APT TO TAKE MSG.
(1)  007716  000413                          BR      5$
(1)  007720  017637  000004  007744  3$:     MOV     @4(SP),4$         ;;PUT MSG ADDR IN JSR LINKAGE
(1)  007726  062766  000002  000004         ADD     #2,4(SP)                  ;;BUMP RETURN ADDRESS
(3)  007734  013746  177776                  MOV     177776,-(SP)      ;;PUSH 177776 ON STACK
(1)  007740  004737  006560                  JSR     PC,$TYPE          ;;CALL TYPE MACRO
(1)  007744  000000                  4$:     .WORD   0
(1)  007746                          5$:
(1)  007746  105737  010034          10$:    TSTB    $FFLG             ;;SHOULD REPORT FATAL ERROR?
(1)  007752  001416                          BEQ     12$               ;;IF NOT:  BR
(1)  007754  005737  001204                  TST     $ENV              ;;RUNNING UNDER APT?
(1)  007760  001413                          BEQ     12$               ;;IF NOT:  BR
(1)  007762  005737  001164          11$:    TST     $MSGTYPE          ;;FINISHED LAST MESSAGE?
(1)  007766  001375                          BNE     11$               ;;IF NOT:  WAIT
(1)  007770  017637  000004  001166         MOV     @4(SP),$FATAL     ;;GET ERROR #
(1)  007776  062766  000002  000004         ADD     #2,4(SP)                  ;;BUMP RETURN ADDR.
(1)  010004  005237  001164                  INC     $MSGTYPE          ;;TELL APT TO TAKE ERROR
(1)  010010  105037  010034          12$:    CLRB    $FFLG             ;;CLEAR FATAL FLAG
(1)  010014  105037  010033                  CLRB    $LFLG             ;;CLEAR LOG FLAG
(1)  010020  105037  010032                  CLRB    $MFLG             ;;CLEAR MESSAGE FLAG
(3)  010024  012601                          MOV     (SP)+,R1          ;;POP STACK INTO R1
(3)  010026  012600                          MOV     (SP)+,R0          ;;POP STACK INTO R0
```

```
(1)  010030  000207                          RTS     PC          ;;RETURN
(1)  010032     000          $MFLG:  .BYTE   0           ;;MESSG. FLAG
(1)  010033     000          $LFLG:  .BYTE   0           ;;LOG FLAG
(1)  010034     000          $FFLG:  .BYTE   0           ;;FATAL FLAG
(1)          010036                  .EVEN
(1)          000200          APTSIZE=200
(1)          000001          APTENV=001
(1)          000100          APTSPOOL=100
(1)          000040          APTCSUP=040
```

```
                                .SBTTL  TRAP DECODER
                                ;;**********************************************************************
                                ;*THIS ROUTINE WILL PICKUP THE LOWER BYTE OF THE ''TRAP'' INSTRUCTION
                                ;*AND USE IT TO INDEX THROUGH THE TRAP TABLE FOR THE STARTING ADDRESS
                                ;*OF THE DESIRED ROUTINE. THEN USING THE ADDRESS OBTAINED IT WILL
                                ;*GO TO THAT ROUTINE.
                                
010036  010046                  $TRAP:  MOV     R0,-(SP)        ;;SAVE R0
010040  016600  000002                  MOV     2(SP),R0        ;;GET TRAP ADDRESS
010044  005740                          TST     -(R0)           ;;BACKUP BY 2
010046  111000                          MOVB    (R0),R0         ;;GET RIGHT BYTE OF TRAP
010050  006300                          ASL     R0              ;;POSITION FOR INDEXING
010052  016000  010072                  MOV     $TRPAD(R0),R0   ;;INDEX TO TABLE
010056  000200                          RTS     R0              ;;GO TO ROUTINE
                                
                                ;;THIS IS USE TO HANDLE THE ''GETPRI'' MACRO
                                
010060  011646                  $TRAP2: MOV     (SP),-(SP)      ;;MOVE THE PC DOWN
010062  016666  000004  000002          MOV     4(SP),2(SP)     ;;MOVE THE PSW DOWN
010070  000002                          RTI                     ;;RESTORE THE PSW
                                
                                .SBTTL  TRAP TABLE
                                
                                ;*THIS TABLE CONTAINS THE STARTING ADDRESSES OF THE ROUTINES CALLED
                                ;*BY THE ''TRAP'' INSTRUCTION.
                                
                                ;       ROUTINE
                                ;       -------
010072  010060                  $TRPAD: .WORD   $TRAP2
010074  006560                          $TYPE   ;;CALL=TYPE     TRAP+1(104401)  TTY TYPEOUT ROUTINE
010076  007066                          $TYPOC  ;;CALL=TYPOC    TRAP+2(104402)  TYPE OCTAL NUMBER (WITH LEADING ZEROS)
010100  007042                          $TYPOS  ;;CALL=TYPOS    TRAP+3(104403)  TYPE OCTAL NUMBER (NO LEADING ZEROS)
010102  007102                          $TYPON  ;;CALL=TYPON    TRAP+4(104404)  TYPE OCTAL NUMBER (AS PER LAST CALL)
010104  007270                          $TYPDS  ;;CALL=TYPDS    TRAP+5(104405)  TYPE DECIMAL NUMBER (WITH SIGN)
010106  007514                          $TYPBN  ;;CALL=TYPBN    TRAP+6(104406)  TYPE BINARY (ASCII) NUMBER
                                
                                
010110  006126                          $RDCHR  ;;CALL=RDCHR    TRAP+7(104407)  TTY TYPEIN CHARACTER ROUTINE
010112  006216                          $RDLIN  ;;CALL=RDLIN    TRAP+10(104410) TTY TYPEIN STRING ROUTINE
                                
                                ;MEMORY USAGE MAP BLOCK
010114  000100                  ADRPOK: .BLKW   100
010314  000000                  ADRTOP: 0                       ;LAST LOCATION USED BY PROGRAM
                                
000001                                  .END
```

```
AABASE  001262            55#     90*     91*    148
AACNT   001274            63#     98*    152     182
AAOFF   001250            47#     91
AAPRI   004054           150     181     475#
ABASE = 171000            14#     42
ACDW1 = 000000            42
ACDW2 = 000000            42
ACPUOP= 000000            42
ADBASE  001256            53#     87*     88      90      92      94     131
ADCNT   001270            61#     96*    135     174
ADDW0 = 000000            42
ADDW1 = 000000            42
ADDW10= 000000            42
ADDW11= 000000            42
ADDW12= 000000            42
ADDW13= 000000            42
ADDW14= 000000            42
ADDW15= 000000            42
ADDW2 = 000000            42
ADDW3 = 000000            42
ADDW4 = 000000            42
ADDW5 = 000000            42
ADDW6 = 000000            42
ADDW7 = 000000            42
ADDW8 = 000000            42
ADDW9 = 000000            42
ADEVCT= 000000            42
ADEVM = 000000            42
ADGO    003456           130     328     391#
ADPRI   004030           133     173     473#
ADRPOK  010114            72     213     230     530#
ADRTOP  010314           227     240     531#
AENV  = 000000            42
AENVM = 000000            42
AFATAL= 000000            42
AMADR1= 000000            42
AMADR2= 000000            42
AMADR3= 000000            42
AMADR4= 000000            42
AMAMS1= 000000            42
AMAMS2= 000000            42
AMAMS3= 000000            42
AMAMS4= 000000            42
AMSGAD= 000000            42
AMSGLG= 000000            42
AMSGTY= 000000            42
AMTYP1= 000000            42
AMTYP2= 000000            42
AMTYP3= 000000            42
AMTYP4= 000000            42
APASS = 000000            42
APRIOR= 000000            42
APTCSU= 000040           520     525#
APTENV= 000001           520     525#
```

```
APTSIZ= 000200            81     525#
APTSPO= 000100           520     525#
ASWREG= 000000            42
ATESTN= 000000            42
ATPRI   004147           288     480#
AUNIT = 000000            42
AUSWR = 000000            42
AVECT1= 000000            42
AVECT2= 000000            42
BEGIN   001324            37      80#    519
BIT0  = 000001            13#    419
BIT00 = 000001            13#
BIT01 = 000002            13#
BIT02 = 000004            13#
BIT03 = 000010            13#
BIT04 = 000020            13#
BIT05 = 000040            13#
BIT06 = 000100            13#
BIT07 = 000200            13#
BIT08 = 000400            13#
BIT09 = 001000            13#
BIT1  = 000002            13#    468
BIT10 = 002000            13#
BIT11 = 004000            13#
BIT12 = 010000            13#
BIT13 = 020000            13#    456
BIT14 = 040000            13#
BIT15 = 100000            13#    211     226
BIT2  = 000004            13#
BIT3  = 000010            13#    466
BIT4  = 000020            13#
BIT5  = 000040            13#
BIT6  = 000100            13#    420
BIT7  = 000200            13#
BIT8  = 000400            13#    402
BIT9  = 001000            13#
BPTVEC= 000014            13#
CHAIN   000042            33#    105
CR    = 000015            13#    520
CRLF  = 000200            13#    102     520
DDISP = 177570            13#     42      81
DIBASE  001264            56#     92*     93*    156
DICNT   001276            64#     99*    160     186
DIGO    003534           155     408#
DIOFF   001252            48#     93
DIPRI   004066           158     185     476#
DISPLA  001142            42#     81*
DISPRE  001322            76#     81
DOBASE  001266            57#     94*     95*    164
DOCNT   001300            65#    100*    168     190
DOGO    003560           163     415#
DOOFF   001254            49#     95
DOPRI   004100           166     189     477#
DSWR  = 177570            13#     42      81
```

```
EMTVEC= 000030          13#
ERRVEC= 000004          13#     81*     208     214*    242*    263     266*    270*    325*
FIXVCT  003306         273     350#
FLAGAD  001316          74#     115*    118*    301     326*
FLAGMP  001314          73#     123*    126*    203     206*
GNS    = ****** U      102     527
HT     = 000011         13#     520
IOTRD   003224         270     331#
IOTVEC= 000020          13#
KWBASE  001260          54#     88*     89*     139
KWCNT   001272          62#     97*     143     178
KWGO    003474         138     397#
KWOFF   001246          46#     89
KWPRI   004042         141     177     474#
LF     = 000012         13#     520
LOOP    002062         104     110     125     129#    254
MDASH   004207         443     484#
MDIF    004232         458     486#
MNCMAP  004474         207     492#
MPRMP   004251         460     487#
MSE     004213         454     485#
NBEXT   001310          71#     264*    306*    313     324
NIPRI   004141         172     479#
NOPRI   004112         295     321     478#
OUTADR  001312          72#     210*    232     239*
OUTBIN  002554         235     236     237     238     249#
PC     =%000007         13#     86*     235*    236*    237*    238*    252*    254*    273*    274*    303*    377*    395*
                       403*    410*    421*    470*    519*    520*    525*
PIRQ   = 177772         13#
PIRQVE= 000240          13#
PR0    = 000000         13#
PR1    = 000040         13#
PR2    = 000100         13#
PR3    = 000140         13#
PR4    = 000200         13#
PR5    = 000240         13#
PR6    = 000300         13#
PR7    = 000340         13#
PS     = 177776         13#
PSW    = 177776         13#
PWRVEC= 000024          13#
QUESAD  004262         111     488#
QUESMP  004373         119     490#
RDCHR  = 104407        108     112     120     519     527#
RDLIN  = 104410        527#
RESVEC= 000010          13#
R0     =%000000         13#     109*    113*    114*    116     121*    122*    124     209*    210     215     217*    218
                       220*    230*    240     249     254*    275*    279*    350*    357     359     361     363     365
                       372*    373*    375     378     380     397*    398*    399*    400*    415*    416*    417*    418*
                       419*    440*    445*    452     456     464*    465*    466*    467     520*    523*    525*    527*
R1     =%000001         13#     211*    216     219     222*    226*    351*    372     374     379     381     434*    435*
                       442     444*    447*    448     450*    451     461*    462     464     523*    524*    525*
R2     =%000002         13#     212*    216*    219*    224     225*    352*    373     432*    433*    434     440     523*
R3     =%000003         13#     213*    224*    227     519*    522*    523*
```