IDENTIFICATION

PRODUCT CODE: AC-8872G-MC

PRODUCT NAME: CZKWAGO KW11-L LINE FREQUENCY CLOCK TEST

PRODUCT DATE: 1-MAY-78

MAINTAINER: DIAGNOSTIC ENGINEERING

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1.0 GENERAL PROGRAM INFORMATION

1.1 ABSTRACT

THIS PROGRAM TESTS THE KW11L LINE FREQUENCY CLOCK. IT VALIDATES PROPER OPERATION UNDER BOTH INTERRUPT AND NON-INTERRUPT MODES

1.2 SYSTEM REQUIREMENTS

THIS PROGRAM IS DESIGNED TO RUN ON ANY PDP-11 WITH 4K OF MEMORY AND A KW11 LINE FREQUENCY CLOCK.

1.3 DEVICE ADDRESSES

THE DIAGNOSTIC ASSUMES THE LINE CLOCK ADDRESS IS 177546. VARIOUS TESTS IN THE DIAGNOSTIC ENSURE THAT THE LINE CLOCK IS NOT AFFECTED WHEN THE PAPER TAPE PUNCH (ADDRESS 177556) AND TELETYPE (ADDRESS 177566) ARE ACCESSED. THEREFORE, AN OCCASIONAL "@" MAY BE OUTPUT AT THE TELETYPE AND A CHARACTER MAY BE PUNCHED AT THE PAPER TAPE PUNCH. THESE ARE NOT ERRORS.

2.0 OPPERATING INSTRUCTIONS

2.1 LOADING

PROCEDURE FOR NORMAL BINARY TAPES SHOULD BE FOLLOWED

A. ABSOLUTE LOADER PROGRAM MUST BE IN MEMORY
B. PLACE THE BINARY TAPE IN THE PAPER TAPE READER
C. LOAD ADDRESS 17500
D. DEPRESS START (TAPE SHOULD READ IN)

2.2 STARTING

PROGRAM STARTING ADDRESS IS 000200

A. LOAD ADDRESS 000200
B. SELECT SWITCH REGISTER OPTIONS (SEE SECTION 2.3)

NOTE: IF THE PROCESSOR DOES NOT HAVE A HARDWARE SWITCH REGISTER, LOCATION # 176 SHOULD BE LOADED WITH THE APPROPRIATE SWITCH SETTINGS AFTER THE DIAGNOSTIC HAS BEEN LOADED INTO MEMORY. THE PROGRAM IS THEN STARTED AT ADDRESS 200.

C. DEPRESS START (PROGRAM SHOULD START RUNNING)

2.3 SWITCH REGISTER OPTIONS

HERE IS A LIST OF CONSOLE SWITCHES AND THEIR EFFECT ON THE PROGRAM...

SWITCH	ACTION IF SET
15	HALT ON ERROR
14	LOOP ON CURRENTLY EXECUTING TEST
13	INHIBIT ERROR PRINTOUTS
12	(UNUSED)
11	INHIBIT ITERATIONS
10	BELL ON ERROR
9	LOOP ON ERROR
8	LOOP ON TEST SPECIFIED IN SWR<7:0>
7-0	# OF TEST TO LOOP ON (ONLY WHEN SWR8 = 1)

2.4 EXECUTION TIMES

EXECUTION TIME FOR THIS PROGRAM IS DEPENDENT ON THE
MODEL OF PDP-11 IT IS BEING RUN ON. FOR A PDP-11/40 SEQ 0003
ABOUT 5 SECONDS IS NECESSARY TO DO 1 PASS OF THE PROGRAM
WITHOUT ITERATIONS.

3.0 ERROR INFORMATION

3.1 STANDARD ERROR REPORTING PROCEDURES

ERROR PRINTOUTS CONSIST OF FROM 4 TO 8 COLUMNS OF DATA, A
DATA HEADER, AND POSSIBLY A SHORT ERROR MESSAGE DESCRIBING
THE ERROR. FOR EXAMPLE...

```
CLOCK FAILED TO INTERRUPT
PC      PS      SP      TEST#   LKS
002262  000344  000764  000007  000300
```

THE FIRST 4 COLUMNS OF OF THE ERROR MESSAGE ALWAYS SHOW THE
CONTENTS OF THE PC, PS, SP, AND THE TEST NUMBER. MORE COLUMNS
OF DATA ARE ADDED WHERE THEY MIGHT BE RELAVENT TO A PARTICULAR
ERROR.

3.2 UNEXPECTED TRAP ERROR REPORTING

AN UNEXPECTED TRAP TO ADDRESS 4 CAUSES THE FOLLOWING
MESSAGE TO BE PRINTED OUT...

```
TRAPPED TO LOC 4 FROM LOCATION "XXXXXX"
RESTARTING PROGRAM
```

IN THE ACTUAL MESSAGE THE "XXXXXX" IS REPLACED BY THE PC
ADDRESS PUSHED ONTO THE STACK WHEN THE UNEXPECTED TRAP
OCCURS. THE PROGRAM THEN TRYS TO RESTART ITSELF
DESPITE SWITCH REGISTER SETTINGS.

3.3 POWER FAIL

IF A POWER FAIL CONDITION IS DETECTED THE FOLLOWING MESSAGE
IS PRINTED...

```
POWER
```

AFTER PRINTING OUT THE MESSAGE THE PROGRAM TRYS TO
RESTART ITSELF.

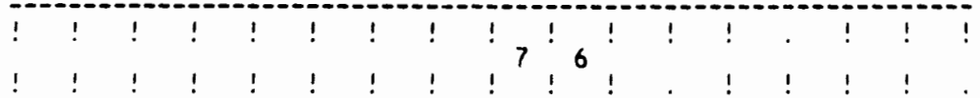
5.0 DEVICE INFORMATION

5.1 GENERAL INFORMATION

THE LINE CLOCK INTERRUPT VECTOR ADDRESS IS 100
THE LINE CLOCK PRIORITY LEVEL IS BR6

5.2 REGISTERS

LINE CLOCK STATUS REGISTER (LKS) 777546



BIT6 IF SET MONITOR=1 CAUSES AN INTERRUPT

BIT7 MONITOR BIT. SET BY CLOCK, CLEARED BY USER

7.0 LISTING

```
                                .ABS
                                .ENABL AMA
                                .LIST   ME
                                .NLIST  MC, MD, CND
167400                          $SWR=167400
000000                          $TN=0
                                        .ENABL  ABS
                                .TITLE  CZKWA-G  LINE FREQUENCY CLOCK PROGRAM
                                ;*COPYRIGHT (C) 1970,1977
                                ;*DIGITAL EQUIPMENT CORP.
                                ;*MAYNARD, MASS. 01754
                                ;*
                                ;*PROGRAM BY J. COMEAU
                                ;*
                                ;*THIS PROGRAM WAS ASSEMBLED USING THE PDP-11 MAINDEC SYSMAC
                                ;*PACKAGE (MAINDEC-11-DZQAC-B1),AUG 29,1975.
                                ;*

                                .SBTTL  OPERATIONAL SWITCH SETTINGS
                                ;*
                                ;*      SWITCH                  USE
                                ;*      ------          --------------------
                                ;*        15            HALT ON ERROR
                                ;*        14            LOOP ON TEST
                                ;*        13            INHIBIT ERROR TYPEOUTS
                                ;*        11            INHIBIT ITERATIONS
                                ;*        10            BELL ON ERROR
                                ;*         9            LOOP ON ERROR
                                ;*         8            LOOP ON TEST IN SWR<7:0>
                                ;*       7-0            #OF TEST TO LOOP ON IF SWR<8> IS SET

                                .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
177774                          STKLMT= 177774          ;;STACK LIMIT REGISTER
177772                          PIRQ=   177772          ;;PROGRAM INTERRUPT REQUEST REGISTER
177570                          DSWR=   177570          ;;HARDWARE SWITCH REGISTER
177570                          DDISP=  177570          ;;HARDWARE DISPLAY REGISTER

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

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

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

                                ;*DATA BIT DEFINITIONS (BIT00 TO BIT15)
100000                          BIT15=  100000
040000                          BIT14=  40000
020000                          BIT13=  20000
010000                          BIT12=  10000
004000                          BIT11=  4000
002000                          BIT10=  2000
001000                          BIT09=  1000
000400                          BIT08=  400
000200                          BIT07=  200
000100                          BIT06=  100
000040                          BIT05=  40
000020                          BIT04=  20
000010                          BIT03=  10
000004                          BIT02=  4
000002                          BIT01=  2
000001                          BIT00=  1
                                .EQUIV  BIT09,BIT9
```

```
                        .EQUIV  BIT03,BIT8
                        .EQUIV  BIT07,BIT7
                        .EQUIV  BIT06,BIT6
                        .EQUIV  BIT05,BIT5
                        .EQUIV  BIT04,BIT4
                        .EQUIV  BIT03,BIT3
                        .EQUIV  BIT02,BIT2
                        .EQUIV  BIT01,BIT1
                        .EQUIV  BIT00,BIT0

                        ;*BASIC "CPU" TRAP VECTOR ADDRESSES
000004                  ERRVEC= 4               ;;TIME OUT AND OTHER ERRORS
000010                  RESVEC= 10              ;;RESERVED AND ILLEGAL INSTRUCTIONS
000014                  TBITVEC=14              ;;"T" BIT
000014                  TRTVEC= 14              ;;TRACE TRAP
000014                  BPTVEC= 14              ;;BREAKPOINT TRAP (BPT)
000020                  IOTVEC= 20              ;;INPUT/OUTPUT TRAP (IOT) **SCOPE**
000024                  PWRVEC= 24              ;;POWER FAIL
000030                  EMTVEC= 30              ;;EMULATOR TRAP (EMT) **ERROR**
000034                  TRAPVEC=34              ;;"TRAP" TRAP
000060                  TKVEC=  60              ;;TTY KEYBOARD VECTOR
000064                  TPVEC=  64              ;;TTY PRINTER VECTOR
000240                  PIRQVEC=240             ;;PROGRAM INTERRUPT REQUEST VECTOR
                        ;MISCELANHUS EQUATES
177546                  LKS=177546
000240                  NOP=240
000774                  BUF2=774
000776                  BUF1=776

                        .SBTTL  TRAP CATCHER

000000                          .=0
                        ;*ALL UNUSED LOCATIONS FROM 4 - 776 CONTAIN A ".+2,HALT"
                        ;*SEQUENCE TO CATCH ILLEGAL TRAPS AND INTERRUPTS
                        ;*LOCATION 0 CONTAINS 0 TO CATCH IMPROPERLY LOADED VECTORS
000174                          .=174
000174  000000                  DISPREG: .WORD  0               ;;SOFTWARE DISPLAY REGISTER
000176  000000                  SWREG:   .WORD  0               ;;SOFTWARE SWITCH REGISTER

                        .SBTTL  STARTING ADDRESS(ES)
000200  000137  001400          JMP     @#KSTART                ;;JUMP TO STARTING ADDRESS OF PROGRAM
                        ;*****************************************************************

                        .SBTTL  ACT11 HOOKS
                        ;HOOKS REQUIRED BY ACT11
000204                          $SVPC=.                 ;SAVE PC
000046                          .=46
000046  006232                  $ENDAD                  ;;1)SET LOC.46 TO ADDRESS OF $ENDAD IN .$EOP
000052                          .=52
000052  000000                  .WORD   0               ;;2)SET LOC.52 TO ZERO
000204                          .=$SVPC                 ;; RESTORE PC
```

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

                        .SBTTL  COMMON TAGS

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

        001100                  .=1100
001100                  $CMTAG:                         ;;START OF COMMON TAGS
001100  000000          $PASS:  .WORD   0               ;;CONTAINS PASS COUNT
001102     000          $TSTNM: .BYTE   0               ;;CONTAINS THE TEST NUMBER
001103     000          $ERFLG: .BYTE   0               ;;CONTAINS ERROR FLAG
001104  000000          $ICNT:  .WORD   0               ;;CONTAINS SUBTEST ITERATION COUNT
001106  000000          $LPADR: .WORD   0               ;;CONTAINS SCOPE LOOP ADDRESS
001110  000000          $LPERR: .WORD   0               ;;CONTAINS SCOPE RETURN FOR ERRORS
001112  000000          $ERTTL: .WORD   0               ;;CONTAINS TOTAL ERRORS DETECTED
001114     000          $ITEMB: .BYTE   0               ;;CONTAINS ITEM CONTROL BYTE
001115     001          $ERMAX: .BYTE   1               ;;CONTAINS MAX. ERRORS PER TEST
001116  000000          $ERRPC: .WORD   0               ;;CONTAINS PC OF LAST ERROR INSTRUCTION
001120  000000          $GDADR: .WORD   0               ;;CONTAINS ADDRESS OF 'GOOD' DATA
001122  000000          $BDADR: .WORD   0               ;;CONTAINS ADDRESS OF 'BAD' DATA
001124  000000          $GDDAT: .WORD   0               ;;CONTAINS 'GOOD' DATA
001126  000000          $BDDAT: .WORD   0               ;;CONTAINS 'BAD' DATA
001130  000000                  .WORD   0               ;;RESERVED--NOT TO BE USED
001132  000000                  .WORD   0
001134  000000                  .WORD   0
001136  177570          SWR:    .WORD   DSWR            ;;ADDRESS OF SWITCH REGISTER
001140  177570          DISPLAY: .WORD  DDISP           ;;ADDRESS OF DISPLAY REGISTER
001142  177560          $TKS:   177560                  ;;TTY KBD STATUS
001144  177562          $TKB:   177562                  ;;TTY KBD BUFFER
001146  177564          $TPS:   177564                  ;;TTY PRINTER STATUS REG. ADDRESS
001150  177566          $TPB:   177566                  ;;TTY PRINTER BUFFER REG. ADDRESS
001152     000          $NULL:  .BYTE   0               ;;CONTAINS NULL CHARACTER FOR FILLS
001153     002          $FILLS: .BYTE   2               ;;CONTAINS # OF FILLER CHARACTERS REQUIRED
001154     012          $FILLC: .BYTE   12              ;;INSERT FILL CHARS. AFTER A "LINE FEED"
001155     000          $TPFLG: .BYTE   0               ;;"TERMINAL AVAILABLE" FLAG (BIT<07>=0=YES)
001156  000000          $REGAD: .WORD   0               ;;CONTAINS THE ADDRESS FROM
                                                        ;;WHICH  ($REG0) WAS OBTAINED
001160  000000          $REG0:  .WORD   0               ;;CONTAINS (($REGAD)+0)
001162  000000          $REG1:  .WORD   0               ;;CONTAINS (($REGAD)+2)
001164  000000          $REG2:  .WORD   0               ;;CONTAINS (($REGAD)+4)
001166  000000          $REG3:  .WORD   0               ;;CONTAINS (($REGAD)+6)
001170  000000          $REG4:  .WORD   0               ;;CONTAINS (($REGAD)+10)
001172  000000          $REG5:  .WORD   0               ;;CONTAINS (($REGAD)+12)
001174  000000          $REG6:  .WORD   0               ;;CONTAINS (($REGAD)+14)
001176  000000          $REG7:  .WORD   0               ;;CONTAINS (($REGAD)+16)
001200  000000          $TMP0:  .WORD   0               ;;USER DEFINED
001202  000000          $TMP1:  .WORD   0               ;;USER DEFINED
001204  000000          $TMP2:  .WORD   0               ;;USER DEFINED
001206  000000          $TMP3:  .WORD   0               ;;USER DEFINED
001210  000000          $TMP4:  .WORD   0               ;;USER DEFINED
001212  000000          $TMP5:  .WORD   0               ;;USER DEFINED
001214  000000          $TMP6:  .WORD   0               ;;USER DEFINED
001216  000000          $TMP7:  .WORD   0               ;;USER DEFINED
001220  000000          $TIMES: 0                       ;;MAX. NUMBER OF ITERATIONS
001222  000000          $ESCAPE:0                       ;;ESCAPE ON ERROR ADDRESS
```

```
   220  001224  177607  000377          $BELL:  .ASCIZ  <207><377><377> ;;CODE FOR BELL
   221  001230     077                  $QUES:  .ASCII  /?/             ;;QUESTION MARK
   222  001231     015                  $CRLF:  .ASCII  <15>            ;;CARRIAGE RETURN
   223  001232  000012                  $LF:    .ASCIZ  <12>            ;;LINE FEED
```

```
                                        ;**********************  ****************************************
001234  000000                          WORD:   000000

                                        .SBTTL  ERROR POINTER TABLE

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

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

001236                                  $ERRTB:
001236  010462                                 EM1     ;"                                      LKS     LKS     "
001240  010543                                 DH1     ;"PC      PS      SP      TEST#   WAS     S/B     "
001242  010624                                 DT1     ;$ERRPC,$REG7,$REG6,$REG5,LKS,$GDDAT
001244  000000                                 0

001246  010642                                 EM2     ;"CLOCK FAILED TO INTERRUPT"
001250  010674                                 DH2     ;"PC      PS      SP      TEST#   LKS     "
001252  010746                                 DT2     ;$ERRPC,$REG7,$REG6,$REG5,LKS
001254  000000                                 0

001256  010762                                 EM3     ;"CLOCK INTERRUPTED WHEN THE PROCESSOR PRIORITY WAS TOO HIGH"
001260  011055                                 DH3     ;"PC      PS      SP      TEST#   LKS     "
001262  011126                                 DT3     ;$ERRPC,$REG7,$REG6,$REG5,LKS
001264  000000                                 0

001266  011142                                 EM4     ;"CLOCK GIVES UNEQUAL # OF PULSES OVER TWO EQUAL PERIODS OF TIME"
001270  011241                                 DH4     ;"PC      PS      SP      TEST#   1ST     2ND"
001272  011376                                 DT4     ;$ERRPC,$REG7,$REG6,$REG5,$REG1,$REG0
001274  000000                                 0

001276  011414                                 EM5     ;"LKS REGISTER RESPONDS TO ANOTHER ADDRESS"
001300  011465                                 DH5     ;"PC      PS      SP      TEST#   ADDRESS"
001302  011536                                 DT5     ;$ERRPC,$REG7,$REG6,$REG5,$GDADR
001304  000000                                 0

001306  011552                                 EM6     ;"A NO SACK TIMEOUT HAS OCCURED"
001310  011610                                 DH6     ;"PC      PS      SP      TEST#   LKS     "
001312  011662                                 DT6     ;$ERRPC,$REG7,$REG6,$REG5,LKS
001314  000000                                 0

001316  011676                                 EM7     ;"WRONG CONDITION CODES WERE PUT ONTO STACK BY INTERRUPT"
001320  011765                                 DH7     ;"PC      PS      SP      TEST#   CC      CC"
001322  012044                                 DT7     ;$ERRPC,$REG7,$REG6,$REG5,BUF1,$GDDAT
001324  000000                                 0

001326  012062                                 EM10    ;"WRONG PC PUT ONTO THE STACK BY AN INTERRUPT"
001330  012136                                 DH10    ;"PC      PS      SP      TEST#   "
001332  012222                                 DT10    ;$ERRPC,$REG7,$REG6,$REG5,BUF2,$GDDAT
```

```
                                                0

                                        EM11    ;''TRAPPED TRYING TO ACCESS LKS REGISTER''
                                        DH11    ;''(PC)    (PS)    (SP)    TEST#''
                                        DT11    ;$ERRPC,$REG7,$REG6,$REG5
                                0
                                ;STARTUP CODE
                        001400  .=1400
001400  012706  001000        KSTART: MOV     #1000,SP                ;INITIALIZE THE STACK SO WE CAN CALL THE TYPEOUT
001404  005046                        CLR     -(SP)           ;;
001406  013746  000034                MOV     34,-(SP)        ;;SAVE CURRENT TRAP VECTOR
001412  012737  001422  000034        MOV     #64$,34         ;;SETUP NEW TRAP VECTOT
001420  104400                        TRAP                    ;;PUSH OLD PSW AN PCON STACK
001422  016666  000002  000006  64$:  MOV     2(SP),6(SP)     ;;
001430  012716  001436                MOV     #65$,(SP)               ;;REPLACE OLD PC WITH NEW
001434  000002                        RTI                     ;;RESTORE PSW
001436  012637  000034        65$:    MOV     (SP)+,34                ;;RESTORE OLD TRAP  VECTOR
001442  004737  006612                JSR     PC,$TYPE                ;PRINTOUT STARTUP MESSAGE
001446  010322                        STMES                   ;ADDRESS OF MESSAGE 'MAINDEC-11-DZKWA-F''
001450                          START:
001450  012706  001100                MOV     #$CMTAG,R6      ;;FIRST LOCATION TO BE CLEARED
001454  005026                        CLR     (R6)+           ;;CLEAR MEMORY LOCATION
001456  022706  001126                CMP     #$BDDAT,R6      ;;DONE?
001462  001374                        BNE     .-6             ;;LOOP BACK IF NO
001464  012706  001000                MOV     #1000,SP                ;;SETUP THE STACK POINTER
001470  012737  006340  000020        MOV     #$SCOPE,@#IOTVEC ;;IOT VECTOR FOR SCOPE ROUTINE
001476  012737  000340  000022        MOV     #340,@#IOTVEC+2 ;;LEVEL 7
001504  012737  007634  000030        MOV     #$ERROR,@#EMTVEC ;;EMT VECTOR FOR ERROR ROUTINE
001512  012737  000340  000032        MOV     #340,@#EMTVEC+2 ;;LEVEL 7
001520  012737  010040  000034        MOV     #$TRAP,@#TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
001526  012737  000340  000036        MOV     #340,@#TRAPVEC+2;LEVEL 7
001534  012737  010074  000024        MOV     #$PWRDN,@#PWRVEC ;;POWER FAILURE VECTOR
001542  012737  000340  000026        MOV     #340,@#PWRVEC+2 ;;LEVEL 7
001550  013737  006200  006172        MOV     $ENDCT,$EOPCT   ;;SETUP END-OF-PROGRAM COUNTER
001556  005037  001220                CLR     $TIMES          ;;INITIALIZE NUMBER OF ITERATIONS
001562  005037  001222                CLR     $ESCAPE         ;;CLEAR THE ESCAPE ON ERROR ADDRESS
001566  112737  000001  001115        MOVB    #1,$ERMAX       ;;ALLOW ONE ERROR PER TEST
001574  012737  001574  001106        MOV     #.,$LPADR       ;;INITIALIZE THE LOOP ADDRESS FOR SCOPE
001602  012737  001602  001110        MOV     #.,$LPERR       ;;SETUP THE ERROR LOOP ADDRESS
001610  013746  000004                MOV     @#4,-(SP)       ;;SAVE ERROR VECTOR
001614  013746  000006                MOV     @#6,-(SP)
001620  012737  001634  000004        MOV     #64$,4          ;;SET UP TIME OUT VECTOR
001626  005777  177304                TST     @SWR            ;;TRY TO REFERENCE HARDWARE SWR
001632  000407                        BR      65$             ;;BRANCH IF NO TIMEOUT TRAP OCCURS
001634  012737  000176  001136  64$:  MOV     #SWREG,SWR      ;;POINT TO SOFTWARE SWR
001642  012737  000174  001140        MOV     #DISPREG,DISPLAY ;;POINT TO SOFTWARE DISPLAY REG
001650  022626                        CMP     (SP)+,(SP)+     ;;RESTORE STACK
001652  012637  000006        65$:    MOV     (SP)+,@#6       ;;RESTORE ERROR VECTOR
001656  012637  000004                MOV     (SP)+,@#4
001662  005737  000042                TST     42              ;LOADED BY A MONITOR
001666  001401                        BEQ     T0001           ;BR IF NO
001670  000005                        RESET                   ;YES--GENERATE AN INIT
```

```
                                        .SBTTL  TEST THAT THE LKS CAN BE REFERENCED WITHOUT A BUS ERROR
                                        ;LKS ACCESS TEST
001672  000004                T0001:  SCOPE
001674  012737  001730  000004        MOV     #E0001,@#4      ;PREPARE FOR ADDRESSING THE LKS REGISTER. BAD HARDWARE
001702  012737  000340  000006        MOV     #340,@#6        ;COULD CAUSE A TRAP TO 4
001710  012737  001716  001106        MOV     #R0001,$LPADR   ;TIGHTEN UP THE SCOPE LOOP A BIT IN CASE OF AN ERROR
001716  012706  001000        R0001:  MOV     #1000,SP        ;SETUP THE STACK POINTER IN CASE OF AN ERROR
001722  005037  177546        I0001:  CLR     @#LKS           ;JUST REFERENCE LKS. DONT WORRY IF IT DIDNT CLEAR YET
001726  000401                        BR      T0002           ;WE DIDNT TRAP IF WE REACH HERE. GO ON TO NEXT TEST
001730  104011                E0001:  ERROR 11                ;ERROR:::TRAPED TRYING TO ACCESS THE LKS REGISTER


                                        .SBTTL  TEST THAT START CLEARS LINE CLOCK INTERRUPT ENABLE BIT
                                        ;TEST THAT START CLEARS LINE CLOCK INTERRUPT ENABLE BIT
001732  000004                T0002:  SCOPE
001734  012737  006266  000004        MOV     #TRAP0,@#4      ;SETUP VECOR IN CASE OF UNFORSEEN PROBLEMS
001742  012737  000340  000006        MOV     #340,@#6        ;NO INTERRUPTS WHILE PRINTING FATAL MESSAGE
001750  012737  001756  001106        MOV     #R0002,$LPADR   ;SETUP LOOPBACK ADDRESS IN CASE OF AN ERROR
001756  000005                R0002:  RESET
001760  012737  000200  001124        MOV     #200,$GDDAT     ;HAVE GOOD DATA INFO READY FOR TYPEOUT IN CASE OF AN ERR
001766  032737  000100  177546        BIT     #100,LKS        ;TEST THE INTERRUPT ENABLE BIT
001774  001401                        BEQ     T0003
001776  104001                E0002:  ERROR 1                 ;ERROR, CLOCK INTERRUPT ENABLE NOT CLEARED BY INIT


                                        .SBTTL  TEST THAT START SETS CLOCK FLAG
                                        ;TEST THAT START SETS CLOCK FLAG
002000  000004                T0003:  SCOPE
002002  012737  006266  000004        MOV     #TRAP0,@#4      ;SETUP VECOR IN CASE OF UNFORSEEN PROBLEMS
002010  012737  000340  000006        MOV     #340,@#6        ;NO INTERRUPTS WHILE PRINTING FATAL MESSAGE
002016  012737  000200  001124        MOV     #200,$GDDAT     ;HAVE GOOD DATA INFO READY FOR TYPEOUT IN CASE OF AN ERR
002024  012737  002032  001106        MOV     #R0003,$LPADR   ;SETUP LOOPBACK ADDRESS IN CASE OF AN ERROR
002032  000005                R0003:  RESET                   ;SHOULD SET THE  CLOCK FLAG
002034  105737  177546                TSTB    LKS             ;FIND OUT IF IT DID
002040  100401                        BMI     T0004           ;GO ON TO THE NEXT TEST IF IT SET THE CLOCK FLAG
002042  104001                E0003:  ERROR 1                 ;ERROR, CLOCK FLAG NOT SET BY INIT


                                        .SBTTL  TEST THAT CLOCK FLAG WILL SET AFTER SUFFICIENT PERIOD OF TIME (20 MS MIN)
                                        ;TEST THAT CLOCK FLAG WILL SET AFTER SUFFICIENT PERIOD OF TIME (20 MS MIN)
002044  000004                T0004:  SCOPE
002046  012737  006266  000004        MOV     #TRAP0,@#4      ;SETUP VECOR IN CASE OF UNFORSEEN PROBLEMS
002054  012737  000340  000006        MOV     #340,@#6        ;NO INTERRUPTS WHILE PRINTING FATAL MESSAGE
002062  012737  002070  001106        MOV     #R0004,$LPADR   ;SETUP LOOPBACK ADDRESS IN CASE OF AN ERROR
002070  012737  000200  001124  R0004:  MOV     #200,$GDDAT     ;HAVE GOOD DATA INFO READY FOR TYPEOUT IN CASE OF AN ERR
002076  005037  177546                CLR     LKS             ;CLEAR THE CLOCK FLAG
002102  005000                        CLR     R0              ;AND A TIMER LOCATION
002104  105737  177546        A0004:  TSTB    LKS             ;IS CLOCK FLAG SET
002110  100403                        BMI     T0005
002112  005200                        INC     R0              ;NO, INCREMENT COUNT 003 WAIT FOR SOMEMORE
002114  001373                        BNE     A0004           ;WAIT SUFFICIENT AMOUNT OF TIME FOR CLOCK
002116  104001                E0004:  ERROR 1                 ;ERROR, CLOCK FLAG FAILED TO SET
```

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                                        .SBTTL  TEST THAT INTERRUPT ENABLE BIT MAY BE SET
                                        ;TEST THAT INTERRUPT ENABLE BIT MAY BE SET
002120  000004                  T0005:  SCOPE
002122  012737  006266  000004          MOV     #TRAP0,@#4      ;SETUP VECOR IN CASE OF UNFORSEEN PRCBLEMS
002130  012737  000340  000006          MOV     #340,@#6        ;NO INTERRUPTS WHILE PRINTING FATAL MESSAGE
002136  012737  000100  001124          MOV     #100,$GDDAT     ;HAVE GOOD DATA INFO READY FOR TYPEOUT IN CASE OF AN ERR
002144  012737  002164  001106          MOV     #R0005,$LPADR   ;SETUP LOOP BACK ADDRESS IN CASE OF ERROR
002152  013746  000340                  MOV     PR7,-(SP)       ;;PUT NEW PS ON STACK
002156  012746  002164                  MOV     #64$,-(SP)      ;;PUT NEW PC ON  STACK
002162  000002                          RTI                     ;; POP NEW PC AND PS
002164                          64$:
002164  005037  177546          R0005:  CLR     LKS
002170  005003                          CLR     R3              ;INITIALIZE A COUNTER LOCATION
002172  105737  177546          A0005:  TSTB    LKS             ;IS THE CLOCK FLAG SET?
002176  100404                          BMI     B0005           ;IF SO, CONTINUE ON WITH THE TEST
002200  005203                          INC     R3              ;IF NOT INCREMENT THE COUNTER LOCATION
002202  001373                          BNE     A0005           ;AND GO TEST THE CLOCK FLAG AGAIN. UNLESS...
002204  104001                  E0005:  ERROR 1                 ;CLOCK FLAG DID NOT SET AFTER A WAITING PERIOD > 20 MS
002206  000410                          BR      T0006
002210                          B0005:
002210  012737  000100  177546          MOV     #100,LKS        ;CLEAR CLOCK FLAG AND SET INTERRUPT ENABLE
002216  032737  000100  177546          BIT     #100,LKS        ;IS INTERRUPT ENABLE SET?
002224  001001                          BNE     T0006
002226  104001                  E1005:  ERROR 1                 ;ERROR INTERRUPT ENABLE NOT SET


                                        .SBTTL  TEST THAT INTERRUPT ENABLE BIT MAY BE CLEARED
                                        ;TEST THAT INTERRUPT ENABLE BIT MAY BE CLEARED
002230  000004                  T0006:  SCOPE
002232  012737  006266  000004          MOV     #TRAP0,@#4      ;SETUP VECOR IN CASE OF UNFORSEEN PROBLEMS
002240  012737  000340  000006          MOV     #340,@#6        ;NO INTERRUPTS WHILE PRINTING FATAL MESSAGE
002246  012737  000000  001124          MOV     #0,$GDDAT
002254  012737  002274  001106          MOV     #R0006,$LPADR   ;INITIALIZE THE LOOPBACK ADDRESS IN CASE OF AN ERROR
002262  013746  000340                  MOV     PR7,-(SP)       ;;PUT NEW PS ON STACK
002266  012746  002274                  MOV     #64$,-(SP)      ;;PUT NEW PC ON  STACK
002272  000002                          RTI                     ;; POP NEW PC AND PS
002274                          64$:
002274  005037  177546          R0006:  CLR     LKS
002300  005003                          CLR     R3              ;INITIALIZE A COUNTER LOCATION
002302  105737  177546          A0006:  TSTB    LKS             ;IS THE CLOCK FLAG SET?
002306  100404                          BMI     B0006           ;IF SO, CONTINUE ON WITH THE TEST
002310  005203                          INC     R3              ;IF NOT INCREMENT THE COUNTER LOCATION
002312  001373                          BNE     A0006           ;AND GO TEST THE CLOCK FLAG AGAIN. UNLESS...
002314  104001                  E0006:  ERROR 1                 ;CLOCK FLAG DID NOT SET AFTER A WAITING PERIOD > 20 MS
002316  000412                          BR      T0007
002320                          B0006:
002320  012737  000100  177546          MOV     #100,LKS        ;CLEAR CLOCK FLAG AND SET INTERRUPT ENABLE
002326  005037  177546                  CLR     LKS             ;CLEAR INTERRUPT ENABLE
002332  032737  000100  177546          BIT     #100,LKS        ;TEST THE INTERRUPT ENABLE BIT
002340  001401                          BEQ     T0007           ;IS INTERRUPT ENABLE CLEARED
002342  104001                  E10006: ERROR 1                 ;ERROR, ERROR INTERRUPT BIT CAN NOT BE CLEARED
```

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                                        .SBTTL  TEST THAT CLOCK INTERRUPTS TO CORRECT VECTOR ADDRESS
                                        ;TEST THAT CLOCK INTERRUPTS TO CORRECT VECTOR ADDRESS
002344  000004                  T0007:  SCOPE
002346  012737  006266  000004          MOV     #TRAP0,@#4      ;SETUP VECOR IN CASE OF UNFORSEEN PROBLEMS
002354  012737  000340  000006          MOV     #340,@#6        ;NO INTERRUPTS WHILE PRINTING FATAL MESSAGE
002362  012737  000300  001124          MOV     #300,$GDDAT     ;HAVE GOOD DATA INFO READY FOR TYPEOUT IN CASE OF AN ERR
002370  012737  002412  001106          MOV     #R0007,$LPADR   ;INITIALIZE THE LOOPBACK ADDRESS IN CASE OF AN ERROR
002376  012737  002474  000100          MOV     #D0007,100      ;SET UP VECTOR RETURN POINTER
002404  012737  000340  000102          MOV     #340,@#102      ;1 INTERRUPT IS ENOUGH
002412  012706  001000          R0007:  MOV     #1000,SP        ;GET STACK READY FOR INTERRUPTS
002416  005046                          CLR     -(SP)           ;DROP CPU PRIORITY LEVEL
002420  012746  002426                  MOV     #1$,-(SP)       ;SET RETURN ADDRESS ON STACK FROM 'RTI'
002424  000002                          RTI                     ;RETURN TO NEXT INSTRUCTION
002426  005037  177546          1$:     CLR     LKS
002432  005003                          CLR     R3              ;INITIALIZE A COUNTER LOCATION
002434  105737  177546          A0007:  TSTB    LKS             ;IS THE CLOCK FLAG SET?
002440  100404                          BMI     B0007           ;IF SO, CONTINUE ON WITH THE TEST
002442  005203                          INC     R3              ;IF NOT INCREMENT THE COUNTER LOCATION
002444  001373                          BNE     A0007           ;AND GO TEST THE CLOCK FLAG AGAIN. UNLESS...
002446  104001          E0007:  ERROR 1                         ;CLOCK FLAG DID NOT SET AFTER A WAITING PERIOD > 20 MS
002450  000415                          BR      T0010
002452                  B0007:
002452  012737  000100  177546          MOV     #100,LKS        ;ENABLE INTERRUPT
002460  005000                          CLR     R0
002462  005200          C0007:  INC     R0
002464  000240                          NOP                     ;STALL FOR TIME
002466  001375                          BNE     C0007           ;WAIT FOR INTERRUPT
002470  104002          E10007: ERROR 2                         ;ERROR, DIDNT GET INTERRUPT
002472  000404                          BR      T0010
002474  105737  177546          D0007:  TSTB    LKS             ;ENTER HERE IF INTERRUPTED
002500  100401                          BMI     T0010
002502  104001          E20007: ERROR 1                         ;ERROR, INTERRUPT NOT CAUSED BY CLOCK


                                        .SBTTL  TEST THAT CLOCK WILL INTERRUPT WITH PROCESSOR AT PRIORITY 5
                                        ;TEST THAT CLOCK WILL INTERRUPT WITH PROCESSOR AT PRIORITY 5
                                        ;NOTE: IF THERE IS NO HARDWARE 'PSW' THIS TEST WILL BE SKIPPED
002504  000004                  T0010:  SCOPE
002506  012737  006266  000004          MOV     #TRAP0,@#4      ;SETUP VECOR IN CASE OF UNFORSEEN PROBLEMS
002514  012737  000340  000006          MOV     #340,@#6        ;NO INTERRUPTS WHILE PRINTING FATAL MESSAGE
002522  012737  002544  001106          MOV     #R0010,$LPADR   ;INITIALIZE THE LOOPBACK ADDRESS IN CASE OF AN ERROR
002530  012737  002654  000100          MOV     #D0010,100      ;SET UP VECTOR RETURN POINTER
002536  012737  000340  000102          MOV     #340,@#102      ;NO INTERRUPTS ALLOWED AFTER THE FIRST ONE
002544  005037  177546          R0010:  CLR     LKS
002550  013746  000004                  MOV     4,-(SP)         ;SAVE BUS TIMEOUT VECTOR CONTENTS
002554  012737  002572  000004          MOV     #1$,4           ;SET A SERVICE 'PC' IN CASE TIMEOUT OCCURS
002562  012737  000240  177776          MOV     #PR5,PS         ;DO WE HAVE A HARDWARE 'PSW'?
002570  000404                          BR      2$              ;BRANCH IF YES
002572  022626          1$:     CMP     (SP)+,(SP)+     ;RESTORE STACK FROM TIMEOUT
002574  012637  000004                  MOV     (SP)+,4         ;RESTORE BUS TIMEOUT VECTOR CONTENTS
002600  000431                          BR      T0011
002602  012637  000004          2$:     MOV     (SP)+,4         ;RESTORE BUS TIMEOUT VECTOR CONTENTS
002606  012706  001000                  MOV     #1000,SP        ;INITIALIZE THE STACK POINTER
```

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  504  002612  005003                    CLR     R3              ;INITIALIZE A COUNTER LOCATION
  505  002614  105737  177546  A0010:    TSTB    LKS             ;IS THE CLOCK FLAG SET?
  506  002620  100404                    BMI     B0010           ;IF SO, CONTINUE ON WITH THE TEST
  507  002622  005203                    INC     R3              ;IF NOT INCREMENT THE COUNTER LOCATION
  508  002624  001373                    BNE     A0010           ;AND GO TEST THE CLOCK FLAG AGAIN. UNLESS...
  509  002626  104001          E0010:    ERROR 1                 ;CLOCK FLAG DID NOT SET AFTER A WAITING PERIOD > 20 MS
  510  002630  000415                    BR      T0011
  511  002632                  B0010:
  512  002632  012737  000100  177546    MOV     #100,LKS        ;ENABLE INTERRUPT
  513  002640  005000                    CLR     R0
  514  002642  005200          C0010:    INC     R0
  515  002644  000240                    NOP                     ;STALL FOR SOME TIME
  516  002646  001375                    BNE     C0010           ;WAIT FOR INTERRUPT
  517  002650  104002          E10010:   ERROR 2                 ;ERROR, INTERRUPT FAILED TO OCCUR
  518  002652  000404                    BR      T0011
  519  002654  105737  177546  D0010:    TSTB    LKS             ;ENTER HERE IF INTERRUPTED
  520  002660  100401                    BMI     T0011
  521  002662  104001          E20010:   ERROR 1                 ;ERROR, INTERRUPTDID NOT CLEAR THE CLOCK FLAG
  522
  523
  524
  525                          .SBTTL  TEST THAT CLOCK WILL NOT INTERRUPT WITH PROCESSOR PRIORITY 6
  526                          ;TEST THAT CLOCK WILL NOT INTERRUPT WITH PROCESSOR PRIORITY 6
  527                          ;NOTE: IF THERE IS NO HARDWARE 'PSW' THIS TEST WILL BE SKIPPED
  528  002664  000004          T0011:    SCOPE
  529  002666  012737  006266  000004    MOV     #TRAP0,@#4      ;SETUP VECOR IN CASE OF UNFORSEEN PROBLEMS
  530  002674  012737  000340  000006    MOV     #340,@#6        ;NO INTERRUPTS WHILE PRINTING FATAL MESSAGE
  531  002702  012737  002710  001106    MOV     #R0011,$LPADR   ;SETUP LOOPBACK ADDRESS IN CASE OF AN ERROR
  532  002710  005037  177546  R0011:    CLR     LKS
  533  002714  005003                    CLR     R3              ;INITIALIZE A COUNTER LOCATION
  534  002716  105737  177546  A0011:    TSTB    LKS             ;IS THE CLOCK FLAG SET?
  535  002722  100404                    BMI     B0011           ;IF SO, CONTINUE ON WITH THE TEST
  536  002724  005203                    INC     R3              ;IF NOT INCREMENT THE COUNTER LOCATION
  537  002726  001373                    BNE     A0011           ;AND GO TEST THE CLOCK FLAG AGAIN. UNLESS...
  538  002730  104001          E0011:    ERROR 1                 ;CLOCK FLAG DID NOT SET AFTER A WAITING PERIOD > 20 MS
  539  002732  000443                    BR      T0012
  540  002734                  B0011:
  541  002734  012706  001000            MOV     #1000,SP        ;INITIALIZE THE STACK POINTER
  542  002740  013746  000004            MOV     4,-(SP)         ;SAVE BUS TIMEOUT VECTOR CONTENTS
  543  002744  012737  002762  000004    MOV     #1$,4           ;SET SERVICE 'PC' IN CASE TIMEOUT OCCURS
  544  002752  012737  000300  177776    MOV     #PR6,PS         ;DO WE HAVE A HARDWARE 'PSW'?
  545  002760  000404                    BR      2$              ;BRANCH IF YES
  546  002762  022626          1$:       CMP     (SP)+,(SP)+     ;RESTORE STACK FROM BUS TIMEOUT
  547  002764  012637  000004            MOV     (SP)+,4         ;RESTORE BUS TIMEOUT VECTOR CONTENTS
  548  002770  000424                    BR      T0012
  549  002772  012637  000004  2$:       MOV     (SP)+,4         ;RESTORE BUS TIMEOUT VECTOR CONTENTS
  550  002776  012737  003026  000100    MOV     #E1011,100      ;SET UP VECTOR RETURN
  551  003004  012737  000100  177546    MOV     #100,LKS        ;ENABLE INTERRUPT
  552  003012  005003                    CLR     R3              ;INITIALIZE A COUNTER LOCATION
  553  003014  105737  177546  C0011:    TSTB    LKS             ;IS THE CLOCK FLAG SET?
  554  003020  100404                    BMI     D0011           ;IF SO, CONTINUE ON WITH THE TEST
  555  003022  005203                    INC     R3              ;IF NOT INCREMENT THE COUNTER LOCATION
  556  003024  001373                    BNE     C0011           ;AND GO TEST THE CLOCK FLAG AGAIN. UNLESS...
  557  003026  104001          E1011:    ERROR 1                 ;CLOCK FLAG DID NOT SET AFTER A WAITING PERIOD > 20 MS
  558  003030  000715                    BR      T0011
  559  003032                  D0011:
```

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                                        NOP
003034  000240                          NOP                     ;GIVE CLOCK EXTRA TIME TO INTERRUPT
003036  000401                          BR      T0012
003040  104003                  E20011: ERROR 3                 ;ERROR, CLOCK INTERRUPTED WITHOUT HAVING PRIORITY


                                .SBTTL  TEST THAT RESET SETS CLOCK FLAG
                                ;TEST THAT RESET SETS CLOCK FLAG
003042  000004                  T0012:  SCOPE
003044  012737  000200  001124          MOV     #200,$GDDAT     ;HAVE GOOD DATA INFO READY FOR TYPEOUT IN CASE OF AN ERR
003052  012737  006266  000004          MOV     #TRAP0,@#4      ;SETUP VECOR IN CASE OF UNFORSEEN PROBLEMS
003060  012737  000340  000006          MOV     #340,@#6        ;NO INTERRUPTS WHILE PRINTING FATAL MESSAGE
003066  012737  003074  001106          MOV     #R0012,$LPADR   ;SETUP LOOPBACK ADDRESS IN CASE OF AN ERROR
003074  005037  177546          R0012:  CLR     LKS             ;CLEAR CLOCK FLAG
003100  005003                          CLR     R3              ;INITIALIZE A COUNTER LOCATION
003102  105737  177546          A0012:  TSTB    LKS             ;IS THE CLOCK FLAG SET?
003106  100404                          BMI     B0012           ;IF SO, CONTINUE ON WITH THE TEST
003110  005203                          INC     R3              ;IF NOT INCREMENT THE COUNTER LOCATION
003112  001373                          BNE     A0012           ;AND GO TEST THE CLOCK FLAG AGAIN. UNLESS...
003114  104001                  E0012:  ERROR 1                 ;CLOCK FLAG DID NOT SET AFTER A WAITING PERIOD > 20 MS
003116  000407                          BR      T0013
003120                          B0012:
003120  005037  177546                  CLR     LKS
003124  000005                          RESET                   ;SHOULD SET CLOCK FLAG
003126  105737  177546                  TSTB    LKS
003132  100401                          BMI     T0013
003134  104001                  E10012: ERROR 1                 ;ERROR, RESET DIDN'T SET CLOCK FLAG


                                .SBTTL  TEST LINE CLOCK REPEATABILITY
                                ;TEST LINE CLOCK REPEATABILITY
                                ;MAKE SURE THAT OVER TWO EQUAL PERIODS OF TIME
                                ;THE CLOCK PUTS OUT THE SAME NUMBER OF PULSES
003136  000004                  T0013:  SCOPE
003140  005000                  R0013:  CLR     R0              ;CLEAR 1ST TIME COUNT
003142  005001                          CLR     R1              ;CLEAR 1ST CLOCK COUNT
003144  013746  000340                  MOV     PR7,-(SP)       ;;PUT NEW PS ON STACK
003150  012746  003156                  MOV     #64$,-(SP)      ;;PUT NEW PC ON  STACK
003154  000002                          RTI                     ;; POP NEW PC AND PS
003156                          64$:
003156  012737  003156  001106  R1013:  MOV     #R1013,$LPADR   ;ERROR IN NEXT  FEW INSTRUCTIONS CAUSES A SHORT SCOPE LO
003164  005037  177546                  CLR     LKS
                                                                ;SYNC ON CLOCK FLAG A COUPLE OF TIMES
003170  005003                          CLR     R3              ;INITIALIZE A COUNTER LOCATION
003172  105737  177546          A0013:  TSTB    LKS             ;IS THE CLOCK FLAG SET?
003176  100404                          BMI     B0013           ;IF SO, CONTINUE ON WITH THE TEST
003200  005203                          INC     R3              ;IF NOT INCREMENT THE COUNTER LOCATION
003202  001373                          BNE     A0013           ;AND GO TEST THE CLOCK FLAG AGAIN. UNLESS...
003204  104001                  E0013:  ERROR 1                 ;CLOCK FLAG DID NOT SET AFTER A WAITING PERIOD > 20 MS
003206  000524                          BR      T0014
003210                          B0013:
003210  012737  003210  001106  R2013:  MOV     #R2013,$LPADR   ;MAKE SCOPE LOOP SHORT IN CASE OF AN ERROR
003216  005037  177546                  CLR     LKS
003222  005003                          CLR     R3              ;INITIALIZE A COUNTER LOCATION
```

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  616  003224  105737  177546          C0013:  TSTB    LKS             ;IS THE CLOCK FLAG SET?
  617  003230  100404                          BMI     D0013           ;IF SO, CONTINUE ON WITH THE TFST
  618  003232  005203                          INC     R3              ;IF NOT INCREMENT THE COUNTER LOCATION
  619  003234  001373                          BNE     C0013           ;AND GO TEST THE CLOCK FLAG AGAIN. UNLESS...
  620  003236  104001                  E10013: ERROR 1                 ;CLOCK FLAG DID NOT SET AFTER A WAITING PERIOD > 20 MS
  621  003240  000507                          BR      T0014
  622  003242                          D0013:
  623  003242  005037  177546                  CLR     LKS
  624  003246  032737  000200  177546  1$:     BIT     #200,LKS        ;IS THE CLOCK FLAG SET ?
  625  003254  001374                          BNE     1$              ; NO, WAIT FOR IT
  626  003256  005037  177546                  CLR     LKS
  627  003262  105737  177546          F0013:  TSTB    LKS             ;IS CLOCK FLAG SET
  628  003266  100003                          BPL     G0013           ;NO
  629  003270  005201                          INC     R1              ;+1 TO CLOCK COUNT
  630  003272  005037  177546                  CLR     LKS             ;CLEAR CLOCK IF SET
  631  003276  005200                  G0013:  INC     R0              ;+1 TO TIME COUNT
  632  003300  001370                          BNE     F0013           ;REPEAT UNTIL R0=0
  633  003302  005000                          CLR     R0              ;CLEAR 2ND TIME COUNT
  634  003304  005002                          CLR     R2              ;CLEAR 2ND CLOCK COUNT
  635  003306  012737  003306  001106  R3013:  MOV     #R3013,$LPADR   ;INSURE A SHORT SCOPE LOOP
  636  003314  005037  177546                  CLR     LKS
  637                                                                  ;SYNC ON CLOCK FLAG TWICE
  638  003320  005003                          CLR     R3              ;INITIALIZE A COUNTER LOCATION
  639  003322  105737  177546          H0013:  TSTB    LKS             ;IS THE CLOCK FLAG SET?
  640  003326  100404                          BMI     J0013           ;IF SO, CONTINUE ON WITH THE TEST
  641  003330  005203                          INC     R3              ;IF NOT INCREMENT THE COUNTER LOCATION
  642  003332  001373                          BNE     H0013           ;AND GO TEST THE CLOCK FLAG AGAIN. UNLESS...
  643  003334  104001                  E20013: ERROR 1                 ;CLOCK FLAG DID NOT SET AFTER A WAITING PERIOD > 20 MS
  644  003336  000450                          BR      T0014
  645  003340                          J0013:
  646  003340  012737  003340  001106  R4013:  MOV     #R4013,$LPADR   ;INSURE A SHORT SCOPE LOOP
  647  003346  005037  177546                  CLR     LKS
  648  003352  005003                          CLR     R3              ;INITIALIZE A COUNTER LOCATION
  649  003354  105737  177546          K0013:  TSTB    LKS             ;IS THE CLOCK FLAG SET?
  650  003360  100404                          BMI     L0013           ;IF SO, CONTINUE ON WITH THE TEST
  651  003362  005203                          INC     R3              ;IF NOT INCREMENT THE COUNTER LOCATION
  652  003364  001373                          BNE     K0013           ;AND GO TEST THE CLOCK FLAG AGAIN. UNLESS...
  653  003366  104001                  E30013: ERROR 1                 ;CLOCK FLAG DID NOT SET AFTER A WAITING PERIOD > 20 MS
  654  003370  000433                          BR      T0014
  655  003372                          L0013:
  656  003372  012737  003140  001106          MOV     #R0013,$LPADR   ;MUST LOOP BACK TO BEGINING OF TEST IF EEROR COMES NOW
  657  003400  005037  177546                  CLR     LKS
  658  003404  032737  000200  177546  1$:     BIT     #200,LKS        ;IS CLOCK FLAG SET ?
  659  003412  001374                          BNE     1$              ;NO, WAIT
  660  003414  005037  177546                  CLR     LKS
  661  003420  105737  177546          M0013:  TSTB    LKS             ;IS CLOCK FLAG SET
  662  003424  100003                          BPL     N0013           ;NO
  663  003426  005202                          INC     R2              ;+1 TO CLOCK COUNT
  664  003430  005037  177546                  CLR     LKS             ;CLEAR CLOCK IF SET
  665  003434  005200                  N0013:  INC     R0              ;+1 TO TIME COUNT
  666  003436  001370                          BNE     M0013           ;REPEAT UNTIL R0=0
  667  003440  020102                          CMP     R1,R2           ;IS 1ST CLOCK COUNT EQUAL TO 2ND CLOCK COUNT?
  668  003442  001406                          BEQ     T0014           ;YES
  669  003444  010137  001162          E40013: MOV     R1,$REG1        ;GET R1 READY FOR PRINTOUT
  670  003450  010237  001164                  MOV     R2,$REG2        ;GET R2 READY FOR PRINTOUT
  671  003454  104004                          ERROR 4                 ;ERROR, CLOCK FLAG OCCURRED DIFFERENT
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                                        NOP                     ;NUMBER OF TIMES IN EQUAL PERIODS


                                .SBTTL  LINE CLOCK REGISTER ADDRESSING TEST
                                ;LINE CLOCK REGISTER ADDRESSING TEST
                                ;TEST THAT THE "LKS" REGISTER CAN NOT BE ADDRESSED AS ANYTHING BUT 177546
                                ;SET A LOCATION THAT IS CLOSE(DIFFERS BY 1 BIT) TO THE LKS REGISTER
                                ;TO 100. IF THE LKS ALSO CHANGES, THEN SIGNAL AN ERROR
003460  000004                T0014:  SCOPE
003462  005037  001124                CLR     $GDDAT
003466  012737  003542  001106        MOV     #R0014,$LPADR   ;INITIALIZE THE LOOPBACK ADDRESS IN CASE OF AN ERROR
003474  012737  157546  001120        MOV     #157546,$GDADR  ;SAME AS "LKS" ADDRESS EXCEPT WITH BIT 13 CLEAR
003502  012737  003560  000004        MOV     #A0014,4        ;SETUP VECTOR IN CASE IT IS NONEXISTANT
003510  012737  000340  000006        MOV     #340,6
003516  005037  177546                CLR     LKS
003522  017737  175372  012364        MOV     @$GDADR,        SAVE    ;SAVE CONTENTS
003530  013746  000340                MOV     PR7,-(SP)       ;;PUT NEW PS ON STACK
003534  012746  003542                MOV     #64$,-(SP)      ;;PUT NEW PC ON  STACK
003540  000002                        RTI                     ;; POP NEW PC AND PS
003542                          64$:
003542  012706  001000        R0014:  MOV     #1000,SP        ;SETUP THE STACK
003546  005037  177546                CLR     LKS
003552  012777  000100  175340  I0014:  MOV     #100,@$GDADR    ;SET THE "CLOSE" ADDRESS TO = 100
003560  032737  000100  177546  A0014:  BIT     #100,LKS        ;MAKE SURE THAT "LKS" WAS NOT AFFECTED
003566  001401                        BEQ     B0014
003570  104005                E0014:  ERROR 5                 ;IT AFFECTED "LKS"  --  ERROR
003572  005037  177546        B0014:  CLR     LKS
003576  012737  003612  000004        MOV     #T0015  ,4
003604  013777  012364  175306        MOV     SAVE,   @$GDADR ;RESTORE CONTENTS


                                .SBTTL  LINE CLOCK REGISTER ADDRESSING TEST
                                ;LINE CLOCK REGISTER ADDRESSING TEST
003612  000004                T0015:  SCOPE
003614  012737  003700  000004        MOV     #A0015,4        ;SETUP VECTOR IN CASE IT IS NONEXISTANT
003622  012737  000340  000006        MOV     #340,6
003630  005037  001124                CLR     $GDDAT
003634  012737  003662  001106        MOV     #R0015,$LPADR   ;INITIALIZE THE LOOPBACK ADDRESS IN CASE OF AN ERROR
003642  012737  177146  001120        MOV     #177146,$GDADR  ;SAME AS "LKS" ADDRESS EXCEPT WITH BIT 8 CLEAR
003650  013746  000340                MOV     PR7,-(SP)       ;;PUT NEW PS ON STACK
003654  012746  003662                MOV     #64$,-(SP)      ;;PUT NEW PC ON  STACK
003660  000002                        RTI                     ;; POP NEW PC AND PS
003662                          64$:
003662  012706  001000        R0015:  MOV     #1000,SP        ;SETUP THE STACK
003666  005037  177546                CLR     LKS
003672  012777  000100  175220  I0015:  MOV     #100,@$GDADR    ;SET THE "CLOSE" ADDRESS TO = 100
003700  032737  000100  177546  A0015:  BIT     #100,LKS        ;MAKE SURE THAT "LKS" WAS NOT AFFECTED
003706  001401                        BEQ     B0015
003710  104005                E0015:  ERROR 5                 ;IT AFFECTED "LKS"  --  ERROR
003712  005037  177546        B0015:  CLR     LKS
003716  012737  003730  000004        MOV     #T0016  ,4
003724  005077  175170                CLR     @$GDADR         ;CLEAR OUT THE "CLOSE" ADDRESS
```

```
                                        .SBTTL  LINE CLOCK REGISTER ADDRESSING TEST
                                        ;LINE CLOCK REGISTER ADDRESSING TEST
003730  000004                  T0016:  SCOPE
003732  012737  004016  000004          MOV     #A0016,4        ;SETUP VECTOR IN CASE IT IS NONEXISTANT
003740  012737  000340  000006          MOV     #340,6
003746  005037  001124                  CLR     $GDDAT
003752  012737  004000  001106          MOV     #R0016,$LPADR   ;INITIALIZE THE LOOPBACK ADDRESS IN CASE OF AN ERROR
003760  012737  177446  001120          MOV     #177446,$GDADR  ;SAME AS "LKS" ADDRESS EXCEPT WITH BIT 6 CLEAR
003766  013746  000340                  MOV     PR7,-(SP)       ;;PUT NEW PS ON STACK
003772  012746  004000                  MOV     #64$,-(SP)      ;;PUT NEW PC ON  STACK
003776  000002                          RTI                     ;; POP NEW PC AND PS
004000                          64$:
004000  012706  001000          R0016:  MOV     #1000,SP        ;SETUP THE STACK
004004  005037  177546                  CLR     LKS
004010  012777  000100  175102  I0016:  MOV     #100,@$GDADR    ;SET THE "CLOSE" ADDRESS TO = 100
004016  032737  000100  177546  A0016:  BIT     #100,LKS        ;MAKE SURE THAT "LKS" WAS NOT AFFECTED
004024  001401                          BEQ     B0016
004026  104005                  E0016:  ERROR 5                 ;IT AFFECTED "LKS"  --  ERROR
004030  005037  177546          B0016:  CLR     LKS
004034  012737  004046  000004          MOV     #T0017  ,4
004042  005077  175052                  CLR     @$GDADR         ;CLEAR OUT THE "CLOSE" ADDRESS



                                        .SBTTL  LINE CLOCK REGISTER ADDRESSING TEST
                                        ;LINE CLOCK REGISTER ADDRESSING TEST
004046  000004                  T0017:  SCOPE
004050  012737  004134  000004          MOV     #A0017,4        ;SETUP VECTOR IN CASE IT IS NONEXISTANT
004056  012737  000340  000006          MOV     #340,6
004064  005037  001124                  CLR     $GDDAT
004070  012737  004116  001106          MOV     #R0017,$LPADR   ;INITIALIZE THE LOOPBACK ADDRESS IN CASE OF AN ERROR
004076  012737  177556  001120          MOV     #177556,$GDADR  ;SAME AS "LKS" ADDRESS EXCEPT WITH BIT 3 SET
004104  013746  000340                  MOV     PR7,-(SP)       ;;PUT NEW PS ON STACK
004110  012746  004116                  MOV     #64$,-(SP)      ;;PUT NEW PC ON  STACK
004114  000002                          RTI                     ;; POP NEW PC AND PS
004116                          64$:
004116  012706  001000          R0017:  MOV     #1000,SP        ;SETUP THE STACK
004122  005037  177546                  CLR     LKS
004126  012777  000100  174764  I0017:  MOV     #100,@$GDADR    ;SET THE "CLOSE" ADDRESS TO = 100
004134  032737  000100  177546  A0017:  BIT     #100,LKS        ;MAKE SURE THAT "LKS" WAS NOT AFFECTED
004142  001401                          BEQ     B0017
004144  104005                  E0017:  ERROR 5                 ;IT AFFECTED "LKS"  --  ERROR
004146  005037  177546          B0017:  CLR     LKS
004152  012737  004164  000004          MOV     #T0020  ,4
004160  005077  174734                  CLR     @$GDADR         ;CLEAR OUT THE "CLOSE" ADDRESS



                                        .SBTTL  LINE CLOCK REGISTER ADDRESSING TEST
                                        ;LINE CLOCK REGISTER ADDRESSING TEST
004164  000004                  T0020:  SCOPE
004166  012737  004252  000004          MOV     #A0020,4        ;SETUP VECTOR IN CASE IT IS NONEXISTANT
004174  012737  000340  000006          MOV     #340,6
004202  005037  001124                  CLR     $GDDAT
004206  012737  004234  001106          MOV     #R0020,$LPADR   ;INITIALIZE THE LOOPBACK ADDRESS IN CASE OF AN ERROR
```

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  784  004214  012737  177566  001120          MOV     #177566,$GDADR  ;SAME AS "LKS" ADDRESS EXCEPT WITH BIT 4 SE
  785  004222  013746  000340                  MOV     PR7,-(SP)       ;;PUT NEW PS ON STACK
  786  004226  012746  004234                  MOV     #64$,-(SP)      ;;PUT NEW PC ON  STACK
  787  004232  000002                          RTI                     ;; POP NEW PC AND PS
  788  004234                          64$:
  789  004234  012706  001000          R0020:  MOV     #1000,SP        ;SETUP THE STACK
  790  004240  005037  177546                  CLR     LKS
  791  004244  012777  000100  174646  I0020:  MOV     #100,@$GDADR    ;SET THE "CLOSE" ADDRESS TO = 100
  792  004252  032737  000100  177546  A0020:  BIT     #100,LKS        ;MAKE SURE THAT "LKS" WAS NOT AFFECTED
  793  004260  001401                          BEQ     B0020
  794  004262  104005                  E0020:  ERROR 5                 ;IT AFFECTED "LKS"  --  ERROR
  795  004264  005037  177546          B0020:  CLR     LKS
  796  004270  012737  004302  000004          MOV     #T0021  ,4
  797  004276  005077  174616                  CLR     @$GDADR         ;CLEAR OUT THE "CLOSE" ADDRESS
  798
  799
  800
  801                                  .SBTTL  LINE CLOCK REGISTER ADDRESSING TFST
  802                                  ;LINE CLOCK REGISTER ADDRESSING TEST
  803  004302  000004                  T0021:  SCOPE
  804  004304  012737  004370  000004          MOV     #A0021,4        ;SETUP VECTOR IN CASE IT IS NONEXISTANT
  805  004312  012737  000340  000006          MOV     #340,6
  806  004320  005037  001124                  CLR     $GDDAT
  807  004324  012737  004352  001106          MOV     #R0021,$LPADR   ;INITIALIZE THE LOOPBACK ADDRESS IN CASE OF AN ERROR
  808  004332  012737  177746  001120          MOV     #177746,$GDADR  ;SAME AS "LKS" ADDRESS EXCEPT WITH BIT 7 SET
  809  004340  013746  000340                  MOV     PR7,-(SP)       ;;PUT NEW PS ON STACK
  810  004344  012746  004352                  MOV     #64$,-(SP)      ;;PUT NEW PC ON  STACK
  811  004350  000002                          RTI                     ;; POP NEW PC AND PS
  812  004352                          64$:
  813  004352  012706  001000          R0021:  MOV     #1000,SP        ;SETUP THE STACK
  814  004356  005037  177546                  CLR     LKS
  815  004362  012777  000100  174530  I0021:  MOV     #100,@$GDADR    ;SET THE "CLOSE" ADDRESS TO = 100
  816  004370  032737  000100  177546  A0021:  BIT     #100,LKS        ;MAKE SURE THAT "LKS" WAS NOT AFFECTED
  817  004376  001401                          BEQ     B0021
  818  004400  104005                  E0021:  ERROR 5                 ;IT AFFECTED "LKS"  --  ERROR
  819  004402  005037  177546          B0021:  CLR     LKS
  820  004406  012737  004420  000004          MOV     #T0022  ,4
  821  004414  005077  174500                  CLR     @$GDADR         ;CLEAR OUT THE "CLOSE" ADDRESS
  822
  823
  824
  825                                  .SBTTL  LINE CLOCK REGISTER HIGH BYTE TEST
  826                                  ;LINE CLOCK REGISTER HIGH BYTE TEST
  827                                  ;MAKE SURE THE LKS REGISTER LOW BYTE RESPONDS TO THE HIGH BYTES ADDRESS
  828  004420  000004                  T0022:  SCOPE
  829  004422  000137  004534                  JMP     T0023
  830  004426  012737  006266  000004          MOV     #TRAP0,@#4      ;SETUP VECOR IN CASE OF UNFORSEEN PROBLEMS
  831  004434  012737  000340  000006          MOV     #340,@#6        ;NO INTERRUPTS WHILE PRINTING FATAL MESSAGE
  832  004442  012737  000100  001124          MOV     #100,$GDDAT
  833  004450  012737  004476  001106          MOV     #R0022,$LPADR   ;INITIALIZE THE LOOPBACK ADDRESS IN CASE OF AN ERROR
  834  004456  012737  177547  001120          MOV     #177547,$GDADR  ;HIGH BYTE OF THE LKS REGISTER
  835  004464  013746  000340                  MOV     PR7,-(SP)       ;;PUT NEW PS ON STACK
  836  004470  012746  004476                  MOV     #64$,-(SP)      ;;PUT NEW PC ON  STACK
  837  004474  000002                          RTI                     ;; POP NEW PC AND PS
  838  004476                          64$:
  839  004476  012706  001000          R0022:  MOV     #1000,SP        ;SETUP THE STACK
```

```
  840  004502  005037  177546            CLR     LKS
  841  004506  112777  000100  174404 I0022:  MOVB    #100,@$GDADR    ;SET THE HIGH BYTE ADDRESS TO = 100
  842  004514  032737  000100  177546      BIT     #100,LKS        ;MAKE SURE THAT "LKS" LOW BYTE WAS AFFECTED
  843  004522  001001                      BNE     A0022
  844  004524  104005                E0022: ERROR 5                 ;SHOULD HAVE SET BIT 7.  ERROR
  845  004526  005037  177546       A0022: CLR     LKS
  846  004532  000005                      RESET
  847
  848
  849
  850                                .SBTTL  CLOCK FLAG BIT TEST
  851                                ;CLOCK FLAG BIT TEST
  852  004534  000004                T0023: SCOPE
  853  004536  012737  006266  000004      MOV     #TRAP0,@#4      ;SETUP VECOR IN CASE OF UNFORSEEN PROBLEMS
  854  004544  012737  000340  000006      MOV     #340,@#6        ;NO INTERRUPTS WHILE PRINTING FATAL MESSAGE
  855  004552  012737  000200  001124      MOV     #200,$GDDAT
  856  004560  012737  004566  001106      MOV     #R0023,$LPADR   ;INITIALIZE THE LOOPBACK ADDRESS IN CASE OF AN ERROR
  857  004566  005037  177546       R0023: CLR     LKS
  858  004572  005003                      CLR     R3              ;INITIALIZE A COUNTER LOCATION
  859  004574  105737  177546       A0023: TSTB    LKS             ;IS THE CLOCK FLAG SET?
  860  004600  100404                      BMI     B0023           ;IF SO, CONTINUE ON WITH THE TEST
  861  004602  005203                      INC     R3              ;IF NOT INCREMENT THE COUNTER LOCATION
  862  004604  001373                      BNE     A0023           ;AND GO TEST THE CLOCK FLAG AGAIN. UNLESS...
  863  004606  104001                E0023: ERROR 1                 ;CLOCK FLAG DID NOT SET AFTER A WAITING PERIOD > 20 MS
  864  004610  000410                      BR      T0024
  865  004612                       B0023:
  866  004612  012737  000200  177546 I0023:  MOV     #200,LKS        ;MOVE A 1 INTO THE CLOCK FLAG BIT
  867  004620  023737  177546  001124      CMP     LKS,$GDDAT      ;SHOULD NOT AFFECT THE FLAG BIT
  868  004626  001401                      BEQ     T0024
  869  004630  104001               E10023: ERROR 1                ;CLOCK FLAG DID NOT CLEAR
  870
  871
  872
  873                                .SBTTL  INTERRUPT TEST
  874  004632  000004                T0024: SCOPE
  875  004634  012737  006266  000004      MOV     #TRAP0,@#4      ;SETUP VECOR IN CASE OF UNFORSEEN PROBLEMS
  876  004642  012737  000340  000006      MOV     #340,@#6        ;NO INTERRUPTS WHILE PRINTING FATAL MESSAGE
  877  004650  012737  000200  001124      MOV     #200,$GDDAT     ;HAVE GOOD DATA INFO READY FOR TYPEOUT IN CASE OF AN ERR
  878  004656  012737  004676  001106      MOV     #R0024,$LPADR   ;INITIALIZE THE LOOPBACK ADDRESS IN CASE OF AN ERROR
  879  004664  012737  004736  000100      MOV     #E0024,100
  880  004672  005037  177546              CLR     LKS             ;ALLOW CLOCK INTERRUPTS
  881  004676                       R0024:
  882  004676  013746  000340              MOV     PR7,-(SP)       ;;PUT NEW PS ON STACK
  883  004702  012746  004710              MOV     #64$,-(SP)      ;;PUT NEW PC ON  STACK
  884  004706  000002                      RTI                     ;; POP NEW PC AND PS
  885  004710                       64$:
  886  004710  012737  000300  177546      MOV     #300,LKS
  887  004716  005227  000000       A0024: INC     #0              ;WAIT FOR 20+ MS
  888  004722  001375                      BNE     A0024           ;LOOP BACK IF NOT DONE WAITING
  889  004724  000005                      RESET                   ;RESET SHOULD CLEAR INTERRUPT ENABLE
  890  004726  023737  001124  177546      CMP     $GDDAT,LKS      ;AND LEAVE THE CLOCK FLAG SET
  891  004734  001401                      BEQ     T0025           ;GO ON TO THE NEXT TEST IF IT DID
  892  004736  104001                E0024: ERROR 1                 ;RESET SET INTERRUPT ENABLE OR CLEARED CLOCK FLAG
  893
  894
  895
```

```
                                        .SBTTL  NO SACK TIMEOUT TEST
                                        ;NO SACK TIMEOUT TEST
004740  000004                  T0025:  SCOPE
004742  012737  006266  000004          MOV     #TRAP0,@#4      ;SETUP VECOR IN CASE OF UNFORSEEN PROBLEMS
004750  012737  000340  000006          MOV     #340,@#6        ;NO INTERRUPTS WHILE PRINTING FATAL MESSAGE
004756  012737  000300  001124          MOV     #300,$GDDAT     ;HAVE GOOD DATA INFO READY FOR TYPEOUT IN CASE OF AN ERR
004764  012737  005006  001106          MOV     #R0025,$LPADR   ;INITIALIZE THE LOOPBACK ADDRESS IN CASE OF AN ERROR
004772  012737  000340  000102          MOV     #340,102        ;NO INTERRUPTS AFTER THE FIRST ONE
005000  012737  005070  000100          MOV     #C0025,100
005006  005037  177546          R0025:  CLR     LKS
005012  013746  000340                  MOV     PR7,-(SP)       ;;PUT NEW PS ON STACK
005016  012746  005024                  MOV     #64$,-(SP)      ;;PUT NEW PC ON  STACK
005022  000002                          RTI                     ;; POP NEW PC AND PS
005024                          64$:
005024  005003                          CLR     R3              ;INITIALIZE A COUNTER LOCATION
005026  105737  177546          A0025:  TSTB    LKS             ;IS THE CLOCK FLAG SET?
005032  100404                          BMI     B0025           ;IF SO, CONTINUE ON WITH THE TEST
005034  005203                          INC     R3              ;IF NOT INCREMENT THE COUNTER LOCATION
005036  001373                          BNE     A0025           ;AND GO TEST THE CLOCK FLAG AGAIN. UNLESS...
005040  104001                  E0025:  ERROR 1                 ;CLOCK FLAG DID NOT SET AFTER A WAITING PERIOD > 20 MS
005042  000417                          BR      T0026
005044                          B0025:
005044  005046                          CLR     -(SP)           ;DROP CPU PRIORITY LEVEL
005046  012746  005054                  MOV     #1$,-(SP)       ;SET RETURN 'PC' FROM THE RTI
005052  000002                          RTI                     ;RETURN TO NEXT INSTRUCTION
005054  012737  000100  177546  1$:     MOV     #100,LKS        ;ENABLE CLOCK INTERRUPTS
005062  000001                          WAIT                    ;THE ONLY WAY TO LEAVE HERE WITHOUT ERROR IS TO INTERRUP
005064  104006                  E10025: ERROR 6                 ;IF IT ERROR 1S HERE ITS BECAUSE OF A "NO-SACK" TIMEOUT
005066  000405                          BR      T0026
005070  022737  000300  177546  C0025:  CMP     #300,LKS
005076  001401                          BEQ     T0026           ;FIND OUT WHAT THE INTERRUPT DID TO THE CLOCK STATUS REG
005100  104001                  E20025: ERROR 1                 ;IT CLEARED THE INTERRUPT ENABLE OR THE FLAG BIT
                                        .SBTTL  RESET TEST
                                        ;RESET TEST
005102  000004                  T0026:  SCOPE
005104  012737  006266  000004          MOV     #TRAP0,@#4      ;SETUP VECOR IN CASE OF UNFORSEEN PROBLEMS
005112  012737  000340  000006          MOV     #340,@#6        ;NO INTERRUPTS WHILE PRINTING FATAL MESSAGE
005120  012737  000200  001124          MOV     #200,$GDDAT     ;HAVE GOOD DATA INFO READY FOR TYPEOUT IN CASE OF AN ERR
005126  012737  005162  001106          MOV     #R0026,$LPADR   ;INITIALIZE THE LOOPBACK ADDRESS IN CASE OF AN ERROR
005134  013746  000340                  MOV     PR7,-(SP)       ;;PUT NEW PS ON STACK
005140  012746  005146                  MOV     #64$,-(SP)      ;;PUT NEW PC ON  STACK
005144  000002                          RTI                     ;; POP NEW PC AND PS
005146                          64$:
005146  012737  005220  000100          MOV     #E0026,100
005154  012737  000140  000102          MOV     #140,102        ;SETUP STATUS FOR AFTER THE INTERRUPT
005162  005037  177546          R0026:  CLR     LKS
005166  012706  001000                  MOV     #1000,SP        ;SETUP THE STACK
005172  012737  000100  177546          MOV     #100,LKS        ;SET INTERRUPT ENABLE BIT NOW
005200  005227  000000          A0026:  INC     #0              ;WAIT FOR CLOCK FLAG TO SET
005204  001375                          BNE     A0026
005206  000005                  I0026:  RESET                   ;RESET SHOULD NOT CLEAR THE FLAG
005210  023737  177546  001124          CMP     LKS,$GDDAT      ;FIND OUT IF ID DIT DID OR NOT
005216  001401                          BEQ     T0027
```

```
  952  005220  104001                    E0026:  ERROR 1                 ;RESET DID NOT INITIALIZE THE LKS WORD CORRECTLY
  953
  954
  955
  956                                    .SBTTL  CLOCK FLAG BIT TEST
  957                                    ;CLOCK FLAG BIT TEST
  958                                    ;MAKE SURE IT DOESNT CLEAR WHEN YOU TRY TO SET IT VIA A 'MOV' INSTRUCTION
  959  005222  000004                    T0027:  SCOPE
  960  005224  012737  006266  000004            MOV     #TRAP0,@#4      ;SETUP VECOR IN CASE OF UNFORSEEN PROBLEMS
  961  005232  012737  000340  000006            MOV     #340,@#6        ;NO INTERRUPTS WHILE PRINTING FATAL MESSAGE
  962  005240  012737  000200  001124            MOV     #200,$GDDAT     ;HAVE GOOD DATA INFO READY FOR TYPEOUT IN CASE OF AN ERR
  963  005246  012737  005266  001106            MOV     #R0027,$LPADR   ;INITIALIZE THE LOOPBACK ADDRESS IN CASE OF AN ERROR
  964  005254  005037  000102                    CLR     102
  965  005260  012737  005350  000100            MOV     #T0030  ,100
  966  005266  005037  177546            R0027:  CLR     LKS
  967  005272  013746  000340                    MOV     PR7,-(SP)       ;;PUT NEW PS ON STACK
  968  005276  012746  005304                    MOV     #64$,-(SP)      ;;PUT NEW PC ON  STACK
  969  005302  000002                            RTI                     ;; POP NEW PC AND PS
  970  005304                             64$:
  971  005304  012706  001000                    MOV     #1000,SP        ;SETUP THE STACK
  972  005310  005037  001234                    CLR     WORD            ;SETUP A COUNTER LOCATION TO = 0
  973  005314  005237  001234            A0027:  INC     WORD
  974  005320  001375                            BNE     A0027           ;WASTE TIME LOOPING UNTIL THE COUNTER REACHES 0
  975  005322  012737  000300  177546            MOV     #300,LKS        ;SET INTERRUPT ENABLE AND TRY TO SET THE CLOCK FLAG
  976  005330  012737  000200  177546            MOV     #200,LKS        ;TRY TO SET IT AGAIN
  977  005336  023737  177546  001124            CMP     LKS,$GDDAT      ;DID THE CLOCK FLAG STAY SET?
  978  005344  001401                            BEQ     T0030           ;IF NOT GO ON TO THE NEXT TEST
  979  005346  104001                    E0027:  ERROR 1                 ;ERROR - MOVED A '1' INTO THE CLOCK FLAG BIT AND IT STAY
  980
  981
  982
  983                                    .SBTTL  CLOCK FLAG AFTER INTERRUPT TEST
  984                                    ;SEE IF AN INTERRUPT CLEARS THE CLOCK FLAG
  985  005350  000004                    T0030:  SCOPE
  986  005352  012737  006266  000004            MOV     #TRAP0,@#4      ;SETUP VECOR IN CASE OF UNFORSEEN PROBLEMS
  987  005360  012737  000340  000006            MOV     #340,@#6        ;NO INTERRUPTS WHILE PRINTING FATAL MESSAGE
  988  005366  005037  177546                    CLR     LKS             ;NO CLOCK INTERRUPTS BEFORE WE ARE READY
  989  005372  012737  000100  001124            MOV     #100,$GDDAT     ;HAVE GOOD DATA INFO READY FOR TYPEOUT IN CASE OF AN ERR
  990  005400  012737  005406  001106            MOV     #R0030,$LPADR   ;INITIALIZE THE LOOPBACK ADDRESS IN CASE OF AN ERROR
  991  005406  012737  005454  000100  R0030:    MOV     #A0030,100      ;SETUP CLOCK INTERRUPT VECTOR
  992  005414  005037  000102                    CLR     102             ;PRIORITY LEVEL WILL ALLOW FURTHER INTERRUPTS
  993  005420  005046                            CLR     -(SP)           ;DROP CPU PRIORITY LEVEL
  994  005422  012746  005430                    MOV     #1$,-(SP)       ;SET RETURN 'PC' FROM THE RTI
  995  005426  000002                            RTI                     ;RETURN TO NEXT INSTRUCTION
  996  005430  012706  001000            1$:     MOV     #1000,SP        ;SETUP THE STACK
  997  005434  005037  177546                    CLR     LKS
  998  005440  105037  001234                    CLRB    WORD            ;CLEAR OUT A COUNTER LOCATION
  999  005444  012737  000100  177546            MOV     #100,LKS        ;ENABLE CLOCK INTERRUPTS NOW
 1000  005452  000001                            WAIT                    ;WAIT FOR AN INTERRUPT
 1001  005454  012737  005506  000100  A0030:    MOV     #E0030,100      ;ERROR IF WE INTERRUPT AGAIN
 1002  005462  005046                            CLR     -(SP)           ;DROP CPU PRIORITY LEVEL
 1003  005464  012746  005472                    MOV     #B0030,-(SP)    ;SET RETURN 'PC' FROM THE RTI
 1004  005470  000002                            RTI                     ;RETURN TO NEXT INSTRUCTION
 1005  005472  105237  001234            B0030:  INCB    WORD            ;DO A NOTHING LOOP FOR A VERY SHORT PERIOD OF TIME
 1006  005476  001375                            BNE     B0030           ;WE SHOULD INCREMENT TO 0 LONG BEFORE AN INTERRUPT COMES
 1007  005500  005037  177546                    CLR     LKS
```

```
 1008  005504  000401                        BR      T0031
 1009  005506  104001                E0030:  ERROR 1                 ;INTERRUPT DID NOT CLEAR THE CLOCK FLAG
 1010
 1011
 1012
 1013                                .SBTTL  NO INTERRUT AT PRIORITY 7 TEST
 1014                                ;TEST THAT CLOCK WILL NOT INTERRUPT WITH PROCESSR AT PRIORITY 7
 1015  005510  000004                T0031:  SCOPE
 1016  005512  012737  006266  000004        MOV     #TRAP0,@#4      ;SETUP VECOR IN CASE OF UNFORSEEN PROBLEMS
 1017  005520  012737  000340  000006        MOV     #340,@#6        ;NO INTERRUPTS WHILE PRINTING FATAL MESSAGE
 1018  005526  012737  005534  001106        MOV     #R0031,$LPADR   ;SETUP LOOPBACK ADDRESS IN CASE OF AN ERROR
 1019  005534  005037  177546        R0031:  CLR     LKS
 1020  005540  005003                        CLR     R3              ;INITIALIZE A COUNTER LOCATION
 1021  005542  105737  177546        A0031:  TSTB    LKS             ;IS THE CLOCK FLAG SET?
 1022  005546  100404                        BMI     B0031           ;IF SO, CONTINUE ON WITH THE TEST
 1023  005550  005203                        INC     R3              ;IF NOT INCREMENT THE COUNTER LOCATION
 1024  005552  001373                        BNE     A0031           ;AND GO TEST THE CLOCK FLAG AGAIN. UNLESS...
 1025  005554  104001                E0031:  ERROR 1                 ;CLOCK FLAG DID NOT SET AFTER A WAITING PERIOD > 20 MS
 1026  005556  000431                        BR      T0032
 1027  005560                        B0031:
 1028  005560  012706  001000                MOV     #1000,SP        ;INITIALIZE THE STACK POINTER
 1029  005564  013746  000340                MOV     PR7,-(SP)       ;;PUT NEW PS ON STACK
 1030  005570  012746  005576                MOV     #64$,-(SP)      ;;PUT NEW PC ON  STACK
 1031  005574  000002                        RTI                     ;; POP NEW PC AND PS
 1032  005576                        64$:
 1033  005576  012737  005554  000100        MOV     #E0031,100      ;SET UP VECTOR RETURN
 1034  005604  012737  000100  177546        MOV     #100,LKS        ;ENABLE INTERRUPT
 1035  005612  005003                        CLR     R3              ;INITIALIZE A COUNTER LOCATION
 1036  005614  105737  177546        C0031:  TSTB    LKS             ;IS THE CLOCK FLAG SET?
 1037  005620  100404                        BMI     D0031           ;IF SO, CONTINUE ON WITH THE TEST
 1038  005622  005203                        INC     R3              ;IF NOT INCREMENT THE COUNTER LOCATION
 1039  005624  001373                        BNE     C0031           ;AND GO TEST THE CLOCK FLAG AGAIN. UNLESS...
 1040  005626  104001                E10031: ERROR 1                 ;CLOCK FLAG DID NOT SET AFTER A WAITING PERIOD > 20 MS
 1041  005630  000404                        BR      T0032
 1042  005632                        D0031:
 1043  005632  000240                        NOP
 1044  005634  000240                        NOP                     ;GIVE CLOCK EXTRA TIME TO INTERRUPT
 1045  005636  000401                        BR      T0032
 1046  005640  104003                E20031: ERROR 3                 ;ERROR, CLOCK INTERRUPTED WITHOUT HAVING PRIORITY
 1047
 1048
 1049
 1050                                .SBTTL  CC PUSH TEST FOR CLOCK INTERRUPTS
 1051                                ;TEST THAT CLOCK INTERRUPT PUSHES CONDITION CODES ONTO STACK
 1052  005642  000004                T0032:  SCOPE
 1053  005644  012737  006266  000004        MOV     #TRAP0,@#4      ;SETUP VECOR IN CASE OF UNFORSEEN PROBLEMS
 1054  005652  012737  000340  000006        MOV     #340,@#6        ;NO INTERRUPTS WHILE PRINTING FATAL MESSAGE
 1055  005660  012737  005666  001106        MOV     #R0032,$LPADR   ;SETUP LOOPBACK ADDRESS IN CASE OF AN ERROR
 1056  005666  005037  177546        R0032:  CLR     LKS
 1057  005672  005003                        CLR     R3              ;INITIALIZE A COUNTER LOCATION
 1058  005674  105737  177546        A0032:  TSTB    LKS             ;IS THE CLOCK FLAG SET?
 1059  005700  100404                        BMI     B0032           ;IF SO, CONTINUE ON WITH THE TEST
 1060  005702  005203                        INC     R3              ;IF NOT INCREMENT THE COUNTER LOCATION
 1061  005704  001373                        BNE     A0032           ;AND GO TEST THE CLOCK FLAG AGAIN. UNLESS...
 1062  005706  104001                E0032:  ERROR 1                 ;CLOCK FLAG DID NOT SET AFTER A WAITING PERIOD > 20 MS
 1063  005710  000433                        BR      T0033
```

```
1064  005712                                  B0032:
1065  005712  012706  001000                          MOV     #1000,SP        ;INITIALIZE THE STACK POINTER
1066  005716  005037  000776                          CLR     BUF1
1067  005722  005037  000774                          CLR     BUF2
1068  005726  012737  005756  000100                  MOV     #C0032,100      ;SET UP VECTOR RETURN
1069  005734  012737  000100  177546                  MOV     #100,LKS        ;ENABLE INTERRUPT
1070  005742  005046                                  CLR     -(SP)           ;DROP CPU PRIORITY LEVEL
1071  005744  012746  005752                          MOV     #1$,-(SP)       ;SET RETURN 'PC' FROM THE RTI
1072  005750  000002                                  RTI                     ;RETURN TO NEXT INSTRUCTION
1073  005752  000277                          1$:     +SEC!SEV!SEZ!SEN        ;SET ALL CONDITION CODES
1074  005754  000001                                  WAIT                    ;WAIT FOR INTERRUPT
1075  005756  022737  000017  000776          C0032:  CMP     #17,BUF1
1076  005764  001405                                  BEQ     T0033
1077  005766  012737  000017  001124                  MOV     #17,$GDDAT
1078  005774  104007                                  ERROR 7                 ;ERROR DID NOT PUSH CORRECT PS ONTO STACK
1079  005776  000721                                  BR      T0032
1080
1081
1082
1083                                           .SBTTL  PC PUSH TEST FOR CLOCK INTERRUPTS
1084                                           ;TEST THAT CLOCK INTERRUPT PUSHES THE PROGRAM COUNTER ONTO STACK
1085  006000  000004                          T0033:  SCOPE
1086  006002  012737  006266  000004                  MOV     #TRAP0,@#4      ;SETUP VECOR IN CASE OF UNFORSEEN PROBLEMS
1087  006010  012737  000340  000006                  MOV     #340,@#6        ;NO INTERRUPTS WHILE PRINTING FATAL MESSAGE
1088  006016  012737  006024  001106                  MOV     #R0033,$LPADR   ;SETUP LOOPBACK ADDRESS IN CASE OF AN ERROR
1089  006024  005037  177546          R0033:  CLR     LKS
1090  006030  005003                                  CLR     R3              ;INITIALIZE A COUNTER LOCATION
1091  006032  105737  177546          A0033:  TSTB    LKS             ;IS THE CLOCK FLAG SET?
1092  006036  100404                                  BMI     B0033           ;IF SO, CONTINUE ON WITH THE TEST
1093  006040  005203                                  INC     R3              ;IF NOT INCREMENT THE COUNTER LOCATION
1094  006042  001373                                  BNE     A0033           ;AND GO TEST THE CLOCK FLAG AGAIN. UNLESS...
1095  006044  104001          E0033:  ERROR 1                 ;CLOCK FLAG DID NOT SET AFTER A WAITING PERIOD > 20 MS
1096  006046  000432                                  BR      T0034
1097  006050                          B0033:
1098  006050  012706  001000                          MOV     #1000,SP        ;INITIALIZE THE STACK POINTER
1099  006054  005037  000776                          CLR     BUF1
1100  006060  005037  000774                          CLR     BUF2
1101  006064  012737  006114  000100                  MOV     #C0033,100      ;SET UP VECTOR RETURN
1102  006072  012737  000100  177546                  MOV     #100,LKS        ;ENABLE INTERRUPT
1103  006100  005046                                  CLR     -(SP)           ;DROP CPU PRIORITY LEVEL
1104  006102  012746  006110                          MOV     #1$,-(SP)       ;SET RETURN 'PC' FROM THE RTI
1105  006106  000002                                  RTI                     ;RETURN TO NEXT INSTRUCTION
1106  006110  000277                          1$:     +SEC!SEV!SEZ!SEN        ;SET ALL CONDITION CODES
1107  006112  000001                                  WAIT                    ;WAIT FOR INTERRUPT
1108  006114  022737  006114  000774          C0033:  CMP     #C0033,BUF2
1109  006122  001404                                  BEQ     T0034
1110  006124  012737  006114  001124          E10033: MOV     #C0033,$GDDAT
1111  006132  104010                                  ERROR 10                ;ERROR, DID NOT PUSH CORRECT PC ONTO STACK
1112
1113
1114
1115                                           .SBTTL  END OF PASS INDICATING
1116  006134  000004                          T0034:  SCOPE
1117  006136  005037  177546                          CLR     LKS             ;TURN THE CLOCK OFF
1118  006142  000005                                  RESET                   ;TURN EVERYTHING OFF
1119
```

```
 1120                                   ;*****************************************************************
 1121
 1122                                   .SBTTL  END OF PASS ROUTINE
 1123
 1124                                   ;*INCREMENT THE PASS NUMBER ($PASS)
 1125                                   ;*TYPE "END PASS #XXXXX" (WHERE XXXXX IS A DECIMAL NUMBER)
 1126                                   ;*IF THERES A MONITOR GO TO IT
 1127                                   ;*IF THERE ISN'T JUMP TO T0001
 1128
 1129  006144                           $EOP:
 1130  006144  000004                          SCOPE
 1131  006146  005037  001102                  CLR     $TSTNM          ;;ZERO THE TEST NUMBER
 1132  006152  005037  001220                  CLR     $TIMES          ;;ZERO THE NUMBER OF ITERATIONS
 1133  006156  005237  001100                  INC     $PASS           ;;INCREMENT THE PASS NUMBER
 1134  006162  042737  100000  001100        BIC     #100000,$PASS   ;;DON'T ALLOW A NEG. NUMBER
 1135  006170  005327                  DEC     (PC)+           ;;LOOP?
 1136  006172  000001                  $EOPCT: .WORD   1
 1137  006174  003022                          BGT     $DOAGN          ;;YES
 1138  006176  012737                          MOV     (PC)+,@(PC)+    ;;RESTORE COUNTER
 1139  006200  000001                  $ENDCT: .WORD   1
 1140  006202  006172                          $EOPCT
 1141  006204  104400  006246                  TYPE    ,$ENDMG         ;;TYPE "END PASS #"
 1142  006210  013746  001100                  MOV     $PASS,-(SP)     ;;SAVE $PASS FOR TYPEOUT
 1143  006214  104404                          TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
 1144  006216  104400  006265                  TYPE    ,$ENULL         ;;TYPE A NULL CHARACTER
 1145  006222                           $GET42:
 1146
 1147  006222  013700  000042                  MOV     @#42,R0         ;;GET MONITOR ADDRESS
 1148  006226  001405                          BEQ     $DOAGN          ;;BRANCH IF NO MONITOR
 1149  006230  000005                          RESET                   ;;CLEAR THE WORLD
 1150  006232  004710                  $ENDAD: JSR     PC,(R0)         ;;GO TO MONITOR
 1151  006234  000240                          NOP                     ;;SAVE ROOM
 1152  006236  000240                          NOP                     ;;FOR
 1153  006240  000240                          NOP                     ;;ACT11
 1154  006242                           $DOAGN:
 1155  006242  000137  001672                  JMP     @#T0001         ;;RETURN
 1156  006246  005015  047105  020104  $ENDMG: .ASCIZ  <15><12>/END PASS #/
 1157  006254  040520  051523  021440
 1158  006262     000
 1159  006263     377     377     000  $ENULL: .BYTE   -1,-1,0         ;;NULL CHARACTER STRING
 1160  006266  005046                  TRAP0:  CLR     -(SP)
 1161  006270  004737  006612                  JSR     PC,$TYPE        ;PRINTOUT"TRAPPED TO 4 FROM "
 1162  006274  010371                          TRPMES                  ;ADDRESS OF THE MESSAGE
 1163  006276  011646                          MOV     (SP),-(SP)      ;GET THE ADDRESS WHERE THE TRAP OCCURED
 1164  006300  162716  000002                  SUB     #2,(SP)         ;MAKE IT RIGHT
 1165  006304  104401                          TYPOC                   ;TYPE OUT ADDRESS IN OCTAL
 1166  006306  104400  001231                  TYPE    ,$CRLF          ;PRINTOUT A CARRIAGE RETURN-LINE FEED
 1167  006312  005046                          CLR     -(SP)
 1168  006314  004737  006612                  JSR     PC,$TYPE        ;PRINTOUT RESTARTING MESSAGE
 1169  006320  010432                          TRPM2S                  ;ADDRESS OF RESTART MESSAGE
 1170  006322  000240                          NOP
 1171  006324  000240                          NOP
 1172  006326  000240                          NOP
 1173  006330  000240                          NOP
 1174  006332  000005                          RESET
 1175  006334  000137  001450                  JMP     START
```

```
 1176                                   ;*****************************************************************
 1177
 1178                                   .SBTTL  SCOPE HANDLER ROUTINE
 1179
 1180                                   ;*THIS ROUTINE CONTROLS THE LOOPING OF SUBTESTS. IT WILL INCREMENT
 1181                                   ;*AND LOAD THE TEST NUMBER($TSTNM) INTO THE DISPLAY REG.(DISPLAY<7:0>)
 1182                                   ;*AND LOAD THE ERROR FLAG ($ERFLG) INTO DISPLAY<15:08>
 1183                                   ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
 1184                                   ;*SW14=1        LOOP ON TEST
 1185                                   ;*SW11=1        INHIBIT ITERATIONS
 1186                                   ;*SW09=1        LOOP ON ERROR
 1187                                   ;*SW08=1        LOOP ON TEST IN SWR<7:0>
 1188                                   ;*CALL
 1189                                   ;*      SCOPE           ;;SCOPE=IOT
 1190
 1191  006340                           $SCOPE:
 1192  006340  000240                          NOP
 1193  006342  032777  040000  172566  1$:     BIT     #BIT14,@SWR     ;;LOOP ON PRESENT TEST?
 1194  006350  001111                          BNE     $OVER           ;;YES IF SW14=1
 1195                                   ;#####START OF CODE FOR THE XOR TESTER#####
 1196  006352  000416                  $XTSTR: BR      6$              ;;IF RUNNING ON THE "XOR" TESTER CHANGE
 1197                                                                   ;;THIS INSTRUCTION TO A "NOP" (NOP=240)
 1198  006354  013746  000004                  MOV     @#ERRVEC,-(SP)  ;;SAVE THE CONTENTS OF THE ERROR VECTOR
 1199  006360  012737  006400  000004          MOV     #5$,@#ERRVEC    ;;SET FOR TIMEOUT
 1200  006366  005737  177060                  TST     @#177060        ;;TIME OUT ON XOR?
 1201  006372  012637  000004                  MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
 1202  006376  000463                          BR      $SVLAD          ;;GO TO THE NEXT TEST
 1203  006400  022626                  5$:     CMP     (SP)+,(SP)+     ;;CLEAR THE STACK AFTER A TIME OUT
 1204  006402  012637  000004                  MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
 1205  006406  000423                          BR      7$              ;;LOOP ON THE PRESENT TEST
 1206  006410                           6$:;#####END OF CODE FOR THE XOR TESTER#####
 1207  006410  032777  000400  172520          BIT     #BIT08,@SWR     ;;LOOP ON SPEC. TEST?
 1208  006416  001404                          BEQ     2$              ;;BR IF NO
 1209  006420  127737  172512  001102          CMPB    @SWR,$TSTNM     ;;ON THE RIGHT TEST?    SWR<7:0>
 1210  006426  001462                          BEQ     $OVER           ;;BR IF YES
 1211  006430  105737  001103          2$:     TSTB    $ERFLG          ;;HAS AN ERROR OCCURRED?
 1212  006434  001421                          BEQ     3$              ;;BR IF NO
 1213  006436  123737  001115  001103          CMPB    $ERMAX,$ERFLG   ;;MAX. ERRORS FOR THIS TEST OCCURRED?
 1214  006444  101015                          BHI     3$              ;;BR IF NO
 1215  006446  032777  001000  172462          BIT     #BIT09,@SWR     ;;LOOP ON ERROR?
 1216  006454  001404                          BEQ     4$              ;;BR IF NO
 1217  006456  013737  001110  001106  7$:     MOV     $LPERR,$LPADR   ;;SET LOOP ADDRESS TO LAST SCOPE
 1218  006464  000443                          BR      $OVER
 1219  006466  105037  001103          4$:     CLRB    $ERFLG          ;;ZERO THE ERROR FLAG
 1220  006472  005037  001220                  CLR     $TIMES          ;;CLEAR THE NUMBER OF ITERATIONS TO MAKE
 1221  006476  000415                          BR      1$              ;;ESCAPE TO THE NEXT TEST
 1222  006500  032777  004000  172430  3$:     BIT     #BIT11,@SWR     ;;INHIBIT ITERATIONS?
 1223  006506  001011                          BNE     1$              ;;BR IF YES
 1224  006510  005737  001100                  TST     $PASS           ;;IF FIRST PASS OF PROGRAM
 1225  006514  001406                          BEQ     1$              ;;      INHIBIT ITERATIONS
 1226  006516  005237  001104                  INC     $ICNT           ;;INCREMENT ITERATION COUNT
 1227  006522  023737  001220  001104          CMP     $TIMES,$ICNT    ;;CHECK THE NUMBER OF ITERATIONS MADE
 1228  006530  002021                          BGE     $OVER           ;;BR IF MORE ITERATION REQUIRED
 1229  006532  012737  000001  001104  1$:     MOV     #1,$ICNT        ;;REINITIALIZE THE ITERATION COUNTER
 1230  006540  013737  006610  001220          MOV     $MXCNT,$TIMES   ;;SET NUMBER OF ITERATIONS TO DO
 1231  006546  105237  001102          $SVLAD: INCB    $TSTNM          ;;COUNT TEST NUMBERS
```

```
 1232  006552  011637  001106                 MOV     (SP),$LPADR     ;;SAVE SCOPE LOOP ADDRESS
 1233  006556  011637  001110                 MOV     (SP),$LPERR     ;;SAVE ERROR LOOP ADDRESS
 1234  006562  005037  001222                 CLR     $ESCAPE         ;;CLEAR THE ESCAPE FROM ERROR ADDRESS
 1235  006566  112737  000001  001115         MOVB    #1,$ERMAX       ;;ONLY ALLOW ONE(1) ERROR ON NEXT TEST
 1236  006574  013777  001102  172336 $OVER:  MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER
 1237  006602  013716  001106                 MOV     $LPADR,(SP)     ;;FUDGE RETURN ADDRESS
 1238  006606  000002                         RTI                     ;;FIXES PS
 1239  006610  000010                 $MXCNT: 10                      ;;MAX. NUMBER OF ITERATIONS
 1240                                  ;*****************************************************************
 1241
 1242                                  .SBTTL  TYPE ROUTINE
 1243
 1244                                  ;*ROUTINE TO TYPE ASCIZ MESSAGE. MESSAGE MUST TERMINATE WITH A 0 BYTE.
 1245                                  ;*THE ROUTINE WILL INSERT A NUMBER OF NULL CHARACTERS AFTER A LINE FEED.
 1246   .                              ;*NOTE1:        $NULL CONTAINS THE CHARACTER TO BE USED AS THE FILLER CHARACTER.
 1247                                  ;*NOTE2:        $FILLS CONTAINS THE NUMBER OF FILLER CHARACTERS REQUIRED.
 1248                                  ;*NOTE3:        $FILLC CONTAINS THE CHARACTER TO FILL AFTER.
 1249                                  ;*
 1250                                  ;*CALL:
 1251                                  ;*1) USING A TRAP INSTRUCTION
 1252                                  ;*      TYPE    ,MESADR         ;;MESADR IS FIRST ADDRESS OF AN ASCIZ STRING
 1253                                  ;*OR
 1254                                  ;*      TYPE
 1255                                  ;*      MESADR
 1256                                  ;*
 1257
 1258  006612  105737  001155         $TYPE:  TSTB    $TPFLG          ;;IS THERE A TERMINAL?
 1259  006616  100002                         BPL     1$              ;;BR IF YES
 1260  006620  000000                         HALT                    ;;HALT HERE IF NO TERMINAL
 1261  006622  000407                         BR      3$              ;;LEAVE
 1262  006624  010046                 1$:     MOV     R0,-(SP)        ;;SAVE R0
 1263  006626  017600  000002                 MOV     @2(SP),R0       ;;GET ADDRESS OF ASCIZ STRING
 1264  006632  112046                 2$:     MOVB    (R0)+,-(SP)     ;;PUSH CHARACTER TO BE TYPED ONTO STACK
 1265  006634  001005                         BNE     4$              ;;BR IF IT ISN'T THE TERMINATOR
 1266  006636  005726                         TST     (SP)+           ;;IF TERMINATOR POP IT OFF THE STACK
 1267  006640  012600                 60$:    MOV     (SP)+,R0        ;;RESTORE R0
 1268  006642  062716  000002         3$:     ADD     #2,(SP)         ;;ADJUST RETURN PC
 1269  006646  000002                         RTI                     ;;RETURN
 1270  006650  122716  000011         4$:     CMPB    #THT,(SP)       ;;BRANCH IF <HT>
 1271  006654  001426                         BEQ     8$
 1272  006656  122716  000200                 CMPB    #TCRLF,(SP)     ;;BRANCH IF NOT <CRLF>
 1273  006662  001004                         BNE     5$
 1274  006664  005726                         TST     (SP)+           ;;POP  <CR><LF> EQUIV
 1275  006666  104400                         TYPE                    ;;TYPE A CR AND LF
 1276  006670  001231                         $CRLF
 1277  006672  000757                         BR      2$              ;;GET NEXT CHARACTER
 1278  006674  004737  006756         5$:     JSR     PC,$TYPEC       ;;GO TYPE THIS CHARACTER
 1279  006700  123726  001154         6$:     CMPB    $FILLC,(SP)+    ;;IS IT TIME FOR FILLER CHARS.?
 1280  006704  001352                         BNE     2$              ;;IF NO GO GET NEXT CHAR.
 1281  006706  013746  001152                 MOV     $NULL,-(SP)     ;;GET # OF FILLER CHARS. NEEDED
 1282                                                                  ;;AND THE NULL CHAR.
 1283  006712  105366  000001         7$:     DECB    1(SP)           ;;DOES A NULL NEED TO BE TYPED?
 1284  006716  002770                         BLT     6$              ;;BR IF NO--GO POP THE NULL OFF OF STACK
 1285  006720  004737  006756                 JSR     PC,$TYPEC       ;;GO TYPE A NULL
 1286  006724  105337  007022                 DECB    $CHARCNT        ;;DO NOT COUNT AS A COUNT
 1287  006730  000770                         BR      7$              ;;LOOP
```

```
 1288
 1289                                   ;HORIZONTAL TAB PROCESSOR
 1290
 1291  006732  112716  000040          8$:     MOVB    #40,(SP)        ;;REPLACE TAB WITH SPACE
 1292  006736  004737  006756          9$:     JSR     PC,$TYPEC       ;;TYPE A SPACE
 1293  006742  132737  000007  007022          BITB    #7,$CHARCNT     ;;BRANCH IF NOT AT
 1294  006750  001372                          BNE     9$              ;;TAB STOP
 1295  006752  005726                          TST     (SP)+           ;;POP SPACE OFF STACK
 1296  006754  000726                          BR      2$              ;;GET NEXT CHARACTER
 1297  006756  105777  172164          $TYPEC: TSTB    @$TPS           ;;WAIT UNTIL PRINTER IS READY
 1298  006762  100375                          BPL     $TYPEC
 1299  006764  116677  000002  172156        MOVB    2(SP),@$TPB     ;;LOAD CHAR TO BE TYPED INTO DATA REG.
 1300  006772  122766  000015  000002        CMPB    #15,2(SP)       ;;BRANCH IF
 1301  007000  001003                        BNE     1$              ;;NOT <CR>
 1302  007002  105037  007022                CLRB    $CHARCNT        ;;
 1303  007006  000406                        BR      $TYPEX          ;;EXIT
 1304  007010  122766  000012  000002  1$:   CMPB    #12,2(SP)       ;;BRANCH IF
 1305  007016  002002                        BGE     $TYPEX          ;;<LF>
 1306  007020  105227                        INCB    (PC)+           ;;INC SPACE
 1307  007022  000000          $CHARCNT:.WORD  0               ;;COUNT
 1308  007024  000207          $TYPEX: RTS     PC
 1309                                  ;;      EQUATES
 1310          000011                  THT=11
 1311          000200                  TCRLF=200
 1312
 1313                                  ;*****************************************************************
 1314
 1315                                  .SBTTL  CONVERT BINARY TO DECIMAL AND TYPE ROUTINE
 1316
 1317                                  ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 5-DIGIT
 1318                                  ;*SIGNED DECIMAL (ASCII) NUMBER AND TYPE IT. DEPENDING ON WHETHER THE
 1319                                  ;*NUMBER IS POSITIVE OR NEGATIVE A SPACE OR A MINUS SIGN WILL BE TYPED
 1320                                  ;*BEFORE THE FIRST DIGIT OF THE NUMBER. LEADING ZEROS WILL ALWAYS BE
 1321                                  ;*REPLACED WITH SPACES.
 1322                                  ;*CALL:
 1323                                  ;*      MOV     NUM,-(SP)       ;;PUT THE BINARY NUMBER ON THE STACK
 1324                                  ;*      TYPDS                   ;;GO TO THE ROUTINE
 1325
 1326  007026                          $TYPDS:
 1327  007026  010046                        MOV     R0,-(SP)        ;;PUSH R0 ON STACK
 1328  007030  010146                        MOV     R1,-(SP)        ;;PUSH R1 ON STACK
 1329  007032  010246                        MOV     R2,-(SP)        ;;PUSH R2 ON STACK
 1330  007034  010346                        MOV     R3,-(SP)        ;;PUSH R3 ON STACK
 1331  007036  010546                        MOV     R5,-(SP)        ;;PUSH R5 ON STACK
 1332  007040  012746  020200                MOV     #20200,-(SP)    ;;SET BLANK SWITCH AND SIGN
 1333  007044  016605  000020                MOV     20(SP),R5       ;;GET THE INPUT NUMBER
 1334  007050  100004                        BPL     1$              ;;BR IF INPUT IS POS.
 1335  007052  005405                        NEG     R5              ;;MAKE THE BINARY NUMBER POS.
 1336  007054  112766  000055  000001        MOVB    #'-,1(SP)       ;;MAKE THE ASCII NUMBER NEG.
 1337  007062  005000                1$:     CLR     R0              ;;ZERO THE CONSTANTS INDEX
 1338  007064  012703  007242                MOV     #$DBLK,R3       ;;SETUP THE OUTPUT POINTER
 1339  007070  112723  000040                MOVB    #' ,(R3)+       ;;SET THE FIRST CHARACTER TO A BLANK
 1340  007074  005002                2$:     CLR     R2              ;;CLEAR THE BCD NUMBER
 1341  007076  016001  007232                MOV     $DTBL(R0),R1    ;;GET THE CONSTANT
 1342  007102  160105                3$:     SUB     R1,R5           ;;FORM THIS BCD DIGIT
 1343  007104  002402                        BLT     4$              ;;BR IF DONE
```

```
1344  007106  005202                        INC     R2              ;;INCREASE THE BCD DIGIT BY 1
1345  007110  000774                        BR      3$
1346  007112  060105                4$:     ADD     R1,R5           ;;ADD BACK THE CONSTANT
1347  007114  005702                        TST     R2              ;;CHECK IF BCD DIGIT=0
1348  007116  001002                        BNE     5$              ;;FALL THROUGH IF 0
1349  007120  105716                        TSTB    (SP)            ;;STILL DOING LFADING 0'S?
1350  007122  100407                        BMI     7$              ;;BR IF YES
1351  007124  106316                5$:     ASLB    (SP)            ;;MSD?
1352  007126  103003                        BCC     6$              ;;BR IF NO
1353  007130  116663  000001  177777        MOVB    1(SP),-1(R3)    ;;YES--SET THE SIGN
1354  007136  052702  000060        6$:     BIS     #'0,R2          ;;MAKE THE BCD DIGIT ASCII
1355  007142  052702  000040        7$:     BIS     #' ,R2          ;;MAKE IT A SPACE IF NOT ALREADY A DIGIT
1356  007146  110223                        MOVB    R2,(R3)+        ;;PUT THIS CHARACTER IN THE OUTPUT BUFFER
1357  007150  005720                        TST     (R0)+           ;;JUST INCREMENTING
1358  007152  020027  000010                CMP     R0,#10          ;;CHECK THE TABLE INDEX
1359  007156  002746                        BLT     2$              ;;GO DO THE NEXT DIGIT
1360  007160  003002                        BGT     8$              ;;GO TO EXIT
1361  007162  010502                        MOV     R5,R2           ;;GET THE LSD
1362  007164  000764                        BR      6$              ;;GO CHANGE TO ASCII
1363  007166  105726                8$:     TSTB    (SP)+           ;;WAS THE LSD THE FIRST NON-ZERO?
1364  007170  100003                        BPL     9$              ;;BR IF NO
1365  007172  116663  177777  177776        MOVB    -1(SP),-2(R3)   ;;YES--SET THE SIGN FOR TYPING
1366  007200  105013                9$:     CLRB    (R3)            ;;SET THE TERMINATOR
1367  007202  012605                        MOV     (SP)+,R5        ;;POP STACK INTO R5
1368  007204  012603                        MOV     (SP)+,R3        ;;POP STACK INTO R3
1369  007206  012602                        MOV     (SP)+,R2        ;;POP STACK INTO R2
1370  007210  012601                        MOV     (SP)+,R1        ;;POP STACK INTO R1
1371  007212  012600                        MOV     (SP)+,R0        ;;POP STACK INTO R0
1372  007214  104400  007242                TYPE    ,$DBLK          ;;NOW TYPE THE NUMBER
1373  007220  016666  000002  000004        MOV     2(SP),4(SP)     ;;ADJUST THE STACK
1374  007226  012616                        MOV     (SP)+,(SP)
1375  007230  000002                        RTI                     ;;RETURN TO USER
1376  007232  023420                $DTBL:  10000.
1377  007234  001750                        1000.
1378  007236  000144                        100.
1379  007240  000012                        10.
1380  007242  000004                $DBLK:  .BLKW   4
1381                                ;*****************************************************************
1382
1383                                .SBTTL  BINARY TO OCTAL (ASCII) AND TYPE
1384
1385                                ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 6-DIGIT
1386                                ;*OCTAL (ASCII) NUMBER AND TYPE IT.
1387                                ;*$TYPOS---ENTER HERE TO SETUP SUPPRESS ZEROS AND NUMBER OF DIGITS TO TYPE
1388                                ;*CALL:
1389                                ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
1390                                ;*      TYPOS                   ;;CALL FOR TYPEOUT
1391                                ;*      .BYTE   N               ;;N=1 TO 6 FOR NUMBER OF DIGITS TO TYPE
1392                                ;*      .BYTE   M               ;;M=1 OR 0
1393                                ;*                                      ;;1=TYPE LEADING ZEROS
1394                                ;*                                      ;;0=SUPPRESS LEADING ZEROS
1395                                ;*
1396                                ;*$TYPON----ENTER HERE TO TYPE OUT WITH THE SAME PARAMETERS AS THE LAST
1397                                ;*$TYPOS OR $TYPOC
1398                                ;*CALL:
1399                                ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
```

```
 1400                                   ;*      TYPON                   ;;CALL FOR TYPEOUT
 1401                                   ;*
 1402                                   ;*$TYPOC---ENTER HERE FOR TYPEOUT OF A 16 BIT NUMBER
 1403                                   ;*CALL:
 1404                                   ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
 1405                                   ;*      TYPOC                   ;;CALL FOR TYPEOUT
 1406
 1407  007252  017646  000000          $TYPOS: MOV     @(SP),-(SP)     ;;PICKUP THE MODE
 1408  007256  116637  000001  007475          MOVB    1(SP),$OFILL    ;;LOAD ZERO FILL SWITCH
 1409  007264  112637  007477                  MOVB    (SP)+,$OMODE+1  ;;NUMBER OF DIGITS TO TYPE
 1410  007270  062716  000002                  ADD     #2,(SP)         ;;ADJUST RETURN ADDRESS
 1411  007274  000406                          BR      $TYPON
 1412  007276  112737  000001  007475  $TYPOC: MOVB    #1,$OFILL       ;;SET THE ZERO FILL SWITCH
 1413  007304  112737  000006  007477          MOVB    #6,$OMODE+1     ;;SET FOR SIX(6) DIGITS
 1414  007312  112737  000005  007474  $TYPON: MOVB    #5,$OCNT        ;;SET THE ITERATION COUNT
 1415  007320  010346                          MOV     R3,-(SP)        ;;SAVE R3
 1416  007322  010446                          MOV     R4,-(SP)        ;;SAVE R4
 1417  007324  010546                          MOV     R5,-(SP)        ;;SAVE R5
 1418  007326  113704  007477                  MOVB    $OMODE+1,R4     ;;GET THE NUMBER OF DIGITS TO TYPE
 1419  007332  005404                          NEG     R4
 1420  007334  062704  000006                  ADD     #6,R4           ;;SUBTRACT IT FOR MAX. ALLOWED
 1421  007340  110437  007476                  MOVB    R4,$OMODE       ;;SAVE IT FOR USE
 1422  007344  113704  007475                  MOVB    $OFILL,R4       ;;GET THE ZERO FILL SWITCH
 1423  007350  016605  000012                  MOV     12(SP),R5       ;;PICKUP THE INPUT NUMBER
 1424  007354  005003                          CLR     R3              ;;CLEAR THE OUTPUT WORD
 1425  007356  006105                  1$:     ROL     R5              ;;ROTATE MSB INTO "C"
 1426  007360  000404                          BR      3$              ;;GO DO MSB
 1427  007362  006105                  2$:     ROL     R5              ;;FORM THIS DIGIT
 1428  007364  006105                          ROL     R5
 1429  007366  006105                          ROL     R5
 1430  007370  010503                          MOV     R5,R3
 1431  007372  006103                  3$:     ROL     R3              ;;GET LSB OF THIS DIGIT
 1432  007374  105337  007476                  DECB    $OMODE          ;;TYPE THIS DIGIT?
 1433  007400  100016                          BPL     7$              ;;BR IF NO
 1434  007402  042703  177770                  BIC     #177770,R3      ;;GET RID OF JUNK
 1435  007406  001002                          BNE     4$              ;;TEST FOR 0
 1436  007410  005704                          TST     R4              ;;SUPPRESS THIS 0?
 1437  007412  001403                          BEQ     5$              ;;BR IF YES
 1438  007414  005204                  4$:     INC     R4              ;;DON'T SUPPRESS ANYMORE 0'S
 1439  007416  052703  000060                  BIS     #'0,R3          ;;MAKE THIS DIGIT ASCII
 1440  007422  052703  000040          5$:     BIS     #' ,R3          ;;MAKE ASCII IF NOT ALREADY
 1441  007426  110337  007472                  MOVB    R3,8$           ;;SAVE FOR TYPING
 1442  007432  104400  007472                  TYPE    ,8$             ;;GO TYPE THIS DIGIT
 1443  007436  105337  007474          7$:     DECB    $OCNT           ;;COUNT BY 1
 1444  007442  003347                          BGT     2$              ;;BR IF MORE TO DO
 1445  007444  002402                          BLT     6$              ;;BR IF DONE
 1446  007446  005204                          INC     R4              ;;INSURE LAST DIGIT ISN'T A BLANK
 1447  007450  000744                          BR      2$              ;;GO DO THE LAST DIGIT
 1448  007452  012605                  6$:     MOV     (SP)+,R5        ;;RESTORE R5
 1449  007454  012604                          MOV     (SP)+,R4        ;;RESTORE R4
 1450  007456  012603                          MOV     (SP)+,R3        ;;RESTORE R3
 1451  007460  016666  000002  000004          MOV     2(SP),4(SP)     ;;SET THE STACK FOR RETURNING
 1452  007466  012616                          MOV     (SP)+,(SP)
 1453  007470  000002                          RTI                     ;;RETURN
 1454  007472     000                  8$:     .BYTE   0               ;;STORAGE FOR ASCII DIGIT
 1455  007473     000                          .BYTE   0               ;;TERMINATOR FOR TYPE ROUTINE
```

```
 1456  007474     000                 $OCNT:  .BYTE   0               ;;OCTAL DIGIT COUNTER
 1457  007475     000                 $OFILL: .BYTE   0               ;;ZERO FILL SWITCH
 1458  007476  000000                 $OMODE: .WORD   0               ;;NUMBER OF DIGITS TO TYPE
 1459                                 ;*****************************************************************
 1460
 1461                                 .SBTTL  ERROR MESSAGE TYPEOUT ROUTINE
 1462
 1463                                 ;*THIS ROUTINE USES THE "ITEM CONTROL BYTE" ($ITEMB) TO DETERMINE WHICH
 1464                                 ;*ERROR IS TO BE REPORTED. IT THEN OBTAINS, FROM THE "ERROR TABLE" ($ERRTB),
 1465                                 ;*AND REPORTS THE APPROPRIATE INFORMATION CONCERNING THE ERROR.
 1466
 1467  007500                         $ERRTYP:
 1468  007500  104400  001231                 TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
 1469  007504  010046                 MOV     R0,-(SP)        ;;SAVE R0
 1470  007506  005000                 CLR     R0              ;;PICKUP THE ITEM INDEX
 1471  007510  153700  001114         BISB    @#$ITEMB,R0
 1472  007514  001004                 BNE     1$              ;;IF ITEM NUMBER IS ZERO, JUST
 1473                                                         ;;TYPE THE PC OF THE ERROR
 1474  007516  013746  001116         MOV     $ERRPC,-(SP)    ;;SAVE $ERRPC FOR TYPEOUT
 1475                                                         ;;ERROR ADDRESS
 1476  007522  104401                 TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
 1477  007524  000426                 BR      6$              ;;GET OUT
 1478  007526  005300         1$:     DEC     R0              ;;ADJUST THE INDEX SO THAT IT WILL
 1479  007530  006300                 ASL     R0              ;;      WORK FOR THE ERROR TABLE
 1480  007532  006300                 ASL     R0
 1481  007534  006300                 ASL     R0
 1482  007536  062700  001236         ADD     #$ERRTB,R0      ;;FORM TABLE POINTER
 1483  007542  012037  007552         MOV     (R0)+,2$        ;;PICKUP "ERROR MESSAGE" POINTER
 1484  007546  001404                 BEQ     3$              ;;SKIP TYPEOUT IF NO POINTER
 1485  007550  104400                 TYPE                    ;;TYPE THE "ERROR MESSAGE"
 1486  007552  000000         2$:     .WORD   0               ;;"ERROR MESSAGE" POINTER GOES HERE
 1487  007554  104400  001231         TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
 1488  007560  012037  007570         MOV     (R0)+,4$        ;;PICKUP "DATA HEADER" POINTER
 1489  007564  001404                 BEQ     5$              ;;SKIP TYPEOUT IF 0
 1490  007566  104400                 TYPE                    ;;TYPE THE "DATA HEADER"
 1491  007570  000000         4$:     .WORD   0               ;;"DATA HEADER" POINTER GOES HERE
 1492  007572  104400  001231         TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
 1493  007576  011000         5$:     MOV     (R0),R0         ;;PICKUP "DATA TABLE" POINTER
 1494  007600  001004                 BNE     7$              ;;GO TYPE THE DATA
 1495  007602  012600         6$:     MOV     (SP)+,R0        ;;RESTORE R0
 1496  007604  104400  001231         TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
 1497  007610  000207                 RTS     PC              ;;RETURN
 1498  007612                         7$:
 1499  007612  013046                 MOV     @(R0)+,-(SP)    ;;SAVE @(R0)+ FOR TYPEOUT
 1500  007614  104401                 TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
 1501  007616  005710                 TST     (R0)            ;;IS THERE ANOTHER NUMBER?
 1502  007620  001770                 BEQ     6$              ;;BR IF NO
 1503  007622  104400  007630         TYPE    ,8$             ;;TYPE TWO(2) SPACES
 1504  007626  000771                 BR      7$              ;;LOOP
 1505  007630  020040     000         8$:     .ASCIZ  /  /            ;;TWO(2) SPACES
 1506          007634                         .EVEN
 1507                                 ;*****************************************************************
 1508
 1509                                 .SBTTL  ERROR HANDLER ROUTINE
 1510
 1511                                 ;*THIS ROUTINE WILL INCREMENT THE ERROR FLAG AND THE ERROR COUNT,
```

```
1512                                    ;*SAVE THE ERROR ITEM NUMBER AND THE ADDRESS OF THE ERROR CALL
1513                                    ;*AND GO TO $ERRTYP ON ERROR
1514                                    ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
1515                                    ;*SW15=1        HALT ON ERROR
1516                                    ;*SW13=1        INHIBIT ERROR TYPEOUTS
1517                                    ;*SW10=1        BELL ON ERROR
1518                                    ;*SW09=1        LOOP ON ERROR
1519                                    ;*CALL
1520                                    ;*      ERROR   N       ;;ERROR=EMT AND N=ERROR ITEM NUMBER
1521
1522  007634                            $ERROR:
1523  007634  010637  001174                   MOV     SP,$REG6        ;GET THE CURRENT STACK POINTER VALUE
1524  007640  162737  000004  001174          SUB     #4,$REG6                ;RESTORE IT TO ITS "PRE ERROR TRAP" VALUE FOR PR
1525  007646  016637  000002  001176          MOV     2(SP),$REG7             ;GET THE PS OFF OF THE STACK
1526  007654  005037  001172                   CLR     $REG5                   ;PREPARE "$REG5" TO HOLD THE TEST #
1527  007660  113737  001102  001172          MOVB    $TSTNM,$REG5            ;TEST # IS HELD IN THE LOW BYTE OF "TSTNM"
1528  007666  010037  001160                   MOV     R0,$REG0                ;MOST OF THE TIME R0 HAS GOOD STUFF IN IT ALSO
1529  007672  105237  001103          7$:     INCB    $ERFLG          ;;SET THE ERROR FLAG
1530  007676  001775                   BEQ     7$              ;;DON'T LET THE FLAG GO TO ZERO
1531  007700  013777  001102  171232          MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER AND ERROR FLAG
1532  007706  032777  002000  171222          BIT     #BIT10,@SWR     ;;BELL ON ERROR?
1533  007714  001402                   BEQ     1$              ;;NO - SKIP
1534  007716  104400  001224                   TYPE    ,$BELL          ;;RING BELL
1535  007722  005237  001112          1$:     INC     $ERTTL          ;;COUNT THE NUMBER OF ERRORS
1536  007726  011637  001116                   MOV     (SP),$ERRPC     ;;GET ADDRESS OF ERROR INSTRUCTION
1537  007732  162737  000002  001116          SUB     #2,$ERRPC
1538  007740  117737  171152  001114          MOVB    @$ERRPC,$ITEMB  ;;STRIP AND SAVE THE ERROR ITEM CODE
1539  007746  032777  020000  171162          BIT     #BIT13,@SWR     ;;SKIP TYPEOUT IF SET
1540  007754  001004                   BNE     20$             ;;SKIP TYPEOUTS
1541  007756  004737  007500                   JSR     PC,$ERRTYP      ;;GO TO USER ERROR ROUTINE
1542  007762  104400  001231                   TYPE    ,$CRLF
1543  007766                            20$:
1544  007766  005777  171144          2$:     TST     @SWR            ;;HALT ON ERROR
1545  007772  100001                   BPL     31$             ;;SKIP IF CONTINUE
1546  007774  000000                   HALT                    ;;HALT ON ERROR!
1547  007776  022737  006232  000042  31$:     CMP     #$ENDAD,@#42    ;;ACT-11 AUTO-ACCEPT?
1548  010004  001001                   BNE     3$              ;;BRANCH IF NO
1549  010006  000000                   HALT                    ;;YES
1550  010010  032777  001000  171120  3$:     BIT     #BIT09,@SWR     ;;LOOP ON ERROR SWITCH SET?
1551  010016  001402                   BEQ     4$              ;;BR IF NO
1552  010020  013716  001110                   MOV     $LPERR,(SP)     ;;FUDGE RETURN FOR LOOPING
1553  010024  005737  001222          4$:     TST     $ESCAPE         ;;CHECK FOR AN ESCAPE ADDRESS
1554  010030  001402                   BEQ     5$              ;;BR IF NONE
1555  010032  013716  001222                   MOV     $ESCAPE,(SP)    ;;FUDGE RETURN ADDRESS FOR ESCAPE
1556  010036                            5$:
1557  010036  000002                   RTI                     ;;RETURN
1558                                    ;*****************************************************************
1559
1560                                    .SBTTL  TRAP DECODER
1561
1562                                    ;*THIS ROUTINE WILL PICKUP THE LOWER BYTE OF THE "TRAP" INSTRUCTION
1563                                    ;*AND USE IT TO INDEX THROUGH THE TRAP TABLE FOR THE STARTING ADDRESS
1564                                    ;*OF THE DESIRED ROUTINE. THEN USING THE ADDRESS OBTAINED IT WILL
1565                                    ;*GO TO THAT ROUTINE.
1566
1567  010040  010046                    $TRAP:  MOV     R0,-(SP)        ;;SAVE R0
```

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 1568  010042  016600  000002              MOV     2(SP),R0        ;;GET TRAP ADDRESS
 1569  010046  005740                      TST     -(R0)           ;;BACKUP BY 2
 1570  010050  111000                      MOVB    (R0),R0         ;;GET RIGHT BYTE OF TRAP
 1571  010052  006300                      ASL     R0              ;;POSITION FOR INDEXING
 1572  010054  016000  010062              MOV     $TRPAD(R0),R0   ;;INDEX TO TABLE
 1573  010060  000200                      RTS     R0              ;;GO TO ROUTINE
 1574
 1575
 1576                                  .SBTTL  TRAP TABLE
 1577
 1578                                  ;*THIS TABLE CONTAINS THE STARTING ADDRESSES OF THE ROUTINES CALLED
 1579                                  ;*BY THE "TRAP" INSTRUCTION.
 1580
 1581                                  ;       ROUTINE
 1582                                  ;       -------
 1583  010062                          $TRPAD:
*1584  010062  006612                          $TYPE   ;;CALL=TYPE     TRAP+0(104400)  TTY TYPEOUT ROUTINE
 1585  010064  007276                          $TYPOC  ;;CALL=TYPOC    TRAP+1(104401)  TYPE OCTAL NUMBER (WITH LEADING ZEROS)
 1586  010066  007252                          $TYPOS  ;;CALL=TYPOS    TRAP+2(104402)  TYPE OCTAL NUMBER (NO LEADING ZEROS)
 1587  010070  007312                          $TYPON  ;;CALL=TYPON    TRAP+3(104403)  TYPE OCTAL NUMBER (AS PER LAST CALL)
 1588  010072  007026                          $TYPDS  ;;CALL=TYPDS    TRAP+4(104404)  TYPE DECIMAL NUMBER (WITH SIGN)
 1589                                  ;*****************************************************************
 1590
 1591                                  .SBTTL  POWER DOWN AND UP ROUTINES
 1592
 1593                                  ;POWER DOWN ROUTINE
 1594  010074  012737  010236  000024  $PWRDN: MOV     #$ILLUP,@#PWRVEC ;;SET FOR FAST UP
 1595  010102  012737  000340  000026          MOV     #340,@#PWRVEC+2 ;;PRIO:7
 1596  010110  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
 1597  010112  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
 1598  010114  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
 1599  010116  010346                          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
 1600  010120  010446                          MOV     R4,-(SP)        ;;PUSH R4 ON STACK
 1601  010122  010546                          MOV     R5,-(SP)        ;;PUSH R5 ON STACK
 1602  010124  013746  010456                  MOV     POWPUS,-(SP)    ;;PUSH POWPUS ON STACK
 1603  010130  013746  010460                  MOV     POWPOP,-(SP)    ;;PUSH POWPOP ON STACK
 1604  010134  013746  010254                  MOV     POWMES,-(SP)    ;;PUSH POWMES ON STACK
 1605  010140  013746  001672                  MOV     T0001,-(SP)     ;;PUSH T0001 ON STACK
 1606  010144  010637  010242                  MOV     SP,$SAVR6       ;;SAVE SP
 1607  010150  012737  010162  000024          MOV     #$PWRUP,@#PWRVEC ;;SET UP VECTOR
 1608  010156  000000                          HALT
 1609  010160  000776                          BR      .-2             ;;HANG UP
 1610
 1611                                  ;POWER UP ROUTINE
 1612  010162  013706  010242          $PWRUP: MOV     $SAVR6,SP       ;;GET SP
 1613  010166  005037  010242                  CLR     $SAVR6          ;;WAIT LOOP FOR THE TTY
 1614  010172  005237  010242          1$:     INC     $SAVR6          ;;WAIT FOR THE INC
 1615  010176  001375                          BNE     1$              ;;OF <POWPUS>,<POWPOP>,<POWMES>,<T0001> WORD
 1616  010200  012605                          MOV     (SP)+,R5        ;;POP STACK INTO R5
 1617  010202  012604                          MOV     (SP)+,R4        ;;POP STACK INTO R4
 1618  010204  012603                          MOV     (SP)+,R3        ;;POP STACK INTO R3
 1619  010206  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
 1620  010210  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
 1621  010212  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
 1622  010214  012737  010074  000024          MOV     #$PWRDN,@#PWRVEC ;;SET UP THE POWER DOWN VECTOR
 1623  010222  012737  000340  000026          MOV     #340,@#PWRVEC+2 ;;PRIO:7
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1624  010230  104400                          TYPE                    ;REPORT THE POWER FAILURE
1625  010232  010244                $PWRMG:   .WORD   $POWER          ;;POWER FAIL MESSAGE POINTER
1626  010234  000002                          RTI
1627  010236  000000                $ILLUP:   HALT                    ;;THE POWER UP SEQUENCE WAS STARTED
1628  010240  000776                          BR      .-2             ;; BEFORE THE POWER DOWN WAS COMPLETE
1629  010242  000000                $SAVR6:   0                       ;;PUT THE SP HERE
1630  010244  005015  047520  042527 $POWER:  .ASCIZ  <15><12>"POWER"
1631  010252  000122
1632                                          .EVEN
1633  010254  005015  042522  052123 POWMES:  .ASCIZ <15> <12> "RESTARTING AFTER A POWER FIALURE" <15> <12> <12>
1634  010262  051101  044524  043516
1635  010270  040440  052106  051105
1636  010276  040440  050040  053517
1637  010304  051105  043040  040511
1638  010312  052514  042522  005015
1639  010320  000012
1640  010322  005015  041412  045532 STMES:   .ASCIZ  <15><12><12>"CZKWA-G LINE FREQUENCY CLOCK TEST"<15><12>
1641  010330  040527  043455  046040
1642  010336  047111  020105  051106
1643  010344  050505  042525  041516
1644  010352  020131  046103  041517
1645  010360  020113  042524  052123
1646  010366  005015     000
1647
1648  010371     124  040522  050120 TRPMES:  .ASCIZ  "TRAPPED TO LOC 4 FROM LOCATION  "
1649  010376  042105  052040  020117
1650  010404  047514  020103  020064
1651  010412  051106  046517  046040
1652  010420  041517  052101  047511
1653  010426  020116  000040
1654  010432  042522  052123  051101 TRPM2S:  .ASCIZ  "RESTARTING PROGRAM"
1655  010440  044524  043516  050040
1656  010446  047522  051107  046501
1657  010454     000
1658          010456                          .EVEN
1659  010456  001234                POWPUS:   WORD
1660  010460  001234                POWPOP:   WORD
1661  010462  020040  020040  020040 EM1:     .ASCIZ  "                                   LKS     LKS     "
1662  010470  020040  020040  020040
1663  010476  020040  020040  020040
1664  010504  020040  020040  020040
1665  010512  020040  020040  020040
1666  010520  020040  045514  020123
1667  010526  020040  020040  045514
1668  010534  020123  020040  020040
1669  010542     000
1670  010543     050  041520  020051 DH1:     .ASCIZ  "(PC)    (PS)    (SP)    TEST#   WAS     S/B     "
1671  010550  020040  024040  051520
1672  010556  020051  020040  024040
1673  010564  050123  020051  020040
1674  010572  052040  051505  021524
1675  010600  020040  053440  051501
1676  010606  020040  020040  051440
1677  010614  041057  020040  020040
1678  010622  000040
1679                                    .EVEN
```

```
 1680  010624  001116  001176  001174  DT1:    $ERRPC,$REG7,$REG6,$REG5,LKS,$GDDAT
 1681  010632  001172  177546  001124
 1682  010640  000000                  0
 1683  010642  046103  041517  020113  EM2:    .ASCIZ  "CLOCK FAILED TO INTERRUPT"
 1684  010650  040506  046111  042105
 1685  010656  052040  020117  047111
 1686  010664  042524  051122  050125
 1687  010672  000124
 1688  010674  050050  024503  020040  DH2:    .ASCIZ  "(PC)    (PS)    (SP)    TEST#   (LKS)   "
 1689  010702  020040  050050  024523
 1690  010710  020040  020040  051450
 1691  010716  024520  020040  020040
 1692  010724  042524  052123  020043
 1693  010732  020040  046050  051513
 1694  010740  020051  020040     000
 1695          010746                  .EVEN
 1696  010746  001116  001176  001174  DT2:    $ERRPC,$REG7,$REG6,$REG5,LKS
 1697  010754  001172  177546
 1698  010760  000000                  0
 1699  010762  046103  041517  020113  EM3:    .ASCIZ  "CLOCK INTERRUPTED WHEN THE PROCESSOR PRIORITY WAS TOO HIGH"
 1700  010770  047111  042524  051122
 1701  010776  050125  042524  020104
 1702  011004  044127  047105  052040
 1703  011012  042510  050040  047522
 1704  011020  042503  051523  051117
 1705  011026  050040  044522  051117
 1706  011034  052111  020131  040527
 1707  011042  020123  047524  020117
 1708  011050  044510  044107     000
 1709  011055     050  041520  020051  DH3:    .ASCIZ  "(PC)    (PS)    (SP)    TEST#   (LKS)   "
 1710  011062  020040  024040  051520
 1711  011070  020051  020040  024040
 1712  011076  050123  020051  020040
 1713  011104  052040  051505  021524
 1714  011112  020040  024040  045514
 1715  011120  024523  020040  000040
 1716                          .EVEN
 1717  011126  001116  001176  001174  DT3:    $ERRPC,$REG7,$REG6,$REG5,LKS
 1718  011134  001172  177546
 1719  011140  000000                  0
 1720  011142  046103  041517  020113  EM4:    .ASCIZ  "CLOCK GIVES UNEQUAL # OF PULSES OVER TWO EQUAL PERIODS OF TIME"
 1721  011150  044507  042526  020123
 1722  011156  047125  050505  040525
 1723  011164  020114  020043  043117
 1724  011172  050040  046125  042523
 1725  011200  020123  053117  051105
 1726  011206  052040  047527  042440
 1727  011214  052521  046101  050040
 1728  011222  051105  047511  051504
 1729  011230  047440  020106  044524
 1730  011236  042515     000
 1731  011241     050  041520  020051  DH4:    .ASCIZ  "(PC)    (PS)    (SP)    TEST#   1ST     2ND"<15><12>"
 1732  011246  020040  024040  051520
 1733  011254  020051  020040  024040
 1734  011262  050123  020051  020040
 1735  011270  052040  051505  021524
```

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 1736  011276  020040  030440  052123
 1737  011304  020040  020040  031040
 1738  011312  042116  005015  020040
 1739  011320  020040  020040  020040
 1740  011326  020040  020040  020040
 1741  011334  020040  020040  020040
 1742  011342  020040  020040  020040
 1743  011350  020040  020040  020040
 1744  011356  042520  044522  042117
 1745  011364  020040  042520  044522
 1746  011372  042117     000
 1747          011376                  .EVEN
 1748  011376  001116  001176  001174  DT4:    $ERRPC,$REG7,$REG6,$REG5,$REG1,$REG2
 1749  011404  001172  001162  001164
 1750  011412  000000                  0
 1751  011414  045514  020123  042522  EM5:    .ASCIZ  "LKS REGISTER RESPONDS TO ANOTHER ADDRESS"
 1752  011422  044507  052123  051105
 1753  011430  051040  051505  047520
 1754  011436  042116  020123  047524
 1755  011444  040440  047516  044124
 1756  011452  051105  040440  042104
 1757  011460  042522  051523     000
 1758  011465     050  041520  020051  DH5:    .ASCIZ  "(PC)    (PS)    (SP)    TEST#   ADDRESS"
 1759  011472  020040  024040  051520
 1760  011500  020051  020040  024040
 1761  011506  050123  020051  020040
 1762  011514  052040  051505  021524
 1763  011522  020040  040440  042104
 1764  011530  042522  051523     000
 1765          011536                  .EVEN
 1766  011536  001116  001176  001174  DT5:    $ERRPC,$REG7,$REG6,$REG5,$GDADR
 1767  011544  001172  001120
 1768  011550  000000                  0
 1769  011552  020101  047516  051440  EM6:    .ASCIZ  "A NO SACK TIMEOUT HAS OCCURED"
 1770  011560  041501  020113  044524
 1771  011566  042515  052517  020124
 1772  011574  040510  020123  041517
 1773  011602  052503  042522  000104
 1774  011610  050050  024503  020040  DH6:    .ASCIZ  "(PC)    (PS)    (SP)    TEST#   (LKS)   "
 1775  011616  020040  050050  024523
 1776  011624  020040  020040  051450
 1777  011632  024520  020040  020040
 1778  011640  042524  052123  020043
 1779  011646  020040  046050  051513
 1780  011654  020051  020040     000
 1781          011662                  .EVEN
 1782  011662  001116  001176  001174  DT6:    $ERRPC,$REG7,$REG6,$REG5,LKS
 1783  011670  001172  177546
 1784  011674  000000                  0
 1785  011676  051127  047117  020107  EM7:    .ASCIZ  "WRONG CONDITION CODES WERE PUT ONTO STACK BY INTERRUPT"
 1786  011704  047503  042116  052111
 1787  011712  047511  020116  047503
 1788  011720  042504  020123  042527
 1789  011726  042522  050040  052125
 1790  011734  047440  052116  020117
 1791  011742  052123  041501  020113
```

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 1792  011750  054502  044440  052116
 1793  011756  051105  052522  052120
 1794  011764     000
 1795  011765     050  041520  020051  DH7:    .ASCIZ  "(PC)    (PS)    (SP)    TEST#   CC WAS  CC S/B"
 1796  011772  020040  024040  051520
 1797  012000  020051  020040  024040
 1798  012006  050123  020051  020040
 1799  012014  052040  051505  021524
 1800  012022  020040  041440  020103
 1801  012030  040527  020123  041440
 1802  012036  020103  027523  000102
 1803                          .EVEN
 1804  012044  001116  001176  001174  DT7:    $ERRPC,$REG7,$REG6,$REG5,BUF1,$GDDAT
 1805  012052  001172  000776  001124
 1806  012060  000000                  0
 1807  012062  051127  047117  020107  EM10:   .ASCIZ  "WRONG PC PUT ONTO THE STACK BY AN INTERRUPT"
 1808  012070  041520  050040  052125
 1809  012076  047440  052116  020117
 1810  012104  044124  020105  052123
 1811  012112  041501  020113  054502
 1812  012120  040440  020116  047111
 1813  012126  042524  051122  050125
 1814  012134  000124
 1815  012136  050050  024503  020040  DH10:   .ASCIZ  "(PC)    (PS)    (SP)    TEST#  @(SP)WAS @(SP)S/B  "
 1816  012144  020040  050050  024523
 1817  012152  020040  020040  051450
 1818  012160  024520  020040  020040
 1819  012166  042524  052123  020043
 1820  012174  040040  051450  024520
 1821  012202  040527  020123  024100
 1822  012210  050123  051451  041057
 1823  012216  020040     000
 1824          012222                  .EVEN
 1825  012222  001116  001176  001174  DT10:   $ERRPC,$REG7,$REG6,$REG5,BUF2,$GDDAT
 1826  012230  001172  000774  001124
 1827  012236  000000                  0
 1828  012240  051124  042531  020104  EM11:   .ASCIZ  "TRYED TO ACCESS THE LAS REGISTER, AND TRAPPED"
 1829  012246  047524  040440  041503
 1830  012254  051505  020123  044124
 1831  012262  020105  045514  020123
 1832  012270  042522  044507  052123
 1833  012276  051105  020054  047101
 1834  012304  020104  051124  050101
 1835  012312  042520  000104
 1836  012316  050050  024503  020040  DH11:   .ASCIZ  "(PC)    (PS)    (SP)    TEST#"
 1837  012324  020040  050050  024523
 1838  012332  020040  020040  051450
 1839  012340  024520  020040  020040
 1840  012346  042524  052123  000043
 1841                          .EVEN
 1842  012354  001116  001176  001174  DT11:   $ERRPC,$REG7,$REG6,$REG5
 1843  012362  001172
 1844  012364  000000          SAVE:   0                       ;SAVE @#157546 IN TEST 14
 1845  012366  000000          0
 1846          000001          .END
```

```
A0004   002104            387#    390
A0005   002172            408#    411
A0006   002302            435#    438
A0007   002434            465#    468
A0010   002614            505#    508
A0011   002716            534#    537
A0012   003102            576#    579
A0013   003172            606#    609
A0014   003560            685     696#
A0015   003700            708     720#
A0016   004016            732     744#
A0017   004134            756     768#
A0020   004252            780     792#
A0021   004370            804     816#
A0022   004526            843     845#
A0023   004574            859#    862
A0024   004716            887#    888
A0025   005026            911#    914
A0026   005200            947#    948
A0027   005314            973#    974
A0030   005454            991    1001#
A0031   005542           1021#   1024
A0032   005674           1058#   1061
A0033   006032           1091#   1094
BIT0  = 000001            121#
BIT00 = 000001            111#    121
BIT01 = 000002            110#    120
BIT02 = 000004            109#    119
BIT03 = 000010            108#    118
BIT04 = 000020            107#    117
BIT05 = 000040            106#    116
BIT06 = 000100            105#    115
BIT07 = 000200            104#    114
BIT08 = 000400            103#    113    1207
BIT09 = 001000            102#    112    1215    1550
BIT1  = 000002            120#
BIT10 = 002000            101#   1532
BIT11 = 004000            100#   1222
BIT12 = 010000             99#
BIT13 = 020000             98#   1539
BIT14 = 040000             97#   1193
BIT15 = 100000             96#
BIT2  = 000004            119#
BIT3  = 000010            118#
BIT4  = 000020            117#
BIT5  = 000040            116#
BIT6  = 000100            115#
BIT7  = 000200            114#
BIT8  = 000400            113#
BIT9  = 001000            112#
BPTVEC= 000014            128#
BUF1  = 000776            140#   1066*   1075    1099*   1804
BUF2  = 000774            139#   1067*   1100*   1108    1825
B0005   002210            409     414#
B0006   002320            436     441#
B0007   002452            466     471#
```

```
B0010   001632             506     511#
B0011   002734             535     540#
B0012   003120             577     582#
B0013   003210             607     612#
B0014   003572             697     699#
B0015   003712             721     723#
B0016   004030             745     747#
B0017   004146             769     771#
B0020   004264             793     795#
B0021   004402             817     819#
B0023   004612             860     865#
B0025   005044             912     917#
B0030   005472            1003    1005#   1006
B0031   005560            1022    1027#
B0032   005712            1059    1064#
B0033   006050            1092    1097#
C0007   002462             474#    476
C0010   002642             514#    516
C0011   003014             553#    556
C0013   003224             616#    619
C0025   005070             904     925#
C0031   005614            1036#   1039
C0032   005756            1068    1075#
C0033   006114            1101    1108#   1110
DDISP = 177570              43#     191
DH1     010543             243    1670#
DH10    012136             278    1815#
DH11    012316             283    1836#
DH2     010674             248    1688#
DH3     011055             253    1709#
DH4     011241             258    1731#
DH5     011465             263    1758#
DH6     011610             268    1774#
DH7     011765             273    1795#
DISPLA  001140             191#    327*   1236*   1531*
DISPRE  000174             149#    327
DSWR  = 177570              42#     190
DT1     010624             244    1680#
DT10    012222             279    1825#
DT11    012354             284    1842#
DT2     010746             249    1696#
DT3     011126             254    1717#
DT4     011376             259    1748#
DT5     011536             264    1766#
DT6     011662             269    1782#
DT7     012044             274    1804#
D0007   002474             457     479#
D0010   002654             492     519#
D0011   003032             554     559#
D0013   003242             617     622#
D0031   005632            1037    1042#
EMTVEC= 000030             131#    309*    310*
EM1     010462             242    1661#
EM10    012062             277    1807#
EM11    012240             282    1828#
EM2     010642             247    1683#
```

```
EM3     010762              252    1699#
EM4     011142              257    1720#
EM5     011414              262    1751#
EM6     011552              267    1769#
EM7     011676              272    1785#
ERRVEC= 000004              124#   1198    1199*   1201*   1204*
E0001   001730              340     346#
E0002   001776              360#
E0003   002042              374#
E0004   002116              391#
E0005   002204              412#
E0006   002314              439#
E0007   002446              469#
E0010   002626              509#
E0011   002730              538#
E0012   003114              580#
E0013   003204              610#
E0014   003570              698#
E0015   003710              722#
E0016   004026              746#
E0017   004144              770#
E0020   004262              794#
E0021   004400              818#
E0022   004524              844#
E0023   004606              863#
E0024   004736              879     892#
E0025   005040              915#
E0026   005220              942     952#
E0027   005346              979#
E0030   005506             1001    1009#
E0031   005554             1025#   1033
E0032   005706             1062#
E0033   006044             1095#
E10006  002342              446#
E10007  002470              477#
E10010  002650              517#
E10012  003134              587#
E10013  003236              620#
E10023  004630              869#
E10025  005064              923#
E10031  005626             1040#
E10033  006124             1110#
E1005   002226              418#
E1011   003026              550     557#
E20007  002502              481#
E20010  002662              521#
E20011  003040              563#
E20013  003334              643#
E20025  005100              927#
E20031  005640             1046#
E30013  003366              653#
E40013  003444              669#
F0013   003262              627#    632
GNS   = ****** U            148    1584    1585    1586    1587    1588
G0013   003276              628     631#
H0013   003322              639#    642
```

```
IOTVEC= 000020   129#   307*   308*
I0001   001722   344#
I0014   003552   695#
I0015   003672   719#
I0016   004010   743#
I0017   004126   767#
I0020   004244   791#
I0021   004362   815#
I0022   004506   841#
I0023   004612   866#
I0026   005206   949#
J0013   003340   640    645#
KSTART  001400   153    290#
K0013   003354   649#   652
LKS   = 177546   137#   344*   358    372    385*   387    406*   408    415*   416    433*   435    442*
                 443*   444    463*   465    472*   479    494*   505    512*   519    532*   534    551*
                 553    574*   576    583*   585    603*   606    614*   616    623*   624    626*   627
                 630*   636*   639    647*   649    657*   658    660*   661    664*   687*   694*   696
                 699*   718*   720    723*   742*   744    747*   766*   768    771*   790*   792    795*
                 814*   816    819*   840*   842    845*   857*   859    866*   867    880*   886*   890
                 905*   911    921*   925    944*   946*   950    966*   975*   976*   977    988*   997*
                 999*  1007*  1019*  1021   1034*  1036   1056*  1058   1069*  1089*  1091   1102*  1117*
                1680   1696   1717   1782
L0013   003372   650    655#
M0013   003420   661#   666
NOP   = 000240   138#
N0013   003434   662    665#
PIRQ  = 177772    41#
PIRQVE= 000240   135#
POWMES  010254  1604   1633#
POWPOP  010460  1603   1660#
POWPUS  010456  1602   1659#
PR0   = 000000    58#
PR1   = 000040    59#
PR2   = 000100    60#
PR3   = 000140    61#
PR4   = 000200    62#
PR5   = 000240    63#   497
PR6   = 000300    64#   544
PR7   = 000340    65#   402    429    598    689    713    737    761    785    809    835    882    906
                 938    967   1029
PS    = 177776    38#    39    497*   544*
PSW   = 177776    39#
PWRVEC= 000024   130#   313*   314*  1594*  1595*  1607*  1622*  1623*
RESVEC= 000010   125#
R0001   001716   342    343#
R0002   001756   355    356#
R0003   002032   370    371#
R0004   002070   383    384#
R0005   002164   401    406#
R0006   002274   428    433#
R0007   002412   456    459#
R0010   002544   491    494#
R0011   002710   531    532#
R0012   003074   573    574#
R0013   003140   596#   656
```

```
R0014   003542            683     693#
R0015   003662            711     717#
R0016   004000            735     741#
R0017   004116            759     765#
R0020   004234            783     789#
R0021   004352            807     813#
R0022   004476            833     839#
R0023   004566            856     857#
R0024   004676            878     881#
R0025   005006            902     905#
R0026   005162            937     944#
R0027   005266            963     966#
R0030   005406            990     991#
R0031   005534           1018    1019#
R0032   005666           1055    1056#
R0033   006024           1088    1089#
R1013   003156            602#
R2013   003210            613#
R3013   003306            635#
R4013   003340            646#
SAVE    012364            688*    701    1844#
STACK = 001100             35#
START   001450            301#   1175
STKLMT= 177774             40#
STMES   010322            300    1640#
SWR     001136            190#    324     326*   1193    1207    1209    1215    1222    1532    1539    1544    1550
SWREG   000176            150#    326
SW0   = 000001             93#
SW00  = 000001             83#     93
SW01  = 000002             82#     92
SW02  = 000004             81#     91
SW03  = 000010             80#     90
SW04  = 000020             79#     89
SW05  = 000040             78#     88
SW06  = 000100             77#     87
SW07  = 000200             76#     86
SW08  = 000400             75#     85
SW09  = 001000             74#     84
SW1   = 000002             92#
SW10  = 002000             73#
SW11  = 004000             72#
SW12  = 010000             71#
SW13  = 020000             70#
SW14  = 040000             69#
SW15  = 100000             68#
SW2   = 000004             91#
SW3   = 000010             90#
SW4   = 000020             89#
SW5   = 000040             88#
SW6   = 000100             87#
SW7   = 000200             86#
SW8   = 000400             85#
SW9   = 001000             84#
TBITVE= 000014            126#
TCRLF = 000200           1272    1311#
THT   = 000011           1270    1310#
```

```
TKVEC = 000060            133#
TPVEC = 000064            134#
TRAPVE= 000034            132#    311*    312*
TRAPO   006266            353     367     381     398     425     453     489     529     571     830     853     875     899
                          934     960     986    1016    1053    1086    1160#
TRPMES  010371           1162    1648#
TRPM2S  010432           1169    1654#
TRTVEC= 000014            127#
TYPDS = 104404           1143    1588#
TYPE  = 104400           1141    1144    1166    1275    1372    1442    1468    1485    1487    1490    1492    1496    1503
                         1534    1542    1584#   1624
TYPDC = 104401           1165    1476    1500    1585#
TYPDN = 104403           1587#
TYPDS = 104402           1586#
T0001   001672            332     339#    1155    1605
T0002   001732            345     352#
T0003   002000            359     366#
T0004   002044            373     380#
T0005   002120            388     397#
T0006   002230            413     417     424#
T0007   002344            440     445     452#
T0010   002504            470     478     480     488#
T0011   002664            501     510     518     520     528#    558
T0012   003042            539     548     562     569#
T0013   003136            581     586     595#
T0014   003460            611     621     644     654     668     681#
T0015   003612            700     707#
T0016   003730            724     731#
T0017   004046            748     755#
T0020   004164            772     779#
T0021   004302            796     803#
T0022   004420            820     828#
T0023   004534            829     852#
T0024   004632            864     868     874#
T0025   004740            891     898#
T0026   005102            916     924     926     933#
T0027   005222            951     959#
T0030   005350            965     978     985#
T0031   005510           1008    1015#
T0032   005642           1026    1041    1045    1052#   1079
T0033   006000           1063    1076    1085#
T0034   006134           1096    1109    1116#
WORD    001234            225#    972*    973*    998*   1005*   1659    1660
$BDADR  001122            184#
$BDDAT  001126            186#    304
$BELL   001224            220#   1534    1558
$CHARC  007022           1286*   1293    1302*   1307#
$CMTAG  001100            172#    302     309     315     316     317
$CM1  = 000010            202#    203#    204#    205#    206#    207#    208#    209#    210#
$CM2  = 000020            202#    203#    204#    205#    206#    207#    208#    209#    210#
$CM3  = 000010            200#    202
$CM4  = 000010            210#    211#    212#    213#    214#    215#    216#    217#    218#
$CRLF   001231            222#   1166    1276    1313    1468    1487    1492    1496    1542    1558
$DBLK   007242           1338    1372    1380#
$DOAGN  006242           1137    1148    1154#
$DTBL   007232           1341    1376#
```

```
$ENDAD  006232            160    1150#   1547
$ENDCT  006200            315    1139#
$ENDMG  006246           1141    1156#
$ENULL  006263           1144    1159#
$EOP    006144           1129#
$EOPCT  006172            315*   1136#   1140
$ERFLG  001103            175#   1182    1211    1213    1219*   1240    1529*   1558
$ERMAX  001115            181#    318*   1213    1235*   1240
$ERROR  007634            309    1522#
$ERRPC  001116            182#   1474    1536*   1537*   1538    1558    1680    1696    1717    1748    1766    1782    1804
                         1825    1842
$ERRTB  001236            241#   1482
$ERRTY  007500           1467#   1541
$ERTTL  001112            179#   1535*   1558
$ESCAP  001222            219#    317*   1234*   1553    1555    1558
$FILLC  001154            198#   1279    1313
$FILLS  001153            197#   1313
$GDADR  001120            183#    684*    688     695*    701*    712*    719*    725*    736*    743*    749*    760*    767*
                          773*    784*    791*    797*    808*    815*    821*    834*    841*   1766
$GDDAT  001124            185#    357*    369*    384*    400*    427*    455*    570*    682*    710*    734*    758*    782*
                          806*    832*    855*    867     877*    890     901*    936*    950     962*    977     989*   1077*
                         1110*   1680    1804    1825
$GET42  006222           1145#
$HD   = 000000             18
$ICNT   001104            176#   1226*   1227    1229*   1239
$ILLUP  010236           1594    1627#
$ITEMB  001114            180#   1471    1538*   1558
$LF     001232            223#   1313    1558
$LPADR  001106            177#    319*    342*    355*    370*    383*    401*    428*    456*    491*    531*    573*    602*
                          613*    635*    646*    656*    683*    711*    735*    759*    783*    807*    833*    856*    878*
                          902*    937*    963*    990*   1018*   1055*   1088*   1217*   1232*   1237    1239
$LPERR  001110            178#    320*   1217    1233*   1239    1552
$MAIL = ****** U          331    1232    1264    1544
$MXCNT  006610           1230    1239#
$NULL   001152            196#   1281    1313
$OCNT   007474           1414*   1443*   1456#
$OMODE  007476           1409*   1413*   1418    1421*   1432*   1458#
$OVER   006574           1194    1210    1218    1228    1236#
$PASS   001100            173#   1133*   1134*   1142    1156    1224    1240
$POWER  010244           1625    1630#
$PWRDN  010074            313    1594#   1622
$PWRMG  010232           1625#
$PWRUP  010162           1607    1612#
$QUES   001230            221#   1313    1558
$RDCHR= ****** U         1589
$RDDEC= ****** U         1589
$RDLIN= ****** U         1589
$RDOCT= ****** U         1589
$REGAD  001156            200#
$REG0   001160            202#   1528*
$REG1   001162            203#    669*   1748
$REG2   001164            204#    670*   1748
$REG3   001166            205#
$REG4   001170            206#
$REG5   001172            207#   1526*   1527*   1680    1696    1717    1748    1766    1782    1804    1825    1842
$REG6   001174            208#   1523*   1524*   1680    1696    1717    1748    1766    1782    1804    1825    1842
```

```
$REG7   001176          209#    1525*   1680    1696    1717    1748    1766    1782    1804    1825    1842
$R2A  = ****** U        1589
$SAVRE= ****** U        1589
$SAVR6  010242          1606*   1612    1613*   1614*   1629#
$SCOPE  006340          307     1191#
$SETUP= 000037          8#      307     309     311     313     315     316     317     319     1131    1547
$STUP = 177777          9#
$SVLAD  006546          1202    1231#
$SVPC = 000204          158#    163
$SWR  = 167400          5#      18      23      24      25      26      27      28      29      218     219     220     316
                        317     319     320     1126    1132    1146    1155    1156    1183    1184    1185    1186    1187
                        1193    1205    1207    1208    1211    1212    1213    1220    1221    1222    1233    1236    1239
                        1514    1515    1516    1517    1518    1532    1539    1544    1550    1558    1626
$SWRMK= 000000          29      30      1187    1188    1209
$TIMES  001220          218#    316*    1132*   1220*   1227    1230*   1239
$TKB    001144          193#
$TKS    001142          192#
$TMP0   001200          210#
$TMP1   001202          211#
$TMP2   001204          212#
$TMP3   001206          213#
$TMP4   001210          214#
$TMP5   001212          215#
$TMP6   001214          216#
$TMP7   001216          217#
$TN   = 000000          6#      18
$TPB    001150          195#    1299*   1313
$TPFLG  001155          199#    1258    1313
$TPS    001146          194#    1297    1313
$TRAP   010040          311     1567#
$TRP  - 000005          1575#   1585#   1586#   1587#   1588#   1589#
$TRPAD  010062          1572    1583#
$TSTNM  001102          174#    1131*   1182    1209    1231*   1236    1240    1527    1531    1558
$TYPBN= ****** U        1589
$TYPDS  007026          1326#   1588
$TYPE   006612          299     1161    1168    1258#   1575    1584
$TYPEC  006756          1278    1285    1292    1297#   1298
$TYPEX  007024          1303    1305    1308#
$TYPOC  007276          1412#   1585
$TYPON  007312          1411    1414#   1587
$TYPOS  007252          1407#   1586
$XTSTR  006352          1196#
$OFILL  007475          1408*   1412*   1422    1457#
$40CAT= ****** U        1193    1541
.     = 012370          144#    148#    158     159#    161#    163#    171#    224     289#    305     319     320     1156
                        1160    1239    1240    1313    1380#   1506#   1558    1609    1628    1658#   1695#   1747#   1765#
                        1781#   1824#
```

```
ADITAG   164#   225
COMMEN     1#   136#
ENDCOM     1#   136#
ERROR     36#   346   360   374   391   412   418   439   446   469   477   481   509   517   521
          538   557   563   580   587   610   620   643   653   671   698   722   746   770   794
          818   844   863   869   892   915   923   927   952   979  1009  1025  1040  1046  1062
         1078  1095  1111
ESCAPE     1#   136#
GETPRI     1#     8#   291
MULT       1#   136#
NEWTST     1#   136#
POP        1#   136#  1367  1616
PUSH       1#   136#  1326  1596  1602
REPORT     1#
SAVE    1507#  1523
SCOPE     37#   339   352   366   380   397   424   452   488   528   569   595   681   707   731
          755   779   803   828   852   874   898   933   959   985  1015  1052  1085  1116  1130
SETPRI     1#     8#   402   429   598   689   713   737   761   785   809   835   881   906   938
          967  1029
SETRAP     8#   353   367   381   398   425   453   489   529   571   830   853   875   899   934
          960   986  1016  1053  1086
SETTRA  1575#  1585  1586  1587  1588
SETUP      1#   136#   301
SKIP       1#   136#
SLASH      1#   136#
SPACE    136#
STARS      1#     8#   136#   154   164   224  1120  1176  1240  1313  1381  1459  1507  1558  1589
SWRSU      1#   321#
TRMTRP  1575#
TYPBIN     1#   136#
TYPDEC     1#   136#  1142
TYPNAM     1#
TYPNUM     1#   136#
TYPOCS     1#   136#
TYPOCT     1#   136#  1474  1498
TYPTXT     1#   136#
WAITLK     8#   407   434   464   504   533   552   575   605   615   638   648   858   910  1020
          1035  1057  1090
$$CMRE   164#   202   203   204   205   206   207   208   209
$$CMTM   164#   210   211   212   213   214   215   216   217
$$FSCA     1#   136#
$$NEWT     1#   136#
$$SET   1575#  1585  1586  1587  1588
$$SKIP     1#   136#
.EQUAT     1#     8#    31
.HEADE     1#     8#
.KT11      1#
.SETUP     1#     8#
.SWRHI     1#     8#    18
.SWRLO     8#    30#
.$ACT1     1#     8#   154
.$APTB     1#
.$APTH     1#
.$APTY     1#
.$ASTA     1#
.$CATC     1#     8#   141
```

```
.$CMTA      1#       8#     164
.$DB2D      1#
.$DB2O      1#
.$DIV       1#
.$EOP       1#       8#    1120
.$ERRO      1#       8#    1507
.$ERRT      1#       8#    1459
.$MULT      1#
.$POWE      1#       8#    1589
.$RAND      1#
.$RDDE      1#
.$RDOC      1#
.$READ      1#
.$R2AZ      1#
.$SAVE      1#
.$SB2D      1#
.$SB2O      1#
.$SCOP      1#       8#    1176
.$SIZE      1#
.$SUPR      1#
.$TRAP      1#       8#    1558
.$TYPB      1#
.$TYPD      1#       8#    1313
.$TYPE      1#       8#    1240
.$TYPO      1#       8#    1381
.$40CA      1#


. ABS.  012370     000


 ERRORS DETECTED:  0

 CZKWAG.BIN,CZKWAG.LST/CRF/SOL/NL:TOC=DSKZ:CZKWAG.SML,DSKM:CZKWAG.P11
 RUN-TIME: 16 12 1 SECONDS
 RUN-TIME RATIO: 398/30=13.2
 CORE USED:  28K  (55 PAGES)
```