ICS-11

FIELD TEST PROGRAM

MD-11-DZICA-B

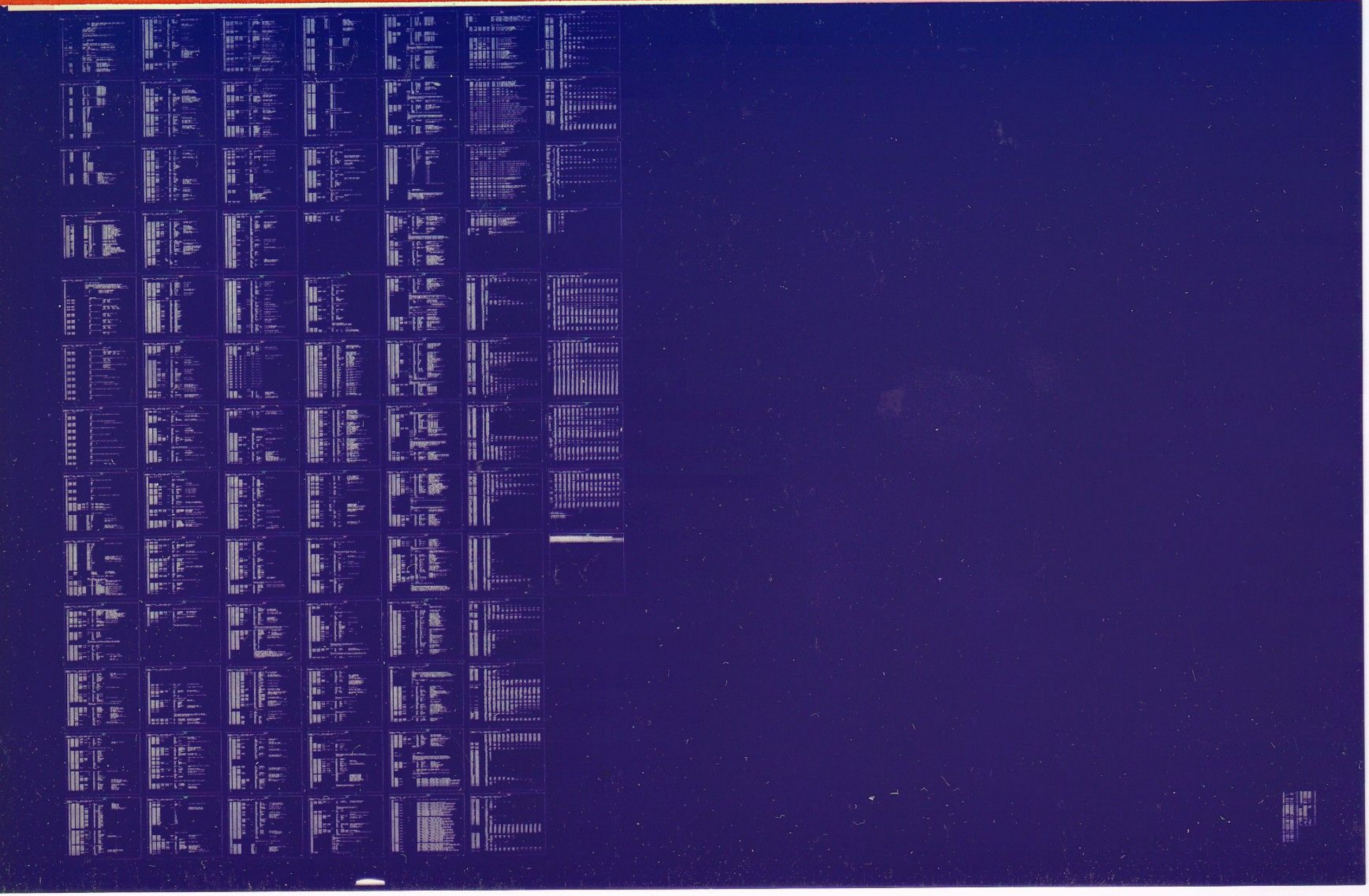
EP DZICA D DL A

NOV 1976

FICHE 1 OF 1

digital

MADE IN USA



```
                                        .MCALL  .HEADER,.SETUP,.$POWER,.$TYPE,.EQUAT,.$CMTAG,.$ERRTYP,.$TYPOCT
                                        .MCALL  .$CATCH,.$TRAP,.TRMTRP,SETTRAP,.$READ,.$RDDEC,.$ERROR,.$SCOPE
                                        .MCALL  .$SB2D,.$DB2D,.$SAVE,.$RAND
                164000                  $SWR=164000

000000                                  .HEADER ↑/MAINDEC-11-DZICA-B/, 1976, ↑/DAN DEKNIS/
                                .TITLE  MAINDEC-11-DZICA-B
                                ;*COPYRIGHT (C) 1976
                                ;*DIGITAL EQUIPMENT CORP.
                                ;*MAYNARD, MASS. 01754
                                ;*
                                ;*PROGRAM BY DAN DEKNIS
                                ;*
                                ;*THIS PROGRAM WAS ASSEMBLED USING THE PDP-11 MAINDEC SYSMAC
                                ;*PACKAGE (MAINDEC-11-DZQAC-CO),MAR 21, 1976.
                                ;*
                000001          $TN=1

000000                                  .$CATCH START
                                .SBTTL  TRAP CATCHER

                000000                  .=0
                                ;*ALL UNUSED LOCATIONS FROM 4 - 776 CONTAIN A ".+2,HALT"
                                ;*SEQUENCE TO CATCH ILLEGAL TRAPS AND INTERRUPTS
                                ;*LOCATION 0 CONTAINS 0 TO CATCH IMPROPERLY LOADED VECTORS
                000174                  .=174
000174  000000                  DISPREG: .WORD  0               ;;SOFTWARE DISPLAY REGISTER
000176  000000                  SWREG:   .WORD  0               ;;SOFTWARE SWITCH REGISTER
                                .SBTTL  STARTING ADDRESS(ES)
000200  000137  001704                  JMP     @#START ;;JUMP TO STARTING ADDRESS OF PROGRAM

                000210                  .=210
000210  000137  003366                  JMP     @#START1

000214                                  .EQUAT
                                .SBTTL  BASIC DEFINITIONS

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

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

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

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

                                ;*"SWITCH REGISTER" SWITCH DEFINITIONS
100000                  SW15=   100000
040000                  SW14=   40000
020000                  SW13=   20000
010000                  SW12=   10000
004000                  SW11=   4000
002000                  SW10=   2000
001000                  SW09=   1000
000400                  SW08=   400
000200                  SW07=   200
000100                  SW06=   100
000040                  SW05=   40
000020                  SW04=   20
000010                  SW03=   10
000004                  SW02=   4
000002                  SW01=   2
000001                  SW00=   1
                        .EQUIV  SW09,SW9
                        .EQUIV  SW08,SW8
                        .EQUIV  SW07,SW7
                        .EQUIV  SW06,SW6
                        .EQUIV  SW05,SW5
                        .EQUIV  SW04,SW4
                        .EQUIV  SW03,SW3
                        .EQUIV  SW02,SW2
                        .EQUIV  SW01,SW1
                        .EQUIV  SW00,SW0

                                ;*DATA BIT DEFINITIONS (BIT00 TO BIT15)
100000                  BIT15=  100000
040000                  BIT14=  40000
020000                  BIT13=  20000
010000                  BIT12=  10000
004000                  BIT11=  4000
```

```
                        002000          BIT10=  2000
                        001000          BIT09=  1000
                        000400          BIT08=  400
                        000200          BIT07=  200
                        000100          BIT06=  100
                        000040          BIT05=  40
                        000020          BIT04=  20
                        000010          BIT03=  10
                        000004          BIT02=  4
                        000002          BIT01=  2
                        000001          BIT00=  1
                                        .EQUIV  BIT09,BIT9
                                        .EQUIV  BIT08,BIT8
                                        .EQUIV  BIT07,BIT7
                                        .EQUIV  BIT06,BIT6
                                        .EQUIV  BIT05,BIT5
                                        .EQUIV  BIT04,BIT4
                                        .EQUIV  BIT03,BIT3
                                        .EQUIV  BIT02,BIT2
                                        .EQUIV  BIT01,BIT1
                                        .EQUIV  BIT00,BIT0

                                        ;*BASIC "CPU" TRAP VECTOR ADDRESSES
                        000004          ERRVEC= 4               ;;TIME OUT AND OTHER ERRORS
                        000010          RESVEC= 10              ;;RESERVED AND ILLEGAL INSTRUCTIONS
                        000014          TBITVEC=14              ;;"T" BIT
                        000014          TRTVEC= 14              ;;TRACE TRAP
                        000014          BPTVEC= 14              ;;BREAKPOINT TRAP (BPT)
                        000020          IOTVEC= 20              ;;INPUT/OUTPUT TRAP (IOT) **SCOPE**
                        000024          PWRVEC= 24              ;;POWER FAIL
                        000030          EMTVEC= 30              ;;EMULATOR TRAP (EMT) **ERROR**
                        000034          TRAPVEC=34              ;;"TRAP" TRAP
                        000060          TKVEC=  60              ;;TTY KEYBOARD VECTOR
                        000064          TPVEC=  64              ;;TTY PRINTER VECTOR
                        000240          PIRQVEC=240             ;;PROGRAM INTERRUPT REQUEST VECTOR
  000214                                        .$CMTAG
```

```
                                .SBTTL  COMMON TAGS

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

                        001100          .=1100
001100                  $CMTAG:                         ;;START OF COMMON TAGS
001100  000000          $PASS:  .WORD   0               ;;CONTAINS PASS COUNT
001102  000             $TSTNM: .BYTE   0               ;;CONTAINS THE TEST NUMBER
001103  000             $ERFLG: .BYTE   0               ;;CONTAINS ERROR FLAG
001104  000000          $ICNT:  .WORD   0               ;;CONTAINS SUBTEST ITERATION COUNT
001106  000000          $LPADR: .WORD   0               ;;CONTAINS SCOPE LOOP ADDRESS
001110  000000          $LPERR: .WORD   0               ;;CONTAINS SCOPE RETURN FOR ERRORS
001112  000000          $ERTTL: .WORD   0               ;;CONTAINS TOTAL ERRORS DETECTED
001114  000             $ITEMB: .BYTE   0               ;;CONTAINS ITEM CONTROL BYTE
001115  001             $ERMAX: .BYTE   1               ;;CONTAINS MAX. ERRORS PER TEST
001116  000000          $ERRPC: .WORD   0               ;;CONTAINS PC OF LAST ERROR INSTRUCTION
001120  000000          $GDADR: .WORD   0               ;;CONTAINS ADDRESS OF 'GOOD' DATA
001122  000000          $BDADR: .WORD   0               ;;CONTAINS ADDRESS OF 'BAD' DATA
001124  000000          $GDDAT: .WORD   0               ;;CONTAINS 'GOOD' DATA
001126  000000          $BDDAT: .WORD   0               ;;CONTAINS 'BAD' DATA
001130  000000                  .WORD   0               ;;RESERVED--NOT TO BE USED
001132  000000                  .WORD   0
001134  000             $AUTOB: .BYTE   0               ;;AUTOMATIC MODE INDICATOR
001135  000             $INTAG: .BYTE   0               ;;INTERRUPT MODE INDICATOR
001136  000000                  .WORD   0
001140  177570          SWR:    .WORD   DSWR            ;;ADDRESS OF SWITCH REGISTER
001142  177570          DISPLAY: .WORD  DDISP           ;;ADDRESS OF DISPLAY REGISTER
001144  177560          $TKS:   177560                  ;;TTY KBD STATUS
001146  177562          $TKB:   177562                  ;;TTY KBD BUFFER
001150  177564          $TPS:   177564                  ;;TTY PRINTER STATUS REG. ADDRESS
001152  177566          $TPB:   177566                  ;;TTY PRINTER BUFFER REG. ADDRESS
001154  000             $NULL:  .BYTE   0               ;;CONTAINS NULL CHARACTER FOR FILLS
001155  002             $FILLS: .BYTE   2               ;;CONTAINS # OF FILLER CHARACTERS REQUIRED
001156  012             $FILLC: .BYTE   12              ;;INSERT FILL CHARS. AFTER A "LINE FEED"
001157  000             $TPFLG: .BYTE   0               ;;"TERMINAL AVAILABLE" FLAG (BIT<07>=0=YES)
001160  000000          $TIMES: 0                       ;;MAX. NUMBER OF ITERATIONS
001162  077             $QUES:  .ASCII  /?/             ;;QUESTION MARK
001163  015             $CRLF:  .ASCII  <15>            ;;CARRIAGE RETURN
001164  000012          $LF:    .ASCIZ  <12>            ;;LINE FEED
001166                  STARS
                        ;;*****************************************************************
```

```
                                .SBTTL  ERROR POINTER TABLE

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

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


001166                          $ERRTB:

                                        ;AD05 ERRORS
                                        ;ERROR 1 ADDRESS ABILITY
001166  022141                          EM1                     ;"COULD NOT SEND-RECIEVE DATA"
001170  022536                          DH1                     ;ERROR   AD05
                                                                ;  PC    ADDR
001172  001500                          DT1                     ;$ERRC,  ADCSR,0
001174  001476                          DF0                     ;0

                                        ;ERROR 2 "BIT EXERCISER"
001176  022177                          EM2                     ;"SEND-RECIEVE DATA ERROR"
001200  022571                          DH2                     ;ERROR   A/D    GOOD    BAD
                                                                ;  PC    ADDR    DATA    DATA
001202  001506                          DT2                     ;$ERRPC, ADCSR,  $GDDAT, $BDDAT,C
001204  001476                          DF0                     ;0

                                        ;ERROR 3 CONVERT BIT

001206  022231                          EM3                     ;CONVERT BIT FAILED TO SET
001210  022536                          DH1                     ;ERROR   A/D
001212  001500                          DT1                     ;  PC    ADDR
001214  001476                          DF0                     ;$ERRPC, ADCSR,0

                                        ;ERROR 4 CONVERT BIT

001216  022265                          EM4                     ;CONVERT BIT FAILED TO CLEAR
001220  022536                          DH1                     ;ERROR   A/D
001222  001500                          DT1                     ;  PC    ADDR
001224  001476                          DF0                     ;$ERRPC, ADCSR,0

                                        ;ERROR 5 READ C/R BIT
001226  022323                          EM5                     ;CAN'T READ DATA REGISTER
001230  022536                          DH1                     ;ERROR   A/D
001232  001500                          DT1                     ;  PC    ADDR
001234  001476                          DF0                     ;$ERRPC, ADCSR,0

                                        ;ERROR 6 AD05 INTERRUPT

001236  022356                          EM6                     ;AD05 FAILED TO INTERRUPT
001240  022536                          DH1                     ;ERROR   A/D
001242  001500                          DT1                     ;  PC    ADDR
```

```
                                DF0                     ;$ERRPC, ADCSR,0

                                ;ERROR 7 ADDS ADDR OR GENERIC CODE

001246  022411                  EM7                     ;ADDR. OR GENERIC CODE INCORRECT ON INTR.
001250  022665                  DH3                     ;ERROR   MODULE    ICAR
001252  001506                  DT2                     ;  PC    ADDR      S/B    WAS
001254  001476                  DF0                     ;$ERRPC, ADCSR,  $GDDAT, $BDDAT

                                ;ERROR 10 RIF BIT ACTION

001256  022470                  EM10                    ;RIF DID NOT CLEAR INTR. FLAG ON ADDS
001260  022536                  DH1                     ;ERROR   A/D
001262  001500                  DT1                     ;  PC    ADDR
001264  001476                  DF0                     ;$ERRPC, ADCSR

                                ;ERROR 11 COUNTER MODULE ADDRESSABILITY

001266  023015                  EM11                    ;COUNTER MODULE COULD NOT READ-WRITE BUFFER
001270  023077                  DH4                     ;ERROR COUNTER
001272  001520                  DT3                     ;PC ADDR
001274  001476                  DF0                     ;$ERRPC $BDADR

                                ;ERROR 12 COUNTER MODULE "BIT EXERCISE ROUTINE

001276  022177                  EM2
001300  022571                  DH2
001302  001526                  DT4
001304  001476                  DF0

                                ;ERROR 13 COUNTER MODULE COUNTING

001306  023140                  EM12                    ;COUNTER MODULE MISSED A COUNT
001310  022571                  DH2
001312  001526                  DT4
001314  001476                  DF0

                                ;ERROR 14 COUNTER MODULE FAILED TO INTERRUPT

001316  023204                  EM13                    ;COUNTER FAILED TO INTERRUPT
001320  023077                  DH4
001322  001520                  DT3
001324  001476                  DF0

                                ;ERROR 15 COUNTER MODULE ADDR OR GENERIC CODE INCORRECT

001326  023251                  EM14
001330  022665                  DH3
001332  001526                  DT4
001334  001476                  DF0

                                ;ERROR 16 COUNTER DIDN'T HALT ON OVERFLOW

001336  023347                  EM15
001340  022571                  DH2
001342  001526                  DT4
```

```
  305  001344  001476                        DF0
  306
  307                                       ;ERROR 17 RIF DIDN'T CLEAR INTERRUPT FLAG ON COUNTER
  308
  309  001346  023431                        EM16
  310  001350  023077                        DH4
  311  001352  001520                        DT3
  312  001354  001476                        DF0
  313
  314                                       ;ERROR 20 COUNTER MODULE INITIALIZATION PART 1
  315
  316  001356  023506                        EM17                    ;INIT FAILED TO CLEAR COUNTER BIT(S)
  317  001360  022571                        DH2
  318  001362  001526                        DT4
  319  001364  001476                        DF0
  320
  321                                       ;ERROR 21 ILLEGAL INTERRUPT POSTED ON ICS BUS
  322
  323  001366  023562                        EM20
  324  001370  023077                        DH4
  325  001372  001520                        DT3
  326  001374  001476                        DF0
  327
  328                                       ;ERROR 22 ICS-11 FAILED TO INTERRUPT
  329
  330  001376  023630                        EM21
  331  001400  023077                        DH4
  332  001402  001520                        DT3
  333  001404  001476                        DF0
  334
  335                                       ;ERROR 23 ICAR NOT ZERO AFTER FORCED ICS INTERRUPT.
  336
  337  001406  023666                        EM22
  338  001410  022665                        DH3
  339  001412  001526                        DT4
  340  001414  001476                        DF0
  341
  342                                       ;ERROR 24 SYS INITIALIZE FAILED TO CLEAR COUNTER INTERRUPT FLAG
  343
  344  001416  023737                        EM23
  345  001420  023077                        DH4
  346  001422  001520                        DT3
  347  001424  001476                        DF0
  348
  349                                       ;ERROR 25 COUNTER STARTED COUNTING AFTER SYSTEM INIT.
  350
  351  001426  024017                        EM24
  352  001430  022571                        DH2
  353  001432  001526                        DT4
  354  001434  001476                        DF0
  355
  356                                       ;ERROR 26 A005 READ DUAL ADDR ERROR
  357
  358  001436  024100                        EM25
  359  001440  024217                        DH5                     ;ERROR   A/D    DUAL
  360  001442  001540                        DT5                     ;  PC     ADDR    ADDR
```

```
                                                DF0

                                                ;ERROR 27 A005 WRITE DUAL ADDR. ERROR

                                                EM26
                                                DH5
                                                DT5
                                                DF0


                                                ;ERROR 30   SEND -RECIEVE DATA ERROR

                                                EM27
                                                DH2
                                                DT4
                                                DF0


                                                ;ERROR 31     SAME AS ERROR 30 ONLY NO HEADER TYPEOUT

                                                DF0
                                                $CRLF
                                                DT4
                                                DF0


001476  000000                          DF0:    0
001500  001116  007062  000000          DT1:    .WORD   $ERRPC, ADCSR,0
001506  001116  007062  001124          DT2:    .WORD   $ERRPC,ADCSR,$GDDAT,$BDDAT,0
001514  001126  000000
001520  001116  001122  000000          DT3:    .WORD   $ERRPC,$BDADR,0
001526  001116  001122  001124          DT4:    .WORD   $ERRPC,$BDADR,$GDDAT,$BDDAT,0
001534  001126  000000
001540  001116  007062  001122          DT5:    .WORD   $ERRPC,ADCSR,$BDADR,0
001546  000000


                                                ;*TABLE OF CONSTANTS

001550  020320                          FR110:  20320                   ;TTY DELAY TIME
001552  006532                          FR50:   6532
001554  005650                          FR40:   5650
001556  002724                          FR20:   2724
001560  002052                          FR16:   2052                    ;DELAY FOR 16 MILLSEC
001562  001024                          FR5:    1024
001564  000500                          FR3:    500                     ;DELAY FOR 3 MILLI SEC.
001566  000000                          FREQ:   0                       ;DELAY TIME.
001570  000000                          FREQ1:  0
001572  000000                          FREQ2:  0
001574  000000                          FREQ3:  0
001576  000152                          FR1:    152                     ;DELAY FOR 1 MILLI SEC.
001600  000220                          FR1120: 220                     ;ON AN 11/20  FR1 X 3 FOR 11/45.
001602  000000                          PATRNM: 0                       ;PATTERN MODIFIER
001604  000000                          PATRN:  0                       ;PATTERN TO BE SENT TO OUTPUT MODULE
001606  000000                          PATRNC: 0
001610  000000                          PATJOY: 0
```

```
   417  001612  171000                  ICSMOD: 171000                  ;STARTING ADDRESS OF ICS MODULES.
   418  001614  171776                  ICSR:   171776
   419  001616  171774                  ICAR:   171774
   420  001620  000234                  ICSVT:  234
   421  001622  000236                  ICSVT2: 236
   422  001624  000064                  TPVCT:  64
   423  001626  000066                  TPVCT2: 66
   424  001630  000000                  INCFLG: 0
   425  001632  000000                  TPBSY:0
   426  001634  000000                  HEADER: 0
   427  001636  000000                  TOADR:0
   428  001640  000000                  TODAT:0
   429  001642  000000                  TOGEN:  0
   430  001644  000000                  TPBSYP: 0
   431  001646  000001                  ST200:  1                       ;CLEARED ON PROGRAM START AT 200
   432  001650  000000                  CORSIZ: 0                       ;END ADDR OF CORE.
   433  001652  000000                  EXPERT: 0                       ;0=NOVICE MODE--1=EXPERT MODE
   434  001654  000000                  CONNT:  0                       ;0=NORMAL; 1=MODS CONNECTED FOR TST 0
   435  001656  000000                  LPAV:   0
   436  001660  000000                  LINEPR: 0                       ;0=TTY OUTPUT---1=LINE PRINTER
   437  001662  177514                  LPCSR:  177514
   438  001664  177516                  LPDBR:  177516
   439  001666  000000                  TPCSR:  0
   440  001670  000000                  TPDBR:  0
   441  001672  000000                  TMPFIL: 0
   442  001674  000000                  TMPVEC: 0
   443  001676  000000                  ICSHGH: 0
   444  001700  000000                  CTLLOC: 0
   445  001702  000000                  ICSLMT: 0
   446
   447          000002                          EXIT=   2               ; RTI INSTRUCTION
   448          000207                          RETURN=207              ;RTS PC INSTRUCTION
   449          004737                          GOSUB=4737              ;JSR PC, INSTRUCTION
   450          022626                          POPSP2=22626
   451
   452  001704                          .SETUP  <.$TRAP,.$SCOPE,.$ERROR,.$POWER>
   453
   454  001704                  START:  SETUP
   455                          .SBTTL  INITIALIZE THE COMMON TAGS
   456                          ;;CLEAR THE COMMON TAGS ($CMTAG) AREA
   457  001704  012706  001100          MOV     #$CMTAG,R6      ;;FIRST LOCATION TO BE CLEARED
   458  001710  005026                  CLR     (R6)+           ;;CLEAR MEMORY LOCATION
   459  001712  022706  001140          CMP     #SWR,R6 ;;DONE?
   460  001716  001374                  BNE     .-6             ;;LOOP BACK IF NO
   461  001720  012706  001100          MOV     #STACK,SP       ;;SETUP THE STACK POINTER
   462                          ;;INITIALIZE A FEW VECTORS
   463  001724  012737  017424  000020  MOV     #$SCOPE,@#IOTVEC ;;IOT VECTOR FOR SCOPE ROUTINE
   464  001732  012737  000340  000022  MOV     #340,@#IOTVEC+2 ;;LEVEL 7
   465  001740  012737  016576  000030  MOV     #$ERROR,@#EMTVEC ;;EMT VECTOR FOR ERROR ROUTINE
   466  001746  012737  000340  000032  MOV     #340,@#EMTVEC+2 ;;LEVEL 7
   467  001754  012737  020474  000034  MOV     #$TRAP,@#TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
   468  001762  012737  000340  000036  MOV     #340,@#TRAPVEC+2;LEVEL 7
   469  001770  012737  017252  000024  MOV     #$PWRDN,@#PWRVEC ;;POWER FAILURE VECTOR
   470  001776  012737  000340  000026  MOV     #340,@#PWRVEC+2 ;;LEVEL 7
   471  002004  005037  001160          CLR     $TIMES          ;;INITIALIZE NUMBER OF ITERATIONS
   472  002010  012737  002010  001106  MOV     #.,$LPADR       ;;INITIALIZE THE LOOP ADDRESS FOR SCOPE
```

```
                                                SWRSU
                                ;;SIZE FOR A HARDWARE SWITCH REGISTER. IF NOT FOUND OR IT IS
                                ;;EQUAL TO A "-1", SETUP FOR A SOFTWARE SWITCH REGISTER.
002016  013746  000004          MOV     @#ERRVEC,-(SP)  ;;SAVE ERROR VECTOR
002022  012737  002056  000004  MOV     #64$,@#ERRVEC   ;;SET UP ERROR VECTOR
002030  012737  177570  001140  MOV     #DSWR,SWR       ;;SETUP FOR A HARDWARE SWICH REGISTER
002036  012737  177570  001142  MOV     #DDISP,DISPLAY  ;;AND A HARDWARE DISPLAY REGISTER
002044  022777  177777  177066  CMP     #-1,@SWR        ;;TRY TO REFERENCE HARDWARE SWR
002052  001012                  BNE     66$             ;;BRANCH IF NO TIMEOUT TRAP OCCURRED
                                                        ;;AND  THE HARDWARE SWR IS NOT = -1
002054  000403                  BR      65$             ;;BRANCH IF NO TIMEOUT
002056  012716  002064  64$:    MOV     #65$,(SP)       ;;SET UP FOR TRAP RETURN
002062  000002                  RTI
002064  012737  000176  001140  65$:    MOV     #SWREG,SWR      ;;POINT TO SOFTWARE SWR
002072  012737  000174  001142          MOV     #DISPREG,DISPLAY
002100  012637  000004  66$:    MOV     (SP)+,@#ERRVEC  ;;RESTORE ERROR VECTOR

002104  012737  176543  016342  MOV     #176543,$HINUM
002112  012737  123456  016344  MOV     #123456,$LONUM
002120  005037  001654          CLR     CONNT

                                ;
                                ;FILL LOCATIONS "214-1000" WITH .+2, IOT
                                ;
002124  012700  000214  FILVEC: MOV     #214,R0
002130  012701  000216          MOV     #216,R1
002134  010120          98$:    MOV     R1,(R0)+
002136  012720  000004          MOV     #4,(R0)+
002142  022121                  CMP     (R1)+,(R1)+
002144  022700  001000          CMP     #1000,R0
002150  003371                  BGT     98$
002152  104400                  TYPE                    ;TYPE HEADER
002154  020574                  MHEAD
                                ;**
                                ;** SINCE ISC-11 IS CAPABLE OF DIFFERENT CONTROL REGISTERS
                                ;** ASK OPERATOR FOR FILE BOX AND INTERRUPT VECTOR ADDRESS
                                ;**

002156  012737  002164  001700  MOV     #10$,CTLLOC
002164  104400  026251  10$:    TYPE, MFILE             ;ASK FOR FILE BOX
002170  012737  000001  002206  MOV     #1,22$
002176  000401                  BR      .+4
002200  000771                  BR      10$
002202  104411                  INOCT
002204  001672                  TMPFIL
002206  000001  22$:    1
002210  022737  000013  001672  CMP     #13,TMPFIL
002216  002003                  BGE     11$
002220  104400  026336          TYPE, ILLEG             ;ILLEGAL FILE BOX... RE-ASK
002224  000757                  BR      10$
002226  012737  171000  001702  11$:    MOV     #171000,ICSLMT          ;INIT. MODULE ADDRESSES
002234  012737  171776  001614          MOV     #171776,ICSR            ;INIT. ICSR
002242  005237  001672          INC     TMPFIL
002246  005337  001672  19$:    DEC     TMPFIL                  ;DEC. FILE
002252  001407                  BEQ     18$                     ;BRANCH IF FOUND
```

```
                                                SUB     #10,ICSR                ;NEXT ICSR
                                                ADD     #40,ICSLMT              ;NEXT GROUP OF MODULE ADDRESSES
                                                BR      19$                     ;LOOP
                                        18$:    MOV     ICSR,ICAR               ;CREATE ICAR
                                                SUB     #2,ICAR
                                                MOV     ICSLMT,ICSHGH           ;SET UPPER ADDRESS LIMIT
                                                ADD     #40,ICSHGH
                                                MOV     #12$,@#4
                                                MOV     @ICSR,R0
                                                BR      97$
                                        12$:    POPSP2
                                                TYPE,   NONXST
                                                BR      10$
                                        97$:    MOV     #6,@#4
                                                MOV     #99$,CTLLOC
                                        99$:    TYPE, MVECT             ;ASK FOR INTERRUPT VECTOR
                                                MOV     #1,23$
                                                BR      .+4
                                                BR      99$
                                                INOCT
                                                TMPVEC
                                        23$:    1
                                                CMP     #776,TMPVEC
                                                BLT     16$
                                                CMP     #234,TMPVEC
                                                BLE     17$
                                        16$:    TYPE, ILLEG             ;NOT IN FLOATING AREA
                                                BR      99$
                                        17$:    MOV     TMPVEC,ICSVT
                                                ADD     #2,TMPVEC
                                                MOV     TMPVEC,ICSVT2           ;STORE VECTOR ADDRESS
                                        ;**
                                        ;**VERIFY THAT VECTOR GIVEN IS ACTUAL VECTOR BEFORE GOING
                                        ;**ANY FARTHER
                                        ;


                                                MOV     @#20,93$                ;SAVE LOC. 20
                                                MOV     #95$,@#20               ;SET UP IOT TRAP VECTOR
                                                MOV     #94$,@ICSVT             ;SET UP INTERRUPT ROUTINE
                                                MOV     #340,@ICSVT2            ;PS PICKUP
                                                MOV     #240,@#PS               ;SET PRIORITY TO 5
                                                MOV     #404,@ICSR              ;SET MAINT. TO INTERRUPT
                                                NOP
                                                TYPE,   NOINT                   ;NO INTERRUPT
                                                MOV     93$,@#20                ;RESTORE LOC 20
                                                BR      96$                     ;RE-ASK QUESTION
                                        95$:    MOV     (SP),R5                 ;INVALID VECTOR ADDRESS PRINT
                                                CMP     -(R5),-(R5)             ;SUB 4 FROM R5
                                                POPSP2                          ;POP STACK
                                                NOP
                                                TYPE,   FILINT                  ;PRINT WHERE VECTOR
                                                TYPOCT  R5
                                                MOV     R5,-(SP)        ;;SAVE R5 FOR TYPEOUT
                                                TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
                                                TYPE,   CKJMP
                                                POPSP2
```

```
                                96$:    CLR     @ICSR
                                        MOV     93$,@#20
                                        HALT
                                        JMP     99$
                                94$:    MOV     93$,@#20                ;INTERRUPT OK, RESTORE 20
                                        POPSP2                          ;POP STACK
                                        CLR     @ICSR
                                        BR      .+4
                                93$:    0
                                ;
                                ;FILL LOCATIONS "214-1000" WITH .+2, HALT
                                ;
                                        MOV     #START1,CTLLOC
                                FILHLT: MOV     #214,R0
                                        MOV     #216,R1
                                90$:    MOV     R1,(R0)+
                                        MOV     #0,(R0)+
                                        CMP     (R1)+,(R1)+
                                        CMP     #1000,R0
                                        BGT     90$
                                        MOV     #KEYSRV,@#60
                                        BIS     #100,@$TKS
                                        MOV     #9$,@#4
                                        INC     LPAV
                                        TST     @LPCSR
                                        TYPE
                                        $CRLF
                                        TYPE
                                        MLPAV
                                        BR      8$
                                9$:     CLR     LPAV
                                        POPSP2
                                8$:     MOV     #3$,@#4         ;DETERMINE CORE SIZE.
                                        CLR     R0
                                2$:     TST     (0)+
                                        BR      2$
                                3$:     TST     -(0)
                                        MOV     R0,CORSIZ
                                        BPL     4$
                                        MOV     #077776,CORSIZ
                                4$:     MOV     #6,@#4
                                        MOV     FR1120,FR1              ;SET FREQ FOR 11/20
                                        MOV     #RTI,@#12               ;FIND OUT IF 11/20 OR 11/45
                                        SEV                             ;IF 11/45 THEN DELAY ITERATIONS
                                         OR     %1,%1                   ;MUST BE INCREASED.
                                        ,VS     5$
                                        ADD     FR1120,FR1              ;FLOW FELL THUR TO HERE -
                                        ADD     FR1120,FR1              ;IT MUST BE AN 11/45 OR EQUIV.
                                        MOV     @#4,-(SP)               ;SAVE LOC 4
                                        MOV     @#6,-(SP)               ;SAVE LOC 6
                                        MOV     #99$,@#4                ;SETUP FOR TRAP
                                        TST     @#177760                ;CHECK IF 11/70
                                        ASL     FR1                     ;11/70, DOUBLE
```

```
641  003060  000401                        BR      .+4                     ;SKIP
642  003062  022626                99$:    POPSP2                          ;RESTORE STACK
643  003064  012637  000006              MOV     (SP)+,@#6               ;RESTORE LOC 6
644  003070  012637  000004              MOV     (SP)+,@#4               ;RESTORE LOC 4
645  003074  005037  000012        5$:   CLR     @#12                    ;RESTORE LOC 12.
646  003100  013737  001576  001564      MOV     FR1,FR3                 ;NOW WE MUST SET THE REST OF
647  003106  006137  001564              ROL     FR3                     ;OF THE DELAY TIMES UP.
648  003112  013737  001564  001562      MOV FR3,FR5
649  003120  063737  001576  001564      ADD     FR1,FR3
650  003126  063737  001564  001562      ADD FR3,FR5
651  003134  013737  001562  001560      MOV     FR5,FR16
652  003142  006137  001560              ROL     FR16
653  003146  063737  001562  001560      ADD     FR5,FR16
654  003154  013737  001560  001556      MOV     FR16,FR20
655  003162  063737  001576  001560      ADD     FR1,FR16
656  003170  063737  001562  001556      ADD     FR5,FR20
657  003176  013737  001556  001552      MOV     FR20,FR50
658  003204  006137  001552              ROL     FR50
659  003210  063737  001562  001552      ADD     FR5,FR50
660  003216  063737  001562  001552      ADD     FR5,FR50
661  003224  013737  001552  001550      MOV     FR50,FR110
662  003232  006137  001550              ROL     FR110
663  003236  063737  001562  001550      ADD     FR5,FR110
664  003244  063737  001562  001550      ADD     FR5,FR110
665  003252  013737  001556  001554      MOV     FR20,FR40
666  003260  006137  001554              ROL     FR40
667  003264  005037  001652              CLR     EXPERT
668
669
670  003270  012737  001564  001566      MOV     #FR3,   FREQ
671  003276  005037  001604              CLR     PATRN
672  003302  005737  001646              TST     ST200
673  003306  001406                      BEQ     7$
674  003310  013737  001150  001666      MOV     $TPS,TPCSR
675  003316  013737  001152  001670      MOV     $TPB,TPDBR
676  003324  012700  013104        7$:   MOV     #INADR, R0              ;CLEAR ADDR AREA
677  003330  005037  001646              CLR     ST200                   ;INDICATE START AT LOC 200.
678  003334  005020                1$:   CLR     (0)+
679  003336  020027  013252              CMP     R0,#OUTS
680  003342  001374                      BNE     1$
681  003344  005037  001574              CLR     FREQ3
682  003350  005037  001572              CLR     FREQ2
683  003354  005037  001570              CLR     FREQ1
684  003360  013737  001564  001566      MOV     FR3,FREQ
685
686  003366  012706  001100      START1: MOV     #1100,SP
687  003372  005077  176216              CLR     @ICSR
688  003376  005037  001100              CLR     $PASS
689  003402  005037  001660              CLR     LINEPR
690  003406  013737  001566  013042      MOV     FREQ,RTEMP
691  003414  005737  001646              TST     ST200                   ;HAS PROG. BEEN EVER STARTED
692  003420  001411                      BEQ     3$                      ;AT ADDR. 200? IF SO CONTINUE.
693  003422  012737  020254  000034      MOV     #$TYPE,@#34             ;SET UP TO PRINT.
694  003430  005037  000036              CLR     @#36
695  003434  104400                      TYPE
696  003436  021767                      MSTERR
```

```
                                                JMP     START           ;PROGRAM MUST BE STARTED AT ADDR. 200.
003440  000137  001704                          MOV     FR110,  FREQ    ;SET DELAY FOR TTY SETTLE TIME.
003444  013737  001550  001566  3$:             CLR     FREQ1
003452  005037  001570                          MOV     TPCSR,$TPS
003456  013737  001666  001150                  MOV     TPDBR,$TPB
003464  013737  001670  001152                  DELAY                   ;CAUSE A DELAY.
003472  104417                                  RESET                   ;ISSUE SYSTEM INITIALIZE.
003474  000005                                  DELAY                   ;TTY SETTLE DOWN TIME.
003476  104417                                  MOV     #340,PS
003500  012737  000340  177776                  TYPE                    ;TYPE "TEST NO.?"
003506  104400                          99$:    MTN
003510  021522                                  MOV     #TSTNO, 1$
003512  012737  003630  003534                  MOV     #1,     1$+2
003520  012737  000001  003536                  BR      .+4
003526  000401                                  BR      99$
003530  000766                                  INOCT                   ;GET TEST NUMBER
003532  104411                          1$:     TSTNO
003534  003630                                  1
003536  000001                                  TST     TSTNO
003540  005737  003630                          BMI     4$
003544  100404                                  CMP     TSTNO,  #7.     ;LEGAL NUMBER?
003546  023727  003630  000007                  BLE     2$
003554  003403                          4$:     TYPE                    ;NO-TYPE "NO SUCH TEST"
003556  104400                                  MTNL
003560  021545                                  BR      START1
003562  000701                          2$:     MOV     TSTNO,RTEMP
003564  013737  003630  013042                  ASL     RTEMP
003572  006337  013042                          ADD     #TST_ST, RTEMP
003576  062737  003632  013042                  MOV     @RTEMP,RTEMP
003604  017737  007232  013042                  MOV     #100,@$TKS      ;ENABLE TTY TO INTERRUPT.
003612  012777  000100  175324                  CLR     PS
003620  005037  177776                          JMP     @RTEMP          ;GOTO TEST
003624  000177  007212

003630  000000                  TSTNO:  0                               ;TEST NUMBER
003632  003706                  TST_ST: TST0                            ;INPUT AND OUTPUT MODULE EXERCISER
003634  005264                          TST1                            ;INPUT OR OUTPUT MODULE SIMPLE EXER.
003636  005530                          TST2                            ;DAC CALIBRATION TEST
003640  005622                          TST3                            ;DAC INTERACTION TEST
003642  005672                          TST4                            ;COUNTER MODULE TEST
003644  007064                          TST5                            ;A/D LOGIC TEST
003646  007744                          TST6                            ;A/D CALIBRATION TEST
003650  010706                          TST7                            ;A/D REPEATIBILITY TEST


                                        ;*
                                        ;*KEYBOARD INTERRUPT HANDLER
                                        ;*
003652  017737  175270  003704  KEYSRV: MOV     @$TKB,2$
003660  042737  177600  003704          BIC     #177600,2$
003666  122737  000003  003704          CMPB    #3,2$
003674  001401                          BEQ     1$
003676  000002                          EXIT
003700  000137  003366          1$:     JMP     START1
003704  000000                  2$:     0
```

```
                                        ;*
                                        ;*TEST 0 INPUT AND OUTPUT MODULE EXERCISER
                                        ;*

003706  104430          TSTO:  TYPE                    ;TYPE HEADER.
003710  024642                 MHTO
003712  104412                 INAR                   ;GET INPUT MODULE ADDRS.
003714  104413                 OUTAR                  ;GET OUTPUT MODULE ADDRS.
003716  104414                 PATAR                  ;GET PATTERN (OR USE DEFALT).
003720  104415                 DELAR                  ;GET DELAY TIME (OR USE DEFALT).
003722  005037  001100         CLR    $PASS
003726  005037  001634         CLR    HEADER
                                                      ;INITIAL SETUP.
003732  012777  004406  175660 MOV    #TOINT,@ICSVT   ;SET UP FOR ICS INTERRUPTS.
003740  012777  004332  175656 MOV    #TCPINT,@TPVCT  ;SET UP FOR TTY INTERRUPTS.
003746  012777  000340  175646 MOV    #340,@ICSVT2    ;SET CPU PRIORITY TO 6 ON ICS INTR.
003754  012777  000200  175644 MOV    #200,@TPVCT2    ;SET CPU PRIORITY TO 4 ON TTY INTR.
003762  005037  001632         CLR    TPBSY           ;SET NO TTY OUTPUT IN PROGRESS
003766  012700  013252         MOV    #OUTS,R0        ;CLEAR TEMP STORAGE AREA OF INPUT
003772  005020          1$:    CLR    (0)+            ;MODULE DATA CHANGE.
003774  020027  013312         CMP    R0,#OUTSE
004000  001374                 BNE    1$
004002  005737  001654         TST    CONNT
004006  001002                 BNE    2$
004010  104400                 TYPE                   ;TYPE HEADER.
004012  020756                 MTOH
004014  005037  001636  2$:    CLR    TOADR           ;CLEAR TYPE OUT CONSTANTS.
004020  005037  001640         CLR    TODAT
004024  005037  001642         CLR    TOGEN

                                                      ;TAKE CARE OF OUTPUT ADDRS.
004030  104417                 DELAY
004032  012737  004032  001106 TOOUTR: MOV    #TOOUTR,$LPADR
004040  104416                 DELAY2
004042  012702  013104         MOV    #INADR,R2
004046  052777  000004  175540 BIS    #4,@ICSR        ;ALLOW ICS TO INTR.
004054  005037  177776         CLR    PS              ;LET CPU ALLOW INTRS.
004060  012704  013252         MOV    #OUTS,R4
004064  012700  013144 TOOUT:  MOV    #OUTADR,R0      ;GET OUTPUT MODULE LIST.
004070  012001          1$:    MOV    (0)+,R1         ;GET FIRST ADDR
004072  001405                 BEQ    TOIN            ;IF N ADDR. - EXIT.
004074  013711  001604         MOV    PATRN,(1)       ;SEND PATTERN TO OUTPUT MODULE.
004100  020027  013204         CMP    R0,#CNTADR
004104  001371                 BNE    1$
                                                      ;TAKE CARE OF INPUT ADDRS.
004106  005737  001654 TOIN:   TST    CONNT           ;MODULES CONNECTED?
004112  001407                 BEQ    2$              ;IF NOT NORMAL CONTINUE.
004114  012701  013252         MOV    #OUTS,R1        ;IF SO COS AREA = CURRENT PATTERN.
004120  013721  001604 3$:     MOV    PATRN,(1)+
004124  020127  013312         CMP    R1,#OUTSE
004130  001373                 BNE    3$
004132  013737  001604  001610 2$:    MOV    PATRN,PATJOY
004140  104417                 DELAY                  ;DELAY TIME
004142  000240                 NOP
004144  005737  001632         TST    TPBSY
004150  001374                 BNE    .-6
```

```
 809  004152  011201                  1$:     MOV     (2),R1          ;PICK UP FIRST ADDR.
 810  004154  001002                          BNE     .+6
 811  004156  000137  004636                  JMP     TOLOP
 812  004162  021114                          CMP     (1),(4)         ;DATA CHANGED?
 813  004164  001007                          BNE     TOIN2           ;IF YES TAKE CARE OF IT
 814          004166          TOIN1=.
 815  004166  005722                          TST     (2)+
 816  004170  005724                          TST     (4)+            ;UPDATE COD POINTER
 817  004172  020227  013144                  CMP     R2,#OUTADR      ;DONE ALL INPUT MODULES?
 818  004176  001365                          BNE     1$
 819  004200  000137  004536                  JMP     TOLOP
 820
 821  004204  005737  001654          TOIN2:          TST     CONNT
 822  004210  001425                          BEQ     1$
 823  004212  005737  001632          2$:     TST     TPBSY
 824  004216  001375                          BNE     2$
 825  004220  010137  001122                  MOV     R1,@BDADR
 826  004224  013737  001610  001124          MOV     PATJOY,@GDDAT
 827  004232  011137  001126                  MOV     (1),@BDDAT
 828  004236  005737  001634                  TST     HEADER
 829  004242  001403                          BEQ     3$
 830  004244  104031                          ERROR   31
 831  004246  000137  004636                  JMP     TOLOP
 832
 833  004252  104030                  3$:     ERROR   30
 834  004254  005237  001634                  INC     HEADER
 835  004260  000137  004636                  JMP     TOLOP
 836
 837  004264  005737  001632          1$:     TST     TPBSY
 838  004270  001375                          BNE     1$
 839  004272  012737  000340  177776          MOV     #340,PS
 840  004300  010137  001636                  MOV     R1,TOADR        ;GET ADDR. OF INPUT MODULE
 841  004304  011137  001640                  MOV     (1),TODAT       ;GET CHANGE DATA
 842  004310  005037  001642                  CLR     TOGEN           ;NO GEN CODE (NO INTERRUPT)
 843  004314  005237  001632                  INC     TPBSY           ;SET TTY BUSY.
 844  004320  011114                          MOV     (1),(4)         ;RECORD NEW DA M
 845  004322  104425                          FOCTA                   ;FORM INFO INTO AN ASCIZ MESSAG.
 846  004324  005046                          CLR     -(6)
 847  004326  012746  004166                  MOV     #TOIN1,-(6)
 848
 849  004332  105777  174612          TOPINT: TSTB    @#TPS           ;PRINTER BUSY?
 850  004336  100375                          BPL     TOPINT
 851  004340  032777  020000  174572          BIT     #020000,@#SWR   ;INHIBIT TYPEOUT?
 852  004346  001403                          BEQ     3$              ;NO CONTINUE.
 853  004350  005037  001632                  CLR     TPBSY           ;YES-STOP TYPEOUT
 854  004354  000002                          EXIT
 855  004356                          3$:
 856  004356  112377  174570                  MOVB    (3)+,@#TPB      ;SEND CHAR.
 857  004362  001404                          BEQ     1$              ;IF END GO TO END
 858  004364  052777  000100  174556          BIS     #100,@#TPS      ;MAKE SURE TTY CAN INTR.
 859  004372  000002                          EXIT                    ;EXIT
 860
 861  004374  005077  174550          1$:     CLR     @#TPS           ;TTY SETTLE DOWN TIME
 862  004400  005037  001632                  CLR     TPBSY           ;CLEAR BUSY
 863
 864  004404  000002                          EXIT
```

```
                                        ;*
                                        ;*ICS INTERRUPT SERVICE ROUTINE
                                        ;*
004406  017737  175204  004630  TOINT:  MOV     @ICAR,6$        ;GET ADDR. OF INTRING MOD.
004414  006137  004630                  ROL     6$              ;FORM REAL ADDR.
004420  042737  177001  004630          BIC     #177001,6$
004426  053737  001612  004630          BIS     ICSMOD,6$
004434  017737  000170  004632          MOV     @6$,7$          ;FETCH DATA.
004442  105737  001632          10$:    TST     TPBSY           ;TYPEOUT PENDING?
004446  001406                          BEQ     5$              ;IF NOT CONTINUE.
004450  042777  000004  175136          BIC     #4,     @ICSR   ;STOP ICS FROM INTR.
004456  005037  177776                  CLR     PS              ;ALLOW INTERRUPTS FROM TTY.
004462  000767                          BR      10$             ;LOOP.
004464  012737  000300  177776  5$:     MOV     #300,PS         ;LOCK OUT INTR.S
004472  052777  000005  175114          BIS     #5,@ICSR        ;RE-ENABLE INTRS.AND SET RIF.
004500  017737  175112  001642          MOV     @ICAR,TOGEN     ;GET GENERIC CODE
004506  013737  004630  001636          MOV     6$,TOADR
004514  005777  175116                  TST     @TOADR
004520  013737  004632  001640          MOV     7$,TODAT
004526  005737  001654                  TST     CONNT
004532  001401                          BEQ     9$
004534  000002                          EXIT

004536  000337  001642          9$:     SWAB    TOGEN           ;RIGHT JUSTIFY GEN CODE.
004542  042737  177760  001642          BIC     #177760,TOGEN     .
004550  010037  004634                  MOV     R0,SAV0 ;SAVE R0
004554  012700  013104                  MOV     #INADR,R0       ;FIND OFFSET OF INPUT MODULE
004560  022037  001636          2$:     CMP     (0)+,TOADR      ;THAT INTERRUPTED.
004564  001404                          BEQ     3$
004566  020027  013144                  CMP     R0,#OUTADR      ;IF NOT ENTERED INPUT MODULE THAT
004572  001407                          BEQ     4$              ;THAN ADDR WILL NOT BE IN TABLE
004574  000771                          BR      2$              ;IN THAT CASE DON'T WORRY ABOUT IT.
004576  162700  013106          3$:     SUB     #INADR+2,R0     ;SUB TO GET OFFSET.
004602  062700  013252                  ADD     #OUTS,R0        ;ADD STORAGE OF COS TO RECORD
004606  013710  001640                  MOV     TODAT,(0)       ;NEW DATA FOR THAT MODULE.
004612  013700  004634          4$:     MOV     SAV0,R0 ;RESTORE R0.
004616  104425                          FOCTA                   ;NO-FORM ASCIZ STRING.
004620  005237  001632                  INC     TPBSY           ;SET OUTPUT BUSY
004624  000642                          BR      TOPINT          ;START OUTPUT
004626                          1$:
004626  000002                          EXIT

004630  000000          6$:     0
004632  000000          7$:     0
004634  000000          SAV0:   0
004636  005737  001632  TOLOP:  TST     TPBSY
004642  001375                  BNE     TOLOP
004644  000004                  SCOPE
004646  104420                  CPATR
004650  000137  004032          JMP     TOOUTR

                                        ;*
                                        ;*ROUTINE TO CONVERT 3 OCTAL NUMBERS TO AN ASCIZ STRING
```

```
                                                        ;* CALL= FOCTA
                
004654  012703  026604          ROCTA:  MOV     #OUTBF,R3       ;SET UP BUFFER
004660  013737  001636  004746          MOV     TOADR,PACK1
004666  004737  004752                  JSR     PC,PACK         ;PACK ADDR.
004672  013737  001640  004746          MOV     TODAT,PACK1
004700  004737  004752                  JSR     PC,PACK         ;PACK DATA
004704  013737  001642  004746          MOV     TOGEN,PACK1
004712  001402                          BEQ     1$
004714  004737  004752                  JSR     PC,PACK         ;PACK GEN CODE (IF ANY)
004720  112723  000001          1$:     MOVB    #1,(3)+         ;FILLER CHARACTERS.
004724  112723  000001                  MOVB    #1,(3)+
004730  112723  000001                  MOVB    #1,(3)+
004734  105023                          CLRB    (3)+            ;STRING TERMINATOR.
004736  105023                          CLRB    (3)+
004740  012703  026602                  MOV     #OUTBF1,R3      ;RESET POINTER
004744  000002                          EXIT
                
004746  000000          PACK1:  0
004750  000000          PACK2:  0
                
004752  012737  000260  004750  PACK:   MOV     #260,PACK2
004760  005737  004746                  TST     PACK1
004764  100002                          BPL     .+6
004766  005237  004750                  INC     PACK2
004772  113723  004750                  MOVB    PACK2,(3)+
004776  000337  004746                  SWAB    PACK1
005002  013737  004746  004750          MOV     PACK1,PACK2
005010  006037  004750                  ROR     PACK2
005014  006037  004750                  ROR     PACK2
005020  006037  004750                  ROR     PACK2
005024  006037  004750                  ROR     PACK2
005030  042737  177770  004750          BIC     #177770,PACK2
005036  052737  000260  004750          BIS     #260,PACK2
005044  113723  004750                  MOVB    PACK2,(3)+
005050  013737  004746  004750          MOV     PACK1,PACK2
005056  006037  004750                  ROR     PACK2
005062  042737  177770  004750          BIC     #177770,PACK2
005070  052737  000260  004750          BIS     #260,PACK2
005076  113723  004750                  MOVB    PACK2,(3)+
005102  000337  004746                  SWAB    PACK1
005106  013737  004746  004750          MOV     PACK1,PACK2
005114  006037  004750                  ROR     PACK2
005120  006037  004750                  ROR     PACK2
005124  006037  004750                  ROR     PACK2
005130  006037  004750                  ROR     PACK2
005134  006037  004750                  ROR     PACK2
005140  006037  004750                  ROR     PACK2
005144  042737  177770  004750          BIC     #177770,PACK2
005152  052737  000260  004750          BIS     #260,PACK2
005160  113723  004750                  MOVB    PACK2,(3)+
005164  013737  004746  004750          MOV     PACK1,PACK2
005172  006037  004750                  ROR     PACK2
005176  006037  004750                  ROR     PACK2
005202  006037  004750                  ROR     PACK2
005206  042737  177770  004750          BIC     #177770,PACK2
```

```
                                        BIS     #260,PACK2
                                        MOVB    PACK2,(3)+
                                        BIC     #177770,PACK1
                                        BIS     #260,PACK1
                                        MOVB    PACK1,(3)+
                                        MOVB    #240,(3)+
                                        MOVB    #240,(3)+
                                        RTS     PC

                                        JMP     START1          ;EXIT

                                        ;*
                                        ;*TEST 1 INPUT OR OUTPUT MODULE EXERCISER
                                        ;*

                                TST1:   TYPE                    ;TYPE HEADER.
                                        MHT1
                                        CLR     @$TKS           ;DON'T ALLOW TTY INTERRUPTS
                                5$:     TST     EXPERT          ;EXPERT MODE?
                                        BNE     .+6
                                        TYPE                    ;ASK "INPUT OR OUTPUT MODULE?"
                                        MIOO
                                        TYPE
                                        MQ
                                        CLR     CHAR
                                1$:     TSTB    @$TKS           ;WAIT FOR RESPONSE
                                        BPL     1$
                                2$:     TSTB    @$TPS           ;PRINTER BUSY?
                                        BPL     2$
                                        MOVB    @$TKB,@$TPB     ;ECHO CHARACTER.
                                        MOVB    @$TKB,RTEMP
                                        BICB    #240,RTEMP
                                        CMPB    RTEMP,#15
                                        BEQ     4$
                                        CMPB    RTEMP,#3        ;WAS ↑C TYPED?
                                        BNE     .+6
                                        JMP     START1          ;IF SO GOTO MONITR.
                                        MOVB    RTEMP,CHAR
                                        BR      1$
                                4$:     TYPE
                                        $CRLF
                                        CMPB    #'O,    CHAR    ;DID HE TYPE "O"?
                                        BEQ     TST10           ;IF SO-GOTO OUTPUT ROUTINE
                                        CMPB    #'I,    CHAR    ;DID HE TYPE "I"?
                                        BNE     5$              ;IF NOT RETYPE QUESTION

                                        ;*ROUTINE TO HANDLE INPUTTING FROM INPUT MODULE TO DISPLAY

                                        INAR                    ;GET INPUT MODULE ADDR.
                                        TYPE,   MSWO
                                        TYPE,   MWK

                                3$:     MOV     @INADR, R0      ;GET DATA FROM INPUT MODULE
                                        MOV     R0, DISPLAY     ;PUT IN DISPLAY REGISTER IF 11/45.
                                        INITR                   ;RESET TO DISPLAY.
                                        BIT     #1,     @SWR    ;IF BIT1 SET THEN GOTO MONITR.
```

```
1033  005466  001767                        BEQ     3$              ;NOT SET-THEN LOOP.
1034  005470  000137  003366                JMP     START1
1035
1036                                        ;*ROUTINE TO HANDLE OUTPUTTING FROM SWITCH REGISTER TO OUTPUT MODULE
1037
1038  005474  104413            TST10:    OUTAR                   ;GET OUTPUT MODULE ADDR.
1039  005476  104415                      DELAR                   ;GET DELAY TIME (DEFAULT=3MS).
1040  005500  005037  177776              CLR     PS
1041  005504  104400  021402              TYPE,   MWK
1042  00551C  012777  000100  173426      MOV     #100,@$TKS      ;ALLOW TTY INTERRUPTS
1043  005516  017777  173416  005420 1$:  MOV     @SWR,@OUTADR    ;SEND DATA FRO THE SWR TO OUTPUT MOD.
1044  005524  104417                      DELAY
1045  005526  000773                      BR      1$
1046
1047                                        ;*
1048                                        ;*TEST 2 DAC CALIBRATION ROUTINE
1049                                        ;*
1050
1051  005530  104400            TST2:     TYPE                    ;TYPE HEADER.
1052  005532  024777                      MHT2
1053  005534  104421                      IDAC                    ;INPUT DAC ADDR.
1054  005536  005737  013244              TST     DACADR          ;ANY DACS PRESENT
1055  005542  001005                      BNE     4$
1056  005544  104400                      TYPE                    ;MESSAGE "NO DAC ADDR. IN BUFFER.
1057  005546  021034                      MNDA
1058  005550  000137  005530              JMP     TST2
1059  005554  000000            2$:       0
1060  005556  104400  021402      4$:     TYPE,   MWK
1061  005562  017737  173352  005554 1$:  MOV     @SWR,2$         ;GET VALUE OF SWR
1062  005570  042737  140017  005554      BIC     #140017, 2$
1063  005576  013777  005554  005440 3$:  MOV     2$,     @DACADR ;SEND VALUE.
1064  005604  062737  040000  005554      ADD     #40000, 2$      ;SET FOR NEXT CH.
1065  005612  103371                      BCC     3$              ;DONE ALL CHS?
1066  005614  000762                      BR      1$
1067
1068  005616  000137  003366              JMP     START1
1069
1070                                        ;*
1071                                        ;*TEST 3 DAC INTERACTION TEST
1072                                        ;*OUTPUTS RAMP TO 4 CHANNELS OF DAC THAT ARE "OUT OF PHASE"
1073                                        ;*
1074
1075  005622  104400            TST3:     TYPE                    ;TYPE HEADER.
1076  005624  025034                      MHT3
1077  005626  104421                      IDAC                    ;GET DAC ADDRESS
1078  005630  005737  013244              TST     DACADR          ;DAC PRESENT?
1079  005634  001004                      BNE     1$
1080  005636  104400                      TYPE                    ;NO-MESSAGE "NO DAC ADDR. IN BUFFER"
1081  005640  021034                      MNDA
1082  005642  000137  005622              JMP     TST3
1083  005646  005000            1$:       CLR     R0
1084  005650  104400  021402              TYPE,   MWK
1085  005654  010077  005364      2$:     MOV     R0,@DACADR      ;SEND WORD TO DAC
1086  005660  062700  000020              ADD     #20,    R0
1087  005664  000773                      BR      2$
1088
```

```
1089  005666  000137  003366                    JMP     START1
1090
1091                                            ;*
1092                                            ;*TEST 4 COUNTER MODULE TEST
1093                                            ;*TEST 1 TO 16 MODULES
1094                                            ;*
1095
1096  005672  104400                  TST4:     TYPE                    ;TYPE HEADER.
1097  005674  025071                            MHT4
1098  005676  104422                            CNTAR                   ;GET COUNTER MODULE ADDRS.
1099  005700  013737  001554  001566            MOV     FR40,FREQ
1100  005706  104400  021402                    TYPE,   MWK
1101
1102  005712  012700  013204          TST4L1:   MOV     #CNTADR,R0      ;GET LIST OF MODULES
1103  005716  010037  004746                    MOV     R0,PACK1
1104  005722  005710                            TST     (0)             ;ANY ADDRS. ENTERED?
1105  005724  001004                            BNE     TST4L
1106  005726  104400  022753                    TYPE    ,MNAE           ;"NO ADDRS ENTERED".
1107  005732  000137  005672                    JMP     TST4
1108
1109  005736  013700  004746          TST4L:    MOV     PACK1,R0
1110  005742  020027  013244                    CMP     R0,#DACADR      ;DONE ALL COUNTERS?
1111  005746  001005                            BNE     2$
1112  005750  005237  001100          1$:       INC     $PASS
1113  005754  104400                            TYPE
1114  005756  021063                            MEND
1115  005760  000754                            BR      TST4L1
1116  005762  012037  001122          2$:       MOV     (0)+,$BDADR     ;GET ADDR. OF COUNTER MODULE.
1117  005766  001770                            BEQ     1$              ;NOTE: ZERO IF NO ADDR. ENTERED.
1118  005770  010037  004746                    MOV     R0,PACK1
1119
1120                                            ;*
1121                                            ;*TEST THAT THE COUNTER MODULE UNDER TEST CAN BE ADDRESSED
1122                                            ;*
1123
1124  005774  012737  005774  001106  TST4A:    MOV     #TST4A,$LPADR   ;SET FOR SCOPE, ITERATIONS.
1125  006002  012777  077777  173112            MOV     #77777,@$BDADR  ;SEND PATTERN.
1126  006010  017737  173106  001126            MOV     @$BDADR,$BDDAT  ;GET IT BACK
1127  006016  001001                            BNE     TST4AL          ;IF NON-ZERO - WE GOT SOMETHING BACk.
1128
1129  005020  104011                            ERROR   11              ;COULD NOT MAKE ANY DATA XFER
1130  006022  000004                  TST4AL:   SCOPE
1131
1132                                            ;*
1133                                            ;*TEST THAT COUNTER MODULE BITS 00 THRU 15 CAN BE SET AND CLEARED
1134                                            ;*
1135
1136  006024  012737  000001  013042  TST4B:    MOV     #1,RTEMP        ;SET "GOOD DATA"
1137  006032  012737  000010  001160            MOV     #10,$TIMES
1138  006040  012737  006040  001106  1$:       MOV     #1$,$LPADR      ;SET FOR ITERATIONS
1139  006046  013737  013042  001124            MOV     RTEMP,$GDDAT
1140  006054  013777  001124  173040            MOV     $GDDAT,@$BDADR  ;SEND PATTERN TO COUNTER MODULE.
1141  006062  017737  173034  001126            MOV     @$BDADR,$BDDAT  ;GET IT BACK.
1142  006070  023737  001124  001126            CMP     $GDDAT,$BDDAT   ;DATA SENT=DATA RECEIVED?
1143  006076  001402                            BEQ     2$
1144
```

```
1145  006100  104012                          ERROR   12              ;NO - REPORT ERROR
1146  006102  000412                          BR      3$              ;LOOP
1147
1148  006104  043777  001124  173010  2$:     BIC     $GDDAT,@$BDADR  ;TRY CLEARING BIT.
1149  006112  017737  173004  001126          MOV     @$BDADR,$BDDAT  ;DID IT CLEAR?
1150  006120  001403                          BEQ     3$              ;YES-LOOP.
1151  006122  005037  001124                  CLR     $GDDAT
1152  006126  104012                          ERROR   12
1153
1154  006130  000004                  3$:     SCOPE
1155  006132  006137  013042                  ROL     RTEMP           ;SET TO NEXT BIT.
1156  006136  103340                          BCC     1$              ;CONTINUE TESTING IF ALL BITS NOT DONE.
1157
1158                                          ;*
1159                                          ;*TEST THAT THE COUNTER MODULE CAN COUNT THRU
1160                                          ;*EACH STATE
1161                                          ;*
1162
1163  006140  012737  007014  013042  TST4C:  MOV     #CNTPAT,RTEMP   ;GET ADDR. OF PATTERNS
1164  006146  012737  000010  001160  1$:     MOV     #10,$TIMES
1165  006154  012737  006146  001106          MOV     #1$,$LPADR
1166
1167  006162  017777  004654  172732          MOV     @RTEMP,@$BDADR  ;SEND PATTERN.
1168  006170  005037  013044                  CLR     RTEMP1
1169  006174  017737  004642  001124          MOV     @RTEMP,$GDDAT
1170  006202  005237  001124                  INC     $GDDAT
1171  006206  005237  013044          4$:     INC     RTEMP1          ;WATCH TO SEE IF COUNTER COUNTS.
1172  006212  001413                          BEQ     5$              ;IF NO COUNT BY OVERFLOW-ERROR!
1173  006214  017737  172702  001126          MOV     @$BDADR,$BDDAT
1174  006222  027737  004614  001126          CMP     @RTEMP,$BDDAT
1175  006230  001766                          BEQ     4$
1176  006232  023737  001124  001126          CMP     $GDDAT,$BDDAT
1177  006240  001401                          BEQ     2$
1178
1179  006242  104013                  5$:     ERROR   13
1180  006244  000004                  2$:     SCOPE
1181  006246  062737  000002  013042          ADD     #2,RTEMP
1182  006254  023727  013042  007060          CMP     RTEMP,#CNTPAE
1183  006262  002731                          BLT     1$
1184
1185                                          ;*
1186                                          ;*TEST TO SEE IF COUNTER INITIALIZES PROPERLY -PART 1
1187                                          ;*
1188
1189  006264  012737  000010  001160  TST4D:  MOV     #10,$TIMES
1190  006272  012737  006272  001106  1$:     MOV     #1$,$LPADR
1191  006300  005077  172616                  CLR     @$BDADR
1192  006304  104424                          INITR
1193  006306  104417                          DELAY
1194  006310  005037  001124                  CLR     $GDDAT
1195  006314  017737  172602  001126          MOV     @$BDADR,$BDDAT
1196  006322  001401                          BEQ     2$
1197
1198  006324  104025                          ERROR   25
1199
1200  006326  000004                  2$:     SCOPE
```

```
1201
1202                                                    ;*
1203                                                    ;*TEST THAT THE COUNTER INITIALIZES PROPERLY PART 2
1204                                                    ;*
1205
1206  006330  012737  000010  001160  TST4E:  MOV     #10,$TIMES      ;SET ITERATION COUNT
1207  006336  012737  006350  001106          MOV     #1$,$LPADR      ;SET LOOP ADDRESS.
1208  006344  005037  001124                  CLR     $GDDAT
1209  006350  012777  177777  172544  1$:     MOV     #177777,@$BDADR ;SET THE COUNTER.
1210  006356  000240                          NOP
1211  006360  104424                          INITR                   ;SYSTEM INITIALIZE.
1212  006362  017737  172534  001126          MOV     @$BDADR,$BDDAT  ;READ COUNTER.
1213  006370  001401                          BEQ     2$
1214
1215  006372  104020                          ERROR   20
1216
1217  006374  000004                  2$:     SCOPE
1218
1219                                                    ;*
1220                                                    ;*TEST THAT THE COUNTER HAS NO
1221                                                    ;*INTERRUPTS POSTED ON THE BUS NOR ANY GENERIC CODE
```

```
1222
1223
1224
1225
1226
1227
1228
1229
1230
1231
1232
1233                                        ;*
1234
1235  006376  105777  173212        TST4F:  TSTB    @ICSR           ;ANY INTERRUPTS POSTED?
1236  006402  100001                        BPL     1$
1237
1238  006404  104021                        ERROR   21              ;ILLEGAL INTERRUPT ON FCS BUS
1239
1240  006406  000004                1$:     SCOPE
1241
1242  006410  012777  006436  173202        MOV     #2$,@ICSVT      ;SET FOR INTERRUPT
1243  006416  012777  000404  173170        MOV     #404,@ICSR      ;SET MAINT + INT ENABLE
1244  006424  005037  177776                CLR     PS
1245  006430  000240                        NOP
1246
1247  006432  104022                        ERROR   22              ;FATAL ERROR - ICS DID NOT INTERRUPT
1248  006434  000424                        BR      3$
1249
1250                                        ;ICS INTERRUPTS TO HERE
1251
1252  006436  017737  173154  001126  2$:     MOV     @ICAR,$BDDAT    ;READ ICAR.
1253  006444  022626                        POPSP2                  ;READJUST STACK
1254  006446  012777  000001  173140        MOV     #1,@ICSR
1255  006454  005037  001124                CLR     $GDDAT
1256  006460  005777  172436                TST     @$BDADR
1257  006464  005037  177776                CLR     PS
1258  006470  042737  000360  001126        BIC     #360,$BDDAT     ;IGNORE FILE BOX ADDR.
1259  006476  005737  001126                TST     $BDDAT          ;NO OTHER ADDR. OR GEN BITS
1260  006502  001401                        BEQ     3$              ;SHOULD SHOW UP
1261
1262  006504  104023                        ERROR   23
1263
1264  006506  000004                3$:     SCOPE
1265
1266                                        ;*
1267                                        ;*TEST THAT THE COUNTER MODULE WILL INTERRUPT ON OVERFLOW.
1268                                        ;*ON INTERRUPT CHECK ADDR AND GENERIC CODE, HALT ON OVERFLOW.
1269                                        ;*CHECK RIF EFFECT ON MODULE
1270                                        ;*
1271
1272  006510  012777  006576  173102  TST4G:  MOV     #TST4GI,@ICSVT  ;SET UP FOR ICS INTERRUPT.
1273  006516  012777  000340  173076        MOV     #340,@ICSVT2    ;PRIORITY 7 ON INTERRUPT.
1274  006524  012737  006532  001106        MOV     #TST4GL,$LPADR  ;SET FOR ITERATIONS.
1275
1276  006532  012737  000340  177776  TST4GL: MOV     #340,PS         ;DON'T ALLOW INTERRUPTS.
1277  006540  012777  000004  173046        MOV     #4,@ICSR        ;ENABLE ICS TO INTERRUPT WHEN READY.
```

```
1278  006546  012777  177777  172346          MOV     #177777,@$BDADR ;SET COUNTER TO ALL ONES.
1279  006554  104417                          DELAY                   ;DELAY 40 MS.
1280  006556  005037  177776                  CLR     PS              ;ALLOW INTERRUPTS.
1281  006562  000240                          NOP
1282  006564  005077  173024                  CLR     @ICSR
1283  006570  104014                          ERROR   14              ;REPORT ERROR - COUNTER MODULE DIDN'T INTR.
1284  006572  104424                          INITR
1285  006574  000457                          BR      TST4GE          ;LOOP.
1286
1287                                          ;*RECEIVE ICS INTERRUPT HERE
1288
1289  006576  012706  001100          TST4GI: MOV     #1100,SP        ;RESET THE STACK POINTER.
1290  006602  017737  173010  001126        MOV     @ICAR,$BDDAT    ;GET ADDR & GENERIC CODE.
1291  006610  013737  001122  001124        MOV     $BDADR,$GDDAT   ;GET REAL ADDR.
1292  006616  006037  001124                ROR     $GDDAT          ;FORM ADDR. AS IT WOULD LOOK IN
1293  006622  142737  177777  001125        BICB    #-1,$GDDAT+1    ;ICAR.
1294  006630  005077  172760                CLR     @ICSR
1295  006634  005037  177776                CLR     PS
1296  006640  052737  003400  001124        BIS     #003400,$GDDAT  ;ADD GENERIC CODE.
1297  006646  023737  001124  001126        CMP     $GDDAT,$BDDAT   ;CHECK ADDR. + GEN. CODE.
1298  006654  001403                        BEQ     1$
1299
1300  006656  104015                        ERROR   15              ;ADDR OR GENERIC CODE INCORRECT.
1301  006660  104424                        INITR
1302  006662  000424                        BR      TST4GE          ;LOOP.
1303
1304  006664  104417                  1$:   DELAY                   ;DELAY 40 MS.
1305  006666  005037  001124                CLR     $GDDAT
1306  006672  017737  172224  001126        MOV     @$BDADR,$BDDAT
1307  006700  001402                        BEQ     2$
1308
1309  006702  104016                        ERROR   16              ;COUNTER MODULE DIDN'T HALT ON OVERFLOW.
1310  006704  000413                        BR      TST4GE          ;LOOP.
1311
1312  006706  052777  000001  172700  2$:   BIS     #1,@ICSR        ;SET RIF BIT IN ICS-11.
1313  006714  005777  172202                TST     @$BDADR         ;INITIATE RIF ON COUNTER MODULE.
1314  006720  000240                        NOP                     ;
1315  006722  105777  172666                TSTB    @ICSR           ;ANY INTR. PENDING ON ICS BUS?
1316  006726  100002                        BPL     TST4GE          ;NO-THEN LOOP.
1317
1318  006730  104017                        ERROR   17              ;RIF DIDN'T CLEAR INTERRUPT FLAG
1319  006732  104424                        INITR
1320  006734  012777  000001  172652  TST4GE: MOV     #1,@ICSR
1321  006742  005777  172154                TST     @$BDADR
1322  006746  000004                        SCOPE
1323
1324                                          ;*
1325                                          ;*TEST TO SEE IF RESET CLEARS INTERRUPT FLAG ON COUNTER
1326                                          ;*
1327
1328  006750  012737  000010  001160  TST4H:  MOV     #10,$TIMES
1329  006756  012777  177777  172136  1$:    MOV     #-1,@$BDADR     ;START COUNTER COUNTING
1330  006764  012737  006756  001106        MOV     #1$,$LPADR
1331  006772  104417                        DELAY                   ;DELAY FOR INTR.
1332  006774  104424                        INITR                   ;SYSTEM INITIALIZE
1333  006776  105777  172612                TSTB    @ICSR           ;INTERRUPT POSTED?
```

```
1334  007002  100001                          BPL     2$
1335
1336  007004  104024                          ERROR   24              ;INIT FAILED TO CLEAR INTR. FLAG
1337  007006  000004                  2$:     SCOPE
1338  007010  000137  005736                  JMP     TST4L
1339
1340  007014  000000                  CNTPAT: 0                       ;PATTERNS USED BY TST4C TO
1341  007016  000001                          1                       ;DETERMINE IF COUNTER MODULE
1342  007020  000003                          3                       ;CAN COUNT THRU EACH STATE.
1343  007022  000007                          7
1344  007024  000017                          17
1345  007026  000037                          37
1346  007030  000077                          77
1347  007032  000177                          177
1348  007034  000377                          377
1349  007036  000777                          777
1350  007040  001777                          1777
1351  007042  003777                          3777
1352  007044  007777                          7777
1353  007046  017777                          17777
1354  007050  037777                          37777
1355  007052  077777                          77777
1356  007054  177777                          177777
1357  007056  100000                          100000
1358  007060  000000                  CNTPAE: 0
1359
1360
1361
1362
1363
1364
1365
1366                                          ;*
1367                                          ;*TEST 5 A/D LOGIC TEST
1368                                          ;*
1369
1370  007062  000000                  ADCSR:  0                       ;ADDR OF AD05 UNDER TEST
1371  007064  104400                  TST5:   TYPE                    ;TYPE HEADER.
1372  007066  025132                          MHT5
1373  007070  104423                          ADAR                    ;GET AD05 ADDR.
1374  007072  012746  007700          ADLOGL: MOV     #ADLOGE,-(6)
1375  007076  104400  021402                  TYPE,   MWK
1376
1377  007102  013737  013246  007062  ADLOG:  MOV     ADADR,ADCSR     ;*GET AD05'S ADDR.
1378  007110  052777  000100  172026          BIS     #100,@$TKS
1379  007116  005037  177776                  CLR     PS
1380  007122  012737  007142  001106          MOV     #1$,$LPADR
1381  007130  012703  007714                  MOV     #ADPATP,R3      ;*GET PATTERN POINTERS.
1382  007134  012737  077770  001124          MOV     #077770,$GDDAT  ;*DATA TO BE SENT
1383  007142  013777  001124  177712  1$:     MOV     $GDDAT,@ADCSR   ;*SEND DATA TO BE SENT
1384  007150  017737  177706  001126          MOV     @ADCSR,$BDDAT   ;*GET DATA BACK.
1385  007156  001001                          BNE     2$              ;*IF DATA PRESENT GO AHEAD
1386
1387  007160  104001                          ERROR   1               ;*ERROR "COULD NOT SEND /RECEIVE DATA"
1388                                          ;*FROM AD05
1389  007162  000004                  2$:     SCOPE
```

```
                                                   ;*BASIC "BIT BANG" OF ADOS

007164  011337  001124          ADLOG2: MOV     (R3),$GDDAT     ;*GET PATTERN TO BE SENT.
007170  013777  001124  177664          MOV     $GDDAT,@ADCSR   ;*SEND PATTERN TO ADCSR.
007176  017737  177660  001126          MOV     @ADCSR,$BDDAT   ;*GET TO BACK.
007204  023737  001124  001126          CMP     $GDDAT,$BDDAT   ;*DATA SENT=DATE RECIEVED?
007212  001401                          BEQ     2$              ;*IF SO-CONTINUE

007214  104002                          ERROR   2               ;*REPORT ERROR: "CSR READ/WRITE ERROR"

007216  000004                  2$:     SCOPE                   ;*LOOP

007220  062703  000002          1$:     ADD     #2,R3           ;*UPDATE PATTERN POINTERS
007224  020327  007736                  CMP     R3,#ADPATE      ;*DONE ALL PATTERNS?
007230  003755                          BLE     ADLOG2          ;*IF NOT-CONTINUE NEXT PATTERN.

                                        ;*WILL CONVERTING SET AND THEN CLEAR?

007232  012737  104000  001124  ADLOG3: MOV     #104000,$GDDAT  ;*SET CONVERT,READ CSR
007240  012737  007240  001106  1$:     MOV     #1$,$LPADR
007246  013777  001124  177606          MOV     $GDDAT,@ADCSR   ;*SEND TO ADCSR
007254  017737  177602  001126          MOV     @ADCSR,$BDDAT   ;*GET ADOS CSR
007262  023737  001124  001126          CMP     $GDDAT,$BDDAT   ;*DID CONVERT BIT SET?
007270  001402                          BEQ     ADL03A
007272  104003                          ERROR   3               ;*ERROR: "CONVERT BIT FAILED TO SET"
007274  000411                          BR      ADLOG4

007276  013737  001560  001566  ADL03A: MOV     FR16,FREQ       ;*SET TO DELAY 16 MILLISEC.
007304  104417                          DELAY
007306  005777  177550                  TST     @ADCSR          ;*DID CONVERT BIT CLEAR?
007312  100002                          BPL     1$+2

007314  104004                          ERROR   4               ;*ERROR "CONVERT BIT FAILED TO CLEAR"

                                                                ;*LOOP.
                                                                ;*NEXT TEST.
007316  104424                  1$:     INITR                   ;*ISSUE SYSTEM INITIALIZE
007320  000004                  ADLOG4: SCOPE

                                        ;*CAN WE READ THE DBR WITH CSR BIT//CLEAR (READ BIT).

007322  012777  052770  177532  ADLOG5: MOV     #52770,@ADCSR   ;*LOAD CSR WITH ALL BUT READ CR BIT
007330  022777  052770  177524          CMP     #52770,@ADCSR   ;*DID WE READ THE CR"
007336  001001                          BNE     1$              ;*IF NOT NO ERROR.

007340  104005                          ERROR   5               ;*REPORT ERROR "CANNOT READ ADOS DATA
                                                                ;*REGISTER WITH READ BIT CLEARED."

007342  000004                  1$:     SCOPE

                                        ;*WILL CONVERT DONE CAUSE INTERRUPT?

007344  012777  000340  172250  ADLOG6: MOV     #340,@ICSVT2
007352  012777  007424  172240          MOV     #ADLOG7,@ICSVT  ;*SET VECTOR FOR INTER.
007360  012777  000004  172226          MOV     #4,@ICSR        ;*ALLOW ICS TO INT.
007366  012777  104000  177466          MOV     #104000,@ADCSR  ;*SET ADOS TO CONVERT.
```

```
1446  007374  013737  001560  001566          MOV     FR16,FREQ       ;*ALLOW UP TO 16 MILLI SEC FOR NTO.
1447  007402  005037  177776                  CLR     PS
1448  007406  104417                          DELAY
1449  007410  000240                          NOP
1450  007412  104006                          ERROR   6               ;*REPORT ERROR "ADDS FAILED TO INTER. AT
1451  007414  005077  172174          ADL6L:  CLR     @ICSR
1452  007420  000004                          SCOPE
1453  007422  000445                          BR      ADLOG9
1454
1455                                          ;*CHECK INTR. ADDR. IN ICAR+GENERIC CODE
1456
1457  007424  022626                  ADLOG7: POPSP2                  ;*ADDS INTR TO HERE RESET SP.
1458  007426  017737  172164  001126          MOV     @ICAR,$BDDAT    ;*GET ADDR. AND GEN CODE
1459  007434  013737  007062  001124          MOV     ADCSR,$GDDAT    ;*FORM GOOD ADDR.
1460  007442  042737  177000  001124          BIC     #177000,$GDDAT
1461  007450  006237  001124                  ASR     $GDDAT
1462  007454  052737  003400  001124          BIS     #003400,$GDDAT  ;*ADD GENERIC CODE
1463  007462  023737  001126  001124          CMP     $BDDAT,$GDDAT   ;*IS ADDR + GENERIC CODE OK?
1464  007470  001402                          BEQ     ADLOG8
1465
1466  007472  104007                          ERROR   7               ;*REPORT ERROR "ADDS ADDR. OR GENERIC
1467
1468                                                                  ;*CODE INCORRECT.
1469  007474  000747                          BR      ADL6L
1470
1471                                          ;*CHECK TO SEE IF RIF CLEARS INTR FLAG ON ADDS
1472
1473  007476  052777  000001  172110  ADLOG8: BIS     #1,@ICSR        ;*SET RIF BIT.
1474  007504  005777  177352                  TST     @ADCSR          ;*PUT IT TO WORK ON ADDS.
1475  007510  012777  007530  172102          MOV     #1$,@ICSVT      ;*SET INTERRUPT VECTORS.
1476  007516  005037  177776                  CLR     PS              ;*ALLOW INTERRUPTS
1477  007522  104417                          DELAY
1478  007524  000240                          NOP
1479  007526  000732                          BR      ADL6L           ;*EXIT A/D TESTS.
1480
1481  007530  022626                  1$:     POPSP2                  ;*RESET SP.
1482  007532  104010                          ERROR   10              ;*REPORT ERROR" RIF DID NOT CLEAR INTR.
1483                                                                  ;*FLAG ON ADDS".
1484  007534  000727                          BR      ADL6L
1485
1486                                          ;*
1487                                          ;*ADDS DUAL ADDRESSING TEST
1488                                          ;*
1489
1490  007536  012737  007626  001106  ADLOG9: MOV     #2$,$LPADR
1491  007544  005037  001122                  CLR     $BDADR          ;SET FIRST ADDR.
1492  007550  053737  001612  001122          BIS     ICSMOD,$BDADR
1493  007556  162737  000002  001122          SUB     #2,$BDADR
1494  007564  013737  001612  013042          MOV     ICSMOD,RTEMP    ;FIX STOP ADDR.
1495  007572  062737  000040  013042          ADD     #40,RTEMP
1496  007600  062737  000002  001122  1$:     ADD     #2,$BDADR       ;UPDATE ADDR.
1497  007606  023737  001122  013042          CMP     $BDADR,RTEMP    ;DONE ALL ADDRS?
1498  007614  001427                          BEQ     6$
1499  007616  023737  001122  007062          CMP     $BDADR,ADCSR    ;SAME ADDR AS ADDS UNDER TEST?
1500  007624  001765                          BEQ     1$
1501  007626  012777  004100  177226  2$:     MOV     #4100,@ADCSR    ;SEND DATA TO A/D.
```

```
1502  007634  022777  004100  171260          CMP     #4100,@$BDADR   ;DUAL ADDR. READ ERROR?
1503  007642  001001                          BNE     3$
1504
1505  007644  104026                          ERROR   26              ;DUAL ADDR. READ ERROR
1506  007646  000004                  3$:     SCOPE
1507
1508  007650  012777  004200  171244  4$:     MOV     #4200,@$BDADR   ;CHECK FOR WRITE ERROR
1509  007656  022777  004200  177176          CMP     #4200,@ADCSR    ;BAD WRITE?
1510  007664  001001                          BNE     5$
1511
1512  007666  104027                          ERROR   27              ;DUAL ADDR. WRITE ERROR
1513
1514  007670  000004                  5$:     SCOPE
1515  007672  000742                          BR      1$
1516  007674  104424                  6$:     INITR
1517  007676  000207                          RTS     PC              ;RETURN TO
1518                                                                  ;ADLOGE
1519
1520                                          ;*END OF A/D TESTS
1521
1522  007700  005237  001100          ADLOGE: INC     $PASS
1523  007704  104400                  1$:     TYPE                    ;*THE "END"
1524  007706  021063                          MEND
1525  007710  000137  007072                  JMP     ADLOGL          ;*RETURN TO MONITOR.
1526
1527  007714  004000                  ADPATP: 004000
1528  007716  004020                          004020
1529  007720  004040                          004040
1530  007722  004100                          004100
1531  007724  004200                          004200
1532  007726  004400                          004400
1533  007730  005000                          005000
1534  007732  006000                          006000
1535  007734  004000                          004000
1536  007736  004000                  ADPATE: 004000
1537
1538  007740  000137  003366                  JMP     START1
1539
1540                                          ;*
1541                                          ;*TEST 6 A/D CALIBRATION TEST
1542                                          ;*
1543
1544  007744  104400                  TST6:   TYPE                    ;TYPE HEADER.
1545  007746  025166                          MHT6
1546  007750  104423                          ADAR                    ;GET ADDS ADDR.
1547  007752  104426                          QUBR                    ;UNI OR BI-POLAR?
1548                                          ;TBCA AUDO1 CALIBRATION ROUTINE
1549                                          ;SWR0=1 RETURN TO MONITR
1550                                          ;SWR4-6 SELECT CHANNEL
1551                                          ;SWR7-10 SELECT MUX.
1552                                          ;SWR11=1 TYPE OUT CONVERSIONS
1553                                          ;SWR11=0 DISPLAY CONVERSIONS
1554                                          ;SWR12-14 SELECT GAIN (1 TO 1000)
1555
1556  007754  104400  024373                  TYPE,   MSWO
1557  007760  104400  021402                  TYPE,   MWK
```

```
1558  007764  052777  000100  171152  T8CAA:  BIS     #100,@$TKS      ;ALLOW TTY INTERRUPT
1559  007772  013737  013246  007062          MOV     ADADR,ADCSR
1560  010000  001004                          BNE     1$
1561  010002  104400                          TYPE
1562  010004  024344                          MNAD
1563  010006  000137  003366                  JMP     START1
1564  010012  032777  000001  171120  1$:     BIT     #1,@SWR         ;CHECK THE SWITCH REGISTER
1565  010020  001402                          BEQ     .+6             ;FOR RETURN TO MONITOR
1566  010022  000137  003366                  JMP     START1
1567  010026  004737  010646                  JSR     PC,CONVER       ;START CONVERSION
1568  010032  017700  177024                  MOV     @ADCSR, %0      ;GET RESULTS
1569  010036  004737  010634                  JSR     PC,REPET7       ;RIGHT JUSTIFY
1570  010042  032737  004000  001140          BIT     #4000,SWR       ;DISPLAY OR TYPE DATA?
1571  010050  001012                          BNE     CALTP           ;TYPE IT
1572  010052  000005                          RESET
1573  010054  023737  001600  001576          CMP     FR1120,FR1
1574  010062  001404                          BEQ     2$
1575  010064  000005                          RESET
1576  010066  000005                          RESET
1577  010070  000005                          RESET
1578  010072  000005                          RESET
1579  010074                          2$:
1580  010074  000733                          BR      T8CAA
1581  010076  104400                  CALTP:  TYPE
1582  010100  001163                          $CRLF
1583  010102  004737  010146                  JSR     %7,CALIT        ;CONVERT DATA TO BINARY
1584  010106  013737  001550  001566          MOV     FR110,FREQ
1585  010114  104417                          DELAY                   ;LET TTY SETTLE DOWN.
1586  010116  104400                          TYPE
1587  010120  024544                          MCALT1
1588  010122  017700  176734                  MOV     @ADCSR, %0      ;GET DATA
1589  010126  004737  010634                  JSR     PC,REPET7
1590  010132                                  TYPOCT  R0
1591  010132  010046                          MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
1592  010134  104401                          TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
1593  010136  104400                          TYPE
1594  010140  024523                          MCALOT
1595  010142  104417                          DELAY
1596  010144  000707                          BR      T8CAA
1597  010146  005737  013250          CALIT:  TST     BIPOL
1598  010152  001406                          BEQ     3$
1599  010154  022700  007777                  CMP     #7777,R0
1600  010160  001017                          BNE     2$
1601  010162  104400                          TYPE
1602  010164  024463                          MPOVFL
1603  010166  000207                          RETURN
1604  010170                          3$:
1605  010170  022700  004000                  CMP     #4000,  %0      ;ROUTINE TO CONVERT BINARY
1606  010174  001003                          BNE     1$              ;READ FROM A/D BUFFER TO SIX
1607  010176  104400                          TYPE                    ;PLACE DECIMAL VOLTAGE
1608  010200  024434                          MMOVFL
1609  010202  000207                          RTS     PC
1610  010204  022700  003777          1$:     CMP     #3777,  %0      ;POSITIVE OR NEGATIVE
1611  010210  001003                          BNE     2$
1612  010212  104400                          TYPE
1613  010214  024463                          MPOVFL
```

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1614  010216  000207                          RTS     PC
1615  010220  012703  010516          2$:     MOV     #A1,    %3      ;CLEAR STORAGE AREA
1616  010224  005023                          CLR     (3)+
1617  010226  020327  010532                  CMP     %3,     #A1+14  ;DETERMINE IF
1618  010232  001374                          BNE     .-6
1619  010234  012703  010516                  MOV     #A1,    %3      ;POSITIVE OR
1620  010240  012702  002000                  MOV     #2000,  %2
1621  010244  005737  013250                  TST     BIPOL
1622  010250  001401                          BEQ     .+4
1623  010252  006302                          ASL     %2
1624  010254  012701  010540                  MOV     #HOLDIT,%1      ;NEGATIVE VOLTAGE
1625  010260  005737  013250                  TST     BIPOL
1626  010264  001012                          BNE     CALIT1
1627  010266  032700  004000                  BIT     #4000,R0
1628  010272  001405                          BEQ     CALITP
1629  010274  104400                          TYPE                    ;IF MINUS TYPE "-"
1630  010276  024570                          MMINUS
1631  010300  005100                          COM     %0
1632  010302  005200                          INC     %0
1633  010304  000402                          BR      CALIT1          ;IF POSITIVE
1634  010306  104400          CALITP: TYPE                            ;TYPE "+"
1635  010310  024572                          MPLUS
1636  010312  030200          CALIT1: BIT     %2,     %0
1637  010314  001044                          BNE     CALIT2          ;DO OCTAL TO
1638  010316  062701  000005                  ADD     #5,     %1
1639  010322  006002          CALITE: ROR     %2                      ;DECIMAL CONVERSIONS
1640  010324  001372                          BNE     CALIT1
1641  010326  005737  010514                  TST     HOLDTM          ;BY METHOD OF INCREMENTING
1642  010332  001403                          BEQ     .+10
1643  010334  112737  000001  010516          MOVB    #1,     A1
1644  010342  005037  010514                  CLR     HOLDTM          ;DECIMAL COUNTER AND
1645  010346  012703  010516                  MOV     #A1,    %3
1646  010352  052723  000260                  BIS     #260,   (3)+
1647  010356  022703  010532                  CMP     #A1+14, %3      ;DECREMENTING OCTAL DATA
1648  010362  001373                          BNE     .-10
1649  010364  012703  010517                  MOV     #A1+1,  %3      ;UNTIL ZERO
1650  010370  112723  000001                  MOVB    #1,     (3)+
1651  010374  105203                          INCB    %3
1652  010376  112723  000256                  MOVB    #256,   (3)+    ;IF DECIMAL COUNTER = 12 (OCTAL)
1653  010402  105203                          INCB    %3
1654  010404  112723  000001                  MOVB    #1,     (3)+
1655  010410  022703  010532                  CMP     #A1+14, %3      ;CLEAR IT AND INCREMENT
1656  010414  001372                          BNE     .-12            ;NEXT COUNTER
1657  010416  105013                          CLRB    (3)
1658  010420  104400                          TYPE                    ;TYPE DECIMAL
1659  010422  010516                          A1
1660  010424  000207                          RTS     %7
1661  010426  005037  010514  CALIT2: CLR     HOLDTM
1662  010432  012703  010532                  MOV     #A1+14, %3      ;FIRST USE TABLE HOLDIT
1663  010436  112137  010512  CALIT3: MOVB    (1)+,   SCAN            ;TO GET DECIMAL VALUE FOR DATA
1664  010442  063743  010512                  ADD     SCAN,   -(3)    ;COMPUTED FROM ADDS
1665  010446  005737  010514                  TST     HOLDTM
1666  010452  001404                          BEQ     CALIT4
1667  010454  005037  010514                  CLR     HOLDTM          ;ADD THESE VALUES TOGETHER
1668  010460  062713  000001                  ADD     #1,     (3)
1669  010464  122713  000012  CALIT4: CMPB    #12,    (3)     ;HOLDIT CONTAINS VALUES FOR DATA
```

```
1670  010470  101004                          BHI     CALIT5
1671  010472  162713  000012                  SUB     #12,    (3)     ;BASED ON GAIN OF A/D
1672  010476  005237  010514                  INC     HOLDTM
1673  010502  022703  010520          CALIT5: CMP     #AI+2,  %3      ;AT TIME DATA WAS TAKEN
1674  010506  001353                          BNE     CALIT3
1675  010510  000704                          BR      CALITE
1676  010512  000000                  SCAN:   0
1677  010514  000000                  HOLDTM: 000000
1678  010516  000000                  AI:     000000
1679          010540                  .=.+20
1680  010540    000     000     000   HOLDIT: .BYTE   0,0,0,0,5      ;TABLE OF VOLTAGE REPRESENTATION
1681  010543    000     005
1682
1683  010545    000     000     000           .BYTE   0,0,0,5,2       ;OF BINARY INPUT.
1684  010550    005     002
1685
1686  010552    000     000     005           .BYTE   0,0,5,2,1
1687  010555    002     001
1688
1689  010557    000     005     002           .BYTE   0,5,2,6,0
1690  010562    006     000
1691
1692  010564    005     002     001           .BYTE   5,2,1,3,0
1693  010567    003     000
1694
1695  010571    003     006     005           .BYTE   3,6,5,1,0
1696  010574    001     000
1697
1698  010576    001     010     007           .BYTE   1,8.,7,0,0
1699  010601    000     000
1700
1701  010603    001     011     003           .BYTE   1,9.,3,0,0
1702  010606    000     000
1703
1704  010610    005     011     001           .BYTE   5,9.,1,0,0
1705  010613    000     000
1706
1707  010615    010     011     000           .BYTE   8.,9.,0,0,0
1708  010620    000     000
1709
1710  010622    011     004     000           .BYTE   9.,4,0,0,0
1711  010625    000     000
1712
1713  010627    004     002     000           .BYTE   4,2,0,0,0
1714  010632    000     000
1715
1716                                  .EVEN
1717
1718  010634  006000                  REPET7: ROR     %0
1719  010636  006000                          ROR     %0              ;ROUTINE TO RIGHT
1720  010640  006000                          ROR     %0              ;JUSTIFY DATA BY
1721  010642  006000                          ROR     %0              ;ROTATING IT 4 PLACE TO
1722  010644  000207                          RTS     PC              ;THE RIGHT
1723  010646  013702  001140          CONVER: MOV     SWR,R2
1724  010652  042702  000017                  BIC     #17,    %2      ;THISROUTINE SAMPLES SWR
1725  010656  052702  104000                  BIS     #104000,%2      ;AND SENDS CHANNEL, GAIN
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```
1726  010662  010277  176174                MOV     #2,     @ADCSR  ;CONVERT AND READ BITS TO ADU01
1727  010666  005777  176170        CONVED: TST     @ADCSR
1728  010672  100775                        BMI     .-4             ;TO START CONVERSION
1729  010674  005077  176162                CLR     @ADCSR          ;AND WAIT FOR CONVERSION COMPLETE
1730  010700  000207                        RTS     PC
1731
1732  010702  000137  003366                JMP     START1
1733
1734
1735
1736
1737
1738
1739
1740
1741
1742
1743                                        ;*
1744                                        ;*TEST 7 ROUTINE TO MANUALLY TAKE SAMPLES, COMPARE RESULTS
1745                                        ;*PRINT ERROR IF ANY
1746                                        ;*CALL=JMP TST8 FROM MONITOR
1747                                        ;*
1748
1749  010706  104400                TST7:   TYPE                    ;TYPE HEADER
1750  010710  025223                        MHT8
1751  010712  104423                        ADAR
1752  010714  104426                        QUBR
1753  010716  013737  013246  007062        MOV     ADADR,ADCSR
1754  010724  013737  001550  001566        MOV     FR110,FREQ
1755  010732  104417                        DELAY                   ;ALLOW TTY TO SETTLE  BEFORE CONT.
1756  010734  004737  007102                JSR     PC,ADLOG        ;BASIC LOGIS CHECK
1757  010740  005737  001652        22$:    TST     EXPERT
1758  010744  001002                        BNE     .+6
1759  010746  104400                        TYPE                    ;ASK FOR GAIN
1760  010750  025361                        MGAIN
1761  010752  012737  013006  010774        MOV     #GAIN,10$
1762  010760  012737  000001  010776        MOV     #1,     10$+2
1763  010766  000401                        BR      99$
1764  010770  000763                        BR      22$
1765  010772  104411                99$:    INOCT                   ;GET GAIN
1766  010774  013006                10$:    GAIN
1767  010776  000001                        1
1768
1769  011000  012700  013062                MOV     #GLIST,R0       ;GET LIST OF LEGAL GAINS.
1770  011004  005710                20$:    TST     (0)             ;AT END OF LIST?
1771  011006  001003                        BNE     21$             ;NO-CONTINUE.
1772  011010  104400                        TYPE                    ;GAIN HE TYPED IS KNOWN.
1773  011012  025731                        MNSG                    ;TELL HIM.
1774  011014  000751                        BR      22$             ;REASK QUESTION.
1775  011016  012001                21$:    MOV     (0)+,R1         ;GET GAIN FROM GAIN LIST.
1776  011020  042701  170000                BIC     #170000,R1      ;MASK OUT REAL GAIN BITS.
1777  011024  020137  013006                CMP     R1,GAIN         ;GAIN HE TYPED MATCH ONE IN GAIN LIST?
1778  011030  001365                        BNE     20$             ;NO-CHECK NEXT IN LIST.
1779  011032  014037  013006                MOV     -(0),GAIN       ;YES-REPLACE TYPED GAIN BY REAL GAIN.
1780
1781  011036  005737  001652        3$:     TST     EXPERT
```

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1782  011042  001002                          BNE     .+6
1783  011044  104400                          TYPE                    ;ASK FOR CHANS:
1784  011046  025376                          MCHAN
1785  011050  005037  013012                  CLR     CHANS
1786  011054  005037  013014                  CLR     CHANF
1787  011060  005037  013016                  CLR     CHANSR
1788  011064  005037  013020                  CLR     CHANFR
1789  011070  013737  001650  013042          MOV     CORSIZ,RTEMP
1790  011076  162737  026636  013042          SUB     #$ENDAD,RTEMP
1791  011104  005037  013044                  CLR     RTEMP1
1792  011110  005237  013044          15$:    INC     RTEMP1
1793
1794  011114  162737  001000  013042          SUB     #1000,RTEMP
1795  011122  100372                          BPL     15$
1796  011124  005337  013044                  DEC     RTEMP1
1797  011130  013737  013044  013022          MOV     RTEMP1,CHANNO
1798  011136  013746  013044                  MOV     RTEMP1,-(SP)
1799  011142  004737  016346                  GOSUB   ,$SB2D
1800  011146  062716  000010                  ADD     #10,(SP)
1801  011152  005726                          TST     (SP)+
1802  011154  012737  013016  011176          MOV     #CHANSR,11$
1803  011162  012737  000002  011200          MOV     #2,11$+2
1804  011170  000401                          BR      .+4
1805  011172  000721                          BR      3$
1806  011174  104411                          INOCT                   ;GET CHANS
1807  011176  013016                  11$:    CHANSR
1808  011200  000002                          2
1809  011202  005737  013020                  TST     CHANFR
1810
1811  011206  001003                          BNE     .+10
1812  011210  013737  013016  013020          MOV     CHANSR,CHANFR
1813  011216  023737  013016  013020          CMP     CHANSR,CHANFR   ;CHAN. S=F?
1814  011224  003403                          BLE     4$
1815  011226  104400                          TYPE
1816  011230  025445                          MCHER1
1817  011232  000701                          BR      3$
1818  011234  023727  013020  000177  4$:     CMP     CHANFR,#177     ;CHAN WITHIN LEGAL BOUNDS?
1819  011242  003403                          BLE     30$
1820  011244  104400                          TYPE                    ;NO-THEN TELL HIM
1821  011246  025651                          MCHANH
1822  011250  000672                          BR      3$
1823  011252  005737  001652          30$:    TST     EXPERT
1824  011256  001002                          BNE     .+6
1825  011260  104400                          TYPE                    ;ASK FOR EXPECTED AVERAGE.
1826  011262  025700                          MAVEQ
1827  011264  012737  013032  011306          MOV     #AVEXP,12$
1828  011272  012737  000001  011310          MOV     #1,12$+2
1829  011300  000401                          BR      .+4
1830  011302  000763                          BR      30$
1831  011304  104411                          INOCT                   ;GET AVERAGE.
1832  011306  013032                  12$:    AVEXP
1833  011310  000001                          1
1834  011312  032737  170000  013032          BIT     #170000,AVEXP           ;LEGAL AVERAGE?
1835  011320  001403                          BEQ     6$
1836  011322  104400                          TYPE                    ;NO TELL HIM(OR HER) ASK:
1837  011324  025751                          MNTL                    ;QUESTION AGAIN.
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1838  011326  000751                          BR      30$
1839  011330  012737  013030  011410  6$:     MOV     #TOLER,13$
1840  011336  012737  000001  011412          MOV     #1,13$+2
1841  011344  032737  004000  013032          BIT     #4000,AVEXP
1842  011352  001406                          BEQ     60$
1843  011354  005737  013250                  TST     BIPOL
1844  011360  001003                          BNE     60$
1845  011362  052737  170000  013032          BIS     #170000,AVEXP
1846  011370  005737  001652          60$:    TST     EXPERT
1847  011374  001002                          BNE     .+6
1848  011376  104400                          TYPE                    ;ASK FOR TOLERANCE.
1849  011400  025423                          MTOL
1850  011402  000401                          BR      .+4
1851  011404  000771                          BR      60$
1852  011406  104411                          INOCT
1853  011410  013030                  13$:    TOLER
1854  011412  000001                          1
1855  011414  005737  001660                  TST     LINEPR
1856  011420  001411                          BEQ     14$
1857  011422  013737  001662  001150          MOV     LPCSR,$TPS
1858  011430  013737  001664  001152          MOV     LPDBR,$TPB
1859  011436  104400  021402                  TYPE,   MWK
1860  011442  000402                          BR      .+6
1861  011444  104400                  14$:    TYPE                    ;TYPE "REPEAT"
1862  011446  024512                          MREP
1863  011450  013737  013016  013014          MOV     CHANSR,CHANF
1864  011456  005337  013014                  DEC     CHANF
1865  011462  032777  000001  167450          BIT     #1,@SWR
1866  011470  001402                          BEQ     .+6
1867  011472  000137  003366                  JMP     START1
1868  011476  013737  013014  013012  5$:     MOV     CHANF,CHANS
1869  011504  005237  013012                  INC     CHANS
1870  011510  063737  013022  013014          ADD     CHANNO,CHANF
187.  011516  023737  013012  013020          CMP     CHANS,CHANFR
1872  011524  003347                          BGT     14$
1873  011526  023737  013014  013020          CMP     CHANF,CHANFR
1874  011534  003403                          BLE     .+10
1875  011536  013737  013020  013014          MOV     CHANFR,CHANF
1876  011544  004737  011556                  GOSUB   ,SAMPR          ;TAKE CONVERSIONS
1877  011550  004737  012060                  GOSUB   ,AVERR          ;TAKE AVERAGES
1878  011554  000750                          BR      5$
1879
1880                                          ;*
1881                                          ;*ROUTINE TO TAKE 256 SAMPLES OF AL CHANNELS SPECIFIED
1882                                          ;*CALL=GOSUB,SAMPR
1883
1884  011556  013737  001552  001566  SAMPR:  MOV     FR50,FREQ       ;SUB PART TO SET UP DELAY BASEDON
1885  011564  013737  013014  013004          MOV     CHANF,CHAN
1886  011572  163737  013012  013004          SUB     CHANS,CHAN      ;NUMBER OF CHANNELLS WERE SAMPLING.
1887  011600  013737  013004  013026          MOV     CHAN,SAMOFF
1888  011606  001416                          BEQ     2$
1889  011610  006337  013026                  ASL     SAMOFF
1890  011614  163737  001562  001566  1$:     SUB     FR5,FREQ
1891  011622  005337  013004                  DEC     CHAN
1892  011626  001372                          BNE     1$
1893  011630  005737  001566                  TST     FREQ
```

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1894  011634  100003                          BPL     2$
1895  011636  012737  000001  001566          MOV     #1,FREQ
1896  011644  012737  177400  013024  2$:     MOV     #-256.,SAMCNT   ;SET SAMPLE COUNT.
1897  011652  012701  026636                  MOV     #BUFFER,R1      ;SET FOR STORAGE.
1898  011656  013737  013012  013004  3$:     MOV     CHANS,CHAN      ;GET STARTING CHANNEL
1899  011664  104417                          DELAY
1900  011666  013737  013004  013002  4$:     MOV     CHAN,CHAN1      ;SET TO RIGHT JUSTIFY CHAN.
1901  011674  006337  013002                  ASL     CHAN1           ;FIX TO LOAD INTO AID WORD.
1902  011700  006337  013002                  ASL     CHAN1
1903  011704  006337  013002                  ASL     CHAN1
1904  011710  006337  013002                  ASL     CHAN1
1905  011714  004737  011752                  GOSUB   ,CONVT          ;TAKE CONVERSION.
1906  011720  010021                          MOV     R0,(1)+         ;STORE RESULT
1907  011722  005237  013004                  INC     CHAN            ;READY FOR NEXT CHAN.
1908  011726  023737  013004  013014          CMP     CHAN,CHANF      ;DONE ALL CHANNELLS
1909  011734  003754                          BLE     4$
1910  011736  005237  013024                  INC     SAMCNT          ;DONE 256 SAMPLES?
1911  011742  001345                          BNE     3$
1912  011744  012701  026636                  MOV     #BUFFER,R1
1913  011750  000207                          RETURN
1914
1915                                          ;*ROUTINE TO FORM A AID WORD FOR CONVERSIONS, START A CONVERSION,
1916                                          ;*WAIT FOR DONE, AND ENABLE READING OF THE AID DBR.
1917
1918                                          ;*CALL=GOSUB,CONVT,RESULT FOUND IN R0,RIGHT JUSTIFIED
1919  011752  013737  013006  013010  CONVT:  MOV     GAIN,ADWD               ;SET GAIN IN WORD
1920  011760  042737  007777  013010          BIC     #7777,ADWD
1921  011766  053737  013002  013010          BIS     CHAN1,ADWD              ;SET CHAN.
1922  011774  052737  104000  013010          BIS     #104000,ADWD            ;SET READ BIT, CONVERT BIT.
1923  012002  013777  013010  175052          MOV     ADWD,@ADCSR             ;START CONVERSION.
1924  012010  005777  175046          1$:     TST     @ADCSR          ;WAIT FOR CONVERSION COMPLETE.
1925  012014  100775                          BMI     1$
1926  012016  005077  175040                  CLR     @ADCSR          ;ENABLE READING OF DBR.
1927  012022  017700  175034                  MOV     @ADCSR,R0       ;READ AID RESULTS PUT IN R0
1928  012026  005737  013250                  TST     BIPOL
1929  012032  001405                          BEQ     2$
1930  012034  006000                          ROR     R0
1931  012036  006000                          ROR     R0
1932  012040  006000                          ROR     R0
1933  012042  006000                          ROR     R0
1934  012044  000207                          RETURN
1935  012046  006200                  2$:     ASR     R0              ;RIGHT JUSTIFY, REMEMBERING SIGN.
1936  012050  006200                          ASR     R0
1937  012052  006200                          ASR     R0
1938  012054  006200                          ASR     R0
1939  012056  000207                          RETURN                  ;RETURN
1940                                          ;*
1941                                          ;*AVERAGING ROUTINE USED BE TEST 7
1942                                          ;*AT THIS POINT IN TIME ALL SAMPLES FOR ALL CHANNELS HAVE
1943                                          ;*BEEN TAKEN AND STORED IN "BUFFER" IN A
1944                                          ;*SEQUENTIAL INTERLEAVED BUFFER FORM" GIVEN BY THE FOLLOWING FORMULA:
1945                                          ;*"L=2*N+R1" WHERE L EQUALS THE LOCATION OF A SAMPLE,
1946                                          ;*N EQUALS THE NUMBER OF CHANNELS SAMPLES WERE TAKEN ON, AND R1
1947                                          ;*IS THE BUFFER POINTER SET TO "BUFFER" INITIALLY.
1948                                          ;*CALL=GOSUB,AVERR
1949
```

```
 1950  012060  013737  013012  013004  AVERR:  MOV     CHANS,CHAN      ;SET TO FIRST CHAN.
 1951  012066  005037  013C02                  CLR     CHAN1           ;1ST CHAN OFFSET
 1952  012072  012737  000400  013024  AVERRL: MOV     #256.,SAMCNT
 1953  012100  013701  013002                  MOV     CHAN1,R1        ;PUT CHAN OFFSET IN R1.
 1954  012104  062701  026636                  ADD     #BUFFER,R1      ;ADD BUFFER POINTER TO R1.
 1955  012110  005037  013034                  CLR     AVTKN           ;SET INITIAL CONDITIONS FOR THIS CHAN.
 1956  012114  005037  013042                  CLR     RTEMP
 1957  012120  011137  013036                  MOV     (1),RLOW
 1958  012124  011137  013040                  MOV     (1),RHIGH
 1959  012130  023711  013040          2$:     CMP     RHIGH,(1)       ;FIND REAL HIGH VALUE.
 1960  012134  003002                          BGT     3$
 1961  012136  011137  013040                  MOV     (1),RHIGH
 1962  012142  021137  013036          3$:     CMP     (1),RLOW        ;FIND REAL LOW VALUE.
 1963  012146  003002                          BGT     4$
 1964  012150  011137  013036                  MOV     (1),RLOW
 1965  012154  012137  013044          4$:     MOV     (1)+,RTEMP1     ;GET CURRENT SAMPLE.
 1966  012160  005737  013250                  TST     BIPOL
 1967  012164  001003                          BNE     .+10
 1968  012166  062737  004000  013044          ADD     #4000,RTEMP1    ;ADD CONSTANT TO SAMPLE.
 1969  012174  063737  013044  013034          ADD     RTEMP1,AVTKN    ;"BOOT" ADD ALL SAMPLES.
 1970  012202  005537  013042                  ADC     RTEMP
 1971  012206  063701  013026                  ADD     SAMOFF,R1       ;UPDATE TO LOOK AT NEXT CHAN SAMPLE
 1972  012212  005337  013024                  DEC     SAMCNT          ;DONE ALL SAMPLES PER THIS CHAN?
 1973  012216  001344                          BNE     2$              ;NO-DO NEXT SAMPLE.
 1974  012220  013737  013032  013044          MOV     AVEXP,RTEMP1    ;YES! SEE IF RHIGH OK:
 1975  012226  063737  013030  013044          ADD     TOLER,RTEMP1
 1976  012234  023737  013044  013040          CMP     RTEMP1,RHIGH
 1977  012242  002427                          BLT     ERAV1           ;NO-THEN REPORT ERROR.
 1978  012244  163737  013030  013044          SUB     TOLER,RTEMP1    ;YES-OK-CHECK LOWEST READING.
 1979  012252  163737  013030  013044          SUB     TOLER,RTEMP1
 1980  012260  023737  013036  013044          CMP     RLOW,RTEMP1
 1981  012266  002415                          BLT     ERAV1           ;NO-REPORT ERROR.
 1982  012270  005737  013030                  TST     TOLER           ;DOES OPERATOR WISH "FORCED" TYPEOUT?
 1983  012274  001415                          BEQ     ERAV2           ;IF SO-DO IT
 1984  012276  062737  000002  013002  AVERRN: ADD     #2,CHAN1        ;SET TO DO NEXT CHAN-BUT
 1985  012304  005237  013004                  INC     CHAN            ;IF DONE ALL CHANS-EXIT-
 1986  012310  023737  013004  013014          CMP     CHAN,CHANF      ;OTHERWIZE LOOP.
 1987  012316  003665                          BLE     AVERRL
 1988  012320  000207                          RETURN
 1989
 1990                                          ;*ERROR REPORTER
 1991
 1992  012322  104400                  ERAV1:  TYPE                    ;TYPE "REPEATIBILITY ERROR"
 1993  012324  026045                          MREPER
 1994  012326  000402                          BR      .+6
 1995  012330  104400                  ERAV2:  TYPE                    ;TYPE "REPEATIBILITY FORCED TYPEOUT"
 1996  012332  026007                          MREPFT
 1997  012334  012702  000007          1$:     MOV     #7,R2           ;FIND AVERAGE.
 1998  012340  006237  013042          10$:    ASR     RTEMP
 1999  012344  006037  013034                  ROR     AVTKN           ;AVERAGE=TOTAL OF SAMPLES-
 2000  012350  005302                          DEC     R2              ;DIVIDED BY 256.
 2001  012352  001372                          BNE     10$
 2002  012354  006237  013042                  ASR     RTEMP
 2003  012360  006037  013034                  ROR     AVTKN
 2004  012364  005537  013034                  ADC     AVTKN
 2005  012370  005737  013250                  TST     BIPOL
```

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2006  012374  001003                          BNE     .+10
2007
2008  012376  162737  004000  013034          SUB     #4000,AVTKN     ;SUBTRACT CONSTANT.
2009  012404  104400                          TYPE                    ;TYPE HEADER 1
2010  012406  026074                          MREPT1
2011  012410                                  TYPOCT  CHAN            ;TYPE CHAN.
2012  012410  013746  013004                  MOV     CHAN,-(SP)      ;;SAVE CHAN FOR TYPEOUT
2013  012414  104401                          TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
2014  012416  104400                          TYPE
2015  012420  026004                          M2SP
2016  012422  013702  013006                  MOV     GAIN,R2         ;TYPE GAIN.
2017  012426  042702  170000                  BIC     #170000,R2
2018  012432                                  TYPOCT  R2
2019  012432  010246                          MOV     R2,-(SP)        ;;SAVE R2 FOR TYPEOUT
2020  012434  104401                          TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
2021  012436  104400                          TYPE
2022  012440  026004                          M2SP
2023  012442  013702  013036                  MOV     RLOW,R2
2024  012446  042702  170000                  BIC     #170000,R2
2025  012452                                  TYPOCT  R2              ;TYPE LOWEST SAMPLE TAKEN.
2026  012452  010246                          MOV     R2,-(SP)        ;;SAVE R2 FOR TYPEOUT
2027  012454  104401                          TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
2028  012456  104400                          TYPE
2029  012460  026004                          M2SP
2030
2031
2032
2033
2034
2035
2036
2037  012462  013702  013034                  MOV     AVTKN,R2
2038  012466  042702  170000                  BIC     #170000,R2
2039  012472                                  TYPOCT  R2              ;TYPE AVERAGE OF SAMPLES TAKEN.
2040  012472  010246                          MOV     R2,-(SP)        ;;SAVE R2 FOR TYPEOUT
2041  012474  104401                          TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
2042  012476  104400                          TYPE
2043  012500  026004                          M2SP
2044  012502  013702  013040                  MOV     RHIGH,R2
2045  012506  042702  170000                  BIC     #170000,R2
2046  012512                                  TYPOCT  R2              ;TYPE HIGHEST SAMPLE TAKEN.
2047  012512  010246                          MOV     R2,-(SP)        ;;SAVE R2 FOR TYPEOUT
2048  012514  104401                          TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
2049  012516  104400                          TYPE                    ;TYPE SECOND HEADER.
2050  012520  026146                          MREPT2
2051  012522  013737  013034  013042          MOV     AVTKN,RTEMP     ;GET AV.
2052  012530  162737  000005  013042          SUB     #5,RTEMP        ;MAKE -5 POINT TO GET LOW POINT.
2053  012536  012737  000400  013024          MOV     #256.,SAMCNT    ;SET # OF SAMPLES.
2054  012544  013701  013002                  MOV     CHAN1,R1
2055  012550  062701  026636                  ADD     #BUFFER,R1
2056  012554  005002                          CLR     R2
2057  012556  022137  013042          2$:     CMP     (1)+,RTEMP
2058  012562  002001                          BGE     3$
2059  012564  005202                          INC     R2
2060  012566  063701  013026          3$:     ADD     SAMOFF,R1
2061  012572  005337  013024                  DEC     SAMCNT
```

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2062  012576  001367                          BNE     2$
2063  012600  004737  012744                  GOSUB   ,AVTYP          ;TYPE RLOW # OF SAMPLES.
2064  012604  012703  177765                  MOV     #-11.,R3                ;SET TO DO 11 TIMES.
2065  012610  012737  000400  013024  4$:     MOV     #256.,SAMCNT    ;SET SAMPLE COUNT AT 256.
2066  012616  005002                          CLR     R2
2067  012620  013701  013002                  MOV     CHAN1,R1        ;GET BUFFER POINTER.
2068  012624  062701  026636                  ADD     #BUFFER,R1
2069  012630  022137  013042          5$:     CMP     (1)+,RTEMP      ;SAMPLE=COUNT POINTER?
2070  012634  001001                          BNE     6$
2071  012636  005202                          INC     R2
2072  012640  063701  013026          6$:     ADD     SAMOFF,R1
2073  012644  005337  013024                  DEC     SAMCNT          ;CHECKED ALL SAMPLES?
2074  012650  001367                          BNE     5$
2075  012652  004737  012744                  GOSUB   ,AVTYP          ;TYPE # OF SAMPLES AT THIS POINT.
2076  012656  005237  013042                  INC     RTEMP           ;MOVE TO NEXT POINT.
2077  012662  005203                          INC     R3              ;DONE ALL POINTS?
2078  012664  001351                          BNE     4$              ;NO-THEN LOOP
2079  012666  005002                          CLR     R2              ;FIND ALL OVERSCALE POINTS.
2080  012670  012737  000400  013024          MOV     #256.,SAMCNT
2081  012676  013701  013002                  MOV     CHAN1,R1
2082  012702  062701  026636                  ADD     #BUFFER,R1
2083  012706  022137  013042          7$:     CMP     (1)+,RTEMP
2084  012712  003401                          BLE     8$
2085  012714  005202                          INC     R2
2086  012716  063701  013026          8$:     ADD     SAMOFF,R1
2087  012722  005337  013024                  DEC     SAMCNT
2088  012726  001367                          BNE     7$
2089  012730  004737  012744                  GOSUB   ,AVTYP
2090  012734  104400                          TYPE
2091  012736  001163                          $CRLF
2092  012740  000137  012276                  JMP     AVERRN
2093  012744  010246          AVTYP:  MOV     R2,-(SP)        ;PUT # ON STACK
2094  012746  004737  016346                  GOSUB   ,$$B2D          ;GOTO OCTAL-BCD ROUTINE.
2095  012752  062716  000007                  ADD     #7,(SP)         ;GET RID OF 1ST.2 DIGITS
2096  012756  012637  012764                  MOV     (SP)+,1$                ;TYPE STRING.
2097  012762  104400                          TYPE
2098  012764  000000          1$:     0
2099  012766  104400                          TYPE                    ;TYPE 2 SPACES.
2100  012770  026004                          M2SP
2101  012772  000207                          RETURN
2102
2103                                          ;*
2104                                          ;*POINTERS USED BY TEST 7  REPEATIBILITY TEST
2105                                          ;*
2106
2107  012774  000000          CHAN7:0
2108  012776  000000          NA07:0
2109  013000  000000          NA17:0
2110  013002  000000          CHAN1:  0               ;LEFT JUSTIFIED CURRENT CHANNELL
2111  013004  000000          CHAN:   0               ;CURRENT CHANNELL
2112  013006  000000          GAIN:   0               ;CURRENT GAIN
2113  013010  000000          ADWD:   0               ;WORD SENT TO A/D
2114  013012  000000          CHANS:  0               ;STARTING CHANNEL
2115  013014  000000          CHANF:  0               ;LAST CHANNEL
2116  013016  000000          CHANSR: 0
2117  013020  000000          CHANFR: 0
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```
2111  013022  000000                  CHANNO: 0
2112  013024  000000                  SAMCNT: 0                       ;SAMPLE COUNT
2113  013026  000000                  SAMOFF: 0                       ;SAMPLE OFFSET
2114  013030  000000                  TOLER:  0                       ;TOLERANCE BEFORE ERROR IS REPORTED
2115  013032  000000                  AVEXP:  0                       ;EXPECTED AVERAGE
2116  013034  000000                  AVTKN:  0                       ;AVERAGE OF SAMPLES TAKEN
2117  013036  000000                  RLOW:   0                       ;LOWEST SAMPLE TAKEN
2118  013040  000000                  RHIGH:  0                       ;HIGHEST SAMPLE TAKEN
2119  013042  000000                  RTEMP:  0
2120  013044  000000                  RTEMP1: 0
2121  013046  000000                  REPMAN: 0                       ;SECTION RESERVED FOR
2122  013050  000000                  0                               ;MANUAL REPEATIBILITY
2123  013052  000000                  0                               ;WHERE OPERATOR ENTERS
2124  013054  000000                  0                               ;IN INFORMATION
2125  013056    000     000           .BYTE   0,0
2126  013060  000000                  0
2127                                  ;*
2128                                  ;* GAIN LIST
2129                                  ;*
2130
2131  013062  071000                  GLIST:  071000                  ;GAIN OF 1000.
2132  013064  060200                          060200                  ;GAIN OF 200.
2133  013066  050100                          050100                  ;GAIN OF 100.
2134  013070  040050                          040050                  ;GAIN OF 50.
2135  013072  030020                          030020                  ;GAIN OF 20.
2136  013074  020010                          020010                  ;GAIN OF 10.
2137  013076  010002                          010002                  ;GAIN OF 2.
2138  013100  000001                          000001                  ;GAIN OF 1.
2139  013102  000000                          000000                  ;ILLEGAL GAIN.
2140
2141                                  ;*INPUT MODULE ADDRESSES
2142  013104  000000                  INADR:  0
2143  013106  000000                          .WORD   0
2144  013110  000000                          .WORD   0
2145  013112  000000                          .WORD   0
2146  013114  000000                          .WORD   0
2147  013116  000000                          .WORD   0
2148  013120  000000                          .WORD   0
2149  013122  000000                          .WORD   0
2150  013124  000000                          .WORD   0
2151  013126  000000                          .WORD   0
2152  013130  000000                          .WORD   0
2153  013132  000000                          .WORD   0
2154  013134  000000                          .WORD   0
2155  013136  000000                          .WORD   0
2156  013140  000000                          .WORD   0
2157  013142  000000                          .WORD   0
2158                                  ;*OUTPUT MODULE ADDRESSES
2159  013144  000000                  OUTADR: 0
2160  013146  000000                          .WORD   0
2161  013150  000000                          .WORD   0
2162  013152  000000                          .WORD   0
2163  013154  000000                          .WORD   0
2164  013156  000000                          .WORD   0
2165  013160  000000                          .WORD   0
```

```
2174  013162  000000                          .WORD   0
2175  013164  000000                          .WORD   0
2176  013166  000000                          .WORD   0
2177  013170  000000                          .WORD   0
2178  013172  000000                          .WORD   0
2179  013174  000000                          .WORD   0
2180  013176  000000                          .WORD   0
2181  013200  000000                          .WORD   0
2182  013202  000000                          .WORD   0
2183                                          ;*COUNTER MODULE ADDRESSES
2184  013204  000000                  CNTADR: 0
2185  013206  000000                          .WORD   0
2186  013210  000000                          .WORD   0
2187  013212  000000                          .WORD   0
2188  013214  000000                          .WORD   0
2189  013216  000000                          .WORD   0
2190  013220  000000                          .WORD   0
2191  013222  000000                          .WORD   0
2192  013224  000000                          .WORD   0
2193  013226  000000                          .WORD   0
2194  013230  000000                          .WORD   0
2195  013232  000000                          .WORD   0
2196  013234  000000                          .WORD   0
2197  013236  000000                          .WORD   0
2198  013240  000000                          .WORD   0
2199  013242  000000                          .WORD   0
2200                                          ;* DAC MODULE ADDRESS
2201  013244  000000                  DACADR: 0
2202                                          ;*ADC5 MODULE ADDRESS
2203  013246  000000                  ADADR:  0
2204  013250  000000                  BIPOL:  0                       ;0=BIPOLAR-1=UNI
2205                                          ;*TEMP STORAGE OF INPUT MODULE DATA
2206  013252  000000                  OUTS:   0
2207  013254  000000                          .WORD   0
2208  013256  000000                          .WORD   0
2209  013260  000000                          .WORD   0
2210  013262  000000                          .WORD   0
2211  013264  000000                          .WORD   0
2212  013266  000000                          .WORD   0
2213  013270  000000                          .WORD   0
2214  013272  000000                          .WORD   0
2215  013274  000000                          .WORD   0
2216  013276  000000                          .WORD   0
2217  013300  000000                          .WORD   0
2218  013302  000000                          .WORD   0
2219  013304  000000                          .WORD   0
2220  013306  000000                          .WORD   0
2221  013310  000000                          .WORD   0
2222  013312  000000                  OUTSE:  0
2223
2224                                          ;*
2225                                          ;*ROUTINE TO INPUT INPUT MODULE ADDRESS.
2226                                          ;*
2227
2228  013314  005737  001652          RINA:   TST     EXPERT
2229  013320  001002                          BNE     .+6
```

```
2230  013322  104400                          TYPE                    ;ASK OPERATOR "INPUT MODULE ADDR(S)?
2231  013324  020661                          MIPA
2232  013326  012737  013104  013350          MOV     #INADR, RINA1
2233  013334  012737  000020  013352          MOV     #16.,   RINA1+2
2234  013342  000401                          BR      .+4
2235  013344  000763                          BR      RINA
2236  013346  104411                          INOCT                   ;CALL TO INPUT OCTAL ROUTINE
2237  013350  013104                  RINA1:  INADR                   ;ADDR TO STORE INPUT ADDRESS AT (VARIES).
2238  013352  000020                          16.                     ;NUMBER OF ADDRESS ALLOWED.
2239  013354  005737  014754                  TST     CHAR
2240  013360  001411                          BEQ     2$
2241  013362  012700  013104                  MOV     #INADR, R0      ;NOW FORM REAL ICS ADDRESS.
2242  013366  053710  001612          1$:     BIS     ICSMOD, (0)     ;NORMAL-ICS MOD=171000 UNLESS PATCHED
2243  013372  004737  015416                  JSR     PC,CKADR
2244  013376  020037  013350                  CMP     R0,RINA1        ;DONE ALL ADDRS?
2245  013402  101771                          BLOS    1$              ;IF NOT CONTINUE.
2246  013404  000002                  2$:     EXIT                    ;IF SO-EXIT
2247
2248                                          ;*
2249                                          ;*ROUTINE TO INPUT OUTPUT MODULE ADDRESSESS
2250                                          ;*
2251
2252  013406  005737  001652          ROUTA:  TST     EXPERT
2253  013412  001002                          BNE     .+6
2254  013414  104400                          TYPE                    ;ASK OPERATOR "OUTPUT MODULE ADDRESSESS"
2255  013416  020717                          MOPA
2256  013420  012737  013144  013442          MOV     #OUTADR, ROUTA1
2257  013426  012737  000020  013444          MOV     #16.,   ROUTA1+2
2258  013434  000401                          BR      .+4
2259  013436  000763                          BR      ROUTA
2260  013440  104411                          INOCT                   ;CALL TO INPUT OCTAL ROUTINE
2261  013442  013144                  ROUTA1: OUTADR                  ;ADDR TO STORE OUTPUT ADDRS.
2262  013444  000020                          16.                     ;
2263  013446  005737  014754                  TST     CHAR
2264  013452  001411                          BEQ     2$
2265  013454  012700  013144                  MOV     #OUTADR, R0     ;
2266  013460  053710  001612          1$:     BIS     ICSMOD, (0)
2267  013464  004737  015416                  JSR     PC,CKADR
2268  013470  020037  013442                  CMP     R0,ROUTA1
2269  013474  101771                          BLOS    1$
2270  013476  000002                  2$:     EXIT
2271
2272                                          ;*
2273                                          ;*ROUTINE TO INPUT COUNTER MODULE ADDRS
2274                                          ;*
2275
2276  013500  005737  001652          RCNTA:  TST     EXPERT
2277  013504  001002                          BNE     .+6
2278  013506  104400                          TYPE                    ;ASK OPERATOR FOR COUNTER MODULE
2279  013510  021076                          MCNT                    ;ADDRS.
2280  013512  012737  013204  013534          MOV     #CNTADR, RCNTA1
2281  013520  012737  000020  013536          MOV     #16.,   RCNTA1+2
2282  013526  000401                          BR      .+4
2283  013530  000763                          BR      RCNTA
2284  013532  104411                          INOCT                   ;GET THEM
2285  013534  013204                  RCNTA1: CNTADR
```

```
 2286  013536  000020                          16.
 2287  013540  012700  013204                  MOV     #CNTADR, R0
 2288  013544  005737  014754                  TST     CHAR
 2289  013550  001407                          BEQ     2$
 2290  013552  053710  001612          1$:     BIS     ICSMOD, (0)
 2291  013556  004737  015416                  JSR     PC,CKADR
 2292  013562  020037  013534                  CMP     R0,RCNTA1
```

```
2293  013566  003771                          BLE     1$
2294
2295  013570  000002                  2$:     EXIT
2296
2297                                          ;*
2298                                          ;*ROUTINE TO INPUT DAC ADDR
2299                                          ;*
2300  013572  005737  001652          RDACA:  TST     EXPERT
2301  013576  001002                          BNE     .+6
2302  013600  104400                          TYPE
2303  013602  021417                          MDAC
2304  013604  012737  013244  013626          MOV     #DACADR, RDAC1
2305  013612  012737  000001  013630          MOV     #1,     RDAC1+2
2306  013620  000401                          BR      .+4
2307  013622  000763                          BR      RDACA
2308  013624  104411                          INOCT
2309  013626  013244                  RDAC1:  DACADR
2310  013630  000001                          1
2311  013632  005737  014754                  TST     CHAR
2312  013636  001407                          BEQ     1$
2313  013640  053737  001612  013244          BIS     ICSMOD, DACADR
2314  013646  012700  013244                  MOV     #DACADR,R0
2315  013652  004737  015416                  JSR     PC,CKADR
2316  013656  000002                  1$:     EXIT
2317                                          ;*
2318                                          ;*ROUTINE TO INPUT ADDS ADDR
2319                                          ;*
2320  013660  005737  001652          RADA:   TST     EXPERT
2321  013664  001002                          BNE     .+6
2322  013666  104400                          TYPE
2323  013670  021442                          MADU
2324  013672  012737  013246  013714          MOV     #ADADR, RADA1
2325  013700  012737  000001  013716          MOV     #1,     RADA1+2
2326  013706  000401                          BR      .+4
2327  013710  000763                          BR      RADA
2328  013712  104411                          INOCT
2329  013714  013246                  RADA1:  ADADR
2330  013716  000001                          1
2331  013720  005737  014754                  TST     CHAR
2332  013724  001407                          BEQ     1$
2333  013726  053737  001612  013246          BIS     ICSMOD, ADADR
2334  013734  012700  013246                  MOV     #ADADR,R0
2335  013740  004737  015416                  JSR     PC,CKADR
2336  013744  000002                  1$:     EXIT
2337
2338                                          ;*
2339                                          ;*INPUT OCTAL ROUTINE
2340                                          ;*NMW TO CALL=WHERE TO STORE NUMBERS
2341                                          ;*NMW = NUMBER OF NUMBERS TO ACCEPT.
2342                                          ;*
2343
2344  013746  104400                  INOCTR: TYPE                    ;TYPE A "?".
2345  013750  021764                          MQ
2346  013752  017601  000000                  MOV     @(6),   R1      ;PICK UP STORAGE ADDRESS.
2347  013756  062716  000002                  ADD     #2,     (6)     ;PICK UP # OF WORDS THAT-
2348  013762  017637  000000  014766          MOV     @(6),   NINC1   ;IS THE MAX # TO BE INPUTED.
```

```
2349  013770  162716  000002                  SUB     #2,     (6)     ;CLEAR COLON TYPED FLAG.
2350  013774  005037  001630                  CLR     INCFLG          ;CLEAR ANY CHAR. TYPED FLAG.
2351  014000  005037  013042                  CLR     RTEMP           ;POINT T6 TEMP STORAGE AREA.
2352  014004  012700  013252                  MOV     #OUTS,R0        ;CLEAR THE AREA.
2353  014010  005020                  20$:    CLR     (0)+
2354  014012  020027  013312                  CMP     R0,#OUTSE
2355  014016  003774                          BLE     20$
2356  014020  012700  013252                  MOV     #OUTS,R0        ;POINT TO AREA AGAIN.
2357  014024  005037  014764                  CLR     NINC            ;CLEAR CHAR. COUNT
2358  014030  005037  014756          1$:     CLR     NIN             ;CLEAR NUMBER TO BE FORMED
2359  014034  005037  014762                  CLR     CHARC           ;INPUTED CHAR. COUNT
2360  014040  105777  165100          2$:     TSTB    @$TKS           ;KEY TYPED?
2361  014044  100375                          BPL     2$              ;NO - THEN WAIT.
2362  014046  117737  165074  014754          MOVB    @$TKB,  CHAR    ;YES - READ CHAR.
2363  014054  042737  177600  014754          BIC     #177600, CHAR   ;STRIP CHAR PARITY BIT - IF ANY.
2364  014062  023727  014754  000177          CMP     CHAR,#177       ;WAS IT A RUBOUT?
2365  014070  001002                          BNE     .+6             ;NO - CONTINUE
2366  014072  000137  014714                  JMP     10$             ;YES - TYPE "?" - REINTIALIZE.
2367  014076  105777  165046                  TSTB    @$TPS           ;PRINTER BUSY?
2368  014102  100375                          BPL     .-4             ;YES - THEN WAIT TILL NOT
2369  014104  013777  014754  165040          MOV     CHAR,   @$TPB   ;NO - ECHO CHAR.
2370  014112  023727  014754  000015          CMP     CHAR,   #15     ;CHAR. = <CR>?
2371  014120  001514                          BEQ     3$              ;YES - THEN TERMINATE INPUT.
2372  014122  023727  014754  000003          CMP     CHAR,#3         ;WAS IT A ↑C?
2373  014130  001002                          BNE     .+6
2374  014132  000177  165542                  JMP     @CTLLOC         ;IF YES GOTO MONITR.
2375  014136  023727  014754  000014          CMP     CHAR,#14        ;CHAR = "↑L"?
2376  014144  001002                          BNE     .+6
2377  014146  000137  015020                  JMP     LPSET           ;YES - THEN SET LINEPRINTER MODE.
2378  014152  122737  000012  014754          CMPB    #12,CHAR        ;CHAR = "↑J"?
2379  014160  001002                          BNE     .+6
2380  014162  000137  015042                  JMP     CONNTR          ;YES - THEN SET JOINED MODE.
2381  014166  122737  000004  014754          CMPB    #4,CHAR         ;CHAR = "↑D"?
2382  014174  001002                          BNE     .+6
2383  014176  000137  015166                  JMP     RDELA3          ;YES - GET SECOUNDARY DELAY.
2384  014202  123727  014754  000005          CMPB    CHAR,#5         ;CHAR = "↑E"?
2385  014210  001002                          BNE     .+6
2386  014212  000137  014770                  JMP     EXSET           ;YES - SET EXPERT MODE.
2387  014216  123727  014754  000016          CMPB    CHAR,#16        ;CHAR = "↑N"?
2388  014224  001002                          BNE     .+6
2389  014226  000137  015004                  JMP     NOSET           ;YES - SET NOVICE MODE
2390  014232  023727  014754  000072          CMP     CHAR,   #':     ;CHAR = COLON?
2391  014240  001522                          BEQ     4$              ;YES SET FOR "THROUGH" ENTRY.
2392  014242  023727  014754  000054          CMP     CHAR,   #',     ;CHAR = A COMMA?
2393  014250  001575                          BEQ     7$
2394  014252  023727  014754  000060          CMP     CHAR,#60        ;CHAR TYPED 7 ASCIZ?
2395  014260  002002                          BGE     .+6
2396  014262  000137  014724                  JMP     11$             ;NO - REPORT ERROR.
2397
2398  014266  023727  014754  000067          CMP     CHAR,#67        ;CHAR TYPED <ASCIZ 7?
2399  014274  003402                          BLE     .+6
2400  014276  000137  014724                  JMP     11$             ;NO - REPORT ERROR.
2401  014302  005237  013042                  INC     RTEMP           ;YES - INCREMENT CHAR. COUNT.
2402  014306  006137  014756                  ROL     NIN             ;LEFT JUSTIFY CURRENT NUMBER.
2403  014312  006137  014756                  ROL     NIN
2404  014316  006137  014756                  ROL     NIN
```

```
2405  014322  005237  014762                    INC     CHARC           ;INCREMENT CHAR COUNT.
2406  014326  042737  000007  014756            BIC     #7,     NIN     ;STRIP LOWER NUMBER.
2407  014334  042737  000260  014754            BIC     #260,   CHAR    ;STRIP CHAR. INPUTED.
2408  014342  053737  014754  014756            BIS     CHAR,   NIN     ;ADD TO CURRENT NUMBER.
2409  014350  000633                            BR      2$              ;LOOP.
2410  014352  005737  001630          3$:       TST     INCFLG          ;COME HERE ON <CR>;COLON FLAG SET?
2411  014356  001066                            BNE     5$              ;YES TAKE CARE OF IT.
2412  014360  023737  014764  014766            CMP     NINC,   NINC1   ;DID WE ASSEMBLE MORE NUMBERS THAN ALLOWED?
2413  014366  003146                            BGT     8$              ;IF SO - REPORT ERROR.
2414  014370  005737  013042                    TST     RTEMP           ;ANY CHAR. TYPED?
2415  014374  001005                            BNE     9$              ;YES - FUDGE RETURN.
2416  014376  012737  000017  014764            MOV     #15.,   NINC
2417  014404  005037  014754                    CLR     CHAR
2418  014410  013720  014756          9$:       MOV     NIN,    (0)+    ;STORE NUMBER.
2419  014414  013737  014766  013042            MOV     NINC1,RTEMP     ;FIX NUMBER INPUTED COUNT.
2420  014422  163737  014764  014766            SUB     NINC,   NINC1   ;FIX EXACT COUNT.
2421  014430  005337  014766                    DEC     NINC1           ;= COUNT -1
2422  014434  012700  013252                    MOV     #OUTS,R0        ;SET TO READ BACK NUMBERS.
2423  014440  012021                  21$:      MOV     (0)+,(1)+       ;STORE IN CORRECT AREA.
2424  014442  005337  014764                    DEC     NINC            ;DONE ALL NUMBERS?
2425  014446  001002                            BNE     22$             ;NO - SKIP NEXT INSTR.
2426  014450  010176  000000                    MOV     R1,@(6)         ;FIX CALL ON ADDR. OF NUMBERS TO INPUT.
2427  014454  005337  013042          22$:      DEC     RTEMP           ;DONE ALL NUMBERS.
2428  014460  001367                            BNE     21$             ;NO - LOOP.
2429  014462  062716  000002                    ADD     #2,     (6)     ;YES - UPDATE SP.
2430  014466  013776  014766  000000            MOV     NINC1,@(6)      ;STORE ON CALL # OF NUMBERS TO INPUT.
2431  014474  062716  000002                    ADD     #2,(6)          ;FIX SP.
2432  014500  104400  001163                    TYPE,   $CRLF
2433  014504  000002                            EXIT                    ;EXIT.
2434
2435  014506  013737  014756  014760  4$:       MOV     NIN,    NIN1    ;ENTER HERE WHEN COLON TYPED. STORE CURRENT #.
2436  014514  005737  001630                    TST     INCFLG          ;CHECK COLON FLAG.
2437  014520  001105                            BNE     12$             ;IF SET UNKNOWN INPUT (2 COLONS!)
2438  014522  012737  000001  001630            MOV     #1,INCFLG       ;SET COLON FLAG.
2439  014530  000137  014030                    JMP     1$              ;EXIT TO LOOP
2440  014534  162737  000002  014760  5$:       SUB     #2,     NIN1    ;COME HERE ON COLON FLAG SET + ANOTHER # FORMED.
2441  014542  062737  000002  014760  6$:       ADD     #2,     NIN1    ;UPDATE FORMER NUMBER.
2442  014550  023737  014764  014766            CMP     NINC,   NINC1   ;NUMBERS OVERFLOW BUFFER AREA?
2443  014556  003052                            BGT     8$              ;YES - REPORT ERROR.
2444  014560  013720  014760                    MOV     NIN1,   (0)+    ;NO - STORE NEW NUMBER.
2445  014564  005237  014764                    INC     NINC            ;UPDATE NUMBER COUNT.
2446  014570  023737  014756  014760            CMP     NIN,    NIN1    ;UPDATED NUMBER = CURRENT NUMBER?
2447  014576  001361                            BNE     6$              ;NO - LOOP.
2448  014600  005037  001630                    CLR     INCFLG          ;YES - CLEAR COLON FLAG
2449  014604  005337  014764                    DEC     NINC
2450  014610  162700  000002                    SUB     #2,R0           ;FIX POINTER (STORAGE).
2451  014614  022737  000015  014754            CMP     #15,    CHAR    ;LAST CHAR TYPED A <CR>?
2452  014622  001653                            BEQ     3$              ;YES - EXIT.
2453  014624  022737  000054  014754            CMP     #',,CHAR        ;LAST CHAR TYPED A COMMA?
2454  014632  001404                            BEQ     7$              ;YES - TAKE CARE OF IT.
2455
2456  014634  062700  000002                    ADD     #2,     R0      ;FIX STORAGE POINTER.
2457  014640  000137  014030                    JMP     1$              ;LOOP.
2458  014644  005737  001630          7$:       TST     INCFLG          ;ENTER HERE ON COMMA TYPED. WAS COLON-
2459  014650  001331                            BNE     5$              ;PREVIOUSLY TYPED? IF SO TAKE CARE OF IT.
2460  014652  023737  014764  014766            CMP     NINC,   NINC1   ;BUFFER OVERFLOW?
```

```
2461  014660  003011                        BGT     8$              ;IF YES - REPORT ERROR.
2462  014662  005737  014762                TST     CHARC           ;WHY CHAR. TYPED?
2463  014666  001422                        BEQ     12$             ;IF NO - REPORT ERROR.
2464  014670  013720  014756                MOV     NIN,    (0)+    ;OTHERWISE STORE CURRENT NUMBER.
2465  014674  005237  014764                INC     NINC            ;INCR. NUMBER COUNT.
2466  014700  000137  014030                JMP     1$              ;LOOP.
2467
2468  014704  104400              8$:       TYPE                    ;"ADDR. BUFFER OVERFLOW ERROR
2469  014706  021466                        MABOV                   ;RETYPE"
2470  014710  000137  013746                JMP     INOCTR
2471
2472  014714  104400              10$:      TYPE                    ;TYPE A "?"
2473  014716  021756                        MQMARK
2474  014720  000137  013746                JMP     INOCTR
2475
2476  014724  104400              11$:      TYPE                    ;TYPE "LAST CHAR TYPED NOT AN OCTAL DIGIT"
2477  014726  025524                        MINNN
2478  014730  000137  014040                JMP     2$
2479  014734  104400              12$:      TYPE
2480  014736  025605                        MINKN
2481  014740  000137  013746                JMP     INOCTR
2482
2483                                ;
2484                                ;RETURN FOR ↑D, ↑J,↑L,↑N, ↑E
2485                                ;
2486
2487  014744  000240              RASK:     NOP
2488  014746  162716  000004                SUB     #4,(6)
2489  014752  000002                        EXIT
2490
2491  014754  000000              CHAR:     0                       ;CHARACTER INPUTTED
2492  014756  000000              NIN:      0                       ;ASSEMBLED NUMBER
2493  014760  000000              NIN1:     0                       ;ASSEMBLED NUMBER, 1ST IF MULTIPLE
2494  014762  000000              CHARC:    0                       ;USED TO COUNT CHARS. IN NUMBER.
2495
2496  014764  000000              NINC:     0                       ;NUMBER OF ADDRESSED ASSEMBLED.
2497  014766  000000              NINC1:    0                       ;MUXIMUM NUMBER TO BE ASSEMBLED.
2498  014770  005237  001652      EXSET:    INC     EXPERT          ;ENTER HER ON "↑E".
2499  014774  104400                        TYPE                    ;SET EXPERT MODE.
2500  014776  021136                        MEXEN
2501  015000  000137  014744                JMP     RASK
2502
2503  015004  005037  001652      NOSET:    CLR     EXPERT          ;ENTER HERE ON "↑N".
2504  015010  104400                        TYPE                    ;SET NOIVE MODE
2505  015012  021166                        MNOEN
2506  015014  000137  014744                JMP     RASK
2507
2508
2509
2510  015020  005737  001656      LPSET:    TST     LPAV            ;ENTER HERE ON "↑L".
2511  015024  001404                        BEQ     1$              ;ANY LP AVAILABLE - IF NOT EXIT.
2512  015026  104400                        TYPE                    ;TYPE "MAKE LP READY"
2513  015030  021217                        MLEN
2514  015032  005237  001660                INC     LINEPR
2515  015036  000137  014744      1$:       JMP     RASK
2516
```

```
                                                ;*
                                                ;*ROUTINE TO CONNECT I/O MODULES (SOFT)
                                                ;*
015042  005137  001654          CONNTR: COM     CONNT
015046  001402                          BEQ     .+6
015050  104400                          TYPE
015052  021305                          MAC
015054  000137  014744                  JMP     RASK


                                                ;*
                                                ;*ROUTINE TO ASK FOR AND SET DELAY TIME
                                                ;* 0 DELAY OR CR BY OPERATOR - USER DEFAULT OF 3 MILLISEC.

015060  005737  001652          RDELA:  TST     EXPERT
015064  001002                          BNE     .+6
015066  104400                          TYPE                    ;ASK OPERATOR -
015070  021632                          MDEL                    ;"DELAY TIME IN MS (DEFAULT=3MS)?"
015072  005037  001570                  CLR     FREQ1
015076  013737  001564  001566          MOV     FR3,    FREQ
015104  104400                          TYPE
015106  021764                          MQ
015110  104406                          RDDEC                   ;GET NUMBER.
015112  012637  013042                  MOV     (6)+,   RTEMP
015116  001417                          BEQ     2$              ;IF ZERRO, USE DEFAULT
015120  005037  001570                  CLR     FREQ1
015124  005037  001566                  CLR     FREQ
015130  063737  001576  001566  1$:     ADD     FR1,    FREQ    ;SET FREQUECY (OR DELAY).
015136  005537  001570                  ADC     FREQ1
015142  005737  001570                  TST     FREQ1
015146  100404                          BMI     3$
015150  005337  013042                  DEC     RTEMP
015154  001365                          BNE     1$
015156  000002                  2$:     EXIT
                                        
015160  104400                  3$:     TYPE                    ;TYPE" TIME TOO LONG".
015162  021672                          MTTL
015164  000735                          BR      RDELA


                                                ;*
                                                ;*ROUTINE TO FORM SECOUNDARY DELAY
                                                ;*
015166  104400  021347          RDELA3: TYPE,   MDEL1
015172  104400                  RDELA4: TYPE
015174  021352                          MDEL2
015176  104406                          RDDEC
015200  012637  013042                  MOV     (6)+,RTEMP
015204  001415                          BEQ     2$
015206  005037  001572                  CLR     FREQ2
015212  063737  001576  001566  1$:     ADD     FR1,FREQ
015220  005537  001574                  ADC     FREQ3
015224  005737  001574                  TST     FREQ3
015230  100405                          BMI     3$
015232  005337  013042                  DEC     RTEMP
015236  001365                          BNE     1$
015240  000137  014744          2$:     JMP     RASK
```

```
2573  015244  104400                  3$:     TYPE
2574  015246  021672                          MTTL
2575  015250  000750                          BR      RDELA4
2576
2577
2578                                          ;*
2579                                          ;*ROUTINE TO SET UNI OR BIPOLAR A/D
2580                                          ;*CALL = QUBR
2581                                          ;*
2582
2583  015252  005737  001652          RQUBR:  TST     EXPERT
2584  015256  001002                          BNE     .+6
2585  015260  104400                          TYPE                    ;UNI OR BI-POLAR?
2586  015262  024276                          MQURB
2587  015264  104400                          TYPE
2588  015266  021764                          MQ
2589  015270  005037  014754                  CLR     CHAR
2590  015274  105777  163644          1$:     TSTB    @$TKS           ;WAIT FOR RESPONSE
2591  015300  100375                          BPL     1$
2592  015302  105777  163642          2$:     TSTB    @$TPS           ;ECHO.
2593  015306  100375                          BPL     2$
2594  015310  017737  163632  013042          MOV     @$TKB,RTEMP
2595  015316  013777  013042  163626          MOV     RTEMP,@$TPB
2596  015324  042737  000240  013042          BIC     #240,RTEMP
2597  015332  023727  013042  000003          CMP     RTEMP,#3        ;^C TYPED?
2598  015340  001002                          BNE     .+6
2599  015342  000137  003366                  JMP     START1
2600  015346  023727  013042  000015          CMP     RTEMP,#15       ;CR TYPED?
2601  015354  001404                          BEQ     3$
2602  015356  013737  013042  014754          MOV     RTEMP,CHAR
2603  015364  000743                          BR      1$
2604  015366  104400  001163          3$:     TYPE,   $CRLF
2605  015372  023727  014754  000125          CMP     CHAR,#'U
2606  015400  001003                          BNE     4$
2607  015402  005237  013250                  INC     BIPOL
2608  015406  000002                          EXIT
2609  015410  005037  013250          4$:     CLR     BIPOL
2610  015414  000002                          EXIT
2611
2612                                          ;*
2613                                          ;*ROUTINE TO CHECK THAT AN ADDRESS TYPED IS A LEGAL ICS-ADDR.
2614                                          ;*TYPE ERROR IF NOT - ENTER WITH ADDR IN (0)
2615                                          ;*CALL = JSR PC,CKADR
2616                                          ;*
2617
2618  015416  013737  000004  015516  CKADR:  MOV     @#4,3$          ;STORE LOCATION 4.
2619  015424  012737  015466  000004          MOV     #2$,@#4         ;SET TIME-OUT LOCATION FOR TRAP IF ANY.
2620  015432  005770  000000                  TST     @(0)            ;TEST MOD. ADDR. TYPED.
2621  015436  000240                          NOP
2622                                          ;**
2623                                          ;** MODULE ADDRESS DOES EXIST BUT MAY NOT BE ASSOCIATED WITH THIS
2624                                          ;** FILE BOX. THEREFORE, CHECK ADDRESS FOR WITHIN FILE BOX LIMITS
2625                                          ;**
2626
2627  015440  013737  015516  000004          MOV     3$,@#4          ;RESTORE TIME OUT VECTOR
2628  015446  023710  001702                  CMP     ICSLMT,(R0)
```

```
2629  015452  003022                          BGT     4$
2630  015454  023710  001676                  CMP     ICSHGH,(R0)
2631  015460  003417                          BLE     4$
2632  015462  005720                  1$:     TST     (0)+
2633  015464  000207                          RTS     PC              ;EXIT - SUBROUTINE.
2634  015466  104400  022115          2$:     TYPE,   MNRFN           ;TYPE ERROR MESSAGE.
2635  015472                                  TYPOCT  (0)             ;TYPE ADDR.
2636  015472  011046                          MOV     (0),-(SP)       ;;SAVE (0) FOR TYPEOUT
2637  015474  104401                          TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
2638  015476  062706  000006                  ADD     #6,R6
2639  015502  162716  000002                  SUB     #2,(6)          ;FIX RETURN ADDRESS ON STACK
2640  015506  013737  015516  000004          MOV     3$,@#4          ;RESTORE VECTOR ADDRESS
2641  015514  000002                          EXIT                    ;SO THAT WE RETURN AND REASK
2642                                                                  ;QUESTION ON MODULE ADDR.
2643  015516  000000                  3$:     .WORD   0               ;TEMP STORAGE OF LOC. 4.
2644
2645
2646  015520  104400  026361          4$:     TYPE, NRANG1            ;NOT WITHIN FILE
2647  015524                                  TYPOCT  (0)
2648  015524  011046                          MOV     (0),-(SP)       ;;SAVE (0) FOR TYPEOUT
2649  015526  104401                          TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
2650  015530  104400  026374                  TYPE, NRANG2
2651  015534  005726                          TST     (R6)+           ;POP STACK PAST JSR RETURN
2652  015536  162716  000002                  SUB     #2,(R6)         ;BACK POINTER TO RE-ASK QUESTION
2653  015542  000002                          EXIT                    ;RETURN
2654
2655
2656                                          ;*
2657                                          ;*ROUTINE USED OFR GENERATION A DELAY
2658                                          ;*CALL=DELAT
2659                                          ;*
2660
2661  015544  013737  001566  013042  RDELAY: MOV     FREQ,   RTEMP   ;GET DELAY TIME
2662  015552  001411                          BEQ     2$
2663  015554  013737  001570  015600          MOV     FREQ1,  RTEMP2
2664  015562  005337  013042          1$:     DEC     RTEMP           ;DELAY
2665  015566  001375                          BNE     1$
2666  015570  005337  015600                  DEC     RTEMP2
2667  015574  100372                          BPL     1$
2668  015576  000002                  2$:     EXIT                    ;RETURN
2669  015600  000000                  RTEMP2: 0
2670
2671                                          ;*
2672                                          ;*ROUTINE TO GENERATE SECOUNDARY DELAY
2673                                          ;*CALL =DELAY2
2674                                          ;*
2675  015602  013737  001572  013042  RDELA2: MOV     FREQ2,RTEMP
2676  015610  001413                          BEQ     2$
2677  015612  013737  001574  015600          MOV     FREQ3,RTEMP2
2678  015620  005037  177776                  CLR     PS
2679  015624  005337  013042          1$:     DEC     RTEMP
2680  015630  001375                          BNE     1$
2681  015632  005337  015600                  DEC     RTEMP2
2682  015636  100372                          BPL     1$
2683  015640  000002                  2$:     EXIT
2684
```

```
                                        ;*
                                        ;*
                                        ;* SYSTEM INITIALIZE ROUTINE
                                        ;*
015642                          RINIT:
015642  013700  001104                  MOV     $ICNT,R0
015646  000005                          RESET
015650  032777  000001  163262          BIT     #1,@SWR
015656  001402                          BEQ     1$
015660  000137  003366                  JMP     START1

015664  052777  000100  163252  1$:     BIS     #100,   @$TKS
015672  000002                          EXIT


                                        ;*
                                        ;*ROUTINE USED TO MODIFY PATTERN SENT TO OUTPUT MODULE
                                        ;*FIRST LOCATION MAY BE CHANGED BY RPATA (PATTERN MODIFIER INPUT ROUTINE)
                                        ;*CALL=CPATR
                                        ;*

015674  023727  001602  000012  RCPAT:  CMP     PATRNM,#12
015702  001442                          BEQ     RCPATR
015704  000241                          CLC                     ;CLEAR C BIT
015706  005237  001604          RCPATI: INC     @#PATRN         ;MODIFY PATTERN
015712  103412                          BCS     1$
015714  022737  005137  015706          CMP     #5137,RCPATI    ;DOING A COMPLEMENT PATERN?
015722  001406                          BEQ     1$              ;IF SO DON'T ADD CARRY IF ANY!
015724  063737  001606  001604          ADD     PATRNC,PATRN
015732  005037  001606                  CLR     PATRNC
015736  000002                          EXIT
015740  023727  015706  006037  1$:     CMP     RCPATI,#6037
015746  001004                          BNE     2$
015750  012737  100000  001606          MOV     #100000,PATRNC
015756  000002                          EXIT
015760  012737  000001  001606  2$:     MOV     #1,PATRNC
015766  000002                          EXIT
                                        ;*MODIFIER LIST
015770  005237                  RCPATL: 5237                    ;*INCREMENTING PATTERN          0
015772  005337                          5337                    ;*DECREMENTING PATTERN          1
015774  005737                          5737                    ;*NO CHANGE OF PATTERN          2
015776  006137                          6137                    ;*ROTATE LEFT PATTERN           3
016000  006037                          6037                    ;*ROTATE RIGHT PATTERN          4
016002  006237                          6237                    ;*RANDOM NUMBER GENERATOR        5
016004  006337                          6337                    ;*ARITH. SHIFT LEFT PATTERN     6
016006  005137                          5137                    ;*COMPLEMENT PATTERN            7


                                        ;*
                                        ;*ALTERNATE CHANGE PATTERN ROUTINE IF RANDOME
                                        ;*NUMBER FOR PATTERN IS SELECTED.
                                        ;*
016010                          RCPATR:
```

```
2741  016010  004737  016244                  JSR     PC,$RAND        ;GENERATE A RANDOM NUMBER.
2742  016014  013737  016344  001604          MOV     $LONUM,PATRN    ;PUT NUMBER IN PATTERN.
2743  016022  000002                          EXIT
2744
2745
2746                                          ;*
2747                                          ;*PATTERN INPUTTER AND MODIFIER ROUTINE
2748                                          ;*FORM PATTERN MODIFIER, PATTERN.
2749                                          ;*CALL=PATAR
2750                                          ;*
2751  016024  005737  001652          RPATA:  TST     EXPERT
2752  016030  001002                          BNE     .+6
2753  016032  104400                          TYPE                    ;ASK OPERATOR-"PATTERN MODIFIER AND
2754
2755  016034  021714                          MPPM                    ;PATTERN?"
2756  016036  012737  001602  016070          MOV     #PATRNM, 1$     ;SET TO INPUT PATTERN + MODIFIER
2757  016044  012737  000002  016072          MOV     #2,     1$+2
2758  016052  005037  001602                  CLR     PATRNM          ;SET DEFAULTS: 0 PATTERN
2759  016056  005037  001604                  CLR     PATRN           ;PATTERN MOD. = INC.
2760  016062  000401                          BR      .+4
2761  016064  000757                          BR      RPATA
2762  016066  104411                          INOCT                   ;GET THEM.
2763  016070  001602                  1$:     PATRNM
2764  016072  000002                          2
2765  016074  012737  015770  013042          MOV     #RCPATL,RTEMP   ;POINT TO BEGINNING OF MODIFIER LIST.
2766  016102  032737  177770  001602          BIT     #177770,PATRNM  ;LEGAL PATTERN MODIFIER?
2767  016110  001403                          BEQ     2$              ;IF YES 2$
2768  016112  104400  025326                  TYPE,   MIVP            ;NO TYPE ERROR MESSAGE.
2769  016116  000742                          BR      RPATA           ;REASK QUESTION.
2770  016120                          2$:
2771  016120  006337  001602                  ASL     PATRNM
2772  016124  042737  177761  001602          BIC     #177761, PATRNM ;FIX ADDITIVE.
2773  016132  063737  001602  013042          ADD     PATRNM, RTEMP   ;POINT TO MODIFIER.
2774  016140  017737  174676  015706          MOV     @RTEMP, RCPAT+12        ;CHANGE PATTERN MODIFIER ROUTINE.
2775  016146  000002                          EXIT                    ;RETURN.
2776  016150                                  .$SAVE
2777                                  .SBTTL  SAVE AND RESTORE R0-R5 ROUTINES
2778
2779  016150                          STARS
2780                                  ;;**********************************************************************
2781                                  ;*SAVE R0-R5
2782                                  ;*CALL:
2783                                  ;*      SAVREG
2784                                  ;*UPON RETURN FROM $SAVREG THE STACK WILL LOOK LIKE:
2785                                  ;*
2786                                  ;*TOP---(+16)
2787                                  ;* +2---(+18)
2788                                  ;* +4---R5
2789                                  ;* +6---R4
2790                                  ;* +8---R3
2791                                  ;*+10---R2
2792                                  ;*+12---R1
2793                                  ;*+14---R0
2794
2795  016150                          $SAVREG:
2796  016150                                  PUSH    <R0,R1,R2,R3,R4,R5>
```

```
016150  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
016152  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
016154  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
016156  010346                          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
016160  010446                          MOV     R4,-(SP)        ;;PUSH R4 ON STACK
016162  010546                          MOV     R5,-(SP)        ;;PUSH R5 ON STACK
016164  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PS OF MAIN FLOW
016170  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PC OF MAIN FLOW
016174  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PS OF CALL
016200  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PC OF CALL
016204  000002                          RTI
                                ;*RESTORE R0-R5
                                ;*CALL:
                                ;*      RESREG
016206                          $RESREG:
016206  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PC OF CALL
016212  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PS OF CALL
016216  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PC OF MAIN FLOW
016222  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PS OF MAIN FLOW
016226                                  POP     <R5,R4,R3,R2,R1,R0>
016226  012605                          MOV     (SP)+,R5        ;;POP STACK INTO R5
016230  012604                          MOV     (SP)+,R4        ;;POP STACK INTO R4
016232  012603                          MOV     (SP)+,R3        ;;POP STACK INTO R3
016234  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
016236  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
016240  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
016242  000002                          RTI
016244                                  .$RAND
                                .SBTTL  RANDOM NUMBER GENERATOR ROUTINE

016244                          STARS
                                ;;*****************************************************************
                                ;*THIS ROUTINE IS A DOUBLE PRECISION PSEUDO RANDOM NUMBER GENERATOR
                                ;*WITH A RANGE OF 0 TO 2(+33)-1.
                                ;*CALL:
                                ;*      JSR     PC,$RAND        ;;CALL THE ROUTINE
                                ;*      RETURN                  ;;RETURN HERE THE RANDOM
                                ;*                              ;;NUMBER WILL BE IN
                                ;*                              ;;$HINUM,$LONUM

016244                          $RAND:  PUSH    <R0,R1,R2>
016244  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
016246  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
016250  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
016252  013700  016344                  MOV     $LONUM,R0       ;;SET R0 WITH LOW
016256  013701  016342                  MOV     $HINUM,R1       ;;SET R1 WITH HIGH
016262  012702  177771                  MOV     #-7,R2          ;;SET SHIFT COUNT
016266  006300                  1$:     ASL     R0              ;;SHIFT R0 LEFT AND
016270  006101                          ROL     R1              ;;ROTATE CARRY INTO R1 AND
016272  005202                          INC     R2              ;;CHECK FOR DONE
016274  001374                          BNE     1$              ;;CONTINUE SHIFT LOOP
016276  063700  016344                  ADD     $LONUM,R0       ;;ADD NUMBER TO MAKE X 129
016302  005501                          ADC     R1              ;;PROPOGATE CARRY
016304  063701  016342                  ADD     $HINUM,R1       ;;ADD NUMBER TO MAKE X 129
016310  062700  001057                  ADD     #1057,R0        ;;ADD LOW CONSTANT
```

```
 2853  016314  005501                          ADC     R1              ;;PROPOGATE CARRY
 2854  016316  062701  047401                  ADD     #47401,R1       ;;ADD HIGH CONSTANT
 2855  016322  010037  016344                  MOV     R0,$LONUM       ;;SAVE R0
 2856  016326  010137  016342                  MOV     R1,$HINUM       ;;SAVE R1
 2857  016332                                  POP      R2,R1,R0>
 2858  016332  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
 2859  016334  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
 2860  016336  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
 2861  016340  000207                          RTS     PC              ;;RETURN
 2862  016342  176543                $HINUM:   .WORD   176543
 2863  016344  123456                $LONUM:   .WORD   123456
 2864  016346                                  .$B2D
 2865                                  .SBTTL  SINGLE LENGTH BINARY TO DECIMAL ASCIZ ROUTINE
 2866
 2867  016346                                  STARS
 2868                                  ;;**********************************************************************
 2869                                  ;*THIS ROUTINE WILL CONVERT A 16-BIT UNSIGNED BINARY NUMBER TO AN
 2870                                  ;*UNSIGNED DECIMAL ASCIZ NUMBER.
 2871                                  ;*CALL
 2872                                  ;*      MOV     NUMBER,-(SP)    ;;PUT BINARY NUMBER ON THE STACK
 2873                                  ;*      JSR     PC,@#$B2D       ;;CALL
 2874                                  ;*      RETURN                  ;;ADDRESS OF THE 1ST ASCIZ CHAR.IS ON THE STACK
 2875
 2876
 2877  016346  016637  000002  016376  $B2D:   MOV     2(SP),1$        ;;SAVE BINARY NUMBER
 2878  016354  012746  016376                  MOV     #1$,-(SP)       ;;SET POINTER
 2879  016360  004737  016402                  JSR     PC,@#$DB2D      ;;CALL DOUBLE LENGTH CONVERT
 2880  016364  062716  000005                  ADD     #5,(SP)         ;;ONLY ALLOW FIVE CHARACTERS
 2881  016370  012666  000002                  MOV     (SP)+,2(SP)     ;;PICKUP POINTER
 2882  016374  000207                          RTS     PC              ;;RETURN
 2883  016376  000000  000000          1$:     .WORD   0,0
 2884  016402                                  .$DB2D
 2885                                  .SBTTL  DOUBLE LENGTH BINARY TO DECIMAL ASCII CONVERT ROUTINE
 2886
 2887  016402                                  STARS
 2888                                  ;;**********************************************************************
 2889                                  ;*THIS ROUTINE WILL CONVERT A 32-BIT BINARY NUMBER TO AN UNSIGNED
 2890                                  ;*DECIMAL (ASCII) NUMBER. THE SIGN OF THE BINARY NUMBER MUST BE
 2891                                  ;*POSITIVE.
 2892                                  ;*CALL
 2893                                  ;*      MOV     #PNTR,-(SP)     ;;POINTER TO LOW WORD OF BINARY NUMBER
 2894                                  ;*      JSR     PC,@#$DB2D
 2895                                  ;*      RETURN                  ;;THE FIRST ADDRESS OF ASCIZ
 2896                                                                  ;;IS ON THE STACK
 2897
 2898
 2899  016402  104407                  $DB2D:  SAVREG                  ;;SAVE REGISTERS
 2900  016404  016602  000002                  MOV     2(SP),R2        ;;PICKUP THE DATA POINTER
 2901  016410  012700  016562                  MOV     #$DECVL,R0      ;;GET ADDRESS OF "$DECVL" STRING
 2902  016414  010066  000002                  MOV     R0,2(SP)        ;;PUT ADDRESS OF ASCIZ STRING ON STACK
 2903  016420  012201                          MOV     (R2)+,R1        ;;PICKUP THE BINARY NUMBER
 2904  016422  012202                          MOV     (R2)+,R2
 2905  016424  012737  000012  016500          MOV     #10.,4$         ;;SET UP TO DO 10 CONVERSIONS
 2906  016432  012704  016512                  MOV     #$TNPWR,R4      ;;ADDRESS OF TEN POWER
 2907  016436  012705  016514                  MOV     #$TNPWR+2,R5
 2908  016442  005003                  1$:     CLR     R3              ;;CLEAR PARTIAL
```

```
2909  016444  161401                  2$:     SUB     (R4),R1         ;;SUBTRACT TEN POWER
2910  016446  005602                          SBC     R2
2911  016450  161502                          SUB     (R5),R2
2912  016452  002402                          BLT     3$              ;;BR IF TEN POWER TO LARGE . .
2913  016454  005203                          INC     R3              ;;ADD 1 TO PARTIAL
2914  016456  000772                          BR      2$              ;;LOOP
2915  016460  062401                  3$:     ADD     (R4)+,R1        ;;RESTORE SUBTRACTED VALUE
2916  016462  005502                          ADC     R2
2917  016464  062402                          ADD     (R4)+,R2
2918  016466  022525                          CMP     (R5)+,(R5)+     ;;MOVE TO NEXT TEN POWER
2919  016470  052703  000060                 BIS     #'0,R3          ;;CHANGE PARTIAL TO ASCII
2920  016474  110320                          MOVB    R3,(R0)+        ;;SAVE IT
2921  016476  005327                          DEC     (PC)+           ;;DONE?
2922  016500  000000                  4$:     .WORD   0
2923  016502  001357                          BNE     1$              ;;BR IF NO
2924  016504  105020                          CLRB    (R0)+           ;;TERMINATOR
2925  016506  104410                          RESREG                  ;;RESTORE REGISTERS
2926  016510  000207                          RTS     PC              ;;RETURN
2927  016512  145000                  $TNPWR: 145000                  ;;1.0E09
2928  016514  035632                          35632
2929  016516  160400                          160400                  ;;1.0E08
2930  016520  002765                          2765
2931  016522  113200                          113200                  ;;1.0E07
2932  016524  000230                          230
2933  016526  041100                          041100                  ;;1.0E06
2934  016530  000017                          17
2935  016532  103240                          103240                  ;;1.0E05
2936  016534  000001                          1
2937  016536  023420                          23420                   ;;1.0E04
2938  016540  000000                          0
2939  016542  001750                          1750                    ;;1.0E03
2940  016544  000000                          0
2941  016546  000144                          144                     ;;1.0E02
2942  016550  000000                          0
2943  016552  000012                          12                      ;;1.0E01
2944  016554  000000                          0
2945  016556  000001                          1                       ;;1.0E00
2946  016560  000000                          0
2947  016562  000014          $DECVL: .BLKB   12.                     ;;RESERVE STORAGE FOR ASCIZ STRING
2948
2949
2950
2951
2952
2953  016576                          .SERROR $ERRTYP
2954                          .SBTTL  ERROR HANDLER ROUTINE
2955
2956  016576                  STARS
2957                          ;;*****************************************************************
2958                          ;*THIS ROUTINE WILL INCREMENT THE ERROR FLAG AND THE ERROR COUNT,
2959                          ;*SAVE THE ERROR ITEM NUMBER AND THE ADDRESS OF THE ERROR CALL
2960                          ;*AND GO TO $ERRTYP ON ERROR
2961                          ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
2962                          ;*SW15=1         HALT ON ERROR
2963                          ;*SW13=1         INHIBIT ERROR TYPEOUTS
2964                          ;*CALL
```

```
                                        ;*      ERROR   N       ;;ERROR=EMT AND N=ERROR ITEM NUMBER
                                        $ERROR:
016576                                  7$:     INCB    $ERFLG          ;;SET THE ERROR FLAG
016576  105237  001103                        BEQ     7$              ;;DON'T LET THE FLAG GO TO ZERO
016602  001775                                MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER AND ERROR FLAG
016604  013777  001102  162330                INC     $ERTTL          ;;INC THE ERROR COUNT
016612  005237  001112                        MOV     (SP),$ERRPC     ;;GET ADDRESS OF ERROR INSTRUCTION
016616  011637  001116                        SUB     #2,$ERRPC
016622  162737  000002  001116                MOVB    @$ERRPC,$ITEMB  ;;STRIP AND SAVE THE ERROR ITEM CODE
016630  117737  162262  001114                BIT     #BIT13,@SWR     ;;SKIP TYPEOUT IF SET
016636  032777  020000  162274                BNE     20$             ;;SKIP TYPEOUTS
016644  001004                                JSR     PC,$ERRTYP      ;;GO TO USER ERROR ROUTINE
016646  004737  016670                        TYPE    ,$CRLF
016652  104400  001163                        20$:
016656                                  2$:     TST     @SWR            ;;HALT ON ERROR
016656  005777  162256                        BPL     3$              ;;SKIP IF CONTINUE
016662  100001                                HALT                    ;;HALT ON ERROR!
016664  000000                          3$:
016666                                  .SBTTL  ERROR MESSAGE TYPEOUT ROUTINE
016666  000002                                  RTI                     ;;RETURN
016670                                          .$ERRTYP
                                        STARS
                                        ;;**********************************************************************
                                        ;*THIS ROUTINE USES THE "ITEM CONTROL BYTE" ($ITEMB) TO DETERMINE WHICH
                                        ;*ERROR IS TO BE REPORTED. IT THEN OBTAINS, FROM THE "ERROR TABLE" ($ERRTB),
                                        ;*AND REPORTS THE APPROPRIATE INFORMATION CONCERNING THE ERROR.

016670                                  $ERRTYP:
016670  104400  001163                        TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
016674  010046                                MOV     R0,-(SP)        ;;SAVE R0
016676  005000                                CLR     R0              ;;PICKUP THE ITEM INDEX
016700  153700  001114                        BISB    @#$ITEMB,R0
016704  001004                                BNE     1$              ;;IF ITEM NUMBER IS ZERO, JUST
                                                                        ;;TYPE THE PC OF THE ERROR
016706                                          TYPOCT  $ERRPC,<ERROR ADDRESS>
016706  013746  001116                        MOV     $ERRPC,-(SP)    ;;SAVE $ERRPC FOR TYPEOUT
                                                                        ;;ERROR ADDRESS
016712  104401                                TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
016714  000426                                BR      6$              ;;GET OUT
016716  005300                          1$:     DEC     R0              ;;ADJUST THE INDEX SO THAT IT WILL
016720  006300                                  ASL     R0              ;;      WORK FOR THE ERROR TABLE
016722  006300                                  ASL     R0
016724  006300                                  ASL     R0
016726  062700  001166                        ADD     #$ERRTB,R0      ;;FORM TABLE POINTER
016732  012037  016742                        MOV     (R0)+,2$        ;;PICKUP "ERROR MESSAGE" POINTER
016736  001404                                BEQ     3$              ;;SKIP TYPEOUT IF NO POINTER
016740  104400                                TYPE                    ;;TYPE THE "ERROR MESSAGE"
016742  000000                          2$:     .WORD   0               ;;"ERROR MESSAGE" POINTER GOES HERE
016744  104400  001163                        TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
016750  012037  016760                  3$:     MOV     (R0)+,4$        ;;PICKUP "DATA HEADER" POINTER
016754  001404                                BEQ     5$              ;;SKIP TYPEOUT IF 0
016756  104400                                TYPE                    ;;TYPE THE "DATA HEADER"
016760  000000                          4$:     .WORD   0               ;;"DATA HEADER" POINTER GOES HERE
016762  104400  001163                        TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
```

```
3021  016766  011000                  5$:     MOV     (R0),R0         ;;PICKUP "DATA TABLE" POINTER
3022  016770  001004                          BNE     7$              ;;GO TYPE THE DATA
3023  016772  012600                  6$:     MOV     (SP)+,R0        ;;RESTORE R0
3024  016774  104400  001163                  TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
3025  017000  000207                          RTS     PC              ;;RETURN
3026  017002                          7$:     TYPOCT  @(R0)+          ;;TYPE AN OCTAL NUMBER
3027  017002  013046                          MOV     @(R0)+,-(SP)    ;;SAVE @(R0)+ FOR TYPEOUT
3028  017004  104401                          TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
3029  017006  005710                          TST     (R0)            ;;IS THERE ANOTHER NUMBER?
3030  017010  001770                          BEQ     6$              ;;BR IF NO
3031  017012  104400  017020                  TYPE    ,8$             ;;TYPE TWO(2) SPACES
3032  017016  000771                          BR      7$              ;;LOOP
3033  017020  020040  000             8$:     .ASCIZ  /  /            ;;TWO(2) SPACES
3034          017024                          .EVEN
3035  017024                                  .$TYPOCT
3036                                  .SBTTL  BINARY TO OCTAL (ASCII) AND TYPE
3037
3038  017024                          STARS
3039                                  ;;**********************************************************************
3040                                  ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 6-DIGIT
3041                                  ;*OCTAL (ASCII) NUMBER AND TYPE IT.
3042                                  ;*$TYPOS---ENTER HERE TO SETUP SUPPRESS ZEROS AND NUMBER OF DIGITS TO TYPE
3043                                  ;*CALL:
3044                                  ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
3045                                  ;*      TYPOS                   ;;CALL FOR TYPEOUT
3046                                  ;*      .BYTE   N               ;;N=1 TO 6 FOR NUMBER OF DIGITS TO TYPE
3047                                  ;*      .BYTE   M               ;;M=1 OR 0
3048                                  ;*                                      ;;1=TYPE LEADING ZEROS
3049                                  ;*                                      ;;0=SUPPRESS LEADING ZEROS
3050                                  ;*
3051                                  ;*$TYPON----ENTER HERE TO TYPE OUT WITH THE SAME PARAMETERS AS THE LAST
3052                                  ;*$TYPOS OR $TYPOC
3053                                  ;*CALL:
3054                                  ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
3055                                  ;*      TYPON                   ;;CALL FOR TYPEOUT
3056                                  ;*
3057                                  ;*$TYPOC---ENTER HERE FOR TYPEOUT OF A 16 BIT NUMBER
3058                                  ;*CALL:
3059                                  ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
3060                                  ;*      TYPOC                   ;;CALL FOR TYPEOUT
3061
3062  017024  017646  000000          $TYPOS: MOV     @(SP),-(SP)     ;;PICKUP THE MODE
3063  017030  116637  000001  017247          MOVB    1(SP),$OFILL    ;;LOAD ZERO FILL SWITCH
3064  017036  112637  017251                  MOVB    (SP)+,$OMODE+1  ;;NUMBER OF DIGITS TO TYPE
3065  017042  062716  000002                  ADD     #2,(SP)         ;;ADJUST RETURN ADDRESS
3066  017046  000406                          BR      $TYPON
3067  017050  112737  000001  017247  $TYPOC: MOVB    #1,$OFILL       ;;SET THE ZERO FILL SWITCH
3068  017056  112737  000006  017251          MOVB    #6,$OMODE+1     ;;SET FOR SIX(6) DIGITS
3069  017064  112737  000005  017246  $TYPON: MOVB    #5,$OCNT        ;;SET THE ITERATION COUNT
3070  017072  010346                          MOV     R3,-(SP)        ;;SAVE R3
3071  017074  010446                          MOV     R4,-(SP)        ;;SAVE R4
3072  017076  010546                          MOV     R5,-(SP)        ;;SAVE R5
3073  017100  113704  017251                  MOVB    $OMODE+1,R4     ;;GET THE NUMBER OF DIGITS TO TYPE
3074  017104  005404                          NEG     R4
3075  017106  062704  000006                  ADD     #6,R4           ;;SUBTRACT IT FOR MAX. ALLOWED
3076  017112  110437  017250                  MOVB    R4,$OMODE       ;;SAVE IT FOR USE
```

```
3077  017116  113704  017247              MOVB    $OFILL,R4       ;;GET THE ZERO FILL SWITCH
3078  017122  016605  000012              MOV     12(SP),R5       ;;PICKUP THE INPUT NUMBER
3079  017126  005003                      CLR     R3              ;;CLEAR THE OUTPUT WORD
3080  017130  006105              1$:     ROL     R5              ;;ROTATE MSB INTO "C"
3081  017132  000404                      BR      3$              ;;GO DO MSB
3082  017134  006105              2$:     ROL     R5              ;;FORM THIS DIGIT
3083  017136  006105                      ROL     R5
3084  017140  006105                      ROL     R5
3085  017142  010503                      MOV     R5,R3
3086  017144  006103              3$:     ROL     R3              ;;GET LSB OF THIS DIGIT
3087  017146  105337  017250              DECB    $OMODE          ;;TYPE THIS DIGIT?
3088  017152  100016                      BPL     7$              ;;BR IF NO
3089  017154  042703  177770              BIC     #177770,R3      ;;GET RID OF JUNK
3090  017160  001002                      BNE     4$              ;;TEST FOR 0
3091  017162  005704                      TST     R4              ;;SUPPRESS THIS 0?
3092  017164  001403                      BEQ     5$              ;;BR IF YES
3093  017166  005204              4$:     INC     R4              ;;DON'T SUPPRESS ANYMORE 0'S
3094  017170  052703  000060              BIS     #'0,R3          ;;MAKE THIS DIGIT ASCII
3095  017174  052703  000040      5$:     BIS     #' ,R3          ;;MAKE ASCII IF NOT ALREADY
3096  017200  110337  017244              MOVB    R3,8$           ;;SAVE FOR TYPING
3097  017204  104400  017244              TYPE    ,8$             ;;GO TYPE THIS DIGIT
3098  017210  105337  017246      7$:     DECB    $OCNT           ;;COUNT BY 1
3099  017214  003347                      BGT     2$              ;;BR IF MORE TO DO
3100  017216  002402                      BLT     6$              ;;BR IF DONE
3101  017220  005204                      INC     R4              ;;INSURE LAST DIGIT ISN'T A BLANK
3102  017222  000744                      BR      2$              ;;GO DO THE LAST DIGIT
3103  017224  012605              6$:     MOV     (SP)+,R5        ;;RESTORE R5
3104  017226  012604                      MOV     (SP)+,R4        ;;RESTORE R4
3105  017230  012603                      MOV     (SP)+,R3        ;;RESTORE R3
3106  017232  016666  000002  000004      MOV     2(SP),4(SP)     ;;SET THE STACK FOR RETURNING
3107  017240  012616                      MOV     (SP)+,(SP)
3108  017242  000002                      RTI                     ;;RETURN
3109  017244     000              8$:     .BYTE   0               ;;STORAGE FOR ASCII DIGIT
3110  017245     000                      .BYTE   0               ;;TERMINATOR FOR TYPE ROUTINE
3111  017246     000              $OCNT:  .BYTE   0               ;;OCTAL DIGIT COUNTER
3112  017247     000              $OFILL: .BYTE   0               ;;ZERO FILL SWITCH
3113  017250  000000              $OMODE: .WORD   0               ;;NUMBER OF DIGITS TO TYPE
3114  017252                              .$POWER  ,PWRMSG,START
3115                                      .SBTTL  POWER DOWN AND UP ROUTINES
3116
3117  017252                              STARS.
3118                                      ;;*****************************************************************
3119                                      ;POWER DOWN ROUTINE
3120  017252  012737  017416  000024  $PWRDN: MOV     #$ILLUP,@#PWRVEC ;;SET FOR FAST UP
3121  017260  012737  000340  000026          MOV     #340,@#PWRVEC+2 ;;PRIO:7
3122  017266                                  PUSH    <R0,R1,R2,R3,R4,R5>
3123  017266  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
3124  017270  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
3125  017272  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
3126  017274  010346                          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
3127  017276  010446                          MOV     R4,-(SP)        ;;PUSH R4 ON STACK
3128  017300  010546                          MOV     R5,-(SP)        ;;PUSH R5 ON STACK
3129  017302                                  PUSH    @SWR
3130  017302  017746  161632                  MOV     @SWR,-(SP)      ;;PUSH @SWR ON STACK
3131  017306  010637  017422                  MOV     SP,$SAVR6       ;;SAVE SP
3132  017312  012737  017324  000024          MOV     #$PWRUP,@#PWRVEC ;;SET UP VECTOR
```

```
3133  017320  000000                          HALT
3134  017322  000776                          BR      .-2             ;;HANG UP
3135
3136  017324                        STARS
3137                                ;;*****************************************************************
3138                                ;POWER UP ROUTINE
3139  017324  012737  017416  000024 $PWRUP: MOV     #$ILLUP,@#PWRVEC ;;SET FOR FAST DOWN
3140  017332  013706  017422                  MOV     $SAVR6,SP       ;;GET SP
3141  017336  005037  017422                  CLR     $SAVR6          ;;WAIT LOOP FOR THE TTY
3142  017342  005237  017422          1$:     INC     $SAVR6          ;;WAIT FOR THE INC
3143  017346  001375                          BNE     1$              ;;OF  WORD
3144  017350                                  POP     @SWR
3145  017350  012677  161564                  MOV     (SP)+,@SWR      ;;POP STACK INTO @SWR
3146  017354                                  POP     <R5,R4,R3,R2,R1,R0>
3147  017354  012605                          MOV     (SP)+,R5        ;;POP STACK INTO R5
3148  017356  012604                          MOV     (SP)+,R4        ;;POP STACK INTO R4
3149  017360  012603                          MOV     (SP)+,R3        ;;POP STACK INTO R3
3150  017362  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
3151  017364  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
3152  017366  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
3153  017370  012737  017252  000024          MOV     #$PWRDN,@#PWRVEC ;;SET UP THE POWER DOWN VECTOR
3154  017376  012737  000340  000026          MOV     #340,@#PWRVEC+2 ;;PRIO:7
3155  017404  104400                          TYPE                    ;;REPORT THE POWER FAILURE
3156  017406  024574                $PWRMG: .WORD   PWRMSG           ;;POWER FAIL MESSAGE POINTER
3157  017410  012716                          MOV     (PC)+,(SP)      ;;RESTART AT START
3158  017412  001704                $PWRAD: .WORD   START            ;;RESTART ADDRESS
3159  017414  000002                          RTI
3160  017416  000000                $ILLUP: HALT                    ;;THE POWER UP SEQUENCE WAS STARTED
3161  017420  000776                          BR      .-2             ;; BEFORE THE POWER DOWN WAS COMPLETE
3162  017422  000000                $SAVR6: 0                       ;;PUT THE SP HERE
3163
3164  017424                                  .$SCOPE
3165                                .SBTTL  SCOPE HANDLER ROUTINE
3166
3167  017424                        STARS
3168                                ;;*****************************************************************
3169                                ;*THIS ROUTINE CONTROLS THE LOOPING OF SUBTESTS. IT WILL INCREMENT
3170                                ;*AND LOAD THE TEST NUMBER($TSTNM) INTO THE DISPLAY REG.(DISPLAY<7:0>)
3171                                ;*AND LOAD THE ERROR FLAG ($ERFLG) INTO DISPLAY<15:08>
3172                                ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
3173                                ;*SW14=1         LOOP ON TEST
3174                                ;*SW11=1         INHIBIT ITERATIONS
3175                                ;*CALL
3176                                ;*      SCOPE           ;;SCOPE=IOT
3177
3178  017424                        $SCOPE:
3179  017424  032777  040000  161506 1$:     BIT     #BIT14,@SWR     ;;LOOP ON PRESENT TEST?
3180  017432  001055                          BNE     $OVER           ;;YES IF SW14=1
3181                                ;*****START OF CODE FOR THE XOR TESTER*****
3182  017434  000416                $XTSTR: BR      6$              ;;IF RUNNING ON THE "XOR" TESTER CHANGE
3183                                                                ;;THIS INSTRUCTION TO A "NOP" (NOP=240)
3184  017436  013746  000004                  MOV     @#ERRVEC,-(SP)  ;;SAVE THE CONTENTS OF THE ERROR VECTOR
3185  017442  012737  017462  000004          MOV     #5$,@#ERRVEC    ;;SET FOR TIMEOUT
3186  017450  005737  177060                  TST     @#177060        ;;TIME OUT ON XOR?
3187  017454  012637  000004                  MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
3188  017460  000436                          BR      $SVLAD          ;;GO TO THE NEXT TEST
```

```
3189  017462  022626                  5$:     CMP     (SP)+,(SP)+     ;;CLEAR THE STACK AFTER A TIME OUT
3190  017464  012637  000004                  MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
3191  017470  000436                          BR      $OVER           ;;LOOP ON THE PRESENT TEST
3192  017472                          6$:;*****END OF CODE FOR THE XOR TESTER*****
3193  017472  105737  001103          2$:     TSTB    $ERFLG          ;;HAS AN ERROR OCCURRED?
3194  017476  001404                          BEQ     3$              ;;BR IF NO
3195  017500  105037  001103          4$:     CLRB    $ERFLG          ;;ZERO THE ERROR FLAG
3196  017504  005037  001160                  CLR     $TIMES          ;;CLEAR THE NUMBER OF ITERATIONS TO MAKE
3197  017510  032777  004000  161422  3$:     BIT     #BIT11,@SWR     ;;INHIBIT ITERATIONS?
3198  017516  001011                          BNE     1$              ;;BR IF YES
3199  017520  005737  001100                  TST     $PASS           ;;IF FIRST PASS OF PROGRAM
3200  017524  001406                          BEQ     1$              ;;      INHIBIT ITERATIONS
3201  017526  005237  001104                  INC     $ICNT           ;;INCREMENT ITERATION COUNT
3202  017532  023737  001160  001104          CMP     $TIMES,$ICNT    ;;CHECK THE NUMBER OF ITERATIONS MADE
3203  017540  002012                          BGE     $OVER           ;;BR IF MORE ITERATION REQUIRED
3204  017542  012737  000001  001104  1$:     MOV     #1,$ICNT        ;;REINITIALIZE THE ITERATION COUNTER
3205  017550  013737  017602  001160          MOV     $MXCNT,$TIMES   ;;SET NUMBER OF ITERATIONS TO DO
3206  017556  105237  001102          $SVLAD: INCB    $TSTNM          ;;COUNT TEST NUMBERS
3207  017562  011637  001106                  MOV     (SP),$LPADR     ;;SAVE SCOPE LOOP ADDRESS
3208  017566  013777  001102  161346  $OVER:  MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER
3209  017574  013716  001106                  MOV     $LPADR,(SP)     ;;FUDGE RETURN ADDRESS
3210  017600  000002                          RTI                     ;;FIXES PS
3211  017602  003720                  $MXCNT: 2000.                   ;;MAX. NUMBER OF ITERATIONS
3212
3213  017604                                  .$READ
3214                                  .SBTTL  TTY INPUT ROUTINE
3215
3216  017604                                  STARS
3217                                  ;;**************************************************************
3218                                  .ENABL  LSB
3219
3220                                  .DSABL  LSB
3221
3222
3223  017604                                  STARS
3224                                  ;;**************************************************************
3225                                  ;*THIS ROUTINE WILL INPUT A SINGLE CHARACTER FROM THE TTY
3226                                  ;*CALL:
3227                                  ;*      RDCHR                   ;;INPUT A SINGLE CHARACTER FROM THE TTY
3228                                  ;*      RETURN HERE             ;;CHARACTER IS ON THE STACK
3229                                  ;*                              ;;WITH PARITY BIT STRIPPED OFF
3230                                  ;
3231
3232  017604  011646          $RDCHR: MOV     (SP),-(SP)      ;;PUSH DOWN THE PC
3233  017606  016666  000004  000002  MOV     4(SP),2(SP)     ;;SAVE THE PS
3234  017614  105777  161324  1$:     TSTB    @$TKS           ;;WAIT FOR
3235  017620  100375                  BPL     1$              ;;A CHARACTER
3236  017622  117766  161320  000004  MOVB    @$TKB,4(SP)     ;;READ THE TTY
3237  017630  042766  177600  000004  BIC     #^C<177>,4(SP)  ;;GET RID OF JUNK IF ANY
3238  017636  026627  000004  000023  CMP     4(SP),#23       ;;IS IT A CONTROL-S?
3239  017644  001013                  BNE     3$              ;;BRANCH IF NO
3240  017646  105777  161272  2$:     TSTB    @$TKS           ;;WAIT FOR A CHARACTER
3241  017652  100375                  BPL     2$              ;;LOOP UNTIL ITS THERE
3242  017654  117746  161266          MOVB    @$TKB,-(SP)     ;;GET CHARACTER
3243  017660  042716  177600          BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII
3244  017664  022627  000021          CMP     (SP)+,#21       ;;IS IT A CONTROL-Q?
```

```
3245  017670  001366                        BNE     2$              ;;IF NOT DISCARD IT
3246  017672  000750                        BR      1$              ;;YES, RESUME
3247  017674  026627  000004  000140  3$:   CMP     4(SP),#140      ;;IS IT UPPER CASE?
3248  017702  002407                        BLT     4$              ;;BRANCH IF YES
3249  017704  026627  000004  000175        CMP     4(SP),#175      ;;IS IT A SPECIAL CHAR?
3250  017712  003003                        BGT     4$              ;;BRANCH IF YES
3251  017714  042766  000040  000004        BIC     #40,4(SP)       ;;MAKE IT UPPER CASE
3252  017722  000002                  4$:   RTI                     ;;GO BACK TO USER
3253  017724                              STARS
3254                                      ;;**************************************************************
3255                                      ;*THIS ROUTINE WILL INPUT A STRING FROM THE TTY
3256                                      ;*CALL:
3257                                      ;*      RDLIN                   ;;INPUT A STRING FROM THE TTY
3258                                      ;*      RETURN HERE             ;;ADDRESS OF FIRST CHARACTER WILL BE ON THE STACK
3259                                      ;*                              ;;TERMINATOR WILL BE A BYTE OF ALL 0'S
3260
3261  017724  010346                  $RDLIN: MOV     R3,-(SP)        ;;SAVE R3
3262  017726  012703  020032          1$:     MOV     #$TTYIN,R3      ;;GET ADDRESS
3263  017732  022703  020042          2$:     CMP     #$TTYIN+8.,R3   ;;BUFFER FULL?
3264  017736  101405                          BLOS    4$              ;;BR IF YES
3265  017740  104404                          RDCHR                   ;;GO READ ONE CHARACTER FROM THE TTY
3266  017742  112613                          MOVB    (SP)+,(R3)      ;;GET CHARACTER
3267  017744  122713  000177          10$:    CMPB    #177,(R3)       ;;IS IT A RUBOUT
3268  017750  001003                          BNE     3$              ;;SKIP IF NOT
3269  017752  104400  001162          4$:     TYPE    $QUES           ;;TYPE A '?'
3270  017756  000763                          BR      1$              ;;CLEAR THE BUFFER AND LOOP
3271  017760  111337  020030          3$:     MOVB    (R3),9$         ;;ECHO THE CHARACTER
3272  017764  104400  020030                  TYPE    9$
3273  017770  122723  000015                  CMPB    #15,(R3)+       ;;CHECK FOR RETURN
3274  017774  001356                          BNE     2$              ;;LOOP IF NOT RETURN
3275  017776  105063  177777                  CLRB    -1(R3)          ;;CLEAR RETURN (THE 15)
3276  020002  104400  001164                  TYPE    $LF             ;;TYPE A LINE FEED
3277  020006  012603                          MOV     (SP)+,R3        ;;RESTORE R3
3278  020010  011646                          MOV     (SP),-(SP)      ;;ADJUST THE STACK AND PUT ADDRESS OF THE
3279  020012  016666  000004  000002          MOV     4(SP),2(SP)     ;;      FIRST ASCII CHARACTER ON IT
3280  020020  012766  020032  000004          MOV     #$TTYIN,4(SP)
3281  020026  000002                          RTI                     ;;RETURN
3282  020030     000                  9$:     .BYTE   0               ;;STORAGE FOR ASCII CHAR. TO TYPE
3283  020031     000                          .BYTE   0               ;;TERMINATOR
3284  020032  000010                  $TTYIN: .BLKB   8.              ;;RESERVE 8 BYTES FOR TTY INPUT
3285  020042  052536  005015     000  $CNTLU: .ASCIZ  /^U/<15><12>    ;;CONTROL "U"
3286  020047     136  006507  000012  $CNTLG: .ASCIZ  /^G/<15><12>    ;;CONTROL "G"
3287  020054  005015  053523  020122  $MSWR:  .ASCIZ  <15><12>/SWR = /
3288  020062  020075     000
3289  020065     040  047040  053505  $MNEW:  .ASCIZ  /  NEW = /
3290  020072  036440  000040
3291  020076                              .$RDDEC
3292                                  .SBTTL  READ A DECIMAL NUMBER FROM THE TTY
3293
3294  020076                              STARS
3295                                      ;;**************************************************************
3296                                      ;*THIS ROUTINE WILL READ A DECIMAL (ASCII) NUMBER FROM THE TTY AND
3297                                      ;*CHANGE IT TO BINARY. IF TOO MANY CHARACTERS OR ANY ILLEGAL CHARACTERS
3298                                      ;*ARE READ A "?" FOLLOWED BY A CARRIAGE RETURN-LINE FEED WILL BE TYPED.
3299                                      ;*THE COMPLETE NUMBER MUST BE RETYPED. THE INPUT IS TERMINATED BY THE
3300                                      ;*USER TYPING A CARRIAGE RETURN. THE RANGE OF THE INPUT NUMBER IS
```

```
                                        ;*POSITIVE 32767 TO NEGATIVE 32768.
                                        ;*CALL:
                                        ;*      RDDEC                   ;;READ A DECIMAL NUMBER
                                        ;*      RETURN HERE             ;;NUMBER IS ON TOP OF THE STACK
                                        ;
020076  011646                  $RDDEC: MOV     (SP),-(SP)      ;;PROVIDE SPACE FOR
020100  016666  000004  000002          MOV     4(SP),2(SP)     ;;THE INPUT NUMBER
020106                                  PUSH    <R0,R1,R2>
020106  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
020110  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
020112  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
020114  104405                  1$:     RDLIN                   ;;READ AN ASCIZ LINE
020116  012600                          MOV     (SP)+,R0        ;;ADDRESS OF 1ST CHAR.
020120  010037  020244                  MOV     R0,6$           ;;SAVE INCASE OF BAD INPUT
020124  005046                          CLR     -(SP)           ;;CLEAR DATA WORD
020126  005002                          CLR     R2              ;;SIGN SET POSITIVE
020130  122710  000055                  CMPB    #'-,(R0)        ;;SEE IF A MINUS SIGN WAS TYPED
020134  001001                          BNE     2$              ;;BR IF NO MINUS SIGN
020136  112002                          MOVB    (R0)+,R2        ;;SAVE FOR LATER USE
020140  112001                  2$:     MOVB    (R0)+,R1        ;;PICKUP THIS CHARACTER
020142  001424                          BEQ     3$              ;;GET OUT IF ZERO
020144  122701  000060                  CMPB    #'0,R1          ;;MAKE SURE THIS CHARACTER
020150  003032                          BGT     5$              ;;IS A DIGIT BETWEEN 0 & 9
020152  122701  000071                  CMPB    #'9,R1
020156  002427                          BLT     5$
020160  032716  170000                  BIT     #^C7777,(SP)    ;;DON'T LET NUMBER GET TO BIG
020164  001024                          BNE     5$              ;;BR IF NUMBER WOULD OVERFLOW
020166  006316                          ASL     (SP)            ;;*2
020170  011646                          MOV     (SP),-(SP)      ;;SAVE FOR LATER
020172  006316                          ASL     (SP)            ;;*4
020174  006316                          ASL     (SP)            ;;*8.
020176  062616                          ADD     (SP)+,(SP)      ;;*10.
020200  102416                          BVS     5$              ;;OVERFLOW ISN'T ALLOWED
020202  162701  000060                  SUB     #'0,R1          ;;STRIP AWAY THE ASCII JUNK
020206  060116                          ADD     R1,(SP)         ;;ADD IN THIS DIGIT
020210  102412                          BVS     5$              ;;OVERFLOW ISN'T ALLOWED
020212  000752                          BR      2$              ;;LOOP
020214  005702                  3$:     TST     R2              ;;CHECK IF NUMBER IS NEG
020216  001401                          BEQ     4$              ;;BR IF NO
020220  005416                          NEG     (SP)            ;;YES--NEGATE THE NUMBER
020222  012666  000012          4$:     MOV     (SP)+,12(SP)    ;;SAVE THE RESULT
020226                                  POP     <R2,R1,R0>
020226  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
020230  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
020232  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
020234  000002                          RTI                     ;;RETURN

020236  005726                  5$:     TST     (SP)+           ;;CLEAN PARTIAL NUMBER FROM STACK
020240  105010                          CLRB    (R0)            ;;SET A TERMINATOR
020242  104400                          TYPE                    ;;TYPE THE INPUT UP TO BAD CHAR.
020244  000000                  6$:     .WORD   0               ;;POINTER GOES HERE
020246  104400  001162                  TYPE    ,$QUES          ;;"?" "CR" &"LF"
020252  000720                          BR      1$              ;;TRY AGAIN

020254                                  .$TYPE
```

```
                                .SBTTL  TYPE ROUTINE

020254                          STARS
                                ;;*****************************************************************
                                ;*ROUTINE TO TYPE ASCIZ MESSAGE. MESSAGE MUST TERMINATE WITH A 0 BYTE.
                                ;*THE ROUTINE WILL INSERT A NUMBER OF NULL CHARACTERS AFTER A LINE FEED.
                                ;*NOTE1:         $NULL CONTAINS THE CHARACTER TO BE USED AS THE FILLER CHARACTER.
                                ;*NOTE2:         $FILLS CONTAINS THE NUMBER OF FILLER CHARACTERS REQUIRED.
                                ;*NOTE3:         $FILLC CONTAINS THE CHARACTER TO FILL AFTER.
                                ;*
                                ;*CALL:
                                ;*1) USING A TRAP INSTRUCTION
                                ;*      TYPE    ,MESADR         ;;MESADR IS FIRST ADDRESS OF AN ASCIZ STRING
                                ;*OR
                                ;*      TYPE
                                ;*      MESADR
                                ;*

020254  105737  001157          $TYPE:  TSTB    $TPFLG          ;;IS THERE A TERMINAL?
020260  100002                          BPL     1$              ;;BR IF YES
020262  000000                          HALT                    ;;HALT HERE IF NO TERMINAL
020264  000407                          BR      3$              ;;LEAVE
020266  010046                  1$:     MOV     R0,-(SP)        ;;SAVE R0
020270  017600  000002                  MOV     @2(SP),R0       ;;GET ADDRESS OF ASCIZ STRING
020274  112046                  2$:     MOVB    (R0)+,-(SP)     ;;PUSH CHARACTER TO BE TYPED ONTO STACK
020276  001005                          BNE     4$              ;;BR IF IT ISN'T THE TERMINATOR
020300  005726                          TST     (SP)+           ;;IF TERMINATOR POP IT OFF THE STACK
020302  012600                  60$:    MOV     (SP)+,R0        ;;RESTORE R0
020304  062716  000002          3$:     ADD     #2,(SP)         ;;ADJUST RETURN PC
020310  000002                          RTI                     ;;RETURN
020312  122716  000011          4$:     CMPB    #HT,(SP)        ;;BRANCH IF <HT>
020316  001430                          BEQ     8$
020320  122716  000200                  CMPB    #CRLF,(SP)      ;;BRANCH IF NOT <CRLF>
020324  001006                          BNE     5$
020326  005726                          TST     (SP)+           ;;POP  <CR><LF> EQUIV
020330  104400                          TYPE                    ;;TYPE A CR AND LF
020332  001163                          $CRLF
020334  105037  020470                  CLRB    $CHARCNT        ;;CLEAR CHARACTER COUNT
020340  000755                          BR      2$              ;;GET NEXT CHARACTER
020342  004737  020424          5$:     JSR     PC,$TYPEC       ;;GO TYPE THIS CHARACTER
020346  123726  001156          6$:     CMPB    $FILLC,(SP)+    ;;IS IT TIME FOR FILLER CHARS.?
020352  001350                          BNE     2$              ;;IF NO GO GET NEXT CHAR.
020354  013746  001154                  MOV     $NULL,-(SP)     ;;GET # OF FILLER CHARS. NEEDED
                                                                ;;AND THE NULL CHAR.
020360  105366  000001          7$:     DECB    1(SP)           ;;DOES A NULL NEED TO BE TYPED?
020364  002770                          BLT     6$              ;;BR IF NO--GO POP THE NULL OFF OF STACK
020366  004737  020424                  JSR     PC,$TYPEC       ;;GO TYPE A NULL
020372  105337  020470                  DECB    $CHARCNT        ;;DO NOT COUNT AS A COUNT
020376  000770                          BR      7$              ;;LOOP

                                ;HORIZONTAL TAB PROCESSOR

020400  112716  000040          8$:     MOVB    #' ,(SP)        ;;REPLACE TAB WITH SPACE
020404  004737  020424          9$:     JSR     PC,$TYPEC       ;;TYPE A SPACE
020410  132737  000007  020470          BITB    #7,$CHARCNT     ;;BRANCH IF NOT AT
020416  001372                          BNE     9$              ;;TAB STOP
```

```
3413  020420  005726                          TST     (SP)+           ;;POP SPACE OFF STACK
3414  020422  000724                          BR      2$              ;;GET NEXT CHARACTER
3415  020424  105777  160520          $TYPEC: TSTB    @$TPS           ;;WAIT UNTIL PRINTER IS READY
3416  020430  100375                          BPL     $TYPEC
3417  020432  116677  000002  160512        MOVB    2(SP),@$TPB     ;;LOAD CHAR TO BE TYPED INTO DATA REG.
3418  020440  122766  000015  000002        CMPB    #CR,2(SP)       ;;IS CHARACTER A CARRIAGE RETURN?
3419  020446  001003                          BNE     1$              ;;BRANCH IF NO
3420  020450  105037  020470                CLRB    $CHARCNT        ;;YES--CLEAR CHARACTER COUNT
3421  020454  000406                          BR      $TYPEX          ;;EXIT
3422  020456  122766  000012  000002  1$:   CMPB    #LF,2(SP)       ;;IS CHARACTER A LINE FEED?
3423  020464  001402                          BEQ     $TYPEX          ;;BRANCH IF YES
3424  020466  105227                          INCB    (PC)+           ;;COUNT THE CHARACTER
3425  020470  000000          $CHARCNT:.WORD  0               ;;CHARACTER COUNT STORAGE
3426  020472  000207          $TYPEX: RTS     PC
3427
3428
3429
3430
3431
3432  020474                          .$TRAP
3433                          .SBTTL  TRAP DECODER
3434
3435  020474                  STARS
3436                          ;;**************************************************************
3437                          ;*THIS ROUTINE WILL PICKUP THE LOWER BYTE OF THE "TRAP" INSTRUCTION
3438                          ;*AND USE IT TO INDEX THROUGH THE TRAP TABLE FOR THE STARTING ADDRESS
3439                          ;*OF THE DESIRED ROUTINE. THEN USING THE ADDRESS OBTAINED IT WILL
3440                          ;*GO TO THAT ROUTINE.
3441
3442  020474  010046          $TRAP:  MOV     R0,-(SP)        ;;SAVE R0
3443  020476  016600  000002          MOV     2(SP),R0        ;;GET TRAP ADDRESS
3444  020502  005740                  TST     -(R0)           ;;BACKUP BY 2
3445  020504  111000                  MOVB    (R0),R0         ;;GET RIGHT BYTE OF TRAP
3446  020506  006300                  ASL     R0              ;;POSITION FOR INDEXING
3447  020510  016000  020516          MOV     $TRPAD(R0),R0   ;;INDEX TO TABLE
3448  020514  000200                  RTS     R0              ;;GO TO ROUTINE
3449
3450  020516                  SETTRAP TYPE,$TYPE,↑/TTY TYPEOUT ROUTINE/
3451  020516                  $$SET   TYPE,$TYPE,\<TRAP+$TRP>,\$TRP,<TTY TYPEOUT ROUTINE>
3452                          .SBTTL  TRAP TABLE
3453
3454                          ;*THIS TABLE CONTAINS THE STARTING ADDRESSES OF THE ROUTINES CALLED
3455                          ;*BY THE "TRAP" INSTRUCTION.
3456
3457                          ;       ROUTINE
3458                          ;       -------
3459  020516                  $TRPAD:
3460  020516  020254                  $TYPE   ;;CALL=TYPE      TRAP+0(104400)  TTY TYPEOUT ROUTINE
3461  020520                  SETTRAP TYPOC,$TYPOC,↑/TYPE OCTAL NUMBER (WITH LEADING ZEROS)/
3462  020520                  $$SET   TYPOC,$TYPOC,\<TRAP+$TRP>,\$TRP,<TYPE OCTAL NUMBER (WITH LEADING ZEROS)>
3463  020520  017050          $TYPOC  ;;CALL=TYPOC     TRAP+1(104401)  TYPE OCTAL NUMBER (WITH LEADING ZEROS)
3464  020522                  SETTRAP TYPOS,$TYPOS,↑/TYPE OCTAL NUMBER (NO LEADING ZEROS)/
3465  020522                  $$SET   TYPOS,$TYPOS,\<TRAP+$TRP>,\$TRP,<TYPE OCTAL NUMBER (NO LEADING ZEROS)>
3466  020522  017024          $TYPOS  ;;CALL=TYPOS     TRAP+2(104402)  TYPE OCTAL NUMBER (NO LEADING ZEROS)
3467  020524                  SETTRAP TYPON,$TYPON,↑/TYPE OCTAL NUMBER (AS PER LAST CALL)/
3468  020524                  $$SET   TYPON,$TYPON,\<TRAP+$TRP>,\$TRP,<TYPE OCTAL NUMBER (AS PER LAST CALL)>
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3469  020524  017064                  $TYPON  ;;CALL=TYPON    TRAP+3(104403)  TYPE OCTAL NUMBER (AS PER LAST CALL)
3470
3471
3472  020526                          SETTRAP RDCHR,$RDCHR,↑/TTY TYPEIN CHARACTER ROUTINE/
3473  020526                          $$SET   RDCHR,$RDCHR,\<TRAP+$TRP>,\$TRP,<TTY TYPEIN CHARACTER ROUTINE>
3474  020526  017604                  $RDCHR  ;;CALL=RDCHR    TRAP+4(104404)  TTY TYPEIN CHARACTER ROUTINE
3475  020530                          SETTRAP RDLIN,$RDLIN,↑/TTY TYPEIN STRING ROUTINE/
3476  020530                          $$SET   RDLIN,$RDLIN,\<TRAP+$TRP>,\$TRP,<TTY TYPEIN STRING ROUTINE>
3477  020530  017724                  $RDLIN  ;;CALL=RDLIN    TRAP+5(104405)  TTY TYPEIN STRING ROUTINE
3478  020532                          SETTRAP RDDEC,$RDDEC,↑/READ A DECIMAL NUMBER FROM TTY/
3479  020532                          $$SET   RDDEC,$RDDEC,\<TRAP+$TRP>,\$TRP,<READ A DECIMAL NUMBER FROM TTY>
3480  020532  020076                  $RDDEC  ;;CALL=RDDEC    TRAP+6(104406)  READ A DECIMAL NUMBER FROM TTY
3481  020534                          SETTRAP SAVREG,$SAVREG,↑/SAVE R0-R5 ROUTINE/
3482  020534                          $$SET   SAVREG,$SAVREG,\<TRAP+$TRP>,\$TRP,<SAVE R0-R5 ROUTINE>
3483  020534  016150                  $SAVREG ;;CALL=SAVREG   TRAP+7(104407)  SAVE R0-R5 ROUTINE
3484  020536                          SETTRAP RESREG,$RESREG,↑/RESTORE R0-R5 ROUTINE/
3485  020536                          $$SET   RESREG,$RESREG,\<TRAP+$TRP>,\$TRP,<RESTORE R0-R5 ROUTINE>
3486  020536  016206                  $RESREG ;;CALL=RESREG   TRAP+10(104410) RESTORE R0-R5 ROUTINE
3487
3488  020540                          SETTRAP INOCT,INOCTR,<INPUT OCTAL ROUTINE>
3489  020540                          $$SET   INOCT,INOCTR,\<TRAP+$TRP>,\$TRP,<INPUT OCTAL ROUTINE>
3490  020540  013746                  INOCTR  ;;CALL=INOCT    TRAP+11(104411) INPUT OCTAL ROUTINE
3491  020542                          SETTRAP INAR,RINA,<INPUT INPUT ADDR. ROUTINE>
3492  020542                          $$SET   INAR,RINA,\<TRAP+$TRP>,\$TRP,<INPUT INPUT ADDR. ROUTINE>
3493  020542  013314                  RINA    ;;CALL=INAR     TRAP+12(104412) INPUT INPUT ADDR. ROUTINE
3494  020544                          SETTRAP OUTAR,ROUTA,<INPUT OUTPUT ADDR. ROUTINE>
3495  020544                          $$SET   OUTAR,ROUTA,\<TRAP+$TRP>,\$TRP,<INPUT OUTPUT ADDR. ROUTINE>
3496  020544  013406                  ROUTA   ;;CALL=OUTAR    TRAP+13(104413) INPUT OUTPUT ADDR. ROUTINE
3497  020546                          SETTRAP PATAR,RPATA,<INPUT PATTERN ROUTINE>
3498  020546                          $$SET   PATAR,RPATA,\<TRAP+$TRP>,\$TRP,<INPUT PATTERN ROUTINE>
3499  020546  016024                  RPATA   ;;CALL=PATAR    TRAP+14(104414) INPUT PATTERN ROUTINE
3500  020550                          SETTRAP DELAR,RDELA,<INPUT DELAY TIME ROUTINE>
3501  020550                          $$SET   DELAR,RDELA,\<TRAP+$TRP>,\$TRP,<INPUT DELAY TIME ROUTINE>
3502  020550  015060                  RDELA   ;;CALL=DELAR    TRAP+15(104415) INPUT DELAY TIME ROUTINE
3503  020552                          SETTRAP DELAY2,RDELA2,<SECOUNDARY DELAY ROUTINE>
3504  020552                          $$SET   DELAY2,RDELA2,\<TRAP+$TRP>,\$TRP,<SECOUNDARY DELAY ROUTINE>
3505  020552  015602                  RDELA2  ;;CALL=DELAY2   TRAP+16(104416) SECOUNDARY DELAY ROUTINE
3506  020554                          SETTRAP DELAY,RDELAY,<ROUTINE TO DELAY XX MILLISEC>
3507  020554                          $$SET   DELAY,RDELAY,\<TRAP+$TRP>,\$TRP,<ROUTINE TO DELAY XX MILLISEC>
3508  020554  015544                  RDELAY  ;;CALL=DELAY    TRAP+17(104417) ROUTINE TO DELAY XX MILLISEC
3509  020556                          SETTRAP CPATR,RCPAT,<ROUTINE TO CHANGE PATTERNS>
3510  020556                          $$SET   CPATR,RCPAT,\<TRAP+$TRP>,\$TRP,<ROUTINE TO CHANGE PATTERNS>
3511  020556  015674                  RCPAT   ;;CALL=CPATR    TRAP+20(104420) ROUTINE TO CHANGE PATTERNS
3512  020560                          SETTRAP IDAC,RDACA,<ROUTINE TO INPUT DAC ADDR>
3513  020560                          $$SET   IDAC,RDACA,\<TRAP+$TRP>,\$TRP,<ROUTINE TO INPUT DAC ADDR>
3514  020560  013572                  RDACA   ;;CALL=IDAC     TRAP+21(104421) ROUTINE TO INPUT DAC ADDR
3515
3516  020562                          SETTRAP CNTAR,RCNTA,<ROUTINE TO INPUT COUNTER MODULE ADDR>
3517  020562                          $$SET   CNTAR,RCNTA,\<TRAP+$TRP>,\$TRP,<ROUTINE TO INPUT COUNTER MODULE ADDR>
3518  020562  013500                  RCNTA   ;;CALL=CNTAR    TRAP+22(104422) ROUTINE TO INPUT COUNTER MODULE ADDR
3519  020564                          SETTRAP ADAR,RADA,<ROUTINE TO INPUT ADDS ADDR>
3520  020564                          $$SET   ADAR,RADA,\<TRAP+$TRP>,\$TRP,<ROUTINE TO INPUT ADDS ADDR>
3521  020564  013660                  RADA    ;;CALL=ADAR     TRAP+23(104423) ROUTINE TO INPUT ADDS ADDR
3522  020566                          SETTRAP INITR,RINIT,<ROUTINE TO ISSUE SYSTEM INITIALIZE>
3523  020566                          $$SET   INITR,RINIT,\<TRAP+$TRP>,\$TRP,<ROUTINE TO ISSUE SYSTEM INITIALIZE>
3524  020566  015642                  RINIT   ;;CALL=INITR    TRAP+24(104424) ROUTINE TO ISSUE SYSTEM INITIALIZE
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                                        SETTRAP F  TA,ROCTA,<ROUTINE TO CONVERT OCTAL NUMBERS TO ASCIZ>
                                        $$SET   FOCTA,ROCTA,<<TRAP+$TRP>  $TRP,<ROUTINE TO CONVERT OCTAL NUMBERS TO ASCI
020570  004654                          ROCTA   ;;CALL=FOCTA    TRAP+25(104425) ROUTINE TO CONVERT OCTAL NUMBERS TO ASCI
                                        SETTRAP QUBR,RQUBR,<ROUTINE TO SET UNI OR BI-POLAR
                                        $$SET   QUBR,RQUBR,<<TRAP+$TRP>,  $TRP,<ROUTINE TO SET UNI OR BI-POLAR,
020572  015252                          RQUBR   ;;CALL=QUBR     TRAP+26(104426) ROUTINE TO SET UNI OR BI-POLAR

                                        ;*
                                        ;*ACSII MESSAGE SECTION
                                        ;*
020574  005015  041511  026523  MHEAD:  .ASCIZ  <15><12>:ICS-11 FIELD TEST PROGRAM - MAINDEC-11-DZICA-B  :<15><12
020661     015  033012  032056  MIPA:   .ASCIZ  <15><12>/6.4 INPUT MODULE ADDRESSES /
020717     015  033012  032456  MOPA:   .ASCIZ  <15><12>/6.5 OUTPUT MODULE ADDRESSES /
020756  005015  040440  042104  MTOH:   .ASCIZ  <15><12>/ ADDR    DATA   GENERIC CODE (IF INTERRUPT)/
021034  005015  047516  042040  MNDA:   .ASCIZ  <15><12>/NO DAC ADDR. ENTERED/

021063     015  042412  042116  MEND:   .ASCIZ  <15><12>/END PASS/



021076  005015  027066  020066  MCNT:   .ASCIZ  <15><12>/6.6 COUNTER MODULE ADDRESSES /
021136  042536                  MEXEN:  .ASCII  /↑E/
021140  005015  054105  042520          .ASCIZ  <15><12>/EXPERT MODE ENABLED/
021166  047136                  MNOEN:  .ASCII  /↑N/
021170  005015  054105  042520          .ASCIZ  <15><12>/EXPERT MODE DISABLED/
021217     136     114          MLEN:   .ASCII  /↑L/
021221     015  034012  032056          .ASCII  <15><12>/8.4 LINE PRINTER MODE ENABLED/
021260  005015  040515  042513          .ASCIZ  <15><12>/MAKE PRINTER READY/
021305     136     112          MAC:    .ASCII  /↑J/
021307     015  044412  047457          .ASCIZ  <15><12>:I/O MODULES ASSUMED CONNECTED:
021347     136  000104          MDEL1:  .ASCIZ  /↑D/
021352  005015  042523  047503  MDEL2:  .ASCIZ  <15><12>/SECONDARY DELAY TIME"/
021402  005015  047527  045522  MWK:    .ASCIZ  <15><12>/WORKING.../

021417     015  033012  033456  MDAC:   .ASCIZ  <15><12>/6.7 DAC ADDRESS /
021442  005015  027066  020070  MADU:   .ASCIZ  <15><12>/6.8 ADDS ADDRESS /
021466  005015  047524  020117  MABOV:  .ASCIZ  <15><12>/TOO MANY NUMBERS-RETYPE- /
021522  005015  027066  020063  MTN:    .ASCIZ  <15><12>/6.3 TEST NUMBER./
021545     015  047012  020117  MTNL:   .ASCIZ  <15><12>/NO SUCH TEST/
021564  005015  027066  030461  MIOO:   .ASCIZ  <15><12>/6.11 INPUT OR OUTPUT MODULE(I OR O):
021632  005015  027066  020071  MDEL:   .ASCIZ  <15><12>/6.9 DELAY TIME (IN MILLISEC) /
021672  005015  052516  041115  MTTL:   .ASCIZ  <15><12>/NUMBER TOO BIG!/
021714  005015  027066  030061  MPPM:   .ASCIZ  <15><12>/6.10 PATTERN MODIFIER, PATTERN

021756  005015  037440  000040  MQMARK: .ASCIZ  <15><12>/ ? /
021764  020077     000          MQ:     .ASCIZ  /? /

021767     015  054412  052517  MSTERR: .ASCII  <15><12>/YOU MUST INITIALLY START PROGRAM AT ADDR. 200
022046  005015  043101  042524          .ASCIZ  <15><12>/AFTER RESART AT ADDR. 210 IS ALLOWED/
022115     015  044412  053116  MNRFN:  .ASCIZ  <15><12>/INVALID ADDRESS: /

022141     015  041412  052517  EM1:    .ASCIZ  <15><12>/COULD NOT SEND-RECEIVE DATA/
022177     015  051412  047105  EM2:    .ASCIZ  <15><12>/SEND-RECIEVE DATA ERROR
```

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022231    015  041412  047117  EM3:    .ASCIZ  <15><12>/CONVERT BIT FAILED TO SET/
022265    015  041412  047117  EM4:    .ASCIZ  <15><12>/CONVERT BIT FAILED TO CLEAR/
022323    015  041412  047101  EM5:    .ASCIZ  <15><12>/CAN'T READ DATA REGISTER/
022356 005015  030101  032460  EM6.    .ASCIZ  <15><12>/ADDS FAILED TO INTERRUPT/
022411    015  040412  042104  EM7:    .ASCIZ  <15><12>/ADDR. OR GENERIC CODE INCORRECT ON INTERRUPT/
022470 005015  044522  020106  EM10:   .ASCIZ  <15><12>/RIF DID NOT CLEAR INTR FLAG ON ADDS/

022536 051105  047522  020122  DH1:    .ASCII  ?ERROR    A/D?
022552 005015  020040  041520          .ASCIZ  <15><12>/  PC     ADDR/

022571    105  051122  051117  DH2:    .ASCII  /ERROR   MODULE   GOOD    BAD/
022625    015  020012  050040          .ASCIZ  <15><12>/  PC     ADDR     DATA    DATA/

022665    105  051122  051117  DH3:    .ASCII  /ERROR   MODULE    ICAR/
022713    015  020012  050040          .ASCIZ  <15><12>/  PC     ADDR    EXP'D   REC'D/

022753    015  047012  020117  MNAE:   .ASCIZ  <15><12>/NO COUNTER MODULE ADDRS.ENTERED/

023015    015  041412  052517  EM11:   .ASCIZ  <15><12>/COULD NOT READ-WRITE INTO COUNTER MODULE BUFFER/

023077    015  020012  051105  DH4:    .ASCII  <15><12>/ ERROR  COUNTER/
023120 005015  020040  041520          .ASCIZ  <15><12>/  PC     ADDR/

023140 005015  047503  047125  EM12:   .ASCIZ  <15><12>/COUNTER MODULE-UP-COUNT INCORRECT/

023204 005015  047503  047125  EM13:   .ASCIZ  <15><12>/COUNTER MODULE FAILED TO INTERRUPT/

023251    015  041412  052517  EM14:   .ASCIZ  <15><12>/COUNTER MODULE-ADDR. OR GENERIC CODE INCORRECT ON INTERRUPT/

023347    015  041412  052517  EM15:   .ASCIZ  <15><12>/COUNTER MODULE DIDN'T STOP COUNTING ON OVERFLOW/

023431    015  051012  043111  EM16:   .ASCIZ  <15><12>/RIF DIDN'T CLEAR INTERRUPT FLAG ON COUNTER/

023506 005015  054523  027123  EM17:   .ASCIZ  <15><12>/SYS. INIT. FAILED TO CLEAR COUNTER BIT(S)/

023562 005015  046111  042514  EM20:   .ASCIZ  <15><12>/ILLEGAL INTERRUPT POSTED ON ICS BUS/

023630 005015  041511  020123  EM21:   .ASCIZ  <15><12>/ICS FAILED TO INTERRUPT CPU/

023666 005015  046111  042514  EM22:   .ASCIZ  <15><12>/ILLEGAL ADDR. OR GEN CODE BITS IN ICAR/

023737    015  051412  051531  EM23:   .ASCIZ  <15><12>/SYS. INIT. FAILED TO CLEAR COUNTER INTR. FLAG/

024017    015  041412  052517  EM24:   .ASCIZ  <15><12>/COUNTER STARTED COUNTING AFTER SYS. INITIALIZE

024100 005015  030101  032460  EM25:   .ASCIZ  <15><12>/ADDS READ DUAL ADDR. ERROR/

024135    015  040412  030060  EM26:   .ASCIZ  <15><12>/ADDS DUAL ADDR. ERROR/
024165    015  051412  047105  EM27:   .ASCIZ  <15><12>/SEND-RECIEVE DATA ERROR/

024217    015  042412  051122  DH5:    .ASCII  <15><12>?ERROR    A/D    DUAL?
024245    015  020012  050040          .ASCIZ  <15><12>/  PC      ADDR    ADDR/

024276 005015  027056  031061  MQURB:  .ASCIZ  <15><12>/6.12 UNIPOLAR OR BIPOLAR ( U OR B) .

024344 005015  047516  040440  MNAD:   .ASCIZ  <15><12>?NO A/D ADDR. ENTERED?
```

```
024373    015  051412  030127  MSWO:    .ASCIZ  <15><12>/SWOO=1 MEANS RETURN TO MONITOR/

024434  030455  027060  030060  MMOVFL:  .ASCIZ  /-10.0000 (OR OVERFLOW)/

024463    053  030061  030056  MPOVFL:  .ASCIZ  /+10.0000 (OR OVERFLOW)/
024512  005015  042522  042520  MREP:    .ASCIZ  <15><12>/REPEAT/

024523    040  042522  042101  MCALOT:  .ASCIZ  / READING (OCTAL)/

024544  053040  046117  051524  MCALT1:  .ASCIZ  / VOLTS (DECIMAL) = /

024570  000055                  MMINUS:  .ASCIZ  /-/
024572  000053                  MPLUS:   .ASCIZ  /+/

024574  005015  042522  052123  PWRMSG:  .ASCIZ  <15><12>/RESTARTING AFTER A POWER FAILURE/<15><12><12>

024642  005001  042524  052123  MHT0:    .ASCIZ  <1><12>/TEST 0 - INPUT AND OUTPUT MODULE EXERCISER/<15><12>

024721    015  052012  051505  MHT1:    .ASCIZ  <15><12>/TEST 1 - INPUT OR OUTPUT MODULE EXERCISER/<15><12>

024777    015  052012  051505  MHT2:    .ASCIZ  <15><12>/TEST 2 - DAC CALIBRATION/<15><12>

025034  005015  042524  052123  MHT3:    .ASCIZ  <15><12>/TEST 3 - DAC INTERACTION/<15><12>

025071    015  052012  051505  MHT4:    .ASCIZ  <15><12>/TEST 4 - COUNTER MODULE TEST/<15><12>

025132  005015  042524  052123  MHT5:    .ASCIZ  <15><12>?TEST 5 - A/D LOGIC TEST?<15><12>

025166  005015  042524  052123  MHT6:    .ASCIZ  <15><12>?TEST 6 - A/D CALIBRATION?<15><12>

025223    015  052012  051505  MHT8:    .ASCIZ  <15><12>?TEST 7 - A/D REPEATABILITY?<15><12>
025262  005015  027070  020064  MLPAV:   .ASCIZ  <15><12>/8.4 LINE PRINTER OPTION AVAILIBLE/
025326  005015  047111  040526  MIVP:    .ASCIZ  <15><12>/INVALID PATTERN MODIFIER/

025361    015  033012  030456  MGAIN:   .ASCIZ  <15><12>/6.13 GAIN /

025376  005015  027066  032061  MCHAN:   .ASCIZ  <15><12>/6.14 CHANS (SC,EC)/
025423    015  033012  030456  MTOL:    .ASCIZ  <15><12>/6.16 TOLERANCE /

025445    015  042412  051122  MCHER1:  .ASCIZ  <15><12>/ERROR! STARTING CHAN. GREATER THAN END CHAN./
025524  005015  040514  052123  MINNN:   .ASCIZ  <15><12>/LAST CHARACTER NOT A OCTAL DIGIT--RETYPE IT.  /
025605    015  037412  047111  MINKN:   .ASCIZ  <15><12>/?INPUT NOT UNDERSTOOD--RETYPE IT./

025651    015  042412  051122  MCHANH:  .ASCIZ  <15><12>/ERROR! NO SUCH CHAN./

025700  005015  027066  032461  MAVEQ:   .ASCIZ  <15><12>/6.15 EXPECTED AVERAGE /
025731    015  047012  020117  MNSG:    .ASCIZ  <15><12>/NO SUCH GAIN!/

025751    015  047012  046525  MNTL:    .ASCIZ  <15><12>/NUMBER TO LARGE-MAX=7777/
026004  020040     000          M2SP:    .ASCIZ  /  /
026007    015  051012  050105  MREPFT:  .ASCIZ  <15><12>/REPEATIBILITY FORCED TYPOUT/

026045    015  051012  050105  MREPER:  .ASCIZ  <15><12>/REPEATABILITY ERROR!/
```

```
MAINDEC-11-DZICA-B     MACY11 27(732)  20-SEP-76  15:53  PAGE 70
DZICAB.P11     TRAP TABLE

        026074  005015  041440  040510  MREPT1: .ASCIZ  <15><12>/ CHAN    GAIN    LOW      AVER   HIGH/<15><12>

        026146  005015  046040  020117  MREPT2: .ASCII  <15><12>/ LO   -5   -4   -3   -2   -1   AV/
        026211     040  025440  020061          .ASCIZ     +1   +2   +3   +4   +5   HI/<15><12>

        026251     015  033012  030456  MFILE:  .ASCIZ  <15><12>/6.1 FILE BOX TO BE TESTED/
        026305     015  033012  031056  MVECT:  .ASCIZ  <15><12>/6.2 ICS VECTOR ADDRESS/
        026336  005015  046111  042514  ILLEG:  .ASCIZ  <15><12>/ILLEGAL NUMBER/<15><12>
        026361     015  040412  042104  NRANG1: .ASCIZ  <15><12>/ADDRESS /
        026374  047040  052117  053440  NRANG2: .ASCIZ  / NOT WITHIN FILE BOX RANGE/<15><12>
        026431     015  043012  046111  NOINT:  .ASCIZ  <15><12>/FILE BOX DID NOT INTERRUPT-FATAL/
        026474  005015  044506  042514  FILINT: .ASCIZ  <15><12>/FILE BOX INTERRUPTED AT /
        026527     040  026455  041440  CKJMP:  .ASCIZ  / -- CHECK JUMPERS /
        026552  005015  047516  026516  NONXST: .ASCIZ  <15><12>/NON-EXISTENT FILE BOX/
                                                .EVEN

  3537  026602     015     012          OUTBF1: .BYTE   15,12
  3538  026604  000000                  OUTBF:  0
  3539          026636                          .=.+30
  3540  026636                          BUFFER:
  3541                                  ;*END ADDRESS IS FUNCTION OF HOW MANY CHANS. ARE BEING EXERCISED
  3542                                  ;*AT ONE TIME IN TEST 7.
  3543          026636                  $ENDAD=.
  3544          000001                          .END
```

```
ADADR   013246          1377    1559    1753    2203#   2324    2329    2333*   2334
ADAR  = 104423          1373    1546    1751    3521#
ADCSR   007062           388     389     394    1370#   1377*   1383*   1384    1393*   1394    1410*   1411    1419    1431#
                        1432    1445*   1459    1474    1499    1501*   1509    1559*   1568    1588    1726*   1727    1729*
                        1753*   1923*   1924    1926*   1927
ADLOG   007102          1377#   1756
ADLOGE  007700          1374    1522#
ADLOGL  007072          1374#   1525
ADLOG2  007164          1392#   1404
ADLOG3  007232          1408#
ADLOG4  007320          1415    1427#
ADLOG5  007322          1431#
ADLOG6  007344          1442#
ADLOG7  007424          1443    1457#
ADLOG8  007476          1464    1473#
ADLOG9  007536          1453    1490#
ADLOGA  007276          1413    1417#
ADLGL   007414          1451#   1469    1479    1484
ADPATE  007736          1403    1536#
ADPATP  007714          1381    1527#
ADWD    013010          1919*   1920*   1921*   1922*   1923    2113#
AVERR   012060          1877    1950#
AVERRL  012072          1952#   1987
AVERRN  012276          1984#   2092
AVEXP   013032          1827    1832    1834    1841    1845*   1974    2122#
AVTKN   013034          1955*   1969*   1999*   2003*   2004*   2008*   2037    2051    2123#
AVTYP   012744          2063    2075    2089    2093#
A1      010516          1615    1617    1619    1643*   1645    1647    1649    1655    1659    1662    1673    1678#
BIPOL   013250          1597    1621    1625    1843    1928    1966    2005    2204#   2607*   2639*
BIT0  = 000001           133#
BIT00 = 000001           123#     133
BIT01 = 000002           122#     132
BIT02 = 000004           121#     131
BIT03 = 000010           120#     130
BIT04 = 000020           119#     129
BIT05 = 000040           118#     128
BIT06 = 000100           117#     127
BIT07 = 000200           116#     126
BIT08 = 000400           115#     125
BIT09 = 001000           114#     124
BIT1  = 000002           132#
BIT10 = 002000           113#
BIT11 = 004000           112#    3197
BIT12 = 010000           111#
BIT13 = 020000           110#    2975
BIT14 = 040000           109#    3179
BIT15 = 100000           108#
BIT2  = 000004           131#
BIT3  = 000010           130#
BIT4  = 000020           129#
BIT5  = 000040           128#
BIT6  = 000100           127#
BIT7  = 000200           126#
BIT8  = 000400           125#
BIT9  = 001000           124#
BPTVEC= 000014           140#
```

```
BUFFER  026636          1897    1912    1954    2055    2068    2082    3540#
CALIT   010146          1583    1597#
CALITE  010322          1639#   1675
CALITP  010306          1628    1634#
CALIT1  010312          1626    1633    1636#   1640
CALIT2  010426          1637    1661#
CALIT3  010436          1663#   1674
CALIT4  010464          1666    1669#
CALIT5  010502          1670    1673#
CALTP   010076          1571    1581#
CHAN    013004          1885*   1886*   1887    1891*   1838*   1900    1907*   1908    1950*   1985*   1986    2012    2111#
CHANF   013014          1786*   1863*   1864*   1868    1870*   1873    1875*   1885    1908    1986    2115#
CHANFR  013020          1788*   1809    1812*   1813    1838    1871    1873    1875    2117#
CHANNO  013022          1797*   1870    2118#
CHANS   013012          1785*   1868*   1869*   1871    1886    1898    1950    2114#
CHANSR  013016          1787*   1802    1807    1812    1813    1863    2116#
CHAN1   013002          1900*   1901*   1902*   1903*   1904*   1921    1951*   1953    1984*   2054    2067    2081    2110#
CHAN7   012774          2107#
CHAR    014754          1001*   1014*   1018    1020    2239    2263    2288    2311    2331    2362*   2363*   2364    2369
                        2370    2372    2375    2378    2381    2384    2387    2390    2392    2394    2398    2407*   2408
                        2417*   2451    2453    2491#   2583*   2602*   2605
CHARC   014762          2359*   2405*   2462    2494#
CKADR   015416          2243    2267    2291    2315    2335    2618#
CKJMP   026527           583    3536#
CNTADR  013204           795    1102    2184#   2280    2285    2287
CNTAR = 104422          1098    3518#
CNTPAE  007060          1182    1358#
CNTPAT  007014          1163    1340#
CONNT   001654           434#    492*    775     738     821     887    2520*
CONNTR  015042          2380    2520#
CONVED  010666          1727#
CONVER  010646          1567    1723#
CONVT   011752          1905    1919#
CORSIZ  001650           432#    625*    627*    1789
CPATR = 104420           916    3511#
CR    = 000015            48#   3418    3428
CRLF  = 000200            49#   3389    3428
CTLLOC  001700           444#    512*    543*    598*   2374
DACADR  013244          1054    1063*   1078    1085*   1110    2201#   2304    2309    2313*   2314
DDISP = 177570            55#    178     479
DELAR = 104415           762    1039    3502#
DELAY = 104417           702     704     784     805    1044    1193    1279    1304    1331    1418    1448    1477    1585
                        1595    1755    1899    3508#
DELAY2= 104416           786    3505#
DFO     001476           215     222     229     236     242     249     256     263     270     277     284     291     298
                         305     312     319     326     333     340     347     354     361     368     376     381     384
                         387#
DH1     022536           212     227     234     240     247     261    3536#
DH2     022571           219     275     282     303     317     352     374    3536#
DH3     022665           254     296     338    3536#
DH4     023077           268     289     310     324     331     345    3536#
DH5     024217           359     366    3536#
DISPLA  001142           178#    479*    487*    1030*   2970*   3208*
DISPRE  000174            29#    487
DSWR  = 177570            54#    177     478
DT1     001500           214     228     235     241     248     262     388#
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DT2     001506            221     255     389#
DT3     001520            269     290     311     325     332     346     391#
DT4     001526            276     283     297     304     318     339     353     375     383     392#
DT5     001540            360     367     394#
EMTVEC= 000030            143#    465*    466*
EM1     022141            211    3536#
EM10    022470            260    3536#
EM11    023015            267    3536#
EM12    023140            281    3536#
EM13    023204            288    3536#
EM14    023251            295    3536#
EM15    023347            302    3536#
EM16    023431            309    3536#
EM17    023506            316    3536#
EM2     022177            218     274    3536#
EM20    023562            323    3536#
EM21    023630            330    3536#
EM22    023666            337    3536#
EM23    023737            344    3536#
EM24    024017            351    3536#
EM25    024100            358    3536#
EM26    024135            365    3536#
EM27    024165            373    3536#
EM3     022231            226    3536#
EM4     022265            233    3536#
EM5     022323            239    3536#
EM6     022356            246    3536#
EM7     022411            253    3536#
ERAV1   012322           1977    1981    1992#
ERAV2   012330           1983    1995#
ERRVEC= 000004            136#    476     477*    488*   3184    3185*   3187*   3190*
EXIT  = 000002            447#    748     854     859     864     889     908     937     2246    2270    2295    2316    2336
                         2433    2489    2550    2608    2610    2641    2553    2668    2683    2700    2718    2722    2724
                         2743    2775
EXPERT  001652            433#    667*    995    1757    1781    1823    1846    2228    2252    2276    2300    2320    2498*
                         2503*   2531    2583    2751
EXSET   014770           2386    2498#
FILHLT  002634            599#
FILINT  026474            579    3536#
FILVEC  002124            498#
FOCTA = 104425            845     904    3527#
FREQ    001566            407#    670*    684*    690     698*   1099*   1417*   1446*   1584*   1754*   1884*   1890*   1893
                         1895*   2536*   2543*   2544*   2566*   2661
FREQ1   001570            408#    683*    699*   2535*   2542*   2545*   2546    2663
FREQ2   001572            409#    682*   2565*   2675
FREQ3   001574            410#    681*   2567*   2568    2677
FR1     001576            411#    629*    634*    635*    640*    646     649     655     1573    2544    2566
FR110   001550            400#    661*    662*    663*    664*    698    1584    1754
FR1120  001600            412#    629     634     635    1573
FR16    001560            404#    651*    652*    653*    654     655*   1417    1446
FR20    001556            403#    654*    656*    657     665
FR3     001564            406#    646*    647*    648     649*    650     670     684     2536
FR40    001554            402#    665*    666*   1099
FR5     001562            405#    648*    650*    651     653     656     659     660     663     664     1890
FR50    001552            401#    657*    658*    659*    660*    661    1884
GAIN    013006           1761    1766    1777    1779*   1919    2016   2112#
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GLIST   013062          1769    2139#
GNS   = ****** U          28    3460    3463    3466    3469    3474    3477    3480    3483    3486    3490    3493    3496
                        3499    3502    3505    3508    3511    3514    3518    3521    3524    3527    3530
GOSJB = 004737           449#   1799    1876    1877    1905    2063    2075    2089    2094
HEADER  001634           426#    764#    828     834#
HOLDIT  010540          1624    1680#
HOLDTM  010514          1641    1644#   1661#   1665    1667#   1672#   1677#
HT    = 000011            46#   3387    3428
ICAR    001616           419#    532#    533#    871     883    1252    1290    1458
ICSHGH  001676           443#    534#    535#   2630
ICSLMT  001702           445#    524#    530#    534    2628
ICSMOD  001612           417#    874    1492    1494    2242    2266    2290    2313    2333
ICSR    001614           418#    525#    529#    532     537     570#    585#    591#    687#    788#    878#    882#   1235
                        1243#   1254#   1277#   1282#   1294#   1312#   1315    1320#   1333    1444#   1451#   1473#
ICSVT   001620           420#    557#    567#    766#   1242#   1272#   1443#   1475#
ICSVT2  001622           421#    559#    568#    768#   1273#   1442#
IDAC  = 104421          1053    1077    3514#
ILLEG   026336           522     555    3536#
INADR   013104           676     787     894     900    1029    2150#   2232    2237    2241
INAR  = 104412           759    1025    3493#
INCFLG  001630           424#   2350#   2410    2436    2438#   2448#   2458
INITR = 104424          1031    1192    1211    1284    1301    1319    1332    1426    1516    3524#
INOCT = 104411           517     548     712    1765    1806    1831    1852    2236    2260    2284    2308    2329    2762
                        3490#
INOCTR  013746          2344#   2470    2474    2481    3490
IOTVEC= 000020           141#    463#    464#
KEYSRV  003652           606     744#
LF    = 000012            47#   3422    3423
LINEPR  001660           436#    689#   1855    2514#
LPAV    001656           435#    609#    616#   2510
LPCSR   001662           437#    610    1857
LPDBR   001664           438#   1858
LPSET   015020          2377    2510#
MABOV   021466          2469    3536#
MAC     021305          2523    3536#
MADU    021442          2323    3536#
MAVEQ   025700          1826    3536#
MCALOT  024523          1594    3536#
MCALT1  024544          1587    3536#
MCHAN   025376          1784    3536#
MCHANH  025651          1821    3536#
MCHER1  025445          1816    3536#
MCNT    021076          2279    3536#
MDAC    021417          2303    3536#
MDEL    021632          2534    3536#
MDEL1   021347          2559    3536#
MDEL2   021352          2561    3536#
MEND    021063          1114    1524    3536#
MEXEN   021136          2500    3536#
MFILE   026251           513    3536#
MGAIN   025361          1760    3536#
MHEAD   020574           506    3536#
MHT0    024642           758    3536#
MHT1    024721           993    3536#
MHT2    024777          1052    3536#
MHT3    025034          1076    3536#
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MHT4    025071          1097    3536#
MHT5    025132          1372    3536#
MHT6    025166          1545    3536#
MHT8    025223          1750    3536#
MINKN   025605          2480    3536#
MINNN   025524          2477    3536#
MIOO    021564           998    3536#
MIPA    020661          2231    3536#
MIVP    025326          2768    3536#
MLEN    021217          2513    3536#
MLPAV   025262           614    3536#
MMINUS  024570          1630    3536#
MMOVFL  024434          1608    3536#
MNAD    024344          1562    3536#
MNAE    022753          1106    3536#
MNDA    021034          1057    1081    3536#
MNOEN   021166          2505    3536#
MNRFN   022115          2634    3536#
MNSG    025731          1773    3536#
MNTL    025751          1837    3536#
MOPA    020717          2255    3536#
MPLUS   024572          1635    3536#
MPOVFL  024463          1602    1613    3536#
MPPM    021714          2755    3536#
MQ      021764          1000    2345    2538    2588    3536#
MQMARK  021756          2473    3536#
MQURB   024276          2586    3536#
MREP    024512          1862    3536#
MREPER  026045          1993    3536#
MREPFT  026007          1996    3536#
MREPT1  026074          2010    3536#
MREPT2  026146          2050    3536#
MSTERR  021767           696    3536#
MSWO    024373          1026    1556    3536#
MTN     021522           707    3536#
MTNL    021545           720    3536#
MTOL    025423          1849    3536#
MTTL    021672          2553    2574    3536#
MTOH    020756           778    3536#
MVECT   026305           544    3536#
MWK     021402          1027    1041    1060    1084    1100    1375    1557    1859    3536#
M2SP    026004          2015    2022    2029    2043    2100    3536#
NA07    012776          2108#
NA17    013000          2109#
NIN     014756          2358*   2402*   2403*   2404*   2406*   2408*   2418    2435    2446    2464    2492#
NINC    014764          2357*   2412    2416*   2420    2424*   2442    2445*   2449*   2460    2465*   2496#
NINC1   014766          2348*   2412    2419    2420*   2421*   2430    2442    2460    2497#
NINI    014760          2435*   2440*   2441*   2444    2446    2493#
NOINT   026431           572    3536#
NONXST  026552           540    3536#
NOSET   015004          2389    2503#
NRANG1  026361          2646    3536#
NRANG2  026374          2650    3536#
OUTADR  013144           791     817     897    1043*   2167#   2256    2261    2265
OUTAR = 104413           760    1038    3496#
OUTBF   026604           523    3538#
```

```
OUTBF1  026602          936   3537#
OUTS    013252          679    771    790    800    901   2206#  2352  2356  2422
OUTSE   013312          773    802   2222#  2354
PACK    004752          925    927    930    942#
PACK1   004746          924*   926*   928*   939#   943    947*   948   956   961*  962   972   979*  980*
                        981   1103*  1109   1118*
PACK2   004750          940#   942*   945*   946    948*   949*   950*  951*  952*  953*  954*  955   956*
                        957*   958*   959*   960    962*   963*   964*  965*  966*  967*  968*  969*  970*
                        971    972*   973*   974*   975*   976*   977*  978
PATAR = 104414          761   3499#
PATJOY  001610          416#   804*   826
PATRN   001604          414#   671*   794    801    804   2712*  2716*  2742*  2759*
PATRNC  001606          415#  2716   2717*  2721*  2723*
PATRNM  001602          413#  2709   2756   2758*  2763   2766   2771*  2772*  2773
PC     =%000007          67#   925*   927*   930*   984*  1517*  1567*  1569*  1589*  1609*  1614*  1722*  1730*
                       1756*  2243*  2267*  2291*  2315*  2335*  2633*  2741*  2861*  2879*  2882*  2921*  2926*
                       2977*  3025*  3157   3396*  3403*  3410*  3424*  3426*
PIRQ   = 177772           53#
PIRQVE= 000240           147#
POPSP2= 022626           450#   539    577    594    590    617    642   1253  1457  1481
PR0    = 000000            70#
PR1    = 000040            71#
PR2    = 000100            72#
PR3    = 000140            73#
PR4    = 000200            74#
PR5    = 000240            75#
PR6    = 000300            76#
PR7    = 000340            77#
PS     = 177776            50#    51    569*   705*   727*   789*   839*  879*  881*  1040*  1244*  1257*  1276*
                       1280*  1295*  1379*  1447*  1476*  2678*
PSW    = 177776            51#
PWRMSG  024574          3156   3536#
PWRVEC= 000024            142#   469*   470*  3120*  3121*  3132*  3139*  3153*  3154*
QUBR   = 104426          1547   1752   3530#
RADA    013660          2320#  2327   3521
RADA1   013714          2324*  2325*  2329#
RASK    014744          2487#  2501   2506   2515   2524   2572
RCNTA   013500          2276#  2283   3518
RCNTA1  013534          2280*  2281*  2285#  2292
RCPAT   015674          2709#  2774*  3511
RCPATI  015706          2712#  2714   2719
RCPATL  015770          2726#  2765
RCPATR  016010          2710   2740#
RDACA   013572          2300#  2307   3514
RDAC1   013626          2304*  2305*  2309#
RDCHR = 104404          3265   3474#
RDDEC = 104406          2539   2562   3480#
RDELA   015060          2531#  2554   3502
RDELAY  015544          2661#  3508
RDELA2  015602          2675#  3505
RDELA3  015166          2383   2559#
RDELA4  015172          2560#  2575
RDLIN = 104405          3313   3477#
REPET7  010634          1569   1589   1718#
REPMAN  013046          2128#
RESREG= 104410          2925   3486#
```

```
RESVEC= 000010           137#
RETURN= 000207           448#
RHIGH   013040          1958*  1959   1961*  1976   2044   2125#
RINA    013314          2228#  2235   3493
RINA1   013350          2232*  2233*  2237#  2244
RINIT   015642          2692#  3524
RLOW    013036          1957*  1962   1964*  1980   2023   2124#
ROCTA   004654           923#  [illegible]
ROUTA   013406          2252#  2[illegible]  3496
ROUTA1  013442          2256*  2257*  2261#  2268
RPATA   016024          2751#  2761   2769   3499
RQLBR   015252          2583#  3530
RTEMP   013042           690*   722*   723*   724*   725*   728   1007*  1008*  1009   1011   1014   1136*  1139
                        1155*  1163*  1167   1169   1174   1181*  1182   1494*  1495*  1497   1789*  1790*  1794*
                        1956*  1970*  1998*  2002*  2051*  2052*  2057   2069   2076*  2083   2126#  2351*  2401*
                        2414   2419*  2427*  2540*  2548*  2563*  2570*  2594*  2595   2596*  2597   2600   2602
                        2661*  2664*  2675*  2679*  2765*  2773*  2774
RTEMP1  013044          1168*  1171*  1791*  1792*  1796*  1797   1798   1965*  1968*  1969   1974*  1975*  1976
                        1978*  1979*  1980   2127#
RTEMP2  015600          2663*  2666*  2669#  2677*  2681*
R0      =%000000          58#   498*   500*   501*   503    537*   599*   601*   602*   604    621*   625    676*
                         679    771*   773    791*   795    893    894*   897    900*   901*   903*   1029*  1030
                        1083*  1085   1086*  1102*  1103   1109*  1110   1118   1591   1599   1627   1769*  1906
                        1927*  1930*  1931*  1932*  1933*  1935*  1936*  1937*  1938*  2241*  2244   2265*  2268
                        2287*  2292   2314*  2334*  2352*  2354   2356*  2422*  2450*  2456*  2628   2630   2693*
                        2797   2823*  2839   2842*  2845*  2849*  2852*  2855   2860*  2901*  2902   2920*  2924*
                        2996   2997*  2998*  3006*  3007*  3008*  3009*  3010*  3011   3016   3021*  3023*  3027
                        3029   3123   3152*  3310   3314*  3315   3318   3320   3321   3346*  3350*  3379   3380*
                        3381   3384*  3442   3443*  3444   3445*  3446*  3447*  3448*
R1      =%000001            59#   499*   500    502    600*   601    603    792*   800*   802    809*   825    840
                        1775*  1776*  1777   1897*  1912*  1953*  1954*  1971*  2054*  2055*  2060*  2067*  2068*
                        2072*  2081*  2082*  2086*  2346*  2426   2798   2822*  2840   2843*  2846*  2850*  2851*
                        2853*  2854*  2856   2859*  2903*  2909*  2915*  3124   3151*  3311   3321*  3323   3325
                        3335*  3336   3345*
R2      =%000002            60#   787*   817    1723*  1997*  2000*  2016*  2017*  2019   2023*  2024*  2026   2037*
                        2038*  2040   2044*  2045*  2047   2056*  2059*  2066*  2071*  2079*  2085*  2093   2799
                        2821*  2841   2844*  2847*  2858*  2900*  2903   2904*  2910*  2911*  2916*  2917*  3125
                        3150*  3312   3317*  3320*  3339   3344*
R3      =%000003            61#   923*   936*   1381*  1402*  1403   2064*  2077*  2800   2820*  2908*  2913*  2919*
                        2920   3070   3079*  3085*  3086*  3089*  3094*  3095*  3096   3105*  3126   3149*  3261
                        3262*  3263   3266*  3267   3271   3273   3275*  3277*
R4      =%000004            62#   790*   2801   2819*  2906*  2909   2915   2917   3071   3073*  3074*  3075*  3076
                        3077*  3091   3093*  3101*  3104*  3127   3148*
R5      =%000005            63#   575*   576    581    2802   2818*  2907*  2911   2918   3072   3078*  3080*  3082*
                        3083*  3084*  3085   3103*  3128   3147*
R6      =%000006            64#    66    457*   458*   459    2638*  2651   2652*
R7      =%000007            65#    67
SAMCNT  013024          1896*  1910*  1952*  1972*  2053*  2061*  2065*  2073*  2080*  2087*  2119#
SAMOFF  013026          1887*  1889*  1971   2060   2072   2086   2120#
SAMPR   011556          1876   1884#
SAVREG= 104407          2899   3483#
SAVO    004634           893*   903    912#
SCAN    010512          1663*  1664   1676#
SP      =%000006            66#   461*   476*   484*   488    575    581*   636*   637*   643    644    686*   1289*
                        1591*  1798*  1800*  1801   2012*  2019*  2026*  2040*  2047*  2093*  2095*  2096   2636*
                        2648*  2797*  2798*  2799*  2800*  2801*  2802*  2803*  2804*  2805*  2806*  2813*  2814*
```

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                    2815*  2816*  2818   2819   2820   2821   2822   2823   2839*  2840*  2841*  2858   2859
                    2860   2877   2878*  2880*  2881*  2900   2902*  2972   2996*  3002*  3023   3027*  3062*
                    3063   3064   3065*  3070*  3071*  3072*  3078   3103   3104   3105   3106*  3107*  3123*
                    3124*  3125*  3126*  3127*  3128*  3130*  3131   3140*  3145   3147   3148   3149   3150
                    3151   3152   3157*  3184*  3187   3189   3193   3207   3209*  3232*  3233*  3236*  3237*
                    3238   3242*  3243*  3244   3247   3249   3251*  3261*  3266   3277   3278*  3279*  3280*
                    3307*  3308*  3310*  3311*  3312*  3314   3316*  3327   3329*  3330*  3331*  3332*  3333*
                    3336*  3341*  3342*  3344   3345   3346   3349   3379*  3380   3381*  3383   3384   3385*
                    3387   3389   3391   3397   3399*  3401*  3409*  3413   3417   3418   3422   3442*  3443
STACK = 001100        41#    461
START   001704        32     454#   697    3158
START1  003366        35     598    686#   721    749    986    1013   1034   1068   1089   1538   1563   1566
                    1732   1867   2599   2697
STKLMT= 177774        52#
ST200   001646       431#    672    677*   691
SWR     001140       177#    459    478*   480    486*   851    1032   1043   1061   1564   1570   1723   1865
                    2695   2975   2980   3130   3145*  3179   3197
SWREG   000176        30#    486
SW0   = 000001       105#
SW00  = 000001        95#    105
SW01  = 000002        94#    104
SW02  = 000004        93#    103
SW03  = 000010        92#    102
SW04  = 000020        91#    101
SW05  = 000040        90#    100
SW06  = 000100        89#     99
SW07  = 000200        88#     98
SW08  = 000400        87#     97
SW09  = 001000        86#     96
SW1   = 000002       104#
SW10  = 002000        85#
SW11  = 004000        84#
SW12  = 010000        83#
SW13  = 020000        82#
SW14  = 040000        81#
SW15  = 100000        80#
SW2   = 000004       103#
SW3   = 000010       102#
SW4   = 000020       101#
SW5   = 000040       100#
SW6   = 000100        99#
SW7   = 000200        98#
SW8   = 000400        97#
SW9   = 001000        96#
TBITVE= 000014       138#
TKVEC = 000060       145#
TMPFIL  001672       441#    518    520    526*   527*
TMPVEC  001674       442#    549    551    553    557    558*   559
TOLER   013030      1839    1853   1975   1978   1979   1982   2121#
TPBSY   001632       425#    770*   807    823    837    843*   853*   862*   876    905*   913
TPBSYP  001644       430#
TPCSR   001666       439#    674*   700
TPDBR   001670       440#    675*   701
TPVCT   001624       422#    767*
TPVCT2  001626       423#    769*
TPVEC = 000064       146#
```

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TRAPVE= 000034   144*  467*  468*
TRTVEC= 000014   139*
TSTLST  003632   724  731*
TSTNO   003630   708  713  715  717  722  730*
TSTO    003706   731  757*
TST1    005264   732  992*
TST10   005474  1019 1038*
TST2    005530   733 1051* 1058
TST3    005622   734 1075* 1082
TST4    005672   735 1096* 1107
TST4A   005774  1124*
TST4AL  006022  1127 1130*
TST4B-  006024  1136*
TST4C   006140  1163*
TST4D   006264  1189*
TST4E   006330  1206*
TST4F   006376  1235*
TST4G   006510  1272*
TST4GE  006734  1285 1302 1310 1316 1320*
TST4GI  006576  1272 1289*
TST4GL  006532  1274 1276*
TST4H   006750  1328*
TST4L   005736  1105 1109* 1338
TST4L1  005712  1102* 1115
TST5    007064   736 1371*
TST6    007744   737 1544*
TST7    010706   738 1749*
TYPE  = 104400   505  513  522  540  544  555  572  579  583  611  613  695  706
                 719  757  777  992  997  999 1016 1026 1027 1041 1051 1056 1060
                1075 1080 1084 1096 1100 1106 1113 1371 1375 1523 1544 1556 1557
                1561 1581 1586 1593 1601 1607 1612 1629 1634 1658 1749 1759 1772
                1783 1815 1820 1825 1836 1848 1859 1861 1992 1995 2009 2014 2021
                2028 2042 2049 2090 2097 2099 2230 2254 2278 2302 2322 2344 2432
                2468 2472 2476 2479 2499 2504 2512 2522 2533 2537 2552 2559 2560
                2573 2585 2587 2604 2634 2646 2650 2753 2768 2978 2995 3013 3015
                3018 3020 3024 3031 3097 3155 3269 3272 3276 3351 3353 3392 3460*
TYPOC = 104401   582 1592 2013 2020 2027 2041 2048 2637 2649 3004 3028 3463*
TYPON = 104403  3469*
TYPOS = 104402  3466*
TOADR   001636   427*  779*  840*  884*  885  895  924
TODAT   001640   428*  780*  841*  886*  902  926
TOGEN   001642   429*  781*  842*  883*  891* 892*  928
TOIN    004106   793  798*
TOINT   004406   766  871*
TOIN1 = 004166   814*  847
TOIN2   004204   813  821*
TOLOP   004636   811  819  831  835  913* 914
TOOUT   004064   791*
TOOUTR  004032   785*  917
TOPINT  004332   767  849*  850  906
TBCAA   007764  1558* 1580 1596
$AUTOB  001134   174*
$BDADR  001122   169*  391  392  394  825* 1116* 1125* 1126 1140* 1141 1148* 1149 1167*
                1173 1191* 1195 1209* 1212 1256 1278* 1291 1306 1313 1321 1329* 1491*
                1492* 1493* 1496* 1497 1499 1502 1508*
$BDDAT  001126   171*  389  392  827* 1126* 1141* 1142 1149* 1173* 1174 1176 1195* 1212*
```

```
                      1252*  1258*  1259   1290*  1297   1306*  1384*  1394*  1395   1411*  1412   1458*  1463
$CHARC  020470        3394*  3404*  3411   3420*  3425*
$CNSWR= ******  U     3472
$CNTRS  001100         157*   456    457    465    471    472
$CR3    = 000000       197*
$CNTLS  020047        3286*
$CNTLU  020042        3285*
$CRLF   001163         189*   382    612   1017   1582   2091   2432   2604   2978   2985   2995   3015   3020
                      3024   3285   3355   3393   3428
$DB2D   016402        2879   2899*
$DECVL  016562        2901   2947*
$ENDAD= 026636        1790   3543*
$ERFLG  001103         160*  2968*  2985   3171   3193   3195*  3212
$ERMAX  001115         166*  3212
$ERROR  016576         465   2967*
$ERRPC  001116         167*   388    389    391    392    394   2972*  2973*  2974   2985   3002
$ERRTB  001166         207*  3010
$ERRTY  016670        2977   2994*
$ERTTL  001112         154*  2971*  2985
$FILLC  001156         185*  3397   3428
$FILLS  001155         184*  3428
$GDADR  001120         168*
$GDDAT  001124         170*   389    392    826*  1139*  1140   1142   1148   1151*  1169*  1170*  1175   1194*
                      1208*  1255*  1291*  1292*  1293*  1296*  1297   1305*  1382*  1393   1392*  1393   1395
                      1408*  1410   1412   1459*  1460*  1461*  1462*  1463
$GTSWR= ******  U     3471
$HD     = 000001        19     20
$HINUM  016342         490*  2843   2851   2856*  2862*
$ICNT   001104         161*  2693   3201*  3202   3204*  3211
$ILLUP  017416        3120   3139   3160*
$INTAG  001135         175*
$ITEMB  001114         165*  2974*  2985   2998
$LF     001164         190*  2985   3276   3285   3355   3428
$LONUM  016344         491*  2742   2842   2849   2855*  2863*
$LPADR  001106         162*   472*   785*  1124*  1138*  1165*  1190*  1207*  1274*  1330*  1380*  1409*  1490*
                      3207*  3209   3211
$LPERR  001110         163*
$MAIL = ******  U      490   2980   3207   3381
$MNEW   020065        3299*
$MSWR   020054        3287*
$MXCNT  017602        3205   3211*
$NULL   001154         183*  3399   3428
$OCNT   017246        3069*  3098*  3111*
$OMODE  017250        3064*  3068*  3073   3076*  3087*  3113*
$OVER   017566        3180   3191   3203   3208*
$PASS   001100         158*   688*   763*  1112*  1522*  3199   3212
$PWRAD  017412        3158*
$PWRON  017252         469   3120*  3153
$PWRMG  017406        3156*
$PWRUP  017324        3132   3139*
$QUES   001162         188*  2985   3269   3285   3353   3355   3428
$RAND   016244        2741   2838*
$RDCHR  017604        3232*  3472   3474
$RDDEC  020076        3307*  3478   3480
$RDLIN  017724        3261*  3475   3477
$RDOCT= ******  U     3478
```

```
$RDSZ = 000010          3253#
$RESRE  016206          2812#   3486
$R2A  = ****** U        3487
$SAVRE  016150          2795#   3481    3483
$SAVR6  017422          3131*   3140    3141*   3142*   3162#
$SB2D   016346          1799    2094    2877#
$SCOPE  017424           463    3178#
$SETUP= 000017           453#    462     463     465     467     469     471     472     2968    2983    2984    3179    3220
                        3291
$STUP = 177777           453#
$SVLAD  017556          3188    3206#
$SWR  = 164000             6#      19     187     188     471     472     473    2961    2962    2963    2964    2971    2975
                        2980    2983    2985    3159    3172    3173    3174    3175    3179    3191    3193    3194    3195
                        3196    3197    3208    3211
$SWRMK= 000000          3175
$TIMES  001160           187#    471*   1137*   1164*   1189*   1206*   1328*   3196*   3202    3205*   3211
$TKB    001146           190#    744    1006    1007    2362    2594    3218    3236    3242
$TKS    001144           179#    607*    726*    994*   1002    1042*   1378*   1558*   2360    2590    2699*   3218    3234
                        3240
$TN   = 000001            19#
$TNPWR  016512          2906    2907    2927#
$TPB    001152           182#    675     701*    856*   1006*   1958*   2369*   2595*   3417*   3428
$TPFLG  001157           186#   3375    3428
$TPS    001150           181#    674     700*    849     858*    861*   1004    1857*   2367    2592    3415    3428
$TRAP   020474           467    3442#
$TRP  = 000027          3450#   3451    3452    3461#   3462    3463    3464#   3465    3466    3467#   3468    3469    3470#
                        3473    3474    3475#   3476    3477    3478#   3479    3480    3481#   3482    3483    3484#   3485
                        3486    3487#   3489    3490    3491#   3492    3493    3494#   3495    3496    3497#   3498    3499
                        3500#   3501    3502    3503#   3504    3505    3506#   3507    3508    3509#   3510    3511    3512#
                        3513    3514    3515#   3517    3518    3519#   3520    3521    3522#   3523    3524    3525#   3526
                        3527    3528#   3529    3530    3531#
$TRPAD  020516          3447    3459#
$TSTNM  001102           159#   2970    2985    3171    3206*   3208    3212
$TTYIN  020032          3262    3263    3280    3284#
$TYPBN= ****** U        3470
$TYPDS= ****** U        3470
$TYPE   020254           693     33 5#  3450    3460
$TYPEC  020424          3396    3403    3410    3415#   3416
$TYPEX  020472          3421    3423    3426#
$TYPOC  017050          3067#   3461    3463
$TYPON  017064          3066    3069#   3469
$TYPOS  017024          3062#   3466
$XTSTR  017434          3182#
$OFILL  017247          3063*   3067*   3077    3112#
$43CAT= ****** U        2977    3179
.     = 026636            24#     28#     34#    156#    191     460     472     515     546     592     641     713     809
                         810     814     944     996    1012    1565    1618    1622    1642    1648    1656    1679#   1728
                        1758    1782    1804    1811    1824    1829    1847    1850    1860    1866    1974    1967    1994
                        2006    2229    2234    2253    2258    2277    2232    2301    2306    2321    2326    2365    2369
                        2373    2376    2379    2382    2385    2388    2395    2399    2521    2532    2584    2598    2732
                        2760    2947#   2985    3034#   3134    3161    3211    3212    3219    3284#   3285    3291    3355
                        3428    3539#   3543
```

```
COMMEN      1#    148#
ENDCOM      1#    148#
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ESCAPE      1#    148#
GETPRI      1#    148#
GETSWR      1#    148#
MULT        1#    148#
NEWTST      1#    149#
POP         1#    148#   2817    2857    3144    3146    3343
PUSH        1#    148#   2796    2838    3122    3129    3309
REPORT      1#    148#
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         1452   1506    1514
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SETTRA      4#   3450#   3461    3464    3467    3472    3475    3478    3481    3484    3488    3491    3494    3497    3500
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SETUP       1#    148#    454
SKIP        1#    148#
SLASH       1#    148#
SPACE     148#
STARS       1#    148#    151     191    2779    2828    2867    2887    2956    2988    3038    3117    3136    3167    3216
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SWRSU       1#    148#    473#
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TYPDEC      1#    148#
TYPNAM      1#    148#
TYPNUM      1#    148#
TYPOCS      1#    148#
TYPOCT      1#    148#    580    1590    2011    2018    2025    2039    2046    2635    2647    3001    3026
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CLRB     934   935  1657  2924  3195  3275  3350  3394  3420
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DECB    3087  3098  3401  3404
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ERRORS DETECTED: 0
DEFAULT GLOBALS GENERATED: 0

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RUN-TIME: 54 46 6 SECONDS
RUN-TIME RATIO: 314/107=2.9
CORE USED: 34K (67 PAGES)

J07

Spooler runtime 14 Seconds, 61 KCS, 360 disk reads, 3 disk writes, 86 pages