PDP11

KIT11-H EXERCISER

MD-11-DZKHA-B

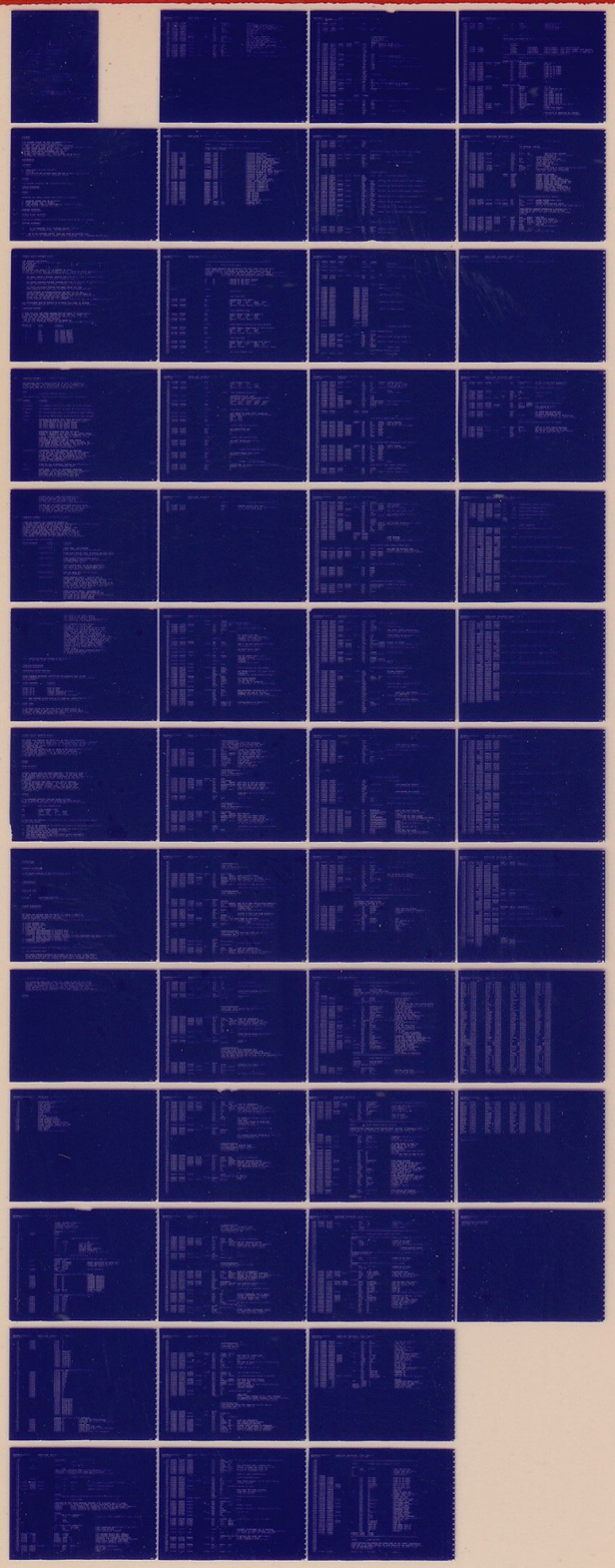
EP-DZKHA-B-DL

FICHE 1 OF 1

JUN 1978

digital

MADE IN USA



IDENTIFICATION

PRODUCT CODE	MAINDEC-11-DZKHA-B-D
PRODUCT NAME	KIT11-H EXERCISER
DATE CREATED	JANUARY 2, 1974
MAINTAINER	DIAGNOSTIC GROUP
AUTHOR	ED BADGER

1. ABSTRACT
****

THIS PROGRAM ALLOWS THE USER TO CHECKOUT OR DEBUG
KIT11-H(UNIBUS INPUT/OUTPUT INTERFACE).
TO TEST, THE USER SIMPLY CONNECTS OUTPUT MODULE(S)
TO INPUT MODULE(S) (SEE SECTION 4.4). THROUGH THE SOFTWARE MONITOR,
THE USER ENTERS ADDRESS OF THE INPUT AND OUTPUT
MODULES, THEIR VECTOR ADDRESSES, AND HOW THE
USER HAS CONNECTED THEM TOGETHER(FOR TEST
PURPOSES) (SEE SECTION 4.5). THIS PROGRAM CAN BE RUN IF
A TELETYPE (OR TERMINAL) DOESN'T EXIST (SEE SECTION 4.6).

2. REQUIREMENTS
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2.1 EQUIPMENT

A. PDP-11/WITH 4K CORE (OR MORE)
B. KIT11-HT
C. KIT11-H/WITH ONE OR MORE INPUT AND ONE OR MORE OUTPUT MODULES
AND ONE OR TWO M7821(OR COMPERABLE MODULE)

2.2 STORAGE

THIS PROGRAM OCCUPIES CORE LOCATIONS 000000-12000

3. LOADING PROCEDURE
******* **********

3.1 METHOD

PROCEDURE FOR NORMAL BINARY TAPES SHOULD BE FOLLOWED:

1. ABSOLUTE LOADER MUST BE IN MEMORY.
2. PLACE BINARY TAPE IN READER.
3. LOAD ADDRESS *7500 (* DETERMINED BY LOCATION OF LOADER)
4. PRESS "START" (PROGRAM WILL LOAD).

4. STARTING PROCEDURE
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4.1 CONTROL SWITCH SETTINGS
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STARTING AT ADDRESS 200 OR 210 ALL SWITCHES SHOULD BE SET AS INDICATED.

4.2 STARTING ADDRESSES
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(A) IF I/O TERMINAL (I.E. TELETYPE) EXISTS LOAD AND
START AT LOCATION 200. SEE SECTION 4.5.

(B) IF NO I/O TERMINAL EXISTS LOAD AND START AT LOCATION 210.
NOTE: IF NO I/O TERMINAL EXISTS, FOLLOW PROCEDURE FOR NO TERMINAL SECTION 4.6.

4.3 PROGRAM AND/OR OPERATOR ACTION

LOAD PROGRAM INTO MEMORY.
SET SWITCH REGISTER TO STARTING ADDRESS.
LOAD ADDRESS.
SET SWITCHES = 0.
PRESS START
THE PROGRAM WILL TYPE AN "*" IF STARTED AT SA200,
OR HALT AT LOCATION 7212 IF STARTED AT SA210. USING THE FORMAT SPECIFIED IN 4.5
OR 4.6,ENTER IN THE NECESSARY INFORMATION ABOUT KIT11-H AS FOLLOWS.

1) 1ST INPUT MODULE'S ADDRESS (EXAMINE THE M105 IN SLOT B02 TO DETERMINE ADDR).
   INITIAL DEFAULT ADDR IS 164000 (JUMPER 11 CUT).

2) 1ST OUTPUT MODULE'S ADDRESS (EXAMINE THE M105 IN SLOT B03 TO DETERMINE ADDR).
   INITIAL DEFAULT ADDR IS 164010 (JUMPERS 11 AND 3 CUT).

3) HOW INPUT AND OUTPUT MODULES HAVE BEEN CABLED FOR TEST
   (WHAT INPUT MODULES HAVE BEEN CONNECTED TO WHAT OUTPUT MODULES).

4) VECTOR ADDRESS OF MODULES SELECTED FOR TEST (V1 AND V2).
   (EXAMINE THE M7821 IN SLOT F02 TO DETERMINE THE VECTOR ADDR, OF
   THE 1ST TWO INPUT MODULES OR THE M7821 IN SLOT F04 TO DETERMINE THE
   VECTOR ADDR, OF THE 2ND TWO INPUT MODULES).
   INITIAL DEFAULT VECTORS ARE 170 (JUMPERS 7 AND 8 CUT) AND 270 (JUMPERS 6 AND 8 CUT).

ALL INFORMATION MUST BE ENTERED OR AN ERROR WILL OCCUR IF STARTED.
ALSO, ALL ADDRESSES MAY NOT BE ODD, NOR ANY VECTOR ADDRESS BE ABOVE 1000.

4.4 CONNECTING MODULES

TO TEST KIT11-H, THE INPUT MODULES MUST BE CABLED TO OUTPUT MODULES.
IF USING A BC08R CABLE FOR CONNECTION, YOU MUST NOT "TWIST" THE
CABLE; THAT IS; THE SMOOTH SIDE OF THE CABLE MUST BE UP ON THE
INPUT AND DOWN ON THE OUTPUT MODULES.
  ONE OR MORE GROUPS OF MODULES MAY BE TESTED AT
ONE TIME. SEE THE CHART BELOW FOR MODULE'S NUMBER, FUNCTION AND SLOT.

MODULE NO.	SLOT	FUNCTION
1	E01	1ST. INPUT MODULE
2	E02	2ND. INPUT MODULE
3	E03	3RD. INPUT MODULE
4	E04	4TH. INPUT MODULE
5	CD01	1ST. OUTPUT MODULE
6	CD02	2ND. OUTPUT MODULE
7	CD03	3RD. OUTPUT MODULE
8	CD04	4TH. OUTPUT MODULE

4.5 DIRECTIVE SUMMARY (IF I/O TERMINAL EXISTS)

THE SOFTWARE MONITOR ALWAYS TYPES AN "@" WHEN IT IS READY TO ACCEPT A COMMAND. THE FOLLOWING ARE A LIST OF COMMANDS THAT CAN BE MADE WHEN IT IS IN THIS MODE; THEY CAN BE ENTERED IN ANY ORDER AND CHANGED AT ANYTIME WHILE IN COMMAND MODE.

NOTE:
"_" INDICATES CARRIAGE RETURN.

ALSO RUBOUT MAYBE TYPED TO DELETE PREVIOUSLY TYPED CHARACTER(S).

COMMAND	FUNCTION
AI:1XXXX0_	SET ADDRESS 1XXXX0 AS 1ST. ADDR. OF INPUT MODULES(S).
AO:1XXXX0_	SET ADDRESS 1XXXX0 AS 1ST ADDR. OF OUTPUT MODUL(S).
V1:XXX_	SET XXX AS VECTOR ADDR. OF 1ST GROUP OF INPUT MODULES.
V2:XXX_	SET XXX AS VECTOR ADDR. OF 2ND GROUP OF INPUT MODULES.
F(ULL)_	INDICATES TO PROGRAM THAT INPUT AND OUTPUT MODULES ARE CONNECTED(FOR TEST) IN THE FOLLOWING MANNER 1ST INPUT MODULE TO 1ST OUTPUT MODULE 2ND INPUT MODULE TO 2ND OUTPUT MODULE 3RD INPUT MODULE TO 3RD OUTPUT MODULE 4TH INPUT MODULE TO 4TH OUTPUT MODULE.
1<6_	INDICATES TO PROGRAM THAT THE 1ST INPUT MODULE IS CONNECTED (FOR TEST) TO 2ND OUTPUT MODULE. NUMBERS 1 THROUGH 4 ARE USED TO REPRESENT INPUT MODULES 1 TO 4. NUMBERS 5-8 ARE USED TO REPRESENT OUTPUT MODULES 1 TO 4(RESPECTIVELY). THIS MODE OF ENTRY IS USED TO SHOW SINGLE CONNECTIONS BETWEEN INPUT AND OUTPUT MODULES. OR IF AN ERROR OCCURS, TO ISOLATE A BAD MODULE BY MAKING A NEW PAIR OF CONNECTED MODULES. ALWAYS USE THE FORM "INPUT MODULE < OUTPUT MODULE."
D(ISCONNECT)_	DISCONNECT (FROM THE PROGRAM) ALL MODULES. CAN BE USED TO DISCONNECT MODULES AND ONLY CONNECT 1 PAIR OF INPUT AND OUTPUT MODULES IF AN ERROR OCCURS (UNDER TEST) OR IS DESIRABLE TO RUN ONLY ONE PAIR OF MODULES. IF TESTING ONE PAIR OF MODULES AT A TIME, ALWAYS DISCONNECT (FROM PROGRAM) THE PREVIOUSLY CONNECTED PAIR.
M(AP)_	PRINT OUT ALL ADDRESSES, VECTORS AND CONNECTIONS AS THE PROGRAM HAS INTERPETED THEM.
S(TART)_	START TEST. NOTE: ALL NECESSARY ADDRESSES AND VECTORS MUST HAVE BEEN ENTERED FOR CONNECTIONS INDICATED, AND AT LEAST ONE CONNECTION MUST HAVE BEEN MADE OR THE PROGRAM WILL TYPE OUT AN ERROR AND RETURN TO COMMAND MODE.

^C	CONTROL AND "C" TYPED SIMULTANEOUSLY WILL BRING THE PROGRAM FROM RUN MODE BACK TO COMMAND MODE (IF THE PRESENT TEST IS NOT TESTING INITIALIZATION (RESET INSTRUCTION)).
^P	CONTROL AND "P" TYPED SIMULTANEOUSLY WILL CAUSE THE NUMBER OF PASSES AND NUMBER OF ERRORS (IN OCTAL) TO BE TYPED OUT. THE PROGRAM WILL THEN RETURN TO THE MODE OF OPERATION IT WAS DOING PRIOR TO ^P (EITHER "RUN MODE" OR "COMMAND MODE").

4.6 DIRECTIVE SUMMARY (IF NO I/O TERMINAL EXSISTS)

A HALT AT LOCATION 7212 INDICATES PROGRAM IS IN COMMAND MODE. ENTER COMMAND IN SWITCH REGISTER BIT 0-3 AND PRESS CONTINUE. ALL DIRECTIVES EXCEPT START COMMAND WILL HALT AT LOCATION 7226 FOR ENTRY OF AN ADDRESS IF NEEDED. WHEN RUNNING WITH NO TERMINAL MAKE SURE THAT PROGRAM HAS HALTED AT THESE LOCATIONS, SINCE IF AN ERROR OCCURED IN ENTERING ADDRESSES AN ERROR HALT WILL OCCUR AT LOCATION 7466. AFTER THE PROGRAM HAS BEEN STARTED AT 210, IT MAY BE RESTARTED AT 1000 AND IT WILL REMAIN IN "NO TERMINAL MODE."

FOR COMMAND MODE HALT AT 7212:

SWITCH REGISTER	ACTION	FUNCTION
0	PRESS CONTINUE	START TEST. ANY FURTHUR HALTS INDICATES AN ERROR HAS OCCURED.
2	PRESS CONTINUE	ENTER INPUT MODULE ADDR. IN SWITCH REGISTER PRESS CONTINUE, NEXT HALT SHOULD BE COMMAND MODE HALT.
4	PRESS CONTINUE	ENTER OUTPUT MODULE ADDRESS SWITCH REGISTER-PRESS CONTINUE. NEXT HALT SHOULD BE COMMAND MODE HALT.
6	PRESS CONTINUE	ENTER VECTOR ADDR. IN SWITCH REGISTER OF 1ST. GROUP OF INPUT MODULES-PRESS CONTINUE NEXT HALT SHOULD BE COMMAND MODE HALT.
10	PRESS CONTINUE	SAME AS ABOVE ONLY FOR 2ND GROUP OF INPUT MODULES.
12	PRESS CONTINUE	PRESS CONTINUE AGAIN. THIS IS USED TO DISCONNECT (FROM THE PROGRAM) ALL MODULES. CAN BE USED TO DISCONNECT ALL MODULES AND ONLY CONNECT 1 PAIR OF INPUT AND OUTPUT MODULES IF AN ERROR OCCURRED (DURING TEST) OR IF IT'S DESIRABLE TO RUN ONLY ONE PAIR OF MODULES. NEXT HALT SHOULD BE COMMAND MODE HALT.
14	PRESS CONTINUE	PRESS CONTINUE AGAIN. INDICATES TO PROGRAM THAT THE USER HAS CONNECTED THE INPUT AND OUTPUT MODULES IN THE FOLLOWING ORDER: 1ST INPUT TO 1ST OUTPUT MODULE 2ND INPUT TO 2ND OUTPUT MODULE

		3RD INPUT TO 3RD OUTPUT MODULE 4TH INPUT TO 4TH OUTPUT MODULE AND DESIRES TO TEST ALL 4 PAIRS AT ONE TIME, NEXT HALT SHOULD BE COMMAND MODE HALT
16	PRESS CONTINUE	THIS DIRECTIVE IS USED TO SHOW HOW ONE PAIR OF MODULES ARE CONNECTED. IT MAY BE USED TO SHOW UNUSAL CONNECTIONS OR SINGULAR CONNECTIONS FOR TEST WHEN ONLY ONE PAIR CAN BE RUN AT ONE TIME. ENTER CONNECTION IN FOLLOWING MANNER: IN SWR BITS 0-2 ENTER BINARY OF NUMBER OF INPUT MODULE (NUMBERS RUN FROM 1 TO 4 FOR 1ST THROUGH 4TH INPUT MODULE); IN SWR BITS 3-6 ENTER BINARY OF NUMBER OF OUTPUT MODULE THAT IS CONNECTED TO INPUT MODULE (NUMBERS RUN FROM 5-8 FOR 1ST THROUGH 4TH OUTPUT MODULE). EXAMPLE: 1000001 WOULD SHOW 1ST INPUT MODULE (001) WAS CONNECTED TO 4TH OUTPUT MODULE (1000). PRESS CONTINUE AFTER ENTERING CONNECTIONS IN SWITCH REGISTER NEXT HALT SHOULD BE COMMAND MODE HALT.

NOTE: DIRECTIVES CAN BE ENTERED IN ANY ORDER AND
AT ANY TIME WHILE IN COMMAND MODE.

5. OPERATING PROCEEDURE

5.1 OPERATIONAL SWITCH SETTINGS

AFTER ENTERING NECESSARY INFORMATION AND STARTING TEST IN THE MANNER PRESCRIBED IN 4.5 OR 4.6 THE FOLLOWING SWITCH REGISTER OPTIONS ARE AVAILABLE:

5.1.2 SWITCH REGISTER FUNCTION

SWITCH REGISTER	FUNCTION
SW15=1 OR UP	HALT ON ERROR
SW14=1 OR UP	LOOP ON TEST
SW13=1 OR UP	INHIBIT PRINTOUT OF ERROR
SW11=1 OR UP	INHIBIT ITERATIONS
SW10=1 OR UP	INHIBIT PRINTOUT OF "END PASS"

NOTE: WHEN PROGRAM IS RUN WITH NO I/O TERMINAL (SA210) PROGRAM WILL HALT UPON DETECTION OF ERROR WHETHER OR NOT SR15=1.

5.1.3 SCOPE LOOPS

IF AN ERROR OCCURS AND THE USER WISHS TO SCOPE ERROR, HE SHOULD SET SW15=1 TO HALT ON ERROR, THEN WHEN PROGRAM HALTS ON ERROR, HE SHOULD SET SW15=0, SET SW14=1 (LOOP ON CURRENT TEST), AND SW13=1 (TO INHIBIT PRINTOUT OF ERROR).

5.2 PROGRAM AND/OR OPERATOR ACTION

THE FIRST PASS THROUGH THE TESTS WILL BE MADE WITH ITERATIONS INHIBITED. SUCCESSIVE PASSES WILL ENABLE ITERATIONS IF SW11=0. "END PASS" IS PRINTED AT END OF A PASS IF AN I/O TERMINAL EXISTS. IF ONE DOES NOT THE OPERATOR CAN EXAMINE LOCATION 1216 TO SEE HOW MANY PASSES HAVE BEEN COMPLETED.
^C (CONTROL AND LETTER C) MAY BE TYPED AT ANY TIME TO BRING PROGRAM BACK TO COMMAND MODE IN ORDER TO CHANGE ANY PARAMETER.
^R (CONTROL AND LETTER R) MAY BE TYPED AT ANY TIME TO GET A RUN SUMMARY CONSISTING OF NUMBER OF PASSES AND NUMBER OF ERRORS (IN OCTAL).

6. ERRORS

6.1 ERROR PRINTOUT

PRINTOUT VARIES WITH THE ERROR DETECTED. THE ERROR PC TYPED OUT IS THE ACTUAL LOCATION OF THE ERROR CALL. IN THE DATA TEST ERROR TYPEOUT,"DATA EXP'D" IS THE COMPLIMENT OF THE DATA SENT, BUT IT REPRESENTS WHAT DATA THE INPUT MODULE SHOULD HAVE SENT TO PROCESSOR.
A HALT AT LOCATION 7466 WHEN RUNNING WITH NO TERMINAL INDICATES AN ERROR HAS OCCURED. TO FIND OUT THE NUMBER OF THE ERROR, EXAMINE LOCATION 1236. THIS IS THE ITEM NUMBER OF THE ERROR. TO FIND OUT WHAT THE ERROR TYPOUT WOULD HAVE BEEN GOTO TO THE ERROR POINTER TABLE BEGINNING AT LOCATION 1306.

6.1.1 EXAMPLE

IF WE EXAMINED LOCATION 1236 AND FOUND A 5 (101)
WE GO TO LOCATION 1306 AND LOOK THROUGH THE ERROR POINTER TABLE UNTIL WE FOUND ITEM 5. THE INFORMATION WOULD LOOK LIKE:

```
;ITEM 5          FROM DUAL ADDRESS TEST

EM5              ;DUAL ADDRESS ERROR
DH3              ;ERROR  ADDR    ADDR    ADDR
                 ;PC     OUT     IN      DUAL
DT3              ;$ERRAD,$TMP0,  $GDADR, $BDADR
DF1              ;0
```

TO FIND OUT THE INFORMATION SPECIFIED BY DT3 ($ERRAD,$TEMP0,$GDADR,$BDADR) FOLLOW THESE STEPS:

(1) LOOK UP THE ADDRESS OF THE LABLE(I.E. $ERRAD) IN THE SYMBOL TABLE (WHICH FOLLOWS THE LISTING)
(2) PUT THIS ADDRESS IN THE SWITCH REGISTER AND DEPRESS THE LOAD ADDRESS SWITCH ON THE PROCESSOR'S CONSOUL.
(3) NOW DEPRESS THE EXAMINE SWITCH.
(4) THE DATA DISPLAYED IN THE DATA LIGHTS IS THE INFORMATION THAT WOULD HAVE BEEN PRINTED FOR THIS LABLE IF YOU HAD A INPUT/OUTPUT TERMINAL.

7. RESTRICTIONS

7.1 STARTING RESTRICTION

IF THE VECTOR ADDRESS OF ANY INPUT MODULE IS 200 OR 210
THE PROGRAM MUST BE RESTARTED AT LOCATION 1000

8.0 MISCELLANEOUS

8.1 EXECUTION TIME

0.5 MIN. ITERATIONS INHIBITED
5.0 MIN. WITH ITERATIONS (FOR EACH CONNECTION)

9.0 PROGRAM DISCRIPTION

THE TESTS ARE DIVIDED INTO TWO PARTS: (1) TESTS TO CHECK OUT
ONE PAIR OF CONNECTED MODULES; AND (2), TESTS TO CHECKOUT ALL
PAIRS OF CONNECTED MODULES AT ONE TIME.
PART ONE TAKES EACH PAIR OF CONNECTED MODULES THOUGTH THE FOLLOWING TESTS:

(A) COUNT PATTERN (UP)
(B) COUNT PATTERN (DOWN)
(C) RANDOM DATA TEST
(D) BYTE OPERATION TEST
(E) INTERRUPT TEST-PROCESSOR AT PRIORITY ZERO
(F) INTERRUPT TEST-PROCESSOR AT PRIORITY FOUR
(G) INTERRUPT TEST-PROCESSOR AT PRIORITY FIVE
NOTE: THE FIRST TWO INPUT MODULES' PRIORITY IS FIVE, THEREFORE THEY SHOULD NOT INTERRUPT.
THE SECOND TWO INPUT MODULES' PRIORITY IS SIX-THEY SHOULD INTERRUPT.
(H) INTERRUPT TEST-PROCESSOR AT PRIORITY SIX
(I) INTERRUPT TEST-PROCESSOR AT PRIORITY SEVEN
(J) INITIALIZATION TEST

PART TWO CHECKS ALL PAIRS OF CONNECTED MODULES IN THE FOLLOWING TESTS:

(A) DUAL ADDRESSING TEST

THE INPUT MODULE'S ADDRESS (IN A PAIR) IS SENT TO ITS' OUTPUT MODULE.
AFTER DOING THIS FOR ALL CONNECTIONS,EACH INPUT MODULE IS READ. IF
ANYTHING OTHER THAN ITS' ADDRESS IS READ FROM IT AN ERROR HAS OCCURED.

(h) INTERRUPT ORDER TEST

ALL INTERRUPTS ARE FIRST LOCKED OUT. DATA IS SENT TO ALL OUTPUT MODULES IN THE CONNECTIONS. NOW INTERRUPTS ARE ENABLED AND TIME ALLOWED FOR INTERRUPTS TO OCCUR. AS THEY OCCUR, A NUMBER IS PLACED ON A STACK REPRESENTING THE ORDER IN WHICH THE INTERRUPT TOOK PLACE. INPUT MODULE #3 SHOULD INTERRUPT BEFORE INPUT MODULE #4, WHICH SHOULD INTERRUPT BEFORE INPUT MODULE #1. #1 SHOULD INTERRUPT BEFORE INPUT MODULE #2.

LISTING
****

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1307	BINARY TO OCTAL (ASCII) AND TYPE
1384	RANDOM NUMBER GENERATOR ROUTINE
1428	TRAP DECODER
1443	TRAP TABLE
1456	POWER DOWN AND UP ROUTINES

```
                                ;TITLE  MAINDEC-11-DZKHA-A
                                ;*COPYRIGHT (C) 1973
                                ;*DIGITAL EQUIPMENT CORP.
                                ;*MAYNARD, MASS. 01754
                                ;*
                                ;*PROGRAM BY ED BADGER
000001                          $IN=1
000000                          $SS=0

                                ;SBTTL          OPERATIONAL SWITCH SETTINGS
                                ;*
                                ;*      SWITCH                  USE
                                ;*      ------          --------------------
                                ;*        15            HALT ON ERROR
                                ;*        14            LOOP ON TEST
                                ;*        13            INHIBIT ERROR TYPEOUTS
                                ;*        11            INHIBIT ITERATIONS
                                ;*        10            INHIBIT PRINTOUT OF "END PASS"

                                ;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
177776                          PS=     177776                  ;PROCESSOR STATUS WORD
                                ;EQUIV  PS,PSW
177570                          SWR=    177570                  ;SWITCH REGISTER
177570                          DISPLAY=SWR

                                ;*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

                                ;*"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
```

```
                                SW05=   40
                                SW04=   20
                                SW03=   10
                                SW02=   4
                                SW01=   2
                                SW00=   1
                                .EQUIV  SW09,SW9
                                .EQUIV  SW08,SW8
                                .EQUIV  SW07,SW7
                                .EQUIV  SW06,SW6
                                .EQUIV  SW05,SW5
                                .EQUIV  SW04,SW4
                                .EQUIV  SW03,SW3
                                .EQUIV  SW02,SW2
                                .EQUIV  SW01,SW1
                                .EQUIV  SW00,SW0

                                ;*DATA BIT DEFINITIONS (BIT00 TO BIT15)
100000                          BIT15=  100000
040000                          BIT14=  40000
020000                          BIT13=  20000
010000                          BIT12=  10000
004000                          BIT11=  4000
002000                          BIT10=  2000
001000                          BIT09=  1000
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
                                                .EQUIV  EMT,    ERROR
                                                .SBTTL          TRAP CATCHER
                        000000                          .=0
                                                ;*ALL UNUSED LOCATIONS FROM 4 - 776 CONTIAN A ",+2,HALT"
                                                ;*SEQUENCE TO CATCH ILLEGAL TRAPS AND INTERRUPTS
                                                ;*LOCATION 0 CONTAINS 0 TO CATCH IMPROPERLY LOADED VECTORS
                                                .SBTTL          STARTING ADDRESS(ES)
                        000200                          .=200
000200  000200  000137  005542                  JMP     @#STAR          ;JUMP TO STARTING ADDRESS OF PROGRAM
                        000210                  .=210
000210  000210  000137  007200                  JMP     NTH             ;GOTO NO TERMINAL HANDLER
                        001000                  .=1000
001000  001000  000137  005542                  JMP     STAR            ;RESTART ADDRESS 1000

                        001100                  .=1100
                                                ;;**************************************************************
                                                .SBTTL          TYPE ROUTINE

                                                ;*ROUTINE TO TYPE ASCIZ MESSAGE, MESSAGE MUST TERMINATE WITH A 0 BYTE.
                                                ;*THE ROUTINE WILL INSERT A NUMBER OF NULL CHARACTERS AFTER A LINE FEED,
                                                ;*NOTE1:        $NULL CONTAINS THE CHARACTER TO BE USED AS THE FILLER CHARACTER,
                                                ;*NOTE2:        $FILLS CONTAINS THE NUMBER OF FILLER CHARACTERS REQUIRED,
                                                ;*NOTE3:        $FILLC CONTAINS THE CHARACTER TO FILL AFTER,

                                                ;*CALL:
                                                ;*1) USING A TRAP INSTRUCTION
                                                ;*      TYPE    ,MESADR                 ;MESADR IS FIRST ADDRESS OF AN ASCIZ STRING
                                                ;*OR
                                                ;*      TYPE
                                                ;*      MESADR

                                                ;*2) USING A JSR INSTRUCTION
                                                ;*      MOV     PS,-(SP)                ;PUSH PROCESSOR STATUS WORD ON THE STACK
                                                ;*      JSR     PC,$TYPE                ;CALL TYPE ROUTINE
                                                ;*      MESADDR                         ;FIRST ADRESS OF MESSAGE

001100  177564          $TPS:   177564                  ;TTY PRINTER STATUS REG, ADDRESS
001102  177566          $TPB:   177566                  ;TTY PRINTER BUFFER REG, ADDRESS
001104     000          $NULL:  .BYTE   0               ;CONTAINS NULL CHARACTER FOR FILLS
001105     002          $FILLS: .BYTE   2               ;CONTAINS # OF FILLER CHARACTERS REQUIRED
001106     012          $FILLC: .BYTE   12              ;FILL CHARS, AFTER A "LINE FEED"
001107     000          $TPFLG: .BYTE   0               ;"TERMINAL AVAILABLE" FLAG (0=YES)

001110  105737  001107  $TYPE:  TSTB    $TPFLG          ;IS THERE A TERMINAL?
001114  001402                  BEQ     1$              ;BR IF YES
001116  000000                  HALT                    ;HALT HERE IF NO TERMINAL
001120  000407                  BR      3$              ;LEAVE
```

```
163  001122  010046                    158:    MOV     R0,-(SP)        ;SAVE R0
164  001124  017600  000002                    MOV     @2(SP),R0       ;GET ADDRESS OF ASCIZ STRING
165  001130  112046                    258:    MOVB    (R0)+,-(SP)     ;PUSH CHARACTER TO BE TYPED ONTO STACK
166  001132  001005                            BNE     48              ;BR IF IT ISN'T THE TERMINATOR
167  001134  005726                            TST     (SP)+           ;IF TERMINATOR POP IT OFF THE STACK
168  001136  012600                            MOV     (SP)+,R0        ;RESTORE R0
169  001140  062716  000002            358:    ADD     #2,(SP)         ;ADJUST RETURN PC
170  001144  000002                            RTI                     ;RETURN
171  001146  004737  001200            458:    JSR     PC,7$           ;GO TYPE THIS CHARACTER
172  001152  123726  001106            558:    CMPB    $FILLC,(SP)+    ;IS IT TIME FOR FILLER CHARS.?
173  001156  001364                            BNE     2$              ;IF NO GO GET NEXT CHAR.
174  001160  013746  001104                    MOV     $NULL,-(SP)     ;GET # OF FILLER CHARS. NEEDED
175                                                                    ;AND THE NULL CHAR.
176  001164  105366  000001            658:    DECB    1(SP)           ;DOES A NULL NEED TO BE TYPED?
177  001170  002770                            BLT     5$              ;BR IF NO--GO POP THE NULL OFF OF STACK
178  001172  004737  001200                    JSR     PC,7$           ;GO TYPE A NULL
179  001176  000772                            BR      6$              ;LOOP
180  001200  105777  177674            758:    TSTB    @#TPS           ;WAIT UNTIL PRINTER IS READY
181  001204  100375                            BPL     7$
182  001206  116677  000002  177666            MOVB    2(SP),@#TPB     ;LOAD CHAR TO BE TYPED INTO DATA REG.
183  001214  000207                            RTS     PC
```

```
                                ;;*****************************************************************

                                .SBTTL          COMMON TAGS

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

001216  000000                  $PASS:  .WORD   0               ;CONTAINS PASS COUNT
001220     000                  $TSTNM: .BYTE   0               ;CONTAINS THE TEST NUMBER
001221     000                  $ERFLG: .BYTE   0               ;CONTAINS ERROR FLAG
001222  000000                  $ICNT:  .WORD   0               ;CONTAINS SUBTEST ITERATION COUNT
001224  000000                  $LPADR: .WORD   0               ;CONTAINS SCOPE LOOP ADDRESS
001226  000000                  $LPERR: .WORD   0               ;CONTAINS SCOPE RETURN FOR ERRORS
001230  000000                  $ERTTL: .WORD   0               ;CONTAINS TOTAL ERRORS DETECTED
001232  000000  000000                  .WORD   0,0             ;RESERVED--NOT TO BE USED
001236     000                  $ITEMB: .BYTE   0               ;CONTAINS ITEM CONTROL BYTE
001237     000                          .BYTE   0               ;RESERVED--NOT TO BE USED
001240  000000                  $ERRAD: .WORD   0               ;CONTAINS PC OF LAST ERROR INSTRUCTION
001242  000000                  $GDADR: .WORD   0               ;CONTAINS ADDRESS OF 'GOOD' DATA
001244  000000                  $BDADR: .WORD   0               ;CONTAINS ADDRESS OF 'BAD' DATA
001246  000000                  $GDDAT: .WORD   0               ;CONTAINS 'GOOD' DATA
001250  000000                  $BDDAT: .WORD   0               ;CONTAINS 'BAD' DATA
001252  000000                  $REGAD: .WORD   0               ;CONTAINS THE ADDRESS FROM
                                                                ;WHICH  ($REG0) WAS OBTAINED
001254  000000                  $REG0:  .WORD   0               ;CONTAINS (($REGAD)+0)
001256  000000                  $REG1:  .WORD   0               ;CONTAINS (($REGAD)+2)
001260  000000                  $REG2:  .WORD   0               ;CONTAINS (($REGAD)+4)
001262  000000                  $REG3:  .WORD   0               ;CONTAINS (($REGAD)+6)
001264  000000                  $REG4:  .WORD   0               ;CONTAINS (($REGAD)+10)
001266  000000                  $REG5:  .WORD   0               ;CONTAINS (($REGAD)+12)
001270  000000                  $TMP0:  .WORD   0               ;USER DEFINED
001272  000000                  $TMP1:  .WORD   0               ;USER DEFINED
001274  000000                  $TMP2:  .WORD   0               ;USER DEFINED
001276  000000                  $TMP3:  .WORD   0               ;USER DEFINED
001300  000000                  $TIMES: 0                       ;MAX. NUMBER OF ITERATIONS
001302     077                  $QUES:  .ASCII  /?/             ;QUESTION MARK
001303     015                  $CRLF:  .ASCII  <15>            ;CARRIAGE RETURN
001304  000012                  $LF:    .ASCIZ  <12>            ;LINE FEED
```

```
                                ;;**********************************************************************

                                .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 $ITEMB IS 0 THE ONLY PERTINENT DATA IS ($ERRAD).
                                ;*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


001306                          $ERRTB:
                                                        ;ERROR-TABLE


                                ;ITEM 1                  FROM DATA TEST

001306  007606                  EM1                     ;SND-RECIEVE DATA ERROR
001310  010476                  DH1                     ;ERROR  ADDR    ADDR    DATA    DATA
                                                        ;PC     OUT     IN      EXP'D   IN
001312  007524                  DT1                     ;$ERRAD, $GDADR, $BDADR, $GDDAT, $BDDAT
001314  000000                  DF1                     ;0

                                ;ITEM 2                  FROM INTERRUPT TEST

001316  007640                  EM2                     ;INPUT MODULE FAILED TO INTERRUPT
001320  010611                  DH2                     ;ERROR  ADDR    ADDR    PROS
                                                        ;PC     OUT     IN      STAT
001322  007540                  DT2                     ;$ERRAD, $GDADR, $BDADR, $TMP0
001324  000000                  DF1                     ;0

                                ;ITEM 3                 ;INPUT MODULE INTERRUPT AT WRONG PRIORITY

001326  007703                  EM3                     ;;INPUT MODULE INTERRUPTED AT WRONG PRIORITY
001330  010611                  DH2                     ;ERROR  ADDR    ADDR    PROS
                                                        ;PC     OUT     IN      STAT
001332  007540                  DT2                     ;$ERRAD, $GDADR, $BDADR, $TMP0
001334  000000                  DF1                     ;0

                                ;ITEM 4                  FROM INIT TEST

001336  007760                  EM4                     ;RESET FAILED TO INITIALIZE INPUT MODULE
001340  010476                  DH1                     ;ERROR  ADDR    ADDR    DATA    DATA
                                                        ;PC     OUT     IN      EXP'D   IN
001342  007524                  DT1                     ;$ERRAD, $GDADR,        $BDADR, $GDDAT, $BDDAT
001344  000000                  DF1                     ;0

                                ;ITEM 5                  FROM DUAL ADDRESS TEST
```

```
001346  010041                  EM5                     ;DUAL ADDRESS ERROR
001350  010706                  DH3                     ;ERROR  ADDR    ADDR    ADDR
                                                        ;PC     OUT     IN      DUAL
001352  007552                  DT3                     ;$ERRAD, $TMP0, $GDADR, $BDADR
001354  000000                  DF1                     ;0

                                ;ITEM 6         ERITR2  FROM INTERRUPT ORDER TEST

001356  010066                  EM6                     ;INTERRUPTS OUT OF ORDER
                                                        ;SHOULD BE: INTER3>INTER4>INTER1>INTER2
                                                        ;IF ADDR=0 THAN NOT UNDER TEST
001360  011003                  DH4                     ;ERROR  INTER1  INTER2  INTER3  INTER4
                                                        ;PC     ADDR    ADDR    ADDR    ADDR
001362  007564                  DT4                     ;$ERRAD, $REG0, $REG1, $REG2, $REG3
001364  000000                  DF1

                                ;ITEM 7         ERCSR   ;FROM CSR INT TEST

001366  010171                  EM7                     ;INT FAILED TO CLEAR INTR, ENABLE BIT
                                                        ;ADDR SHOWS INPUT MODULE THAT INTERRUPTED
001370  011102                  DH5                     ;ERROR  ADDR
                                                        ;PC     INTR
001372  007600                  DT5                     ;$ERRAD $TMP0
001374  000000                  DF1                     ;0

                                ;ITEM 10                 CONTROL TEST MONITOR ERROR

001376  010247                  EM11                    ;NO CONNECTIONS MADE
001400  011137                  DH7                     ;PROGRAM NOT RUNNING
001402  000000                  DT6                     ;0
001404  000000                  DF1                     ;0

                                ;ITEM 11                 CONTROL TEST MONITOR ERROR

001406  010275                  EM12                    ;NO INPUT MODULE ADDR ENTERED
001410  011137                  DH7                     ;PROGRAM NOT RUNNING
001412  000000                  DT6                     ;0
001414  000000                  DF1                     ;0

                                ;ITEM 12                         CONTROL TEST MONITOR ERROR

001416  010335                  EM13                    ;NO OUTPUT MODULE ADDR ENTERED
001420  011137                  DH7                     ;PROGRAM NOT RUNNING
001422  000000                  DT6                     ;0
001424  000000                  DF1                     ;0

                                ;ITEM 13                         CONTROL TEST MONITOR ERROR

001426  010376                  EM14                    ;VECTOR ADDR NOT ENTERED FOR SELECTED CONNECTION
001430  011137                  DH7                     ;PROGRAM NOT RUNNING
001432  000000                  DT6                     ;0
001434  000000                  DF1                     ;0
```

```
330                                                    ;ITEM 14          CONTROL TEST MONITOR FAILURE
331
332   001436  011176                                   MCRLF             ;CARRAGE RETURN LINE FEED
333   001440  011536                                   UNKIN=            ;WRONG INPUT-RETYP IT SO THAT OPERATOR
334   001442  000000                                   DI6               ; 0  CAN SEE HIS MISTAKE
335   001444  000000                                   DF1               ; 0
336
```

```
                                        .SBTTL          TESTS
                                                        ;START UP ROUTINE FOR SUBTESTS
001446  012706  001100          START:  MOV     #1100,  SP      ;SET UP SP
001452  012701  004270                  MOV     #MOD5C, R1
001456  005721                  1$:     TST     (1)+            ;SEE IF ANY CONNECTIONS
001460  001006                          BNE     START1
001462  020127  004300                  CMP     R1,     #MOD8C+2
001466  001373                          BNE     1$
                                                                ;NO CONNECTIONS MADE
                                                                ;WE CAN'T START-LET HIM KNOW
001470  104010                          ERROR 10                ;MESSAGE "NO CONNECTIONS ;MADE"
                                                                ;"PROGRAM NOT RUNNING"
001472  000137  005542                  JMP     STAR
001476  005737  004240          START1: TST     MOD1A           ;SEE IF WE HAVE INPUT MODULE ADDRS,
001502  001003                          BNE     START2          ;CAN'T START IF WE DON'T

001504  104011                          ERROR 11                ;NO INPUT MODULE ADDRS
                                                                ;PROGRAM NOT RUNNING
001506  000137  005542                  JMP     STAR

001512  005737  004250          START2: TST     MOD5A           ;SEE IF OUTPUT MODULE ADDR,
001516  001003                          BNE     START3          ;HAS BEEN ENTERED
                                                                ;MESSAGE "NO OUTPUT MODULE ADDRS
001520  104012                          ERROR 12                ;ENTERED"
                                                                ;"PROGRAM NOT RUNNING"
001522  000137  005542                  JMP     STAR

001526  005737  004260          START3: TST     MOD1V           ;SEE IF WE HAVE VECTORS ENTERED
001532  001006                          BNE     START4
001534  005737  004270                  TST     MOD5C           ;NO VECTOR ENTERED, BUT MIGHT NOT BE
001540  001403                          BEQ     START4          ;CONNECTED
001542  104013                          ERROR 13                ;MESSAGE "NO VECTOR ADDRESS ENTERED"
001544  000137  005542                  JMP     STAR
001550  005737  004264          START4: TST     MOD3V           ;IS VECTOR ENTERED
001554  001006                          BNE     START5          ;FOR SECOND GROUP
001556  005737  004274                  TST     MOD7C           ;IF NOT, SEE IF CONNECTED
001562  001403                          BEQ     START5          ;IS CONNECTED, BUT NOT VECTOR ENTERED
001564  104013                          ERROR   13
001566  000137  005542                  JMP     STAR

001572  005037  004330          START5: CLR     CFLG            ;ALL NECESSARY INFORMATION HAS BEEN ENTERED
001576  005737  001216                  TST     @PASS           ;READY TO GO, SEE IF WE TYPE
001602  001005                          BNE     1$              ;MESSAGE RUNNING-ONLY ONE FIRST
001604  105737  001107                  TSTB    @TPFLG          ;PASS AND ONLY IF WE HAVE A TERMINAL
001610  001002                          BNE     1$
001612  104400                          TYPE
001614  011406                          MRUN
001616  012703  004260          1$:     MOV     #MOD1V, R3      ;INITIALIZATION OF CONNECTIONS
001622  012705  004270                  MOV     #MOD5C, R5      ;AND VECTORS FOR START
001626  012704  004250                  MOV     #MOD5A, R4
```

F2

```
                                        ;*****************
                                        ;THIS HANDLER WILL FORM TEST ADDRESSES
                                        ;AND SEND PROGRAM TO ALL SINGLE LINE TESTS
                                        ;UNTIL ALL CONNECTIONS HAVE BEEN TESTED
                                        ;*****************
001632  020527  004300          SINGLE: CMP     R5,     #MOD8C+2 ;DONE ALL CONNECTIONS?
001636  001417                  BEQ     SINGLF          ;IF YES,GOTO DUAL ADDR TESTING
001640  012437  001242          MOV     (4)+,   $GDADR  ;GET OUTPUT MODULE ADDR
001644  013537  001244          MOV     @(5)+,  $BDADR  ;GET INPUT MODULE ADDR
001650  001770                  BEQ     SINGLE          ;IF NO CONNECTION THEN GET NEW ADDR.
001652  013700  001244          MOV     $BDADR,R0       ;NOW GET VECTOR ADDRESS !
001656  042700  177770          BIC     #177770,R0      ;FORM OFFSET
001662  062700  004260          ADD     #MOD1V,R0       ;USE OFFSET TO GET VECTOR
001666  011037  004300          MOV     (0),VECTOR      ;STORE VECTOR
001672  000137  001702          JMP     DATASC          ;GOTO TO DATA TESTS
001676  000137  003064          SINGLF: JMP     DUAL1           ;GOTO DUAL TESTS

                                        ;*****************
                                        ;DATA TESTS
                                        ;PART 1: COUNT PATTERN (UP)
                                        ;*****************

001702  005037  004500          DATASC: CLR     NINP
001706  012737  001706  001224  1$:     MOV     #1$,$LPADR
001714  013737  004500  001246          MOV     NINP,   $GDDAT  ;GET DATA TO SEND TO OUTPUT MODULE
001722  013777  001246  177312          MOV     $GDDAT,@$GDADR  ;SEND DATA TO OUT PUT MODULE
001730  017737  177310  001250          MOV     @$BDADR, $BDDAT ;GET DATA FROM INPUT MODULE
001736  005137  001246                  COM     $GDDAT          ;EXP'D = COMPLIEMT OF SENT DATA
001742  023737  001246  001250          CMP     $GDDAT, $BDDAT  ;DATA SENT = DATA RECIEVED?
001750  001401                  BEQ     .+4
001752  104001                  ERROR 1                 ;DATA SENT NOT EQUAL TO DATA RECIEVED
                                        ;ITERATE
001754  000004                  SCOPE
001756  005237  004500          INC     NINP            ;COUNT UP FULL
001762  001351                  BNE     1$

                                        ;*****************
                                        ;DATA TESTS
                                        ;PART 2: COUNT PATTERN (DOWN)
                                        ;*****************

001764  012737  001772  001224  DATA1: MOV     #1$,$LPADR
001772  013737  004500  001246  1$:     MOV     NINP,   $GDDAT  ;GET PATTERN
002000  013777  001246  177234          MOV     $GDDAT, @$GDADR ;SEND DATA TO OUTPUT MODULE
002006  017737  177232  001250          MOV     @$BDADR,$BDDAT  ;GET DATA FROM INPUT MODULE
002014  005137  001246                  COM     $GDDAT          ;EXP'D DATA = COMPLIEMT OF DATA SENT
002020  023737  001246  001250          CMP     $GDDAT, $BDDAT  ;DATA EXP'D = DATA RECIEVED ?
002026  001401                  BEQ     .+4             ;IF YES GET NEW DATA WORD

002030  104001                  ERROR 1                 ;DATA EXP'D NOT EQUAL TO DATA RECIEVED
002032  000004                  SCOPE
002034  005337  004500          DEC     NINP            ;COUNT DOWN FULL
002040  001351                  BNE     DATA1
```

```
                                        ;*****************
                                        ;DATA TESTS
                                        ;PART 3: RANDOM NUMBER TEST
                                        ;*****************


002042  012737  002050  001224  DATAR:  MOV     #18,@LPADR
002050  004737  006664          18:     JSR     PC,     $RAND   ;GET A RANDOM NUMBER
002054  013737  007012  001246          MOV     $LONUM, $GDDAT  ;PUT RANDOM NO. IN GDDAT
002062  013777  001246  177152          MOV     $GDDAT, @#GDADR ;SEND RANDOM NO. TO OUTPUT MODULE
002070  017737  177150  001250          MOV     @#BDADR, $BDDAT ;GET DATA FROM INPUT MODULE
002076  005137  001246                  COM     $GDDAT
002102  023737  001246  001250          CMP     $GDDAT, $BDDAT  ;DATA SENT = DATA RECEIVED?
002110  001401                          BEQ     .+4
002112  104001                          ERROR 1                 ;DATA SENT NOT EQUAL TO DATA RECIEVED

                                        ;*****************
                                        ;BYTE OPERATION TEST
                                        ;*****************


002114  000004          DATA0:  SCOPE
002116  005077  177120          CLR     @#GDADR
002122  012737  177400  001246          MOV     #177400,$GDDAT  ;SET UP TO TEST FOR LOW BYTE OPERATION
002130  112777  177777  177104          MOVB    #-1,    @#GDADR ;SEND ALL ONES TO OUTPUT MODULE BUT
002136  017737  177102  001250          MOV     @#BDADR, $BDDAT ;EXPECT ONLY LOW BYTE TO GET THROUGH
                                                                ;JUSTIFY DATA
002144  105737  001250                  TSTB    $BDDAT          ;TEST FOR ZEROS LOW BYTE
002150  001401                          BEQ     .+4
002152  104001                          ERROR 1                 ;FAILED TO DUE A LOW BYTE OPERATION
002154  005137  001246                  COM     $GDDAT          ;SET UP TO TEST HIGH BYTE OPERATION
002160  013700  001242                  MOV     $GDADR,R0
002164  112760  177777  000001          MOVB    #-1,    1(0) ;SEND ONES TO HIGH BYTE
002172  017737  177046  001250          MOV     @#BDADR, $BDDAT ;EXPECT ZERO'S BACK IN LOW BYTE
                                                                ;JUSTIFY DATA
002200  105737  001251                  TSTB    $BDDAT+1                ;TEST FOR ZEROS IN HIGH BYTE
002204  001401                          BEQ     .+4
002206  104001                          ERROR 1                 ;FAILED TO DUE A HIGH BYTE OPERATION

                                        ;*****************
                                        ;THIS ROUTINE MAKE SURE THE INPUT MODULES WILL
                                        ;INTERRUPT, AND TO THE RIGHT VECTOR
                                        ;*****************


002210  000004                  SCOPE
002212  012737  002230  001224          MOV     #SINT,@LPADR
002220  000005                          RESET                   ;INITIALIZE ALL MODULES
002222  052777  000100  001470          BIS     #100,@#TKS
002230  000004          SINT:   SCOPE
002232  012737  000340  177776          MOV     #340,   PSW     ;LOCK OUT INTERRUPTS
002240  012777  002310  002032          MOV     #SINTR, @VECTOR ;SET UP INTERUPT RETURN
002246  013777  005034  001764          MOV     S17,    @MOD1A  ;ENABLE INPUT MODULE TO INTERRUPT
002254  012777  000001  176760          MOV     #1,     @#GDADR ;SEND DATA TO OUTPUT MODULE
```

```
 499  002262  005037  177776                    CLR     PS#             ;ALLOW INTERRUPTS
 500  002266  005000                            CLR     R0
 501  002270  005200                            INC     R0              ;WAIT HERE FOR INTERRUPT
 502  002272  001376                            BNE     .-2
 503  002274  013737  177776  001270            MOV     PSW,    $TMP0
 504  002302  104002                            ERROR 2                 ;INPUT MODULE FAILED TO INTERRUPT AT
 505                                                                     ;PROCESSOR PRIORITY ZERO
 506  002304  000137  002230                    JMP     SINT
 507  002310  022626                  SINTR:    POPSP2                  ;RETURN SP
 508  002312  017737  176726  001270            MOV     @#BDADR,        $TMP0
 509
 510
 511
 512
 513                                             ;*****************
 514                                             ;MAKE SURE INPUT MODULE WILL INTERRUPT WITH
 515                                             ;PROCESSOR PRIORITY AT LEVEL 4
 516                                             ;*****************
 517
 518
 519  002320  000004                  SINT4:    SCOPE
 520  002322  012737  000340  177776            MOV     #340,   PSW     ;LOCK OUT INTERRUPTS
 521  002330  012777  002402  001742            MOV     #SINT4R, @VECTOR ;SET UP INTERRUPT RETURN
 522  002336  013777  005034  001674            MOV     S17,    @MOD1A  ;ENABLE INPUT MODULES TO INTR.
 523  002344  012777  000001  176670            MOV     #1,     @#GDADR ;SEND DATA TO OUTPUT MODULE
 524  002352  012737  000200  177776            MOV     #200,   PSW     ;SET PRIORITY TO LEVAL FOUR
 525  002360  005000                            CLR     R0
 526  002362  005200                            INC     R0              ;WAIT HERE FOR INTERRUPT
 527  002364  001376                            BNE     .-2
 528  002366  012737  000200  001270            MOV     #200,   $TMP0
 529  002374  104002                            ERROR 2                 ;INPUT MODULE FAILED TO INTERRUPT AT
 530                                                                     ;PROCESSOR PRIORITY FOUR
 531  002376  000137  002412                    JMP     SINT5
 532
 533  002402  022626                  SINT4R:   POPSP2                  ;RESET SP
 534  002404  017737  176634  001270            MOV     @#BDADR,        $TMP0
 535
 536
 537                                             ;*****************
 538                                             ;PRIORITY LEVEL FIVE INTERRUPT TEST
 539                                             ;NOTE THAT SOME INPUT MODULES SHOULD INTR
 540                                             ;AT PROCESSOR PRIORITY FIVE AND OTHERS SHOULDN'T
 541                                             ;1ST TWO INPUT MODULES ARE AT LEVEL FIVE AND SHOULDN'T INTR.
 542                                             ;2ND TWO INPUT MODULES ARE AT LEVEL SIX AND SHOULD INTR
 543                                             ;*****************
 544
 545
 546  002412  000004                  SINT5:    SCOPE
 547  002414  005037  004302                    CLR     SFIVE           ;DETERMINE IF CURRENT INPUT
 548  002420  023737  004240  001244            CMP     MOD1A,  @#BDADR ;MODULE SHOULD INTR.
 549  002426  001406                            BEQ     1$
 550  002430  023737  004242  001244            CMP     MOD2A,  @#BDADR
 551  002436  001402                            BEQ     1$
 552  002440  005137  004302                    COM     SFIVE           ;2ND GROUP OF INPUT MODULES
```

```
 553  002444  012737  000240  001270  181      MOV     #240,   $TMP0
 554  002452  012737  000340  177776           MOV     #340,   PSW     ;LOCK OUT INTERRUPTS
 555  002460  012777  002532  001612           MOV     #SINT5R, @VECTOR ;SET UP INTERRUPT RETURN
 556  002466  013777  005034  001544           MOV     S17,    @MOD1A  ;ENABLE INPUT MODULES TO INTERRUPT
 557  002474  012777  000001  176540           MOV     #1,     @#GDADR ;SEND DATA TO OUTPUT MODULE
 558  002502  012737  000240  177776           MOV     #240,   PSW     ;SET PROCESSOR PRIORITY TO LEVEL FIVE
 559  002510  005000                           CLR     R0              ;WAIT HERE FOR AN INTERRUPT
 560  002512  005200                           INC     R0
 561  002514  001376                           BNE     .-2
 562  002516  005737  004302                   TST     $FIVE           ;NO INTERRUPT OCCURED - SHOULD WE
 563  002522  001413                           BEQ     SINT6           ;HAVE ONE?
 564  002524  104002                           ERROR 2                 ;YES, INPUT MODULE AT LEVEL SIX
 565                                                                   ;SHOULD HAVE INTR, WITH PROCESSOR
 566  002526  000137  002552                   JMP     SINT6           ;PRIORITY AT LEVEL 5
 567
 568  002532  022626                  SINT5R:  POPSP2                  ;INTERRUPTED - BUT SHOULD WE HAVE?
 569  002534  017737  176504  001270           MOV     @#BDADR,        $TMP0
 570  002542  005737  004302                   TST     $FIVE
 571  002546  001001                           BNE     SINT6
 572  002550  104003                           ERROR 3                 ;NO - $INPUT MODULE (PRIORITY 5) SHOULD NOT
 573                                                                   ;HAVE INTERRUPTED WITH PROCESSOR
 574                                                                   ;PRIORITY AT LEVEL 5
 575
 576
 577                                          ;*****************
 578                                          ;PRIORTY LEVEL 6 INTERUPT TEST
 579                                          ;NO INPUT MODULES SHOULD INTERRUPT
 580                                          ;WITH PROCESSOR AT THIS LEVEL
 581                                          ;*****************
 582
 583
 584  002552  000004                  SINT6:  SCOPE
 585  002554  012737  000340  177776           MOV     #340,   PSW     ;LOCK OUT INTERRUPTS
 586  002562  012737  000300  001270           MOV     #300,   $TMP0
 587  002570  012777  002310  001502           MOV     #SINTR, @VECTOR ;SET UP INTERRUPT RETURN
 588  002576  013777  005034  001434           MOV     S17,    @MOD1A  ;ENABLE INPUT MODULES TO INTERRUPT
 589  002604  012777  000001  176430           MOV     #1,     @#GDADR ;SEND DATA TO OUTPUT MODULE
 590  002612  013737  001270  177776           MOV     $TMP0,  PSW     ;SET PROCESSOR PRIORITY TO LEVEL 6
 591  002620  005000                           CLR     R0              ;WAIT HERE FOR ANY INTERRUPT
 592  002622  005200                           INC     R0
 593  002624  100376                           BPL     .-2
 594                                                                   ;NO
 595  002626  000137  002644                   JMP     SINT7
 596                                          ;INTERRUPT SERVICE ROUTINE
 597  002632  022626                  SINT6R:  POPSP2                  ;RESET SP
 598  002634  017737  176404  001270           MOV     @#BDADR,        $TMP0
 599  002642  104003                           ERROR 3
 600
 601
 602
 603
 604
 605
 606
```

```
                                                ;*****************
                                                ;PRIORTY LEVEL 7 INTERRUPT TEST
                                                ;NO INPUT MODULES SHOULD INTERRUPT
                                                ;WITH PROCESSOR AT THIS LEVEL
                                                ;*****************

002644  000004          SINT7:  SCOPE
002646  012737  000340  177776          MOV     #340,   PSW     ;LOCK OUT INTERRUPTS
002654  012737  000340  001270          MOV     #340,   $TMP0
002662  012777  002310  001410          MOV     #SINTR, @VECTOR ;SET UP INTERRUPT RETURN
002670  013777  005034  001342          MOV     S17,    @MOD1A  ;ENABLE INPUT MODULES TO INTERRUPT
002676  012777  000001  176336          MOV     #1,     @#GDADR ;SEND DATA TO OUTPUT MODULE
002704  005000                          CLR     R0              ;WAIT HERE FOR ANY INTERRUPT
002706  005200                          INC     R0
002710  100376                          BPL     .-2
                                                                ;NO
002712  000137  002730                  JMP     INIT
002716  022626          SINT7R: POPSP2                          ;RESET SP
002720  017737  176320  001270          MOV     @#BDADR,$TMP0
002726  104003                          ERROR 3

                                                ;*****************
                                                ;INITIALIZATION TEST FOR MODULES
                                                ;*****************

002730  012737  000340  177776  INIT:   MOV     #340,   PSW     ;LOCK OUT INTERRUPTS
002736  012777  003044  001334          MOV     #INITR, @VECTOR ;SET UP FOR POSSIBLE INTERRUPT
002744  012737  177777  001246          MOV     #-1,    $GDDAT  ;SHOULD GET ALL ONES BACK AFTER INITIALIZE
002752  013777  005034  001260          MOV     S17,    @MOD1A  ;ENABLE INPUT MODULE TO INTERRUPT
002760  012777  052525  176254          MOV     #52525, @#GDADR ;SEND DATA TO OUTPUT MODULE
002766  000005                          RESET                   ;SYSTEM INITIALIZE
002770  052777  000100  000722          BIS     #100,@#TKS
002776  017737  176242  001250          MOV     @#BDADR, $BDDAT ;GET DATA FROM INPUT MODULE
003004  023737  001246  001250          CMP     $GDDAT, $BDDAT  ;WAS DATA ALL ONES?
003012  001403                          BEQ     1$
003014  104004                          ERROR 4                 ;INIT FAILED TO INIALIZE MODULES
003016  000137  002730                  JMP     INIT

003022  005037  177776          1$:     CLR     PSW             ;ALLOW INTERRUPTS, SEE IF INPUT
003026  005000                          CLR     R0              ;MODULE INTERRUPTS - IT SHOUDN'T
003030  105200                          INCB    R0              ;INTIALIZE SHOULD HAVE CLEARED
003032  100376                          BPL     .-2             ;INTERRUPT ENABLE BITS
003034  010177  001240                  MOV     R1,     @VECTOR
003040  000137  001632                  JMP     SINGLE          ;GO BACK AND PICK-UP NEW CONNECTION
                                                ;INTERRUPT HANDLE
003044  022626          INITR:  POPSP2                          ;RESET SP
003046  017737  176172  001270          MOV     @#BDADR,$TMP0
003054  104007                          ERROR 7                 ;RESET (SYSTEM INITIALIZE) FAILED
003056  000004                          SCOPE                   ;TO CLEAR INTERRUPT ENABLE BIT IN
003060  000137  001632                  JMP SINGLE              ;CSR (FOR THIS INPUT MODULE)
```

```
                                        ;*****************
                                        ;DUAL ADDRESS TEST FOR ALL
                                        ;CONNECTED MODULES
                                        ;*****************


003064  012737  003072  001224  DUAL1:  MOV     #DUAL,  $LPADR
003072  012701  004270          DUAL:   MOV     #MOD5C, R1      ;GET LIST OF CONNECTIONS
003076  012702  004250                  MOV     #MOD5A, R2      ;GET LIST OF OUTPUT MODULES
003102  005711                  18:     TST     (1)             ;CONNECTION EXIT?
003104  001403                          BEQ     2$              ;NO
003106  017172  000000  000000          MOV     @(1),   @(2)    ;MOV ADR OF INPUT MODULE TO OUTPUT MODULE
003114  005722                  28:     TST     (2)+            ;UPDATE POINTERS
003116  005721                          TST     (1)+
003120  020127  004300                  CMP     R1,#MOD8C+2     ;CHECK FOR END OF LIST
003124  001366                          BNE     1$

003126  012701  004270          DUAL1:  MOV     #MOD5C, R1      ;GET POINTER LIST AGAIN
003132  012702  004250                  MOV     #MOD5A, R2
003136  017137  000000  001242  18:     MOV     @(1),   $GDADR  ;GET ADDR OF INPUT MODULE IF EXISTANT
003144  001413                          BEQ     2$
003146  011237  001270                  MOV     (2),    $TMP0   ;GET ADDR OF OUTPUT MODULE
003152  017737  176064  001244          MOV     @$GDADR,$BDADR  ;GET DATA FROM INPUT MODULE
003160  005137  001244                  COM     $BDADR          ;JUSTIFY DATA
003164  023737  001242  001244          CMP     $GDADR, $BDADR  ;DATA RECIEVED IN INPUT MODULE SHOULD BE
003172  001007                          BNE     3$              ;ITS OWN ADDRESS
003174  005721                  28:     TST     (1)+            ;UPDATE POINTERS
003176  005722                          TST     (2)+
003200  020127  004300                  CMP     R1,     #MOD8C+2 ;END OF LIST?
003204  001354                          BNE     1$
003206  000137  003214                  JMP     AINT            ;YES, EXIT
003212  104005                  38:     ERROR 5                 ;ERROR - SENT ADDRESS OF ALL INPUT MODULES
                                                                ;TO RESPECTIVE OUTPUT MODULES - BUT DIDN'T RECIEVE
                                                                ;CORRESPONDING ADDRESS FROM INPUT MODULE


                                        ;*****************
                                        ;THIS ROUTINE CHECKS THE ORDER IN WHICH WE RECIEVE
                                        ;INTERRUPTS BACK FROM ALL MODULES
                                        ;*****************

003214  000004          AINT:   SCOPE
003216  012704  004304          MOV     #INTPO,R4
003222  005024          108:    CLR     (4)+
003224  020427  004314          CMP     R4,     #INTPO+10
003230  001374                  BNE     10$
003232  012737  000340  177776  MOV     #340,   PSW     ;LOCK OUT INTERRUPTS
003240  012702  004250          MOV     #MOD5A, R2      ;GET OUTPUT MODULE POINTER
003244  012703  004270          MOV     #MOD5C, R3      ;GET CONNECTION POINTER
003250  013777  005034  000762  MOV     $17,    @MOD1A  ;ENABLE INPUT MODULES TO INTERRUPT
003256  012704  004304          MOV     #INTPO, R4      ;SET UP TO STORE ORDER OF INTERRUPTS
003262  012705  004316          MOV     #INTPO1, R5     ;SETUP TO STORE VALUE OF INTERRUPT
003266  013700  004260          MOV     MOD1V,R0        ;SET UP INTERUPT SERVICE ROUTINES
003272  012720  003476          MOV     #INTRS1,(0)+
```

```
   715  003276  012720  000340                MOV     #340,   (0)+    ;LOCK OUT INTERRUPTS WHILE IN SERVICE ROUTINE
   716  003302  012720  003510                MOV     #INTRS2,(0)+
   717  003306  012710  000340                MOV     #340,   (0)
   718  003312  013700  004264                MOV     MOD3V,  R0      ;THE INTERRUPT SERV. ROUTINE WILL
   719  003316  012720  003522                MOV     #INTRS3,(0)+    ;ASSIGN A NUMBER AND STORE ON A STACK
   720  003322  012720  000340                MOV     #340,   (0)+    ;SO WE CAN DETERMINE LATER THE
   721  003326  012720  003534                MOV     #INTRS4,(0)+    ;ORDER THE INTERRUPTS CAME IN
   722  003332  012710  000340                MOV     #340,   (0)
   723  003336  005037  000000                CLR     0               ;SURE WE CLEAR LOCATION ZERO.
   724
   725  003342  005713                  18$:  TST     (3)             ;DOES CONNECTION EXIST?
   726  003344  001403                        BEQ     28
   727  003346  017372  000000  000000        MOV     @(3),   @(2)    ;SEND INPUT MODULES ADDR TO OUTPUT MODULE
   728  003354  005723                  28$:  TST     (3)+            ;UPDATE POINTERS
   729  003356  005722                        TST     (2)+
   730  003360  020227  004260                CMP     R2,     #MOD0A+2 ;AT END OF LIST?
   731  003364  001366                        BNE     18
   732  003366  005037  177776                CLR     PSW             ;NOW ALLOW THE WORLD TO INTR.
   733  003372  005000                        CLR     R0              ;MAKE SURE TO ALLOW PLENTY OF
   734  003374  005200                        INC     R0              ;TIME FOR EVERYONE
   735  003376  001376                        BNE     .-2
   736  003400  000005                        RESET                   ;TIMES-UP EVERYBODY SOULD BE
   737  003402  052777  000100  000310        BIS     #100,@#TKS
   738                                                                ;DONE
   739  003410  012704  004302                MOV     #INTPO-2,R4
   740  003414  005724                  38$:  TST     (4)+
   741  003416  021464  000002                CMP     (4),    2(4)    ;FIRST < SECOND
   742  003422  002403                        BLT     48
   743  003424  005764  000002                TST     2(4)            ;WASN'T, BUT WAS IT A NON-EXSISTANT INTR.?
   744  003430  001005                        BNE     AINTER
   745  003432  020427  004310          48$:  CMP     R4,#INTPO+4     ;END OF LIST?
   746  003436  001366                        BNE     38
   747  003440  000137  005762                JMP     @EOP
   748
   749  003444  012705  004316        AINTER: MOV     #INTPO1, R5     ;ERROR OCCURED - SETUP FOR TXPEQUT
   750  003450  012537  001254                MOV     (5)+,   @REG0
   751  003454  012537  001256                MOV     (5)+,   @REG1
   752  003460  012537  001260                MOV     (5)+,   @REG2
   753  003464  012537  001262                MOV     (5)+,   @REG3
   754
   755  003470  104006                        ERROR   6               ;MODULES INTERRUPTED OUT OF SEQUENCE
   756                                                                ;SHOULD BE (1) INPUT MODULE3, (2) INPUT MODULE4,
   757  003472  000137  005762                JMP     @EOP            ;(3) INPUT MODULE1, (4) INPUT MODULE2
   758                                                                ;
   759                                                        ;INTERRUPT SERVICE ROUTINE FOR FIRST INPUT MODULE
   760  003476  013725  004240        INTRS1: MOV     MOD1A,  (5)+    ;STORE ADDRESS ON STACK
   761  003502  012724  000003                MOV     #3,     (4)+    ;STORE INTERRUPT VALUE ON STACK
   762  003506  000002                        RTI
   763
   764  003510  013725  004242        INTRS2: MOV     MOD2A,  (5)+
   765  003514  012724  000004                MOV     #4,     (4)+
   766  003520  000002                        RTI
   767
   768  003522  013725  004244        INTRS : MOV     MOD3A,  (5)+
```

```
 769  003526  012724  000001                    MOV     #1,     (4)+
 770  003532  000002                            RTI
 771
 772  003534  013725  004246          INTRS4:   MOV     MOD4A,  (5)+
 773  003540  012724  000002                    MOV     #2,     (4)+
 774  003544  000002                            RTI
 775
 776
 777                                            ;****************
 778                                            ;END OF TESTS
 779                                            ;****************
 780                            .SBTTL          HANDLERS
 781  003546  117777  000150  005760  TTYIN:    MOVB    @#TKB,  @TTYINP ;STORE INPUT
 782  003554  142777  000200  005752            BICB    #200,   @TTYINP ;MASK FOR STANDARD INPUT
 783  003562  122777  000003  005744            CMPB    #3,     @TTYINP ;CHECK FOR ^C
 784  003570  001004                            BNE     .+12
 785  003572  104400                            TYPE
 786  003574  011167                            MCONC
 787  003576  000137  005542                    JMP     STAR
 788  003602  122777  000022  005724            CMPB    #22,    @TTYINP ;CHECK FOR ^R
 789  003610  001002                            BNE     .+6             ; IF ^R THEN TYPE RUN SUMMARY
 790  003612  000137  005476                    JMP     SUM
 791  003616  122777  000177  005710            CMPB    #177,   @TTYINP ;CHECK FOR RUBOUT
 792  003624  001002                            BNE     .+6
 793  003626  000137  003724                    JMP     RUBH
 794  003632  005737  003776                    TST     RUBF            ;NOT RUBOUT, BUT WAS FORMER A RUBOUT?
 795  003636  001404                            BEQ     .+12
 796  003640  005037  003776                    CLR     RUBF
 797  003644  104400                            TYPE
 798  003646  011174                            MBS
 799  003650  117737  005660  005474            MOVB    @TTYINP,MAP1
 800  003656  104400                            TYPE
 801  003660  005474                            MAP1
 802  003662  122777  000015  005644            CMPB    #15,    @TTYINP
 803  003670  001010                            BNE     1$
 804  003672  012737  011537  011534            MOV     #TTYINB-1,TTYINP ;DON'T GO TO DECODER IF
 805  003700  005737  004330                    TST     CFLG            ;NOT IN COMMAND MODE
 806  003704  001402                            BEQ     1$
 807  003706  012716  004030                    MOV     #DESIFR,(6)     ;SET UP TO GO TO DECODER ROUTINE
 808  003712  005237  011534          1$:       INC     TTYINP
 809  003716  000002                            RTI
 810
 811  003720  177560                  $TKS:     177560
 812  003722  177562                  $TKB:     177562
 813
 814  003724  022737  011540  011534  RUBH:     CMP     #TTYINB,TTYINP  ;AT BEGINNING OF BUFFER?
 815  003732  001002                            BNE     .+6
 816  003734  000137  005542                    JMP     STAR
 817  003740  005737  003776                    TST     RUBF            ;FLAG SET?
 818  003744  001404                            BNE     .+12
 819  003746  005137  003776                    COM     RUBF
 820  003752  104400                            TYPE                    ;NO, PRINT A SLASH
 821  003754  011174                            MBS
 822  003756  005337  011534                    DEC     TTYINP
```

A3

```
823  003762  117737  005546  005474          MOVB    @TTYINP,MAP1
824  003770  104400                          TYPE
825  003772  005474                          MAP1
826  003774  000002                          RTI
827  003776  000000                  RUBF:   000000
828
829                                          ;THIS ROUTINE CHECKS TO SEE IF INPUT WAS A NUMBER
830
831  004000  127727  005530  000057  NUMBER: CMPB    @TTYINP,#57     ;SEE IF INPUT IS A NUMBER
832  004006  002406                          BLT     .+16
833  004010  127727  005520  000071          CMPB    @TTYINP,#71
834  004016  003002                          BGT     .+6
835  004020  000262                          SEV                     ;SET V BIT IF WAS A NUMBER
836  004022  000207                          RTS PC
837  004024  000242                          CLV
838  004026  000207                          RTS PC
839
840
841                                          ;COMMAND DECODER
842
843  004030  052737  000340  177776  DESIFR: BIS     #340,   PSW     ;LOCK OUT INTERRUPTS
844  004036  104400                          TYPE
845  004040  011176                          MCRLF
846  004042  122777  000101  005464          CMPB    #101,   @TTYINP ;SEE IF THE WANTED TO INPUT ADDRESS "A"
847  004050  001002                          BNE     .+6
848  004052  000137  004332                  JMP     INADR
849  004056  122777  000126  005450          CMPB    #126,   @TTYINP ;SEE IF HE WANTED TO INPUT VECTOR "V"
850  004064  001002                          BNE     .+6
851  004066  000137  004660                  JMP     INVET
852  004072  122777  000106  005434          CMPB    #106,   @TTYINP ;SEE IF HE WANTED NORMAL CONNECTIONS "F"
853  004100  001002                          BNE     .+6
854  004102  000137  005036                  JMP     INNOR
855  004106  122777  000104  005420          CMPB    #104,   @TTYINP ;SEE IF HE WANTED TO DISCONNECT "D"
856  004114  001002                          BNE     .+6
857  004116  000137  005100                  JMP     INUNC
858  004122  122777  000115  005404          CMPB    #115,   @TTYINP ;SEE IF WANTED A MAP "M"
859  004130  001002                          BNE     .+6
860  004132  000137  005334                  JMP     INMAP
861  004136  122777  000123  005370          CMPB    #123,   @TTYINP ;SEE IF HE WANTED TO START TESTING "S"
862  004144  001002                          BNE     .+6
863  004146  000137  001446                  JMP     START
864  004152  004737  004000                  JSR     PC,     NUMBER  ;SEE IF HE WANTS TO CONNECT TWO MODULES
865  004156  102002                          BVC     .+6
866  004160  000137  005130                  JMP     SINCO
867
868
869                                          ;
870                                          ;UNKNOWN INPUT - TELL HIM
871                                          ;
872
873  004164  005737  011534          UNKINP: TST     TTYINP
874  004170  112777  000040  005336          MOVB    #40,    @TTYINP ;TYPE SPACE
875  004176  005237  011534                  INC     TTYINP
876  004202  112777  000077  005324          MOVB    #77,    @TTYINP ;TYPE "?"
```

```
 877  004210  005237  011534                  INC     TTYINP
 878  004214  105077  005314                  CLRB    @TTYINP          ;TERMINATOR
 879
 880  004220  104014                          ERROR 14                 ;UNKNOWN INPUT FROM OPERATOR
 881
 882  004222  000137  005542                  JMP     START            ;EXIT
 883
 884
 885  004226  032737  000001  004500  ODDADR: BIT     #1,     NINP     ;IS IT AN ODD ADR?
 886  004234  001353                          BNE     UNKINP
 887  004236  000207                          RTS     PC
 888
 889
 890                                          ;MAP OF MODULES
 891
 892  004240  164000                  MOD1A:  164000                   ;ADDR OF INPUT MODULES
 893  004242  164002                  MOD2A:  164002
 894  004244  164004                  MOD3A:  164004
 895  004246  164006                  MOD4A:  164006
 896  004250  164010                  MOD5A:  164010                   ;ADDR OF OUTPUT MODULES
 897  004252  164012                  MOD6A:  164012
 898  004254  164014                  MOD7A:  164014
 899  004256  164016                  MOD8A:  164016
 900  004260  000170                  MOD1V:  000170                   ;VECTOR OF INPUT MODULES
 901  004262  000174                  MOD2V:  000174
 902  004264  000270                  MOD3V:  000270
 903  004266  000274                  MOD4V:  000274
 904  004270  000000                  MOD5C:  000000                   ;STATUS OF OUTPUT MODULES
 905  004272  000000                  MOD6C:  000000
 906  004274  000000                  MOD7C:  000000
 907  004276  000000                  MOD8C:  000000
 908  004300  000000                  VECTOR: 000000
 909  004302  000000                  SFIVE:  000000
 910  004304  000000                  INTPO:  000000
 911          004316                          .=.+10
 912  004316  000000                  INTPO1: 000000
 913          004330                          .=.+10
 914  004330  000000                  CFLG:   000000                   ;INDICATES SOFTWARE MODE
 915
 916
 917                                          ;INPUT ADDRESS DECODER
 918
 919  004332  005237  011534          INADR:  INC     TTYINP
 920  004336  122777  000111  005170          CMPB    #111,   @TTYINP ;INPUT MODULE ADDRS? "I"
 921  004344  001002                          BNE     .+6
 922  004346  000137  004504                  JMP     INADRI
 923  004352  122777  000117  005154          CMPB    #117,   @TTYINP ;OUTPUT MODULE ADDRS? "O"
 924  004360  001002                          BNE     .+6
 925  004362  000137  004572                  JMP     INADRO
 926  004366  000137  004164                  JMP     UNKINP           ;UNKNOWN INPUT
 927
 928                                          ;THIS ROUTINE INPUTS A NUMBER
 929
 930  004372  005037  004500          INUMB:  CLR     NINP             ;CLR NUMBER
```

```
   931  004376  062737  000002  011534          ADD     #2,     TTYINP  ;UPDATE POINTER
   932  004404  004737  004000          18:     JSR     PC,     NUMBER  ;SEE IF ITS A NUMBER
   933  004410  102407                          BVS     28              ;V BIT SET IF IT WAS
   934  004412  122777  000015  005114          CMPB    #15,    @TTYINP ;CARRIAGE RETURN?
   935  004420  001001                          BNE     .+4
   936  004422  000207                          RTS     PC              ;EXIT
   937  004424  000137  004164                  JMP     UNKINP          ;UNKNOWN INPUT
   938  004430  000241                  28:     CLC
   939  004432  006137  004500                  ROL     NINP
   940  004436  006137  004500                  ROL     NINP
   94.  004442  006137  004500                  ROL     NINP
   942  004446  117737  005062  004502          MOVB    @TTYINP,NINPT   ;TEMP STORAGE OF NUMBER
   943  004454  042737  177760  004502          BIC     #177760,NINPT
   944  004462  063737  004502  004500          ADD     NINPT,  NINP    ;ADD NUMBER
   945  004470  005237  011534                  INC     TTYINP
   946  004474  000137  004404                  JMP     18
   947
   948  004500  000000                  NINP:   000000
   949  004502  000000                  NINPT:  000000
   950
   951
   952                                          ;THIS ROUTINE SETS ADDRS OF INPUT MODULES
   953
   954  004504  004737  004372          INADRI: JSR     PC,     INUMB   ;INPUT ADDRESS
   955  004510  004737  004226          NTF0:   JSR     PC,     ODDADR  ;SEE IF ODD ADR
   956  004514  013737  004500  004240          MOV     NINP,   MOD1A   ;SET INPUT MODULES ADDRESS
   957  004522  062737  000002  004500          ADD     #2,     NINP
   958  004530  013737  004500  004242          MOV     NINP,   MOD2A
   959  004536  062737  000002  004500          ADD     #2,     NINP
   960  004544  013737  004500  004244          MOV     NINP,   MOD3A
   961  004552  062737  000002  004500          ADD     #2,     NINP
   962  004560  013737  004500  004246          MOV     NINP,   MOD4A
   963  004566  000137  005542                  JMP     STAR            ;EXIT
   964
   965
   966                                          ;THIS ROUTINE SETS ADDRESS OF OUTPUT MODULES
   967
   968  004572  004737  004372          INADRO: JSR     PC,     INUMB   ;INPUT ADDRESS
   969  004576  004737  004226          NTF1:   JSR     PC,     ODDADR  ;SEE IF ODD ADDRESS
   970  004602  013737  004500  004250          MOV     NINP,   MOD5A
   971  004610  062737  000002  004500          ADD     #2,     NINP
   972  004616  013737  004500  004252          MOV     NINP,   MOD6A
   973  004624  062737  000002  004500          ADD     #2,     NINP
   974  004632  013737  004500  004254          MOV     NINP,   MOD7A
   975  004640  062737  000002  004500          ADD     #2,     NINP
   976  004646  013737  004500  004256          MOV     NINP,   MOD8A
   977  004654  000137  005542                  JMP     STAR            ;EXIT
   978
   979                                          ;THIS ROUTINE SETS VECTOR ADDRESSES
   980
   981  004660  005237  011534          INVET:  INC     TTYINP          ;UPDATE POINTER
   982  004664  005037  005024                  CLR     INVETT
   983  004670  004737  004000                  JSR     PC,     NUMBER  ;SEE IF NUMBER FOLLOWS
   984  004674  102402                          BVS     18
```

```
  985  004676  000137  004164                    JMP     UNKINP
  986  004702  117737  004626  005024  18:       MOVB    @TTYINP,INVETT  ;TEMP STORAGE OF WHICH VECTORS
  987  004710  004737  004372                    JSR     PC,     INUMB   ;GET ADDRESS
  988  004714  004737  004226          NTF3B:    JSR     PC,     ODDADR  ;SEE IF ODD ADRESS
  989  004720  162737  000001  005024            SUB     #1,     INVETT
  990  004726  032737  177000  004500            BIT     #177000,NINP    ;SEE IF LEGAL VECTOR ADDR,
  991  004734  001402                            BEQ     .+6
  992  004736  000137  004164                    JMP     UNKINP          ;NO, NUMBER LARGER THAN 376
  993  004742  042737  000176  005024            BIC     #176,   INVETT  ;ZERO OF ONE
  994  004750  000241                            CLC
  995  004752  006137  005024                    ROL     INVETT
  996  004756  006137  005024                    ROL     INVETT
  997  004762  062737  004260  005024            ADD     #MOD1V, INVETT  ;SET POINTER TO STORAGE OF VECTOR
  998  004770  013777  004500  000026            MOV     NINP,   @INVETT ;STORE VECTOR ADDRESS
  999  004776  062737  000002  005024            ADD     #2,     INVETT
 1000  005004  062737  000004  004500            ADD     #4,     NINP
 1001  005012  013777  004500  000004            MOV     NINP,   @INVETT
 1002  005020  000137  005542                    JMP     STAR
 1003  005024  000000                  INVETT:   000000
 1004  005026  000000                  INVET2:   000000
 1005  005030  000000                  S15:      000000                  ;TEMP STORAGE
 1006  005032  000000                  S16:      000000                  ;TEMP STORAGE
 1007  005034  000000                  S17:      000000                  ;INTR, ENABLE BITS TO SEND TO KIT H
 1008
 1009
 1010                                            ;THIS ROUTINE MAKES NORMAL CONNECTIONS
 1011
 1012  005036  012737  004240  004270  INNOR:    MOV     #MOD1A, MOD5C   ;MOD ADDR OF LOCATION THAT
 1013                                                                    ;CONTAIN ADDR OF INPUT MODULE TO
 1014  005044  012737  004242  004272            MOV     #MOD2A, MOD6C   ;OUTPUT MODULES STATUS WORD (MEMORY)
 1015  005052  012737  004244  004274            MOV     #MOD3A, MOD7C
 1016  005060  012737  004246  004276            MOV     #MOD4A, MOD8C
 1017  005066  012737  000017  005034            MOV     #17,    S17
 1018  005074  000137  005542                    JMP     STAR
 1019
 1020
 1021                                            ;THIS ROUTINE UNCONNECTS MODULES
 1022
 1023  005100  005037  004270          INUNC:    CLR     MOD5C
 1024  005104  005037  004272                    CLR     MOD6C
 1025  005110  005037  004274                    CLR     MOD7C
 1026  005114  005037  004276                    CLR     MOD8C
 1027  005120  005037  005034                    CLR     S17
 1028  005124  000137  005542                    JMP     STAR
 1029
 1030
 1031                                            ;THIS ROUTINE CONNECTS TWO MODULES
 1032
 1033  005130  117737  004400  005024  SINCO:    MOVB    @TTYINP,INVETT  ;STORE INPUT MODULE # (1-4)
 1034  005136  042737  177760  005024            BIC     #177760,INVETT
 1035  005144  123727  005024  000004            CMPB    INVETT, #4      ;SEE IF ILLEGAL
 1036  005152  003011                            BGT     16
 1037  005154  005337  005024                    DEC     INVETT
 1038  005160  100406                            BMI     16
```

```
1039  005162  005237  011534                  INC     TTYINP
1040  005166  122777  000074  004340          CMPB    #74,    @TTYINP ;SHOULD GET "<"
1041  005174  001402                          BEQ     .+6
1042  005176  000137  004164          18$     JMP     UNKINP          ;UNKNOWN INPUT
1043  005202  005237  011534                  INC     TTYINP
1044  005206  013737  005024  005032          MOV     INVETT, S16     ;SET INTR, ENABLE BITS OF ONLY
1045  005214  005037  005030                  CLR     S15             ;THOSE MODULES THAT WERE SELECTED
1046  005220  000261                          SEC
1047  005222  006137  005030          28$     ROL     S15             ;FORM ENABLE BIT BY NUMBER OF
1048  005226  005337  005032                  DEC     S16             ;INPUT MODULE SELECTED
1049  005232  100373                          BPL     28
1050  005234  053737  005030  005034          BIS     S15,S17
1051  005242  004737  004000                  JSR     PC,     NUMBER  ;CHECK FOR NUMBER
1052  005246  117737  004262  005026          MOVB    @TTYINP,INVET2  ;STORE # OF OUTPUT MODULE (5-8)
1053  005254  042737  177760  005026          BIC     #177760,INVET2
1054  005262  162737  000005  005026          SUB     #5,     INVET2  ;NUMBER CANNOT BE LESS THAN 5
1055  005270  100742                          BMI     18
1056  005272  000241                          CLC
1057  005274  006137  005024                  ROL     INVETT          ;GET ACCUAL ADDR
1058  005300  062737  004240  005024          ADD     #MOD1A, INVETT
1059  005306  000241                          CLC
1060  005310  006137  005026                  ROL     INVET2
1061  005314  062737  004270  005026          ADD     #MOD5C, INVET2
1062  005322  013777  005024  177476          MOV     INVETT, @INVET2 ;DO IT
1063  005330  000137  005542                  JMP     STAR            ;EXIT
1064
1065
1066                                          ;THIS ROUTINE MAPS AVAILABLE INFORMATION
1067
1068  005334  005037  177776          INMAP:  CLR     PSW             ;ALLOWS INTERRUPTS
1069  005340  104400                          TYPE                    ;TYPE MAP HEADER
1070  005342  011234                          MMHD
1071  005344  012737  000261  005474          MOV     #261,   MAP1    ;SET FOR FIRST MODULE
1072  005352  012701  004240                  MOV     #MOD1A, R1
1073  005356  012702  004260                  MOV     #MOD1V, R2
1074  005362  104400          INMAP1: TYPE
1075  005364  011321                          M8SP                    ;TYPE 8S SPACES (CARRIAGE RETURN)
1076  005366  104400                          TYPE
1077  005370  005474                          MAP1                    ;TYPE MODULE NUMBER
1078  005372  104400                          TYPE
1079  005374  011334                          M3SP
1080  005376  012146                          MOV     (1)+,-(SP)              ;SAVE (1)+ FOR TYPEOUT
1081  005400  104402                          TYPOC                   ;GO TYPE--OCTAL ASCII(ALL DIGITS)
1082  005402  104400                          TYPE                    ;TYPE "2SP INPUT 5SP"
1083  005404  011340                          MFUN
1084  005406  012246                          MOV     (2)+,-(SP)              ;SAVE (2)+ FOR TYPEOUT
1085  005410  104402                          TYPOC                   ;GO TYPE--OCTAL ASCII(ALL DIGITS)
1086  005412  005237  005474                  INC     MAP1
1087  005416  022701  004250                  CMP     #MOD5A, R1      ;DONE ALL INPUT MODULES?
1088  005422  001357                          BNE     INMAP1
1089  005424  104400          18$     TYPE
1090  005426  011321                          M8SP
1091  005430  104400                          TYPE
1092  005432  005474                          MAP1
```

```
1093  005434  104400                      TYPE
1094  005436  011334                      M3SP
1095  005440  012146                      MOV     (1)+,-(SP)              ;SAVE (1)+ FOR TYPEOUT
1096  005442  104402                      TYPOC                           ;GO TYPE--OCTAL ASCII(ALL DIGITS)
1097  005444  104400                      TYPE
1098  005446  011355                      MFUNC2                  ;TYPE "2SP"OUTPUT 6SP N/A 2SP"
1099  005450  013246                      MOV     @(2)+,  -(SP)
1100  005452  001401                      BEQ     2$
1101  005454  104402                      TYPOC                           ;TYPE CONNECTION
1102  005456  005237  005474      2$:     INC     MAP1
1103  005462  020127  004260              CMP     R1,     #MOD8A+2
1104  005466  001356                      BNE     1$
1105  005470  000137  005542              JMP     STAR
1106  005474  000000          MAP1:       000000
1107
1108
1109
1110
1111
1112
1113                                      ;
1114                                      ;RUN SUMMARY TYPEOUT ROUTINE
1115                                      ;
1116  005476  104400          SUM1:       TYPE                            ;TYPE HEADER
1117  005500  011440                      MSUM
1118  005502  013746  001216              MOV     $PASS,-(SP)             ;SAVE $PASS FOR TYPEOUT
1119  005506  104402                      TYPOC                           ;GO TYPE--OCTAL ASCII(ALL DIGITS)
1120  005510  104400                      TYPE
1121  005512  011334                      M3SP
1122  005514  013746  001230              MOV     $ERTTL,-(SP)            ;SAVE $ERTTL FOR TYPEOUT
1123  005520  104402                      TYPOC                           ;GO TYPE--OCTAL ASCII(ALL DIGITS)
1124  005522  104400                      TYPE
1125  005524  011176                      MCRLF
1126  005526  005737  004330              TST     CFLG            ;IF IN COMMAND MODE RETURN TO STAR
1127  005532  001402                      BEQ     .+6
1128  005534  000137  005542              JMP     STAR
1129  005540  000002                      RTI                             ;RETURN TO WHAT WE WERE DOING
1130                                      ;MONITOR HOME
1131
1132  005542                  START:
1133  005542  012706  001100              MOV     #STACK,SP               ;SETUP THE STACK POINTER
1134  005546  012737  006034  000020      MOV     #$SCOPE,@#IOTVEC        ;IOT VECTOR FOR SCOPE ROUTINE
1135  005554  012737  000340  000022      MOV     #340,@#IOTVEC+2         ;LEVEL 7
1136  005562  105037  001220              CLRB    $TSTNM                  ;INITIALIZE THE TEST NUMBER
1137  005566  012737  005542  001224      MOV     #START,$LPADR           ;INITIALIZE THE LOOP ADDRESS FOR SCOPE
1138  005574  012737  006212  000030      MOV     #$ERROR,@#EMTVEC                ;EMT VECTOR FOR ERROR(ERROR) ROUTINE
1139  005602  012737  000340  000032      MOV     #340,@#EMTVEC+2         ;LEVEL 7
1140  005610  012737  007014  000034      MOV     #$TRAP,@#TRAPVEC        ;TRAP VECTOR FOR TRAP CALLS
1141  005616  012737  000340  000036      MOV     #340,@#TRAPVEC+2        ;LEVEL 7
1142  005624  012737  007044  000024      MOV     #$PWRDN,@#PWRVEC        ;POWER FAILURE VECTOR
1143  005632  012737  000340  000026      MOV     #340,@#PWRVEC+2         ;LEVEL 7
1144  005640  005037  001216              CLR     $PASS                   ;CLEAR THE PASS COUNT
1145  005644  005037  001222              CLR     $ICNT                   ;INITIALIZE THE ITERATION COUNTER
1146  005650  005037  001300              CLR     $TIMES                  ;INITIALIZE NUMBER OF ITERATIONS
```

```
1147  005654  105037  001221                  CLRB    $ERFLG                  ;CLEAR THE ERROR FLAG
1148
1149  005660  005037  001230                  CLR     $ERTTL
1150  005664  005237  004330                  INC     CFLG            ;SET COMMAND MODE
1151  005670  012737  000340  177776          MOV     #340,   PSW
1152  005676  005037  003776                  CLR     PUBF
1153  005702  012737  011540  011534          MOV     #TTYINB,TTYINP
1154  005710  105737  001107                  TSTB    @TPFLG          ;SEE IF THERE IS A TERMINAL
1155  005714  001402                          BEQ     1$              ;IF YES GO AHEAD NORMALLY
1156  005716  000137  007200                  JMP     NTH             ;IF NOT THEN GO TO NO TERMINAL HANDLER
1157  005722  012737  003546  000060  1$:     MOV     #TTYIN,@#60
1158  005730  012737  000340  000062          MOV     #340,   @#62
1159  005736  005037  177776                  CLR     PSW
1160  005742  104400                          TYPE                    ;TYPE "@"
1161  005744  011402                          MSTAR
1162  005746  052777  000100  175744          BIS     #100,@$TKS
1163  005754  000001                          WAIT                    ;SPEND REST OF TIME HERE
1164  005756  000137  005754                  JMP     .-2
1165
1166                                  ;;*******************************************************************
1167
1168                                  .SBTTL          END OF PASS ROUTINE
1169
1170                                  ;*INCREMENT THE PASS NUMBER
1171                                  ;*IF THERES A MONITOR GO TO IT
1172                                  ;*IF THERE ISN'T JUMP TO START
1173  005762  004737  007500          $EOP:   JSR     PC,EOPT
1174  005766  005037  001220                  CLR     $TSTNM                  ;ZERO THE TEST NUMBER
1175  005772  005037  001300                  CLR     $ITIMES                 ;ZERO THE NUMBER OF ITERATIONS
1176  005776  005237  001216                  INC     $PASS                   ;INCREMENT THE PASS NUMBER
1177  006002  032737                          BIT     (PC)+,@(PC)+            ;LOOP?
1178  006004  000000          $ENDCT: .WORD   0
1179  006006  001216                          $PASS
1180  006010  001007                          BNE     $DOAGN                  ;YUP
1181  006012  013700  000042  $GET42: MOV     @#42,R0                 ;GET MONITOR ADDRESS
1182  006016  001404                          BEQ     $DOAGN                  ;IF NONE
1183  006020  004710          $ENDAD: JSR     PC,(R0)                 ;GO TO MONITOR
1184  006022  000240                          NOP                             ;SAVE ROOM
1185  006024  000240                          NOP                             ;FOR
1186  006026  000240                          NOP                             ;ACT11
1187  006030  000137  001446  $DOAGN: JMP     @#START                 ;RETURN
```

```
1188                                    ;;**********************************************************************
1189
1190                                    .SBTTL          SCOPE HANDLER ROUTINE
1191
1192                                    ;*SW14=1        LOOP ON TEST
1193                                    ;*SW11=1        INHIBIT ITERATIONS
1194                                    ;*THE TEST NUMBER (STSTNM) IS INCREMENTED AND DISPLAYED IN DISPLAY<7:0>
1195                                    ;*AND THE ERROR FLAG (SERFLG) IS DISPLAYED IN DISPLAY<15:08>
1196  006034                            $SCOPE:
1197  006034  006137  177570                   ROL     @#SWR                   ;LOOP ON PRESENT TEST?
1198  006040  100455                           BMI     $OVER                   ;YES IF SW14=1
1199                                    ;*****START OF CODE FOR THE XOR TESTER*****
1200  006042  000416                  $XTSTR: BR      6$                      ;IF RUNNING ON THE "XOR" TESTER CHANGE
1201                                                                            ;THIS INSTRUCTION TO A "NOP" (NOP=240)
1202  006044  013746  000004                   MOV     @#ERRVEC,-(SP)          ;SAVE THE CONTENTS OF THE ERROR VECTOR
1203  006050  012737  006070  000004           MOV     #5$,@#ERRVEC            ;SET FOR TIMEOUT
1204  006056  005737  177060                   TST     @#177060                ;TIME OUT ON XOR?
1205  006062  012637  000004                   MOV     (SP)+,@#ERRVEC          ;RESTORE THE ERROR VECTOR
1206  006066  000436                           BR      $SVLAD                  ;GO TO THE NEXT TEST
1207  006070  022626                  5$:     CMP     (SP)+,(SP)+             ;CLEAR THE STACK AFTER A TIME OUT
1208  006072  012637  000004                   MOV     (SP)+,@#ERRVEC          ;RESTORE THE ERROR VECTOR
1209  006076  000436                           BR      $OVER                   ;LOOP ON THE PRESENT TEST
1210  006100                          6$:     ;*****END OF CODE FOR THE XOR TESTER*****
1211  006100  105737  001221          2$:     TSTB    $ERFLG                  ;HAS AN ERROR OCCURRED?
1212  006104  001404                           BEQ     3$                      ;BR IF NO
1213  006106  105037  001221          4$:     CLRB    $ERFLG                  ;ZERO THE ERROR FLAG
1214  006112  005037  001300                   CLR     $TIMES                  ;CLEAR THE NUMBER OF ITERATIONS TO MAKE
1215  006116  032737  004000  177570  3$:     BIT     #SW11,@#SWR             ;INHIBIT ITERATIONS?
1216  006124  001011                           BNE     1$                      ;BR IF YES
1217  006126  005737  001216                   TST     $PASS                   ;IF FIRST PASS OF PROGRAM
1218  006132  001406                           BEQ     1$                      ;       INHIBIT ITERATIONS
1219  006134  005237  001222                   INC     $ICNT                   ;INCREMENT ITERATION COUNT
1220  006140  023737  001300  001222           CMP     $TIMES,$ICNT            ;CHECK THE NUMBER OF ITERATIONS MADE
1221  006146  002012                           BGE     $OVER                   ;BR IF MORE ITERATION REQUIRED
1222  006150  012737  000001  001222  1$:     MOV     #1,$ICNT                ;REINITIALIZE THE ITERATION COUNTER
1223  006156  013737  006210  001300           MOV     $MXCNT,$TIMES           ;SET NUMBER OF ITERATIONS TO DO
1224  006164  105237  001220          $SVLAD: INCB    $TSTNM                  ;COUNT TEST NUMBERS
1225  006170  011637  001224                   MOV     (SP),$LPADR             ;SAVE SCOPE LOOP ADDRESS
1226  006174  013737  001220  177570  $OVER:  MOV     $TSTNM,@#DISPLAY        ;DISPLAY TEST NUMBER
1227  006202  013716  001224                   MOV     $LPADR,(SP)             ;FUDGE RETURN ADDRESS
1228  006206  000002                           RTI                             ;FIXES PS
1229  006210  000020                  $MXCNT: 20                              ;MAX. NUMBER OF ITERATIONS
1230                                    ;;**********************************************************************
1231
1232                                    .SBTTL          ERROR HANDLER ROUTINE
1233
1234                                    ;*SW15=1        HALT ON ERROR
1235                                    ;*SW13=1        INHIBIT ERROR TYPEOUTS
1236                                    ;*GO TO $ERRTYP ON ERROR
1237  006212                            $ERROR:
1238  006212  004737  007416                   JSR PC,EEDNH
1239  006216  105237  001221          7$:     INCB    $ERFLG                  ;SET THE ERROR FLAG
1240  006222  001775                           BEQ     7$                      ;DON'T LET THE FLAG GO TO ZERO
1241  006224  005237  001230                   INC     $ERTTL                  ;INC THE ERROR COUNT
```

```
1242  006230  011637  001240              MOV     (SP),$ERRAD             ;GET ADDRESS OF ERROR INSTRUCTION
1243  006234  162737  000002  001240      SUB     #2,$ERRAD
1244  006242  117737  172772  001236      MOVB    @$ERRAD,$ITEMB          ;STRIP AND SAVE THE ERROR ITEM CODE
1245  006250  032737  020000  177570      BIT     #SW13,@#SWR             ;SKIP TYPEOUT IF SET
1246  006256  001004                      BNE     2$                      ;SKIP TYPEOUTS
1247  006260  004737  006302              JSR     PC,@#$ERRTYP            ;GO TO USER ERROR ROUTINE
1248  006264  104400  001303              TYPE    ,$CRLF
1249  006270  005737  177570      2$:     TST     @#SWR                   ;HALT ON ERROR
1250  006274  100001                      BPL     3$                      ;SKIP IF CONTINUE
1251  006276  000000                      HALT                            ;HALT ON ERROR!
1252  006300  000002              3$:     RTI
1253                                      ;;*******************************************************************
1254
1255                                      .SBTTL          ERROR MESSAGE TYPEOUT ROUTINE
1256
1257                                      ;*THIS ROUTINE USES THE "ITEM CONTROL BYTE" ($ITEMB) TO DETERMINE WHICH
1258                                      ;*ERROR IS TO BE REPORTED, IT THEN OBTAINS, FROM THE "ERROR TABLE" ($ERRTB),
1259                                      ;*AND REPORTS THE APPROPRIATE INFORMATION CONCERNING THE ERROR.
1260
1261  006302                              $ERRTYP:
1262  006302  104400  001303                      TYPE    ,$CRLF                  ;"CARRIAGE RETURN" & "LINE FEED"
1263  006306  010046                              MOV     R0,-(SP)                ;SAVE R0
1264  006310  005000                              CLR     R0                      ;PICKUP THE ITEM INDEX
1265  006312  153700  001236                      BISB    @#$ITEMB,R0
1266  006316  001004                              BNE     1$                      ;IF ITEM NUMBER IS ZERO ONLY
1267                                                                              ;TYPE THE PC OF THE ERROR
1268  006320  013746  001240                      MOV     $ERRAD,-(SP)            ;SAVE $ERRAD FOR TYPEOUT
1269                                                                              ;ERROR ADDRESS
1270  006324  104402                              TYPOC                           ;GO TYPE--OCTAL ASCII(ALL DIGITS)
1271  006326  000426                              BR      6$                      ;GET OUT
1272  006330  005300              1$:     DEC     R0                      ;ADJUST THE INDEX SO THAT IT WILL
1273  006332  006300                      ASL     R0                      ;       WORK FOR THE ERROR TABLE
1274  006334  006300                      ASL     R0
1275  006336  006300                      ASL     R0
1276  006340  062700  001306              ADD     #$ERRTB,R0              ;FORM TABLE POINTER
1277  006344  012037  006354              MOV     (R0)+,2$                ;PICKUP "ERROR MESSAGE" POINTER
1278  006350  001404                      BEQ     3$                      ;SKIP TYPEOUT IF NO POINTER
1279  006352  104400                      TYPE                            ;TYPE THE "ERROR MESSAGE"
1280  006354  000000              2$:     .WORD   0                       ;"ERROR MESSAGE" POINTER GOES HERE
1281  006356  104400  001303              TYPE    ,$CRLF                  ;"CARRIAGE RETURN" & "LINE FEED"
1282  006362  012037  006372      3$:     MOV     (R0)+,4$                ;PICKUP "DATA HEADER" POINTER
1283  006366  001404                      BEQ     5$                      ;SKIP TYPEOUT IF 0
1284  006370  104400                      TYPE                            ;TYPE THE "DATA HEADER"
1285  006372  000000              4$:     .WORD   0                       ;"DATA HEADER" POINTER GOES HERE
1286  006374  104400  001303              TYPE    ,$CRLF                  ;"CARRIAGE RETURN" & "LINE FEED"
1287  006400  011000              5$:     MOV     (R0),R0                 ;PICKUP "DATA TABLE" POINTER
1288  006402  001004                      BNE     7$                      ;GO TYPE THE DATA
1289  006404  012600              6$:     MOV     (SP)+,R0                ;RESTORE R0
1290  006406  104400  001303              TYPE    ,$CRLF                  ;"CARRIAGE RETURN" & "LINE FEED"
1291  006412  000207                      RTS     PC                      ;RETURN
1292  006414                      7$:
1293  006414  013046                      MOV     @(R0)+,-(SP)            ;SAVE @(R0)+ FOR TYPEOUT
1294  006416  104402                      TYPOC                           ;GO TYPE--OCTAL ASCII(ALL DIGITS)
1295  006420  005710                      TST     (R0)                    ;IS THERE ANOTHER NUMBER?
```

```
1296  006422  001770                        BEQ     6$                      ;BR IF NO
1297  006424  104400  006432                TYPE    ,8$                     ;TYPE TWO(2) SPACES
1298  006430  000771                        BR      7$                      ;LOOP
1299  006432  020040     000        8$:     .ASCIZ  /  /                    ;TWO(2) SPACES
1300          006436                        .EVEN
1301                                ;;*****************************************************************
1302
1303                                .SBTTL          BINARY TO OCTAL (ASCII) AND TYPE
1304
1305                                ;+$TYPOS---ENTER HERE TO SETUP SUPPRESS ZEROS AND NUMBER OF DIGITS TO TYPE
1306                                ;+CALL:
1307                                ;+      MOV     NUM,-(SP)               ;NUMBER TO BE TYPED
1308                                ;+      TYPOS                           ;CALL FOR TYPEOUT
1309                                ;+      .BYTE   N                       ;N=1 TO 6 FOR NUMBER OF DIGITS TO TYPE
1310                                ;+      .BYTE   M                       ;M=1 OR 0
1311                                ;+                                      ;1=TYPE LEADING ZEROS
1312                                ;+                                      ;0=SUPPRESS LEADING ZEROS
1313                                ;+
1314                                ;+$TYPON----ENTER HERE TO TYPE OUT WITH THE SAME PARAMETERS AS THE LAST
1315                                ;+$TYPOS OR $TYPOCT
1316                                ;+CALL:
1317                                ;+      MOV     NUM,-(SP)               ;NUMBER TO BE TYPED
1318                                ;+      TYPON                           ;CALL FOR TYPEOUT
1319                                ;+
1320                                ;+$TYPOCT---ENTER HERE FOR TYPEOUT OF A 16 BIT NUMBER
1321                                ;+CALL:
1322                                ;+      MOV     NUM,-(SP)               ;NUMBER TO BE TYPED
1323                                ;+      TYPOC                           ;CALL FOR TYPEOUT
1324
1325  006436  017646  000000        $TYPOS: MOV     @(SP),-(SP)             ;PICKUP THE MODE
1326  006442  116637  000001  006661        MOVB    1(SP),$OFILL            ;LOAD ZERO FILL SWITCH
1327  006450  112637  006663                MOVB    (SP)+,$OMODE+1          ;NUMBER OF DIGITS TO TYPE
1328  006454  062716  000002                ADD     #2,(SP)                 ;ADJUST RETURN ADDRESS
1329  006460  000406                        BR      $TYPON
1330  006462                        $TYPOCT:
1331  006462  112737  000001  006661        MOVB    #1,$OFILL               ;SET THE ZERO FILL SWITCH
1332  006470  112737  000006  006663        MOVB    #6,$OMODE+1             ;SET FOR SIX(6) DIGITS
1333  006476  112737  000005  006660  $TYPON: MOVB   #5,$OCNT               ;SET THE ITERATION COUNT
1334  006504  010346                        MOV     R3,-(SP)                ;SAVE R3
1335  006506  010446                        MOV     R4,-(SP)                ;SAVE R4
1336  006510  010546                        MOV     R5,-(SP)                ;SAVE R5
1337  006512  113704  006663                MOVB    $OMODE+1,R4             ;GET THE NUMBER OF DIGITS TO TYPE
1338  006516  005404                        NEG     R4
1339  006520  062704  000006                ADD     #6,R4                   ;SUBTRACT IT FOR MAX, ALLOWED
1340  006524  110437  006662                MOVB    R4,$OMODE               ;SAVE IT FOR USE
1341  006530  113704  006661                MOVB    $OFILL,R4               ;GET THE ZERO FILL SWITCH
1342  006534  016605  000012                MOV     12(SP),R5               ;PICKUP THE INPUT NUMBER
1343  006540  005003                        CLR     R3                      ;CLEAR THE OUTPUT WORD
1344  006542  006105                1$:     ROL     R5                      ;ROTATE MSB INTO "C"
1345  006544  000404                        BR      3$                      ;GO DO MSB
1346  006546  006105                2$:     ROL     R5                      ;FORM THIS DIGIT
1347  006550  006105                        ROL     R5
1348  006552  006105                        ROL     R5
1349  006554  010503                        MOV     R5,R3
```

```
 1350  006556  006103                  38$:    ROL     R3              ;GET LSB OF THIS DIGIT
 1351  006560  105337  006662                  DECB    $OMODE          ;TYPE THIS DIGIT?
 1352  006564  100016                          BPL     7$              ;BR IF NO
 1353  006566  042703  177770                  BIC     #177770,R3      ;GET RID OF JUNK
 1354  006572  001002                          BNE     4$              ;TEST FOR 0
 1355  006574  005704                          TST     R4              ;SUPPRESS THIS 0?
 1356  006576  001403                          BEQ     5$              ;BR IF YES
 1357  006600  005204                  4$:     INC     R4              ;DON'T SUPPRESS ANYMORE 0'S
 1358  006602  052703  000060                  BIS     #'0,R3          ;MAKE THIS DIGIT ASCII
 1359  006606  052703  000040          5$:     BIS     #' ,R3          ;MAKE ASCII IF NOT ALREADY
 1360  006612  110337  006656                  MOVB    R3,8$           ;SAVE FOR TYPING
 1361  006616  104400  006656                  TYPE    ,8$             ;GO TYPE THIS DIGIT
 1362  006622  105337  006660          7$:     DECB    $OCNT           ;COUNT BY 1
 1363  006626  003347                          BGT     2$              ;BR IF MORE TO DO
 1364  006630  002402                          BLT     6$              ;BR IF DONE
 1365  006632  005204                          INC     R4              ;INSURE LAST DIGIT ISN'T A BLANK
 1366  006634  000744                          BR      2$              ;GO DO THE LAST DIGIT
 1367  006636  012605                  6$:     MOV     (SP)+,R5        ;RESTORE R5
 1368  006640  012604                          MOV     (SP)+,R4        ;RESTORE R4
 1369  006642  012603                          MOV     (SP)+,R3        ;RESTORE R3
 1370  006644  016666  000002  000004          MOV     2(SP),4(SP)     ;SET THE STACK FOR RETURNING
 1371  006652  012616                          MOV     (SP)+,(SP)
 1372  006654  000002                          RTI                     ;RETURN
 1373  006656     000                  8$:     .BYTE   0               ;STORAGE FOR ASCII DIGIT
 1374  006657     000                          .BYTE   0               ;TERMINATOR FOR TYPE ROUTINE
 1375  006660     000                  $OCNT:  .BYTE   0               ;OCTAL DIGIT COUNTER
 1376  006661     000                  $OFILL: .BYTE   0               ;ZERO FILL SWITCH
 1377  006662  000000                  $OMODE: 0                       ;NUMBER OF DIGITS TO TYPE
```

```
1378                                    ;;**********************************************************************
1379
1380                                    .SBTTL          RANDOM NUMBER GENERATOR ROUTINE
1381
1382                                    ;*CALL:
1383                                    ;*      JSR     PC,$RAND                ;CALL THE ROUTINE
1384                                    ;*      RETURN                          ;RETURN HERE THE RANDOM
1385                                    ;*                                      ;NUMBER WILL BE IN
1386                                    ;*                                      ;$HINUM,$LONUM
1387  006664                            $RAND:
1388  006664  010046                           MOV     R0,-(SP)                ;PUSH R0 ON STACK
1389  006666  010146                           MOV     R1,-(SP)                ;PUSH R1 ON STACK
1390  006670  010246                           MOV     R2,-(SP)                ;PUSH R2 ON STACK
1391  006672  010346                           MOV     R3,-(SP)                ;PUSH R3 ON STACK
1392  006674  013700  007012                   MOV     $LONUM,R0               ;SET R0 WITH LOW
1393  006700  013701  007010                   MOV     $HINUM,R1               ;SET R1 WITH HIGH
1394  006704  012703  177771                   MOV     #-7,R3                  ;SET SHIFT COUNT
1395  006710  005002                           CLR     R2                      ;ZERO R2
1396  006712  006300                    1$:    ASL     R0                      ;SHIFT R0 LEFT AND
1397  006714  006101                           ROL     R1                      ;ROTATE CARRY INTO R1 AND
1398  006716  006102                           ROL     R2                      ;ROTATE CARRY INTO R2
1399  006720  005203                           INC     R3                      ;CHECK FOR DONE
1400  006722  001373                           BNE     1$                      ;CONTINUE SHIFT LOOP
1401  006724  063702  007012                   ADD     $LONUM,R2               ;ADD NUMBER TO MAKE X 129
1402  006730  005501                           ADC     R1                      ;PROPOGATE CARRY
1403  006732  063701  007010                   ADD     $HINUM,R1               ;ADD NUMBER TO MAKE X 129
1404  006736  005502                           ADC     R2                      ;PROPOGATE CARRY
1405  006740  062700  001057                   ADD     #1057,R0                ;ADD LOW CONSTANT
1406  006744  005501                           ADC     R1                      ;PROPOGATE CARRY
1407  006746  005502                           ADC     R2                      ;PROPOGATE CARRY
1408  006750  062701  047401                   ADD     #47401,R1               ;ADD HIGH CONSTANT
1409  006754  005502                           ADC     R2                      ;PROPOGATE CARRY
1410  006756  062702  000006                   ADD     #6,R2                   ;ADD HIGHEST CONSTART
1411  006762  060200                           ADD     R2,R0                   ;REPRIME R0 WITH HIGHEST DIGIT
1412  006764  005501                           ADC     R1                      ;PROPOGATE CARRY
1413  006766  010037  007012                   MOV     R0,$LONUM               ;SAVE R0
1414  006772  010137  007010                   MOV     R1,$HINUM               ;SAVE R1
1415  006776  012603                           MOV     (SP)+,R3                ;POP STACK INTO R3
1416  007000  012602                           MOV     (SP)+,R2                ;POP STACK INTO R2
1417  007002  012601                           MOV     (SP)+,R1                ;POP STACK INTO R1
1418  007004  012600                           MOV     (SP)+,R0                ;POP STACK INTO R0
1419  007006  000207                           RTS     PC                      ;RETURN
1420  007010  176543                    $HINUM: .WORD   176543
1421  007012  123456                    $LONUM: .WORD   123456
1422                                    ;;**********************************************************************
1423
1424                                    .SBTTL          TRAP DECODER
1425
1426                                    ;*THIS ROUTINE WILL PICKUP THE LOWER BYTE OF THE "TRAP" INSTRUCTION
1427                                    ;*AND USE IT TO INDEX THROUGH THE TRAP TABLE FOR THE STARTING ADDRESS
1428                                    ;*OF THE DESIRED ROUTINE, THEN USING THE ADDRESS OBTAINED IT WILL
1429                                    ;*GO TO THAT ROUTINE.
1430
1431  007014  010046                    $TRAP:  MOV     R0,-(SP)                ;SAVE R0
```

```
1432  007016  016600  000002                  MOV     2(SP),R0                ;GET TRAP ADDRESS
1433  007022  005740                          TST     -(R0)                   ;BACKUP BY 2
1434  007024  111000                          MOVB    (R0),R0                 ;GET RIGHT BYTE OF TRAP
1435  007026  016000  007034                  MOV     $TRPAD(R0),R0           ;INDEX TO TABLE
1436  007032  000200                          RTS     R0                      ;GO TO ROUTINE
1437
1438
1439                                  .SBTTL          TRAP TABLE
1440
1441                                  ;*THIS TABLE CONTAINS THE STARTING ADDRESSES OF THE ROUTINES CALLED
1442                                  ;*BY THE "TRAP" INSTRUCTION.
1443
1444                                  ;       ROUTINE
1445                                  ;       -------
1446  007034  001110                  $TRPAD: $TYPE           ;CALL=TYPE      TRAP+0(104400)  TTY TYPEOUT ROUTINE
1447  007036  006462                          $TYPOCT         ;CALL=TYPOC     TRAP+2(104402)  TYPE OCTAL NUMBER (WITH LEADING
1448  007040  006436                          $TYPOS          ;CALL=TYPOS     TRAP+4(104404)  TYPE OCTAL NUMBER (NO LEADING ZE
1449  007042  006476                          $TYPON          ;CALL=TYPON     TRAP+6(104406)  TYPE OCTAL NUMBER (AS PER LAST C
1450                                  ;;*****************************************************************
1451
1452                                  .SBTTL          POWER DOWN AND UP ROUTINES
1453
1454                                  ;POWER DOWN ROUTINE
1455  007044  012737  007172  000024  $PWRDN: MOV     #$ILLUP,@#PWRVEC        ;SET FOR FAST UP
1456  007052  012737  000340  000026          MOV     #340,@#PWRVEC+2         ;PRIO:7
1457  007060  010046                          MOV     R0,-(SP)                ;PUSH R0 ON STACK
1458  007062  010146                          MOV     R1,-(SP)                ;PUSH R1 ON STACK
1459  007064  010246                          MOV     R2,-(SP)                ;PUSH R2 ON STACK
1460  007066  010346                          MOV     R3,-(SP)                ;PUSH R3 ON STACK
1461  007070  010446                          MOV     R4,-(SP)                ;PUSH R4 ON STACK
1462  007072  010546                          MOV     R5,-(SP)                ;PUSH R5 ON STACK
1463  007074  010637  007176                  MOV     SP,$SAVR6               ;SAVE SP
1464  007100  012737  007112  000024          MOV     #$PWRUP,@#PWRVEC        ;SET UP VECTOR
1465  007106  000000                          HALT
1466  007110  000776                          BR      .-2                     ;HANG UP
1467
1468                                  ;POWER UP ROUTINE
1469  007112  013706  007176          $PWRUP: MOV     $SAVR6,SP               ;GET SP
1470  007116  005037  007176                  CLR     $SAVR6                  ;WAIT LOOP FOR THE TTY
1471  007122  005237  007176          1$:     INC     $SAVR6                  ;WAIT FOR THE INC
1472  007126  001375                          BNE     1$                      ;OF  WORD
1473  007130  012605                          MOV     (SP)+,R5                ;POP STACK INTO R5
1474  007132  012604                          MOV     (SP)+,R4                ;POP STACK INTO R4
1475  007134  012603                          MOV     (SP)+,R3                ;POP STACK INTO R3
1476  007136  012602                          MOV     (SP)+,R2                ;POP STACK INTO R2
1477  007140  012601                          MOV     (SP)+,R1                ;POP STACK INTO R1
1478  007142  012600                          MOV     (SP)+,R0                ;POP STACK INTO R0
1479  007144  012737  007044  000024          MOV     #$PWRDN,@#PWRVEC        ;SET UP THE POWER DOWN VECTOR
1480  007152  012737  000340  000026          MOV     #340,@#PWRVEC+2         ;PRIO:7
1481  007160  104400  011464                  TYPE    ,POWER                  ;POWER FAIL MESSAGE
1482  007164  012716  005542                  MOV     #STAR,(SP)              ;RESTART AT STAR
1483  007170  000002                          RTI
1484  007172  000000          $ILLUP: HALT                                    ;THE POWER UP SEQUENCE WAS STARTED
1485  007174  000776                          BR      .-2                     ; BEFORE THE POWER DOWN WAS COMPLETE
```

```
1486  007176  000000                  $SAVR6: 0                                       ;PUT THE SP HERE
1487
1488                                          ;
1489                                          ;NO TERMINAL HANDLER
1490                                          ;ENTER HERE FROM START AT 210
1491                                          ;
1492
1493  007200  012706  001100          NTH:    MOV     #1100,  SP              ;SET UP STACK POINTER
1494  007204  112737  000001  001107          MOVB    #1,     $TPFLG          ;REMEMBER WE HAVE NO TERMINAL
1495  007212  000000                          HALT                    ;WAITE FOR DIRECTIVE
1496  007214  113700  177570                 MOVB    SWR,    R0              ;SAVE DIRECTIVE FOR LIST
1497  007220  001002                          BNE     1$              ;IF HE WANTED TO START TESTING
1498  007222  000137  001446                  JMP     START           ;DON'T HALT AGAIN
1499  007226  000000                  1$:     HALT                    ;WAIT HERE FOR ADDRESS
1500  007230  013737  177570  004500          MOV     SWR,    NINP    ;STORE ADDRESS
1501  007236  042700  177761                 BIC     #177761,        R0      ;MAKE SURE HE DIN'T GIVE ME BAD DIRECTIVE
1502  007242  062700  007254                 ADD     #NTHFP, R0      ;GET READY TO GO TO A PLACE THAT
1503  007246  000170  000000                 JMP     @(0)            ;THAT WILL TAKE CARE OF DIRECTIVE
1504
1505  007252  000000                  NTHF:   000000                  ;DIRECTIVE POINTER
1506  007254  001446                  NTHFP:  START                   ;SWR=0  START TESTING
1507  007256  004510                          NTF0                    ;SWR=2  INPUT MODULE ADR,
1508  007260  004576                          NTF1                    ;SWR=4  ENTER OUTPUT MODULE ADR,
1509  007262  007274                          NTF2                    ;SWR=6  ENTER 1ST GROUP VECTER ADR,
1510  007264  007304                          NTF3                    ;SWR=10 ENTER 2ND GROUP VECTER ADR,
1511  007266  005100                          INUNC                   ;SWR=12 UNCONNECT MODULES
1512  007270  005036                          INNOR                   ;SWR=14 MAKE NORMAL CONNECTIONS
1513  007272  007316                          NTF4                    ;SWR=16 CONNECT TWO MODULES (SOFT)
1514                                          ;NOTE:  INPUT MODULE # IN SWR 0-2
1515                                          ;       OUTPUT MODULE # IN SWR 3-6
1516
1517                                          ;
1518                                          ;THIS ROUTINE HANLDES INPUTING VECTORS
1519                                          ;
1520  007274  012737  000001  005024  NTF2:   MOV     #1,     INVETT  ;ENTER VECTOR FIRST GROUP
1521  007302  000403                          BR      NTF3A           ;BRANCH AHEAD
1522  007304  012737  000002  005024  NTF3:   MOV     #2,     INVETT  ;ENTER VECTOR SECOUND GROUP
1523  007312  000137  004714          NTF3A:  JMP     NTF3B           ;NOW GO TO NORMAL ROUTINE THAT TAKES CARE OF IT
1524                                          ;
1525                                          ;THIS ROUTINE HANDLES CONNECTING 2 MODULES WITH NO
1526                                          ;TERMINAL BY SETTING UP INPUT BY SWR TO LOOK
1527                                          ;LIKE INPUT FROM A TTY THEN TRANSFERRING TO NORMAL
1528                                          ;ROUTINE
1529                                          ;
1530  007316  113737  177570  001270  NTF4:   MOVB    SWR,    $TMP0   ;GET SWR
1531  007324  042737  177770  001270          BIC     #177770,$TMP0   ;FORM INPUT MODULE #
1532  007332  113737  001270  011540          MOVB    $TMP0,  TTYINB  ;FUDGE IT TO LOOK LIKE IT
1533  007340  112737  000074  011541          MOVB    #74,    TTYINB+1 ;CAME FROM TTY INPUT
1534  007346  113737  177570  001270          MOV8    SWR,    $TMP0   ;GET SWR
1535  007354  006037  001270                  ROR     $TMP0           ;FORM OUTPUT MODULE #
1536  007360  006037  001270                  ROR     $TMP0
1537  007364  006037  001270                  ROR     $TMP0
1538  007370  042737  177760  001270          BIC     #177760,$TMP0   ;MAKE IT LOOK LIKE
```

RV

```
  1539  007376  113737  001270  011542          MOVB    #IMPO,  TTYINB+2 ;TTY INPUT = IMPU
```

```
1540  007404  012737  011540  011534          MOV     #TTYINB,TTYINP  ;GO TO ROUTINE THAT HANDLES TTY
1541  007412  000137  005130                  JMP     SINCO           ;INPUT FOR SINGLE CONNECTIONS
1542
1543                                          ;ERROR HANDLER DOES OUTPUT TERMINAL EXIST?
1544
1545  007416  005037  177776          EEDNH:  CLR     PS
1546  007422  105737  001107                  TSTB    #TPFLG          ;DOES TTY EXIST?
1547  007426  001001                          BNE     2$
1548  007430  000207                  1$:     RTS PC                  ;YES-EXIT
1549  007432  032737  020000  177570  2$:     BIT     #SW13,@#SWR
1550  007440  001373                          BNE     1$
1551
1552  007442  011637  001240                  MOV     (SP),   $ERRAD  ;GET ADDRESS OF ERROR CALL
1553  007446  162737  000002  001240          SUB     #2,     $ERRAD
1554  007454  117737  171560  001236          MOVB    @$ERRAD,$ITEMB  ;GET NUMBER OF ERROR
1555  007462  005237  001230                  INC     $ERTTL          ;INCERROR COUNT
1556
1557  007466  000000                          HALT                    ;AN ERROR HAS OCCURED AND
1558  007470  000240                          NOP                     ;NO OUPUT TERMINAL EXISTS
1559  007472  062716  000004                  ADD     #4,(SP)         ;FOLLOW THE PROCEDURE IN SECTION 6.1
1560  007476  000002                          RTI                     ;DOCUMENTATION TO SEE WHAT ERROR OCCURED
1561
1562                                          ;
1563                                          ;THIS ROUTINE PRINTS "END PASS" IF ENABLED
1564                                          ;
1565
1566  007500  105737  001107          EOPT:   TSTB    #TPFLG          ;SEE IF WE HAVE OUTPUT TERMINAL
1567  007504  001006                          BNE     1$              ;IF NOT DON'T PRINT END OF PASS
1568  007506  032737  002000  177570          BIT     #2000,SWR       ;SEE IF HE INHIBITED END PASS TYPEOUT
1569  007514  001002                          BNE     1$              ;BY SETTING BIT 10 IN SWR
1570  007516  104400                          TYPE
1571  007520  011423                          MEOP
1572  007522  000207                  1$:     RTS     PC              ;EXIT
```

```
1573
1574  007524  001240  001242  001244  DT1:    .WORD   $ERRAD,$GDADR,$BDADR,$GDDAT,$BDDAT,0
1575  007532  001246  001250  000000
1576  007540  001240  001242  001244  DT2:    .WORD   $ERRAD,$GDADR,$BDADR,$TMP0,0
1577  007546  001270  000000
1578  007552  001240  001270  001242  DT3:    .WORD   $ERRAD,$TMP0,$GDADR,$BDADR,0
1579  007560  001244  000000
1580  007564  001240  001254  001256  DT4:    .WORD   $ERRAD,$REG0,$REG1,$REG2,$REG3,0
1581  007572  001260  001262  000000
1582  007600  001240  001270  000000  DT5:    .WORD   $ERRAD,$TMP0,0
1583          000000                  DT6=0
1584          000000                  DF1=0
1585
1586                                  ;ASCII MESSAGES
1587
1588  007606  005015  042523  042116  EM1:    .ASCIZ  <15><12>/SEND-RECIEVE DATA ERROR/
1589  007614  051055  041505  042511
1590  007622  042526  042040  052101
1591  007630  020101  051105  047522
1592  007636  000122
1593  007640  005015  047111  052520  EM2:    .ASCIZ  <15><12>/INPUT MODULE FAILED TO INTERRUPT/
1594  007646  020124  047515  052504
1595  007654  042514  043040  044501
1596  007662  042514  020104  047524
1597  007670  044440  052116  051105
1598  007676  052522  052120     000
1599  007703     015  044412  050116  EM3:    .ASCIZ  <15><12>/INPUT MODULE INTERRUPTED AT WRONG PRIORITY/
1600  007710  052125  046440  042117
1601  007716  046125  020105  047111
1602  007724  042524  051122  050125
1603  007732  042524  020104  052101
1604  007740  053440  047522  043516
1605  007746  050040  044522  051117
1606  007754  052111  000131
1607  007760  005015  054523  052123  EM4:    .ASCIZ  <15><12>/SYSTEM INITIALIZE FAILED TO CLEAR INPUT MODULE/
1608  007766  046505  044440  044516
1609  007774  044524  046101  055111
1610  010002  020105  040506  046111
1611  010010  042105  052040  020117
1612  010016  046103  040505  020122
1613  010024  047111  052520  020124
1614  010032  047515  052504  042514
1615  010040     000
1616  010041     015  042012  040525  EM5:    .ASCIZ  <15><12>/DUAL ADDRESS ERROR/
1617  010046  020114  042101  051104
1618  010054  051505  020123  051105
1619  010062  047522  000122
1620  010066  005015  047111  042524  EM6:    .ASCII  <15><12>/INTERRUPTS OUT OF ORDER, SHOULD BE:/
1621  010074  051122  050125  051524
1622  010102  047440  052125  047440
1623  010110  020106  051117  042504
1624  010116  026122  051440  047510
1625  010124  046125  020104  042502
1626  010132     072
```

EM

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1627  010133     015  044412  052116          .ASCIZ  <15><12>/INTER3>INTER4>INTER1>INTER2/
1628  010140  051105  037063  047111
1629  010146  042524  032122  044476
1630  010154  052116  051105  037061
1631  010162  047111  042524  031122
1632  010170     000
1633  010171     015  044412  044516  EM7:    .ASCIZ  <15><12>/INITIALIZE FAILED TO CLEAR INTR. ENABLE BIT/
1634  010176  044524  046101  055111
1635  010204  020105  040506  046111
1636  010212  042105  052040  020117
1637  010220  046103  040505  020122
1638  010226  047111  051124  020056
1639  010234  047105  041101  042514
1640  010242  041040  052111     000
1641  010247     015  047012  020117  EM11:   .ASCIZ  <15><12>/NO CONNECTIONS MADE/
1642  010254  047503  047116  041505
1643  010262  044524  047117  020123
1644  010270  040515  042504     000
1645  010275     015  047012  020117  EM12:   .ASCIZ  <15><12>/NO INPUT MODULE ADDR. ENTERED/
1646  010302  047111  052520  020124
1647  010310  047515  052504  042514
1648  010316  040440  042104  027122
1649  010324  042440  052116  051105
1650  010332  042105     000
1651  010335     015  047012  020117  EM13:   .ASCIZ  <15><12>/NO OUTPUT MODULE ADDR. ENTERED/
1652  010342  052517  050124  052125
1653  010350  046440  042117  046125
1654  010356  020105  042101  051104
1655  010364  020056  047105  042524
1656  010372  042522  000104
1657  010376  005015  042526  052103  EM14:   .ASCIZ  <15><12>/VECTOR ADDR. NOT ENTERED FOR INPUT MODULE(S) IN CONNECTION(S)/
1658  010404  051117  040440  042104
1659  010412  027122  047040  052117
1660  010420  042440  052116  051105
1661  010426  042105  043040  051117
1662  010434  044440  050116  052125
1663  010442  046440  042117  046125
1664  010450  024105  024523  044440
1665  010456  020116  047503  047116
1666  010464  041505  044524  047117
1667  010472  051450  000051
1668  010476  005015  051105  047522  DH1:    .ASCII  <15><12>/ERROR    ADDR     ADDR     DATA     DATA/
1669  010504  020122  020040  042101
1670  010512  051104  020040  020040
1671  010520  042101  051104  020040
1672  010526  020040  040504  040524
1673  010534  020040  020040  040504
1674  010542  040524
```

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1675  010544  005015  041520  020040          ,ASCIZ  <15><12>/PC      OUT     IN      EXP'D   IN/
1676  010552  020040  020040  052517
1677  010560  020124  020040  020040
1678  010566  047111  020040  020040
1679  010574  020040  054105  023520
1680  010602  020104  020040  047111
1681  010610     000
1682  010611     015  042412  051122  DH2:    ,ASCII  <15><12>/ERROR   ADDR    ADDR    PROS/
1683  010616  051117  020040  040440
1684  010624  042104  020122  020040
1685  010632  040440  042104  020122
1686  010640  020040  050040  047522
1687  010646     123
1688  010647     015  050012  020103          ,ASCIZ  <15><12>/PC      OUT     IN      STAT/
1689  010654  020040  020040  047440
1690  010662  052125  020040  020040
1691  010670  044440  020116  020040
1692  010676  020040  051440  040524
1693  010704  000124
1694  010706  005015  051105  047522  DH3:    ,ASCII  <15><12>/ERROR   ADDR    ADDR    ADLR/
1695  010714  020122  020040  042101
1696  010722  051104  020040  020040
1697  010730  042101  051104  020040
1698  010736  020040  042101  051104
1699  010744  005015  041520  020040          ,ASCIZ  <15><12>/PC      OUT     IN      DUAL/
1700  010752  020040  020040  052517
1701  010760  020124  020040  020040
1702  010766  047111  020040  020040
1703  010774  020040  052504  046101
1704  011002     000
1705  011003     015  042412  051122  DH4:    ,ASCII  <15><12>/ERROR   INTER1  INTER2  INTER3/
1706  011010  051117  020040  044440
1707  011016  052116  051105  020061
1708  011024  044440  052116  051105
1709  011032  020062  044440  052116
1710  011040  051105     063
1711  011043     015  050012  020103          ,ASCIZ  <15><12>/PC      ADDR    ADDR    ADDR/
1712  011050  020040  020040  040440
1713  011056  042104  020122  020040
1714  011064  040440  042104  020122
1715  011072  020040  040440  042104
1716  011100  000122
1717  011102  005015  051105  047522  DH5:    ,ASCII  <15><12>/ERROR   ADDR/
1718  011110  020122  020040  042101
1719  011116  051104
1720  011120  005015  041520  020040          ,ASCIZ  <15><12>/PC      INTR/
1721  011126  020040  020040  047111
1722  011134  051124     000
1723  011137     015  050012  047522  DH7:    ,ASCIZ  <15><12>/PROGRAM NOT RUNNING  /
1724  011144  051107  046501  047040
1725  011152  052117  051040  047125
1726  011160  044516  043516  020040
1727  011166     000
1728  011167     040  057040  000103  MCONC:  ,ASCIZ  /  "C/
```

```
1729  011174  000134                  MBS:    .ASCIZ  /\/
1730  011176  005015     000          MCRLF:  .ASCIZ  <15><12>//
1731  011201     015  047412  042104  MODADR: .ASCIZ  <15><12>/ODD ADDRESS-NOT ACCEPTED/
1732  011206  040440  042104  042522
1733  011214  051523  047055  052117
1734  011222  040440  041503  050105
1735  011230  042524  000104
1736  011234  005015  047515  052504  MMHD:   .ASCIZ  <15><12>/MODULE NO  ADDRESS  FUNCTION  VECTOR  CONNECTED TO/
1737  011242  042514  047040  020117
1738  011250  040440  042104  042522
1739  011256  051523  020040  052506
1740  011264  041516  044524  047117
1741  011272  020040  042526  052103
1742  011300  051117  020040  047503
1743  011306  047116  041505  042524
1744  011314  020104  047524     000
1745  011321     015  020012  020040  MBSP:   .ASCIZ  <15><12>/        /
1746  011326  020040  020040  000040
1747  011334  020040  000040          MJSP:   .ASCIZ          /   /
1748  011340  020040  047111  052520  MFUN:   .ASCIZ          /  INPUT     /
1749  011346  020124  020040  020040
1750  011354     000
1751  011355     040  047440  052125  MFUNC2: .ASCIZ          !  OUTPUT      N/A   !
1752  011362  052520  020124  020040
1753  011370  020040  047040  040457
1754  011376  020040  000040
1755  011402  005015  000052          MSTAR:  .ASCIZ  <15><12>/*/
1756  011406  005015  052522  047116  MRUN:   .ASCIZ  <15><12>/RUNNING.../
1757  011414  047111  027107  027056
1758  011422     000
1759  011423     015  042412  042116  MEOP:   .ASCIZ  <15><12>/END PASS  /
1760  011430  050040  051501  020123
1761  011436  000040
1762  011440  005015  040520  051523  MSUM:   .ASCIZ  <15><12>/PASSES   ERRORS/<15><12>
1763  011446  051505  020040  042440
1764  011454  051122  051117  006523
1765  011462  000012
1766  011464  005015  042522  052524  POWER:  .ASCIZ  <15><12>/RETURN TO MONITOR FROM POWER FAILURE/
1767  011472  047122  052040  020117
1768  011500  047515  044516  047524
1769  011506  020122  051106  046517
1770  011514  050040  053517  051105
1771  011522  043040  044501  052514
1772  011530  042522     000
1773          011534                  .EVEN
1774  011534  000000                  TTYINP: 000000
1775  011536  005015                  UNKINW: .ASCII  <15><12>//
1776  011540  000000                  TTYINB: 000000
1777          011642                          .=.+100
1778          000001                  .END
```

```
AINT     003214          AINTER   003444          BIT0   = 000001          BIT00  = 000001
BIT01  = 000002          BIT02  = 000004          BIT03  = 000010          BIT04  = 000020
BIT05  = 000040          BIT06  = 000100          BIT07  = 000200          BIT08  = 000400
BIT09  = 001000          BIT1   = 000002          BIT10  = 002000          BIT11  = 004000
BIT12  = 010000          BIT13  = 020000          BIT14  = 040000          BIT15  = 100000
BIT2   = 000004          BIT3   = 000010          BIT4   = 000020          BIT5   = 000040
BIT6   = 000100          BIT7   = 000200          BIT8   = 000400          BIT9   = 001000
BPTVEC = 000014          CFLG     004330          DATAR    002042          DATABC   001702
DATA0    002114          DATA1    001764          DESIFR   004030          DF1    = 000000
DH1      010476          DH2      010611          DH3      010706          DH4      011003
DH5      011102          DH7      011137          DISPLA = 177570          DT1      007524
DT2      007540          DT3      007552          DT4      007564          DT5      007600
DT6    = 000000          DUAL     003072          DUALT    003126          DUAL1    003064
EEDNH    007416          EMTVEC = 000030          EM1      007606          EM11     010247
EM12     010275          EM13     010335          EM14     010376          EM2      007640
EM3      007703          EM4      007760          EM5      010041          EM6      010066
EM7      010171          EOPT     007500          ERRVEC = 000004          INADR    004332
INADRI   004504          INADRO   004572          INIT     002730          INITR    003044
INMAP    005334          INMAP1   005362          INNOR    005036          INTPO    004304
INTPO1   004316          INTRS1   003476          INTRS2   003510          INTRS3   003522
INTRS4   003534          INUMB    004372          INUNC    005100          INVET    004660
INVETT   005024          INVET2   005026          IOTVEC = 000020          MAP1     005474
MBS      011174          MCONC    011167          MCRLF    011176          MEOP     011423
MFUN     011340          MFUNC2   011355          MMHD     011234          MODADR   011201
MOD1A    004240          MOD1V    004260          MOD2A    004242          MOD2V    004262
MOD3A    004244          MOD3V    004264          MOD4A    004246          MOD4V    004266
MOD5A    004250          MOD5C    004270          MOD6A    004252          MOD6C    004272
MOD7A    004254          MOD7C    004274          MOD8A    004256          MOD8C    004276
MRUN     011406          MSTAR    011402          MSUM     011440          MSSP     011334
MSSP     011321          NINP     004500          NINPT    004502          NTF0     004510
NTF1     004576          NTF2     007274          NTF3     007304          NTF3A    007312
NTF3B    004714          NTF4     007316          NTH      007200          NTHF     007252
NTHFP    007254          NUMBER   004000          ODDADR   004226          PC     =%000007
POPSP2 = 022626          POWER    011464          PS     = 177776          PSW    = 177776
PWRVEC = 000024          RESVEC = 000010          RUBF     003776          RUBH     003724
R0     =%000000          R1     =%000001          R2     =%000002          R3     =%000003
R4     =%000004          R5     =%000005          R6     =%000006          R7     =%000007
SFIVE    004302          SINCO    005130          SINGLE   001632          SINGLF   001676
SINT     002230          SINTR    002310          SINT4    002320          SINT4R   002402
SINT5    002412          SINT5R   002532          SINT6    002552          SINT6R   002632
SINT7    002644          SINT7R   002716          SP     =%000006          STACK  = 001100
STAR     005542          START    001446          START1   001476          START2   001512
START3   001526          START4   001550          START5   001572          SUM      005476
SWR    = 177570          SW0    = 000001          SW00   = 000001          SW01   = 000002
SW02   = 000004          SW03   = 000010          SW04   = 000020          SW05   = 000040
SW06   = 000100          SW07   = 000200          SW08   = 000400          SW09   = 001000
SW1    = 000002          SW10   = 002000          SW11   = 004000          SW12   = 010000
SW13   = 020000          SW14   = 040000          SW15   = 100000          SW2    = 000004
SW3    = 000010          SW4    = 000020          SW5    = 000040          SW6    = 000100
SW7    = 000200          SW8    = 000400          SW9    = 001000          S15      005030
S16      005032          S17      005034          TBITVE = 000014          TRAPVE = 000034
TRTVEC = 000014          TTYIN    003546          TTYINB   011540          TTYINP   011534
TYPE   = 104400          TYPOC  = 104402          TYPON  = 104406          TYPOS  = 104404
UNKINP   004164          UNKINW   011536          VECTOR   004300          $BDADR   001244
```

```
$BDDAT  001250        $CM1   = 000006        $CM2   = 000014        $CM3   = 000006
$CM4   = 000004       $CRLF    001303        $DOAGN   006030       $ENDAD   006020
$ENDCT   006004       $EOP     005762        $ERFLG   001221       $ERPAD   001240
$ERROR   006212       $ERRTB   001306        $ERRTY   006302       $ERTTL   001230
$FILLC   001106       $FILLS   001105        $GDADR   001242       $GDDAT   001246
$GET42   006012       $HD    = 000003        $HINUM   007010       $ICNT    001222
$ILLUP   007172       $ITEMB   001236        $LF      001304       $LONUM   007012
$LPADR   001224       $LPERR   001226        $MXCNT   006210       $NULL    001104
$OCNT    006660       $OMODE   006662        $OVER    006174       $PASS    001216
$PWRDN   007044       $PWRUP   007112        $QUES    001302       $RAND    006664
$REGAD   001252       $REG0    001254        $REG1    001256       $REG2    001260
$REG3    001262       $REG4    001264        $REG5    001266       $SAVR6   007176
$SCOPE   006034       $SETUP = 000017        $SS    = 000001       $STUP  = 177777
$SVLAD   006164       $SWR   = 164000        $TIMES   001300       $TKB     003722
$TKS     003720       $TMP0    001270        $TMP1    001272       $TMP2    001274
$TMP3    001276       $TN    = 000001        $TPB     001102       $TPFLG   001107
$TPS     001100       $TRAP    007014        $TRP   = 000010       $TRPAD   007034
$TSTNM   001220       $TYPE    001110        $TYPOC   006462       $TYPON   006476
$TYPOS   006436       $XTSTR   006042        $OFILL   006661       .      = 011642
```

ERRORS DETECTED: 0

```
 *DZKHA,DZKHA/SOL_DZKHA,SRC
 RUN-TIME:  21 13 0 SECONDS
 CORE USED:  12K
```