KWV11

KWV11A DIAGNOSTIC

CVKWAC0

AH-8224C-MC

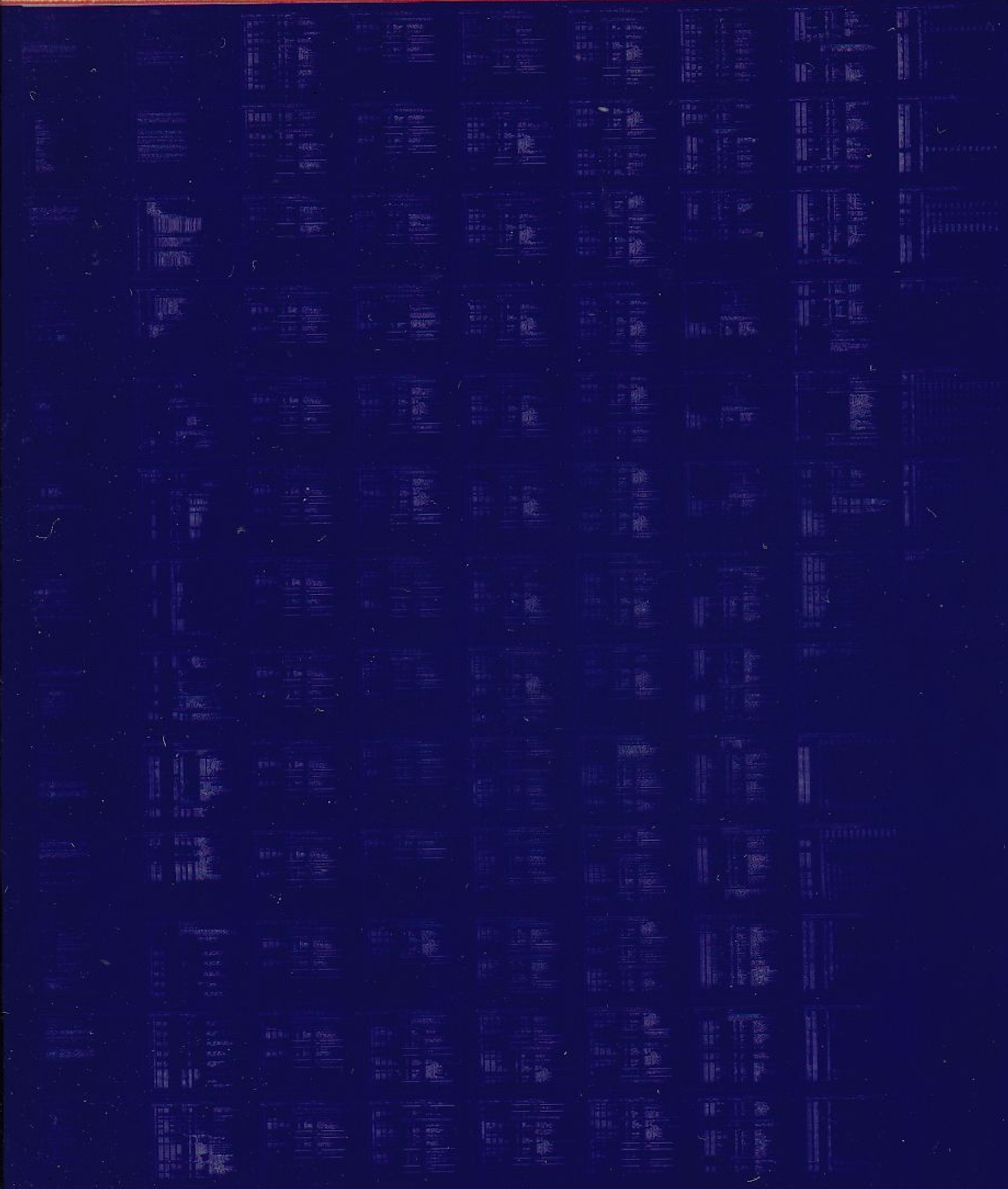
COPYRIGHT '76–80

FICHE 1 OF 1

JAN 1980

digital

MADE IN USA



IDENTIFICATION

Product Code:	AC-8222C-MC
Product Name:	CVKWAC0 KWV11A Diagnostic
Date Created:	October 1976
Date Revised:	July 1979
Maintainer:	Diagnostic Engineering

Table of Contents

1.0 ABSTRACT

2.0 REQUIREMENTS
2.1 Equipment
2.2 Storage

3.0 LOADING PROCEDURE
3.1 Method
3.2 Non-Standard Address, Vector, or Use of Software Switch Register

4.0 STARTING PROCEDURE
4.1 Control Switch Settings
4.2 Starting Address
4.3 Program and/or Operator Action

5.0 OPERATING PROCEDURE
5.1 Switch Register Function
5.2 Scope Loops
5.3 Program and/or Operator Action
5.3.1 Logic Test
5.4 Inhibiting Auto-Size Feature

6.0 ERRORS
6.1 Error Printout
6.1.1 Example
6.2 Non-Standard Error Halts

7.0 RESTRICTIONS
7.1 External Inputs
7.2 Starting Restriction
7.3 Possible Program 'BOMBS''

8.0 MISCELLANEOUS
8.1 Power Fail
8.2 XXDP, ACT, APT
8.3 Execution Time
8.4 LSI-11 ''ODT'' Commands
8.5 Entering LSI-11 ''ODT''
8.6 Use of Program Software SWR
8.7 Special I/O Signal Tests
8.8 Production Starting Address
8.9 Testor Starting Address
8.10 Trap Catcher

1.0 ABSTRACT

This program allows the user check-out or debug the KWV11A, Programmable Real-Time Clock. The logic test is self contained and needs no external maintenance hardware or operator intervention with only one exception: If the customer hardware connected to the KWV11 could inject signals on ST2, ST1, or SLAVE IN inputs, it must be disconnected.

Even though the KWV11 is a Q BUS option, this program was designed to run on any PDP-11 Family computer. If the user is unfamilar with an LSI-11 he should review sections 8.4 and 8.5. A software switch register is included with this program.

Every effort was made to make this program conform to LSI-11 programming restrictions, however; the user should read sections 7.2 and 7.3.

2.0 REQUIREMENTS

2.1 Equipment

1. PDP-11 Family computer with 8K of memory (or more) and I/O facilities (i.e., TTY).
2. KWV11 under test.

2.2 Storage

This program occupies and uses 8K of memory.

3.0 LOADING PROCEDURE

3.1 Method

Standards procedure for normal binary tapes should be followed.

1. Absolute loader must be in memory.
2. Place binary tape in reader.
3. Type Address *7500 (5* determine by location of loader).
4. Type "G" (program will be loaded into memory).

The program can also be loaded by XXDP, ACT, or APT.

3.2 Non-Standard Address, Vector, or Use of Software Switch Register

This program is set to test a KWV11 with a standard address and vector. If any of these are different on the KW11K you are testing, change the corresponding location in memory before starting this test.

LOCATION	TAG	CURRENT CONTENTS	COMMENTS
1250	$BASE:	170420	;;BASE ADDRESS OF EQUIPMENT ;; UNDER TEST
1244	$VECT1:	000440	;;INTERRUPT VECTOR #1
176	$SWREG:	000000	;;MANUAL SWR.
1157	$TPFLG:	.BYTE 0	;;"TERMINAL AVAILABLE" ;; FLAG (BIT<0:7>-0=YES)

4.0 STARTING PROCEDURE

4.1 Control Switch Setting

Before starting the diagnostic, set all switch register bits as desired, see section 5.1.

4.2 Starting Addresses

```
200  Start of Logic Tests
204  Restart Address for Logic Test
210  I/O Signal Test #1
214  I/O Signal Test #2
220  I/O Signal Test #3
230  Production Starting Address
240  Testor Starting Address
```

4.3 Program and/or Operator Action

All switches in switch pack 2 should be in the "OFF" position except when instructed.

1. Load program into memory.

2. Enter keyboard "ODT".

3. Alter location "$SWREG" (Address 176) to reflect desired options of a switch register - see section 5.1.

4. Type starting address, followed by "G" to start program.

5.0 OPERATING PROCEDURE

5.1 Switch Register Function

SWR BIT	OCTAL	FUNCTION WHEN SET
5	100000	HALT ON ERROR
14	040000	LOOP ON TEST
13	020000	INHIBIT ERROR TYPEOUT
12	010000	ENABLE LINE FREQ. RATE TESTING
11	004000	INHIBIT ITERATIONS (SHORT PASS)
10	002000	BELL ON ERROR
09	001000	LOOP ON ERROR
08	000400	LOOP ON TEST IN SWR <7:0>

5.2 Scope Loops

If an error occurs and the user wishes to scope the error, "$SWREG" should be altered to "100000" at the start of the test to halt on error, then when the program halts on error and the CPU enters "ODT", "$SWREG" should be altered to "060000" to loop on current test and inhibit error typeout, then type "P" to continue program execution.

5.3 Program and/or Operator Action

All switches in switch pack 2 should be in the "OFF" position except when instructed.

5.3.1 Logic Test

The first pass through the program will be made with iterations inhibited. Successive passes will enable iterations if SWR11=0.

If not inhibited by APT, the program will look for more KWV11's to exercise, one pass will exercise all KWV11's.

If four units are detected, the following will be typed:

```
UNIT #000001 COMPLETED TESTING UNIT #000002
UNIT #000002 COMPLETED TESTING UNIT #000003
UNIT #000003 COMPLETED TESTING UNIT #000004
UNIT #000004 COMPLETED
```

At End of Pass when all units have been tested, the following typeout will occur:

```
"ENDPASS 12  -  TOTAL ERRORS 4 THERE ARE 4  (OCTAL)  UNITS -
 GOOD UNITS (L TO R) 0000000000001011".
```

This indicates that the program has completed 12 octal (10 decimal) passes. During that time 4(octal) errors were detected. Also we tested 4 units and the third unit was the only unit to fail.

5.4 Inhibiting Auto-Size Feature

This program will automatically auto-size and test each KWV11 it detects on the system. To inhibit this feature, set bit 15 of location "$ENVM". Also, to test an individual KWV11 in a group, set this bit and refer to section 3.2 for changing the base address of the KWV11 under test.

6.0 ERRORS

6.1 Error Printout

Printout varies with the error detected. The error PC typed out is the actual location of the error call.

A HALT at location '$TYPE'+10 when running with no terminal indicates an error has occurred. To find out the number of the error, examine location '$TSTNM'. This is the item number of the error. To find out what the error typeout would have been goto to the error pointer table beginning at location 'ERRTB'.

6.'.1 Example

If we examined location '$TSTNM' and found a 5(101) we go to location '$ERRTB' and look through the error pointer table until we found item 5. The information would look like:

```
;ITEM 5

        EM5     ;CLOCK SR DATA ERROR
        DH5     ;ERRPC ASR WAS S/B
        DT5     ;$ERRPC,ASR,$BDDAT,$GDDAT
        DF0     ;ALL NUMBERS ARE IN OCTAL FORM
```

To find out the information specified by DT5 ($ERRPC,BSR,$BDADR,$BDADR) follow these steps:

1. Look up the address of the label (i.e., $ERRPC) in the symbol table which follows the listing.

2. * Put this address in the switch register and depress the LOAD ADDRESS switch on the processor's console.

3. * Now depress the EXAMINE switch.

4. * The data displayed in the data lights is the information that would have been printed for his label if you had a input/output terminal.

* See section 8.4 for LSI-11 ODT commands.

6.2 Non-Standard Error Halts

Bus errors will cause a Halt to the routine "IOTRD". The address that caused this trap will be in address "TRTC".

7.0 <u>RESTRICTIONS</u>

All switches in switch pack 2 should be in the "OFF" position except when instructed.

7.1 External Inputs

External inputs such as "SLAVE IN", "ST1" and "ST2" must not be connected to any customer hardware that might generate these signal while the diagnostic is running.

7.2 Starting Restriction

If a free-running clock, such as 60Hz from the power supply, is attached to the "BEVNT" bus line on both Rev level C/D and E systems, an interrupt to location 100 will occur when using the "G" and "L" commands prior to executing the first instruction. Therefore this program can not disable the BEVNT bus line by inhibiting interrupts.

User systems requiring a free-running clock attached to the BEVNT bus line can temporarily avoid this situation by setting the PSW(RS) to 200, loading the PC with the starting address instead of using the "G" command, and then using the "P" command. Before using the "L" command, the PSW(RS) can be set to 200, thereby inhibiting interrupts, to avoid receiving the event interrupt after loading the ABS loader.

7.3 Possible Program 'BOMBS'

The first two tests of this program check to see if the KWV11 responds to the address the program thinks its at. If the KWV11 does not respond, a bus error occurs. Also bus errors can occur during the time the program sizes to see how many KWV11 are on you system.

For more information on the next subject, see JAN. 1976 LSI-11 ENGINEERING BULLETIN issued by The Digital Components Group.

Bus errors may alter the preset contents of location 4 before the trap is executed, thereby transferring program control to area in the program that was not set up to handle the trap. If this happens, the program will "BOMB" and possibly rewite parts of itself.

8.0 MISCELLANEOUS

8.1 Power Fail

After a power failure occurs, the program execution will continue at the point where the power occurred. The program will type "POWER".

8.2 XXDP, ACT, APT

The program is chainable under XXDP, ACT, or APT. Although "APT Hooks" have been installed, they have not been tested.

8.3 Execution Time

0.5 minutes (30 sec) iteration inhibited - no errors
2.5 minutes (150 sec) with iterations - no errors

8.4 LSI-11 'ODT'' Commands

FORMAT	DESCRIPTION
<CR> return	Close opened location and accept next command.
<LF> line feed	Close current location; open next sequential location.
^(uparrow)	Open previous location.
_ (left arrow)	Take contents of opened location, indexed by contents of PC, and open that location.
@	Take contents of opened location as absolute address and open that location.
R/	Open the word at location R.
/	Reopen the last location.
$N/ or RN/	Open general register N(0-7) or S(PS register).
R;G or RG	GOTO location R and start program.
NL	Execute bootstrap loader using N as device CSR. Console device is 177560.
;P or P	Proceed with program execution.
RUBOUT	Erases previous numeric character. Response is a backslash ().

8.5 Entering LSI-11 'ODT''

The HALT or ODT microcode state of the KD11F (LSI-11 module) can be entered in five different ways (others are a subset of these) from the run state:

1. Execution of a LSI-11 HALT instruction,
2. A double BUS error,
3. As a POWER UP option,
4. ASCII break with DLV11 framing error asserting the B HALT line (enabled by jumper of DLV11).

Upon entering the HALT state, the KD11F responds through the set of command listed in section 8.4.

8.6 Use of Program Software SWR

The program software switch register is enabled if

1. No hardware SWR exists;
2. If you start with all ones (SWR=177777) in the switch register.

The software switch register may be changed by typing ^G (Control and letter G keys typed simultaneously). When ^G is typed, the program responds by typing ''SWR=XXXXXX'' where XXXXXX equals the former contents of the switch register.

If you wish to keep the current value, type <CR>. If you wish to change the value, type the new value followed by a <CR>.

It is important to note that the diagnostic is not running after the ^G until a <CR> is typed.

8.7 Special I/O Signal Tests

Three tests were included to enable checkout of I/O signals: ST1, ST2, and Clock Overflow. These tests have a special starting address. Since end-passes are immediate, no ''END of Pass'' message is reported. Errors are reported by typing out the PC where the error was detected. When started, the program remains in a loop generating and detecting the specified signals. HALT ON ERROR and INHIBIT ERROR typeout options may be used.

Logic test must have already been run on the KWV11.

8.7.1 I/O Signal Test #1 ST1 IN, ST2 OUT

Switch pack S2 must be set up as follows:

SWITCH	STATE
1	OFF
2	ON
3	OFF
4	OFF
5	ON
6	ON
7	not used

The following jumper must be installed.

J1-SS (ST2 out) to J1-VV (ST1 in)

Load and start the program at 210.

8.7.2 I/O Signal Test #2 Clock Overflow Test

Switch pack S2 must be set up as follows:

SWITCH	STATE
1	OFF
2	OFF
3	OFF
4	ON
5	OFF
6	ON
7	not used

The following jumper must be installed.

J1-RR (clock overflow) to J1-TT (ST2 in)

Load and start at location 214.

8.7.3 I/O Signal Test #3 ST1 out and ST2 in

Switch Pack S2 must be set up as follows:

```
SWITCH STATE
------ -----

  1    OFF
  2    OFF
  3    OFF
  4    ON
  5    ON
  6    ON
  7    not used
```

The following jumper must be installed:

J1-UU (ST1 out) to J1-TT (ST2 in)

Load and start at location 220.

8.8 Production Starting Address

A special starting address has been provided for In-house production to use to start the logic diagnostic and inform the test that production is using it.

In the field only enough addresses were alloted for 4 sequential KWV11s. When the logic tests are started at location 200, we only auto-size up to 4 KWV11s.

In house testing may wish to exercise up to 16 KWV11s at one time. The logic tests may be started at location 230 and the program will auto size up to 16 KWV11s.

8.9 Testor Starting Address

A special starting address has been provided for manufacturing to use to start the logic diagnostic and inform the program that the clock module is cabled to an in-house testor.

Manual intervention is needed in this sequence of testing. The program will type out all instructions. A cable should connect J1 on the clock module to J10 on the testor. Switches 1 and 3 of S2 (on the clock module) should be on, all other switches on S2 should be off.

8.10 Trap Catcher

The Trap Catcher in this diagnostic employs a new concept. This concept will enable the user of this diagnostic to gain more knowledge of the events that lead the program to this area.

The Trap Catch consists of PC+2 and JSR PC,R0. (i.e., Location 300 would contain 302 and location 302 would contain 4700.)

When a device interrupts unexpectedly to the Trap Catcher, it would pick up the PC+2 of the trap as an address of the interrupt service routine.

The program would then pick up ''4700'' as the new PSW. Bit 7 of the new PSW having been set, would cause further interrupts from happening. When the CPU attempts to execute ''4700'' (JSR PC,R0), a Buss-time-out trap will occur to location 4. Location 4 contains a pointer to ''IOTRD'', a routine that will report the trap as an error.

To guard against ''Real'' Bus errors routing us through location 4 to ''IOTRD'', we check to see if the trap that brought us to location 4 really came from the Trap Catcher area. If not we'll halt and leave the Trap Address in ''TRTO''.

More about the interrupt error can be found in the description of the error in the program listing in the routine ''IOTRD''.

```
   56          OPERATIONAL SWITCH SETTINGS
   58          TRAP CATCHER
  100          BASIC DEFINITIONS
  109          ACT11 HOOKS
  111          APT PARAMETER BLOCK
  112          COMMON TAGS
  (2)          APT MAILBOX-ETABLE
  (1)          ERROR POINTER TABLE
  225          INITIALIZE THE COMMON TAGS
  234          TYPE PROGRAM NAME
  (2)          GET VALUE FOR SOFTWARE SWITCH REGISTER
  294          T1      *TEST THE ADDRESSABILITY OF CLOCK CSR
  295          T2      *TEST THE ADDRESSABILITY OF CLOCK BUFFER REG.
  342          T3      *TEST THAT CLOCK A STATUS REGISTER BIT 14 CAN BE SET AND CLEARED
  343          T4      *TEST THAT CLOCK A STATUS REGISTER BIT 13 CAN BE SET AND CLEARED
  344          T5      *TEST THAT CLOCK A STATUS REGISTER BIT 11 CAN BE SET AND CLEARED
  345          T6      *TEST THAT CLOCK A STATUS REGISTER BIT 6 CAN BE SET AND CLEARED
  346          T7      *TEST THAT CLOCK A STATUS REGISTER BIT 5 CAN BE SET AND CLEARED
  347          T10     *TEST THAT CLOCK A STATUS REGISTER BIT 4 CAN BE SET AND CLEARED
  348          T11     *TEST THAT CLOCK A STATUS REGISTER BIT 3 CAN BE SET AND CLEARED
  349          T12     *TEST THAT CLOCK A STATUS REGISTER BIT 2 CAN BE SET AND CLEARED
  350          T13     *TEST THAT CLOCK A STATUS REGISTER BIT 1 CAN BE SET AND CLEARED
  351          T14     *TEST THAT CLOCK A STATUS REGISTER BIT 0 CAN BE SET AND CLEARED
  385          T15     *TEST THAT PATERN 125252 WILL SET AND CLEAR IN BUFFER REG.
  387          T16     *TEST THAT PATERN 052525 WILL SET AND CLEAR IN BUFFER REG.
  390          *
  391          * PHASE 2 ADVANCED BASIC LOGIC TESTS
  392          *
  404          T17     *TEST THE LOW BYTE OPERATION OF CLOCK'S STATUS REGISTER
  430          T20     *TEST THE HIGH BYTE OPERATION OF A'S STATUS REGISTER
  460          T21     *TEST CLOCK'S COUNT REGISTER WITH 125252 PATTERN
  486          T22     *TEST CLOCKS COUNTER REGISTER WITH 052525 PATTERN
  519          T23     *TEST THAT INIT CLEARS STATUS REGISTER
  556          T24     *TEST THAT INIT CLEARS BUFFER REGISTER
  578          T25     *TEST THE SETTING OF MAINTENANCE ST2 IN CLUCK BIT 15 TO SET
  603          T26     *TEST THAT BIT00 IN CLOCK STATUS REG. WILL SET WHEN BIT13 AND MAIN. ST2
  618          *
  619          *PHASE 3 COUNT TESTS
  620          *
  623          T27     *TEST TO SEE IF THE COUNTER WILL INCREMENT
  647          T30     *SEE IF CLOCK WILL COUNT UP FROM A ZERO BASE, RATE:ST1
  683          T31     *TEST THAT OVERFLOW (CSR BIT07) WILL SET ON OVERFLOW
  720          T32     *TEST THAT OVERFLOW WILL CLEAR THE GO BIT
  741          T33     *TEST THAT GO BIT DOES NOT CLEAR ON OVERFLOW, IF MODE 1
  806          T34     *TEST THE ABILITY OF CLOCK TO COUNT AT 1MHZ RATE
  808          T35     *TEST THE ABILITY OF CLOCK TO COUNT AT 100KHZ RATE
  810          T36     *TEST THE ABILITY OF CLOCK TO COUNT AT 10KHZ RATE
  812          T37     *TEST THE ABILITY OF CLOCK TO COUNT AT 1KHZ RATE
  814          T40     *TEST THE ABILITY OF CLOCK TO COUNT AT 100HZ RATE
  816          T41     *TEST THE ABILITY OF CLOCK TO COUNT AT LINEFREQ RATE
  819          T42     *TEST THAT COUNTER DOESN'T COUNT WHEN ''SLAVE IN'' RATE IS SELECTED
  845          T43     *TEST THAT THE CLOCK WILL COUNT IN MODE 1
  864          *
  865          *PHASE 4 CLOCK INTERRUPT TEST.
  866          *
  876          T44     *TEST THAT THE CLOCK WILL INTERRUPT ON OVERFLOW
```

```
   897          T45     *TEST THAT ST2 WILL CAUSE AN INTERRUPT
   916          *
   917          *PHASE 5 ADVANCED TESTING
   918          *
  1000          T46     *TEST THAT THE ''FOR'' BIT WILL SET ON 2 ST2'S
  1018          T47     *TEST THAT FOR BIT WILL SET ON TWO OVERFLOWS
  1038          T50     *TEST THAT FOR BIT WILL CLEAR IF GO BIT IS SET
  1060          T51     *TEST THAT WE CAN DISABLE THE INTERNAL OSC
  1079          T52     *TEST THAT CLOCK CAN BE COUNTED USING MAINTENANCE OSC
  1172          T53     *TEST THE CLOCK'S 1MHZ DIVIDER
  1173          T54     *TEST THE CLOCK'S 100KHZ DIVIDER
  1174          T55     *TEST THE CLOCK'S 10KHZ DIVIDER
  1176          T56     *TEST THE CLOCK'S 1KHZ DIVIDER
  1177          T57     *TEST THE CLOCK'S 100HZ DIVIDER
  1198          T60     *TEST THE CLOCK'S MODE 2 OPERATION
  1238          T61     *TEST THE CLOCK'S MODE 3 OPERATION
  1278          T62     *IF ENABLED,CHECK THRESHOLD ST1 FROM TESTOR
  1312          T63     *IF ENABLED, CHECK ST1,ST2 IN FROM TESTOR
  1410          END OF PASS ROUTINE
  1446                  ;I/O SIGNAL TEST #1 ST1 IN AND ST2 OUT IN AND OUT
  1474                  ;I/O SIGNAL TEST #2 CLOCK OVFLOW OUT TEST.
  1502                  ;I/O SIGNAL TEST #3 ST1 OUT AND ST2 IN
  1542
  1543          *SYSMAC ROUTINES
  1544
  1546          BINARY TO OCTAL (ASCII) AND TYPE
  1547          BINARY TO ASCII AND TYPE ROUTINE
  1560          ERROR HANDLER ROUTINE
  1561          ERROR MESSAGE TYPEOUT ROUTINE
  1562          SCOPE HANDLER ROUTINE
  1563          TTY INPUT ROUTINE
  1564          TYPE ROUTINE
  1565          APT COMMUNICATIONS ROUTINE
  1566          POWER DOWN AND UP ROUTINES
  1635          TRAP DECODER
   (3)          TRAP TABLE
```

```
                                   .NLIST  MC,MD,CND
                                   .LIST   ME
                                   .ENABL  ABS
                                   .ENABL  AMA
          167400                   $SWR=   167400




                         .TITLE  KWV11A DISAGNOSTIC  MAINDEC-11-CVKWA-C
(1)                      ;*COPYRIGHT (C) 1979
(1)                      ;*DIGITAL EQUIPMENT CORP.
(1)                      ;*MAYNARD, MASS. 01754
(1)                      ;*
(1)                      ;*
(1)                      ;*THIS PROGRAM WAS ASSEMBLED USING THE PDP-11 MAINDEC SYSMAC
(1)                      ;*PACKAGE (MAINDEC-11-DZQAC-C3), JAN 19, 1977.
(1)                      ;*
(1)       000001         $TN=1

                         .SBTTL  OPERATIONAL SWITCH SETTINGS
(1)                      ;*
(1)                      ;*      SWITCH               USE
(1)                      ;*      ------          --------------------
(1)                      ;*        15            HALT ON ERROR
(1)                      ;*        14            LOOP ON TEST
(1)                      ;*        13            INHIBIT ERROR TYPEOUTS
(1)                      ;*        11            INHIBIT ITERATIONS
(1)                      ;*        10            BELL ON ERROR
(1)                      ;*         9            LOOP ON ERROR
(1)                      ;*         8            LOOP ON TEST IN SWR<7:0>

                                   .SBTTL  TRAP CATCHER

          000000                   .=0
                                   ;*ALL UNUSED LOCATIONS FROM 4-776 CONTAIN A ".+2"
                                   ;*AND "JSR PC,R0" SEQUENCE TO CATCH ILLEGAL INTERRUPTS.
                                   ;*AND INTERRUPTS TO THE WRONG VECTOR.
                                   ;*LOCATION 0 CONTAINS A 0 TO CATCH IMPROPERLY LOADED
                                   ;*VECTORS.
          000004                   .=4
000004    017102  000200           .WORD   IOTRD,200         ;HANDLE BUSS ERROR.
          000174                   .=174
000174    000000         DISPREG:          .WORD   0              ;;SOFTWARE DISPLAY REGISTER.
000176    000000         SWREG:    .WORD   0                 ;;SOFTWARE SWITCH REGISTER.
          000100                   .=100
000100    000104  000200  000002   .WORD   104,200,2         ;IF 'B EVENT'ON Q-BUS IS
                                                             ;CONNECTED,WE NEED A WAY OF
                                                             ;IGNORING ITS INTERRUPTS.

          000200                   .=200
000200    000137  001506           JMP     @#START
000204    000137  001444           JMP     @#QSTART
```

```
    000210  000137  014046                 JMP      @#OITST1
    000214  000137  014136                 JMP      @#OITST2
    000220  000137  014216                 JMP      @#OITST3

            000230                         .=230
    000230  000137  001472                 JMP      @#WSTART                    ;WESTFIELD STARTING ADDRESS
            000240                         .=240
    000240  000137  001456                 JMP      @#TSTSTR                    ;ALL TESTER TESTS
                                                                                ;IF STARTED HERE.
                                                                                ;ALLOWS PRODUCTION TO EXERCISE
                                                                                ;UP TO 16 CLOCKS.NORMAL=4.

                                    .SBTTL  BASIC DEFINITIONS
(1)
(1)                                 ;*INITIAL ADDRESS OF THE STACK POINTER *** 1100 ***
(1)         001100                  STACK=  1100
(1)                                 .EQUIV  EMT,ERROR         ;;BASIC DEFINITION OF ERROR CALL
(1)                                 .EQUIV  IOT,SCOPE         ;;BASIC DEFINITION OF SCOPE CALL
(1)
(1)                                 ;*MISCELLANEOUS DEFINITIONS
(1)         000011                  HT=     11                ;;CODE FOR HORIZONTAL TAB
(1)         000012                  LF=     12                ;;CODE FOR LINE FEED
(1)         000015                  CR=     15                ;;CODE FOR CARRIAGE RETURN
(1)         000200                  CRLF=   200               ;;CODE FOR CARRIAGE RETURN-LINE FEED
(1)         177776                  PS=     177776            ;;PROCESSOR STATUS WORD
(1)                                 .EQUIV  PS,PSW
(1)         177774                  STKLMT= 177774            ;;STACK LIMIT REGISTER
(1)         177772                  PIRQ=   177772            ;;PROGRAM INTERRUPT REQUEST REGISTER
(1)         177570                  DSWR=   177570            ;;HARDWARE SWITCH REGISTER
(1)         177570                  DDISP=  177570            ;;HARDWARE DISPLAY REGISTER
(1)
(1)                                 ;*GENERAL PURPOSE REGISTER DEFINITIONS
(1)         000000                  R0=     %0                ;;GENERAL REGISTER
(1)         000001                  R1=     %1                ;;GENERAL REGISTER
(1)         000002                  R2=     %2                ;;GENERAL REGISTER
(1)         000003                  R3=     %3                ;;GENERAL REGISTER
(1)         000004                  R4=     %4                ;;GENERAL REGISTER
(1)         000005                  R5=     %5                ;;GENERAL REGISTER
(1)         000006                  R6=     %6                ;;GENERAL REGISTER
(1)         000007                  R7=     %7                ;;GENERAL REGISTER
(1)         000006                  SP=     %6                ;;STACK POINTER
(1)         000007                  PC=     %7                ;;PROGRAM COUNTER
(1)
(1)                                 ;*PRIORITY LEVEL DEFINITIONS
(1)         000000                  PR0=    0                 ;;PRIORITY LEVEL 0
(1)         000040                  PR1=    40                ;;PRIORITY LEVEL 1
(1)         000100                  PR2=    100               ;;PRIORITY LEVEL 2
(1)         000140                  PR3=    140               ;;PRIORITY LEVEL 3
(1)         000200                  PR4=    200               ;;PRIORITY LEVEL 4
(1)         000240                  PR5=    240               ;;PRIORITY LEVEL 5
(1)         000300                  PR6=    300               ;;PRIORITY LEVEL 6
(1)         000340                  PR7=    340               ;;PRIORITY LEVEL 7
(1)
(1)                                 ;*"SWITCH REGISTER" SWITCH DEFINITIONS
(1)         100000                  SW15=   100000
(1)         040000                  SW14=   40000
```

```
    (1)         020000          SW13=   20000
    (1)         010000          SW12=   10000
    (1)         004000          SW11=   4000
    (1)         002000          SW10=   2000
    (1)         001000          SW09=   1000
    (1)         000400          SW08=   400
    (1)         000200          SW07=   200
    (1)         000100          SW06-   100
    (1)         000040          SW05=   40
    (1)         000020          SW04=   20
    (1)         000010          SW03=   10
    (1)         000004          SW02=   4
    (1)         000002          SW01=   2
    (1)         000001          SW00=   1
    (1)                         .EQUIV  SW09,SW9
    (1)                         .EQUIV  SW08,SW8
    (1)                         .EQUIV  SW07,SW7
    (1)                         .EQUIV  SW06,SW6
    (1)                         .EQUIV  SW05,SW5
    (1)                         .EQUIV  SW04,SW4
    (1)                         .EQUIV  SW03,SW3
    (1)                         .FQUIV  SW02,SW2
    (1)                         .EQUIV  SW01,SW1
    (1)                         .EQUIV  SW00,SW0
    (1)
    (1)                         ;*DATA BIT DEFINITIONS (BIT00 TO BIT15)
    (1)         100000          BIT15=  100000
    (1)         040000          BIT14=  40000
    (1)         020000          BIT13=  20000
    (1)         010000          BIT12=  10000
    (1)         004000          BIT11=  4000
    (1)         002000          BIT10=  2000
    (1)         001000          BIT09=  1000
    (1)         000400          BIT08=  400
    (1)         000200          BIT07=  200
    (1)         000100          BIT06=  100
    (1)         000040          BIT05=  40
    (1)         000020          BIT04=  20
    (1)         000010          BIT03=  10
    (1)         000004          BIT02=  4
    (1)         000002          BIT01=  2
    (1)         000001          BIT00=  1
    (1)                         .EQUIV  BIT09,BIT9
    (1)                         .EQUIV  BIT08,BIT8
    (1)                         .EQUIV  BIT07,BIT7
    (1)                         .EQUIV  BIT06,BIT6
    (1)                         .EQUIV  BIT05,BIT5
    (1)                         .EQUIV  BIT04,BIT4
    (1)                         .EQUIV  BIT03,BIT3
    (1)                         .EQUIV  BIT02,BIT2
    (1)                         .EQUIV  BIT01,BIT1
    (1)                         .EQUIV  BIT00,BIT0
    (1)
    (1)                         ;*BASIC "CPU" TRAP VECTOR ADDRESSES
    (1)         000004          ERRVEC- 4               ;;TIME OUT AND OTHER ERRORS
    (1)         000010          RESVEC= 10              ;;RESERVED AND ILLEGAL INSTRUCTIONS
```

```
  (1)          000014              TBITVEC=14          ;;''T'' BIT
  (1)          000014              TRTVEC= 14          ;;TRACE TRAP
  (1)          000014              BPTVEC= 14          ;;BREAKPOINT TRAP (BPT)
  (1)          000020              IOTVEC= 20          ;;INPUT/OUTPUT TRAP (IOT) **SCOPE**
  (1)          000024              PWRVEC= 24          ;;POWER FAIL
  (1)          000030              EMTVEC= 30          ;;EMULATOR TRAP (EMT) **ERROR**
  (1)          000034              TRAPVEC=34          ;;''TRAP'' TRAP
  (1)          000060              TKVEC=  60          ;;TTY KEYBOARD VECTOR
  (1)          000064              TPVEC=  64          ;;TTY PRINTER VECTOR
  (1)          000240              PIRQVEC=240         ;;PROGRAM INTERRUPT REQUEST VECTOR
 101
 102           170420                      ABASE=  170420
 103           000440                      AVECT1= 440
 104           000200                      APRIOR= 200
 105
 106           167400                      $SWR=   167400
 107           000001                      $TN=    1
 108
 109                               .SBTTL  ACT11 HOOKS
  (1)
  (2)                              ;;**************************************************************
  (1)                              ;HOOKS REQUIRED BY ACT11
  (1)          000244                      $SVPC=.                 ;SAVE PC
  (1)          000046                      .=46
  (1)  000046  013720                      $ENDAD                  ;;1)SET LOC.46 TO ADDRESS OF $ENDAD IN .$EOP
  (1)          000052                      .=52
  (1)  000052  000000                      .WORD   0               ;;2)SET LOC.52 TO ZERO
  (1)          000244                      .=$SVPC                 ;; RESTORE PC
 110           001000                      .=1000
 111                               .SBTTL  APT PARAMETER BLOCK
  (1)
  (2)                              ;;**************************************************************
  (1)                              ;SET LOCATIONS 24 AND 44 AS REQUIRED FOR APT
  (2)                              ;;**************************************************************
  (1)          001000                      .$X=.   ;;SAVE CURRENT LOCATION
  (1)          000024                      .=24    ;;SET POWER FAIL TO POINT TO START OF PROGRAM
  (1)  000024  000200                      200     ;;FOR APT START UP
  (1)          000044                      .=44    ;;POINT TO APT INDIRECT ADDRESS PNTR.
  (1)  000044  001000                      $APTHDR ;;POINT TO APT HEADER BLOCK
  (1)          001000                      .=.$X   ;;RESET LOCATION COUNTER
  (2)                              ;;**************************************************************
  (1)                              ;SETUP APT PARAMETER BLOCK AS DEFINED IN THE APT-PDP11 DIAGNOSTIC
  (1)                              ;INTERFACE SPEC.
  (1)
  (1)  001000                      $APTHD:
  (1)  001000  000000              $HIBTS: .WORD   0       ;;TWO HIGH BITS OF 18 BIT MAILBOX ADDR.
  (1)  001002  001174              $MBADR: .WORD   $MAIL   ;;ADDRESS OF APT MAILBOX (BITS 0-15)
  (1)  001004  000002              $TSTM:  .WORD   2       ;;RUN TIM OF LONGEST TEST
  (1)  001006  000170              $PASTM: .WORD   120.    ;;RUN TIME IN SECS. OF 1ST PASS ON 1 UNIT (QUICK VERIFY)
  (1)  001010  000170              $UNITM: .WORD   120.    ;;ADDITIONAL RUN TIME (SECS) OF A PASS FOR EACH ADDITIONAL UNIT
  (1)  001012  000031                      .WORD   $ETEND-$MAIL/2 ;;LENGTH MAILBOX-ETABLE(WORDS)
```

```
                                  .SBTTL  COMMON TAGS
 (1)
 (2)                              ;;*************************************************************
 (1)                              ;*THIS TABLE CONTAINS VARIOUS COMMON STORAGE LOCATIONS
 (1)                              ;*USED IN THE PROGRAM.
 (1)
 (1)           001100                     .=1100
 (1)  001100                      $CMTAG:                           ;;START OF COMMON TAGS
 (1)  001100  000000                      .WORD   0
 (1)  001102     000              $TSTNM: .BYTE   0                 ;;CONTAINS THE TEST NUMBER
 (1)  001103     000              $ERFLG: .BYTE   0                 ;;CONTAINS ERROR FLAG
 (1)  001104  000000              $ICNT:  .WORD   0                 ;;CONTAINS SUBTEST ITERATION COUNT
 (1)  001106  000000              $LPADR: .WORD   0                 ;;CONTAINS SCOPE LOOP ADDRESS
 (1)  001110  000000              $LPERR: .WORD   0                 ;;CONTAINS SCOPE RETURN FOR ERRORS
 (1)  001112  000000              $ERTTL: .WORD   0                 ;;CONTAINS TOTAL ERRORS DETECTED
 (1)  001114     000              $ITEMB: .BYTE   0                 ;;CONTAINS ITEM CONTROL BYTE
 (1)  001115     001              $ERMAX: .BYTE   1                 ;;CONTAINS MAX. ERRORS PER TEST
 (1)  001116  000000              $ERRPC: .WORD   0                 ;;CONTAINS PC OF LAST ERROR INSTRUCTION
 (1)  001120  000000              $GDADR: .WORD   0                 ;;CONTAINS ADDRESS OF 'GOOD' DATA
 (1)  001122  000000              $BDADR: .WORD   0                 ;;CONTAINS ADDRESS OF 'BAD' DATA
 (1)  001124  000000              $GDDAT: .WORD   0                 ;;CONTAINS 'GOOD' DATA
 (1)  001126  000000              $BDDAT: .WORD   0                 ;;CONTAINS 'BAD' DATA
 (1)  001130  000000                      .WORD   0                 ;;RESERVED--NOT TO BE USED
 (1)  001132  000000                      .WORD   0
 (1)  001134     000              $AUTOB: .BYTE   0                 ;;AUTOMATIC MODE INDICATOR
 (1)  001135     000              $INTAG: .BYTE   0                 ;;INTERRUPT MODE INDICATOR
 (1)  001136  000000                      .WORD   0
 (1)  001140  177570              SWR:    .WORD   DSWR              ;;ADDRESS OF SWITCH REGISTER
 (1)  001142  177570              DISPLAY: .WORD  DDISP             ;;ADDRESS OF DISPLAY REGISTER
 (1)  001144  177560              $TKS:   177560                    ;;TTY KBD STATUS
 (1)  001146  177562              $TKB:   177562                    ;;TTY KBD BUFFER
 (1)  001150  177564              $TPS:   177564                    ;;TTY PRINTER STATUS REG. ADDRESS
 (1)  001152  177566              $TPB:   177566                    ;;TTY PRINTER BUFFER REG. ADDRESS
 (1)  001154     000              $NULL:  .BYTE   0                 ;;CONTAINS NULL CHARACTER FOR FILLS
 (1)  001155     002              $FILLS: .BYTE   2                 ;;CONTAINS # OF FILLER CHARACTERS REQUIRED
 (1)  001156     012              $FILLC: .BYTE   12                ;;INSERT FILL CHARS. AFTER A "LINE FEED"
 (1)  001157     000              $TPFLG: .BYTE   0                 ;;"TERMINAL AVAILABLE" FLAG (BIT<07>-0-YES)
 (1)  001160  000000              $TIMES: 0                         ;;MAX. NUMBER OF ITERATIONS
 (1)  001162  000000              $ESCAPE:0                         ;;ESCAPE ON ERROR ADDRESS
 (1)  001164  177607  000377      $BELL:  .ASCIZ  <207><377><377>   ;;CODE FOR BELL
 (1)  001170     077              $QUES:  .ASCII  /?/               ;;QUESTION MARK
 (1)  001171     015              $CRLF:  .ASCII  <15>              ;;CARRIAGE RETURN
 (1)  001172  000012              $LF:    .ASCIZ  <12>              ;;LINE FEED
 (2)                              ;;*************************************************************
 (2)                              .SBTTL  APT MAILBOX-ETABLE
 (2)
 (3)                              ;;*************************************************************
 (2)                              .EVEN
 (2)  001174                      $MAIL:                    ;;APT MAILBOX
 (2)  001174  000000              $MSGTY: .WORD   AMSGTY    ;;MESSAGE TYPE CODE
 (2)  001176  000000              $FATAL: .WORD   AFATAL    ;;FATAL ERROR NUMBER
 (2)  001200  000000              $TESTN: .WORD   ATESTN    ;;TEST NUMBER
 (2)  001202  000000              $PASS:  .WORD   APASS     ;;PASS COUNT
 (2)  001204  000000              $DEVCT: .WORD   ADEVCT    ;;DEVICE COUNT
 (2)  001206  000000              $UNIT:  .WORD   AUNIT     ;;I/O UNIT NUMBER
 (2)  001210  000000              $MSGAD: .WORD   AMSGAD    ;;MESSAGE ADDRESS
```

```
   (2)  001212  000000          $MSGLG: .WORD   AMSGLG  ;;MESSAGE LENGTH
   (2)  001214                  $ETABLE:                ;;APT ENVIRONMENT TABLE
   (2)  001214     000          $ENV:   .BYTE   AENV    ;;ENVIRONMENT BYTE
   (2)  001215     000          $ENVM:  .BYTE   AENVM   ;;ENVIRONMENT MODE BITS
   (2)  001216  000000          $SWREG: .WORD   ASWREG  ;;APT SWITCH REGISTER
   (2)  001220  000000          $USWR:  .WORD   AUSWR   ;;USER SWITCHES
   (2)  001222  000000          $CPUOP: .WORD   ACPUOP  ;;CPU TYPE,OPTIONS
   (2)                          ;*                      BITS 15-11=CPU TYPE
   (2)                          ;*                              11/04=01,11/05=02,11/20=03,11/40-04,11/45 05
   (2)                          ;*                              11/70=06,PDQ=07,Q=10
   (2)                          ;*                      BIT 10=REAL TIME CLOCK
   (2)                          ;*                      BIT  9=FLOATING POINT PROCESSOR
   (2)                          ;*                      BIT  8=MEMORY MANAGEMENT
   (2)  001224     000          $MAMS1: .BYTE   AMAMS1  ;;HIGH ADDRESS,M.S. BYTE
   (2)  001225     000          $MTYP1: .BYTE   AMTYP1  ;;MEM. TYPE,BLK#1
   (2)                          ;*                      MEM.TYPE BYTE   --  (HIGH BYTE)
   (2)                          ;*                              900 NSEC CORE=001
   (2)                          ;*                              300 NSEC BIPOLAR=002
   (2)                          ;*                              500 NSEC MOS=003
   (2)  001226  000000          $MADR1: .WORD   AMADR1  ;;HIGH ADDRESS,BLK#1
   (2)                          ;*                        MEM.LAST ADDR.=3 BYTES,THIS WORD AND LOW OF ''TYPE'' ABOVE
   (2)  001230     000          $MAMS2: .BYTE   AMAMS2  ;;HIGH ADDRESS,M.S. BYTE
   (2)  001231     000          $MTYP2: .BYTE   AMTYP2  ;;MEM.TYPE,BLK#2
   (2)  001232  000000          $MADR2: .WORD   AMADR2  ;;MEM.LAST ADDRESS,BLK#2
   (2)  001234     000          $MAMS3: .BYTE   AMAMS3  ;;HIGH ADDRESS,M.S.BYTE
   (2)  001235     000          $MTYP3: .BYTE   AMTYP3  ;;MEM.TYPE,BLK#3
   (2)  001236  000000          $MADR3: .WORD   AMADR3  ;;MEM.LAST ADDRESS,BLK#3
   (2)  001240     000          $MAMS4: .BYTE   AMAMS4  ;;HIGH ADDRESS,M.S.BYTE
   (2)  001241     000          $MTYP4: .BYTE   AMTYP4  ;;MEM.TYPE,BLK#4
   (2)  001242  000000          $MADR4: .WORD   AMADR4  ;;MEM.LAST ADDRESS,BLK#4
   (2)  001244  000440          $VECT1: .WORD   AVECT1  ;;INTERRUPT VECTOR#1,BUS PRIORITY#1
   (2)  001246  000000          $VECT2: .WORD   AVECT2  ;;INTERRUPT VECTOR#2BUS PRIORITY#2
   (2)  001250  170420          $BASE:  .WORD   ABASE   ;;BASE ADDRESS OF EQUIPMENT UNDER TEST
   (2)  001252  000000          $DEVM:  .WORD   ADEVM   ;;DEVICE MAP
   (2)  001254  000000          $CDW1:  .WORD   ACDW1   ;;CONTROLLER DESCRIPTION WORD#1
   (2)  001256                  $ETEND:
   (2)                          .MEXIT
```

```
                                .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


001256                          $ERRTB:

                                ;ITEM   1

001256  017232                          EM1                     ;CLOCK   SR FUNCTION ERROR
001260  017555                          DH1                     ;ERRPC   ASR     WAS     S/B
001262  017764                          DT1                     ;$ERRPC,ASR,$BDDAT,$GDDAT
001264  020062                          DF0                     ;ALL NUMBERS ARE IN OCTAL FORM


                                ;ITEM   2

001266  017264                          EM2                     ;CLOCK   SR DATA ERROR
001270  017555                          DH1                     ;ERRPC   ASR     WAS     S/B
001272  017764                          DT1                     ;$ERRPC,ASR,$BDDAT,$GDDAT
001274  020062                          DF0                     ;ALL NUMBERS ARE IN OCTAL FORM


                                ;ITEM   3

001276  017312                          EM3                     ;CLOCK  BR DATA ERROR
001300  017601                          DH3                     ;ERRPC   ABR     WAS
001302  017776                          DT3                     ;$ERRPC,ABR,$BDDAT,$GDDAT
001304  020062                          DF0                     ;ALL NUMBERS ARE IN OCTAL FORM


                                ;ITEM   4

001306  017340                          EM4             ;INTERRUPT ERROR.
001310  017625                          DH4A            ;ERRPC   TO      ROM ADDR.
001312  020010                          DT4             ;$ERRPC,        TRTO,TRFRO
001314  020062                          DF0                     ;ALL NUMBERS ARE IN OCTAL FORM


                                ;ITEM   5

001316  017361                          EM5                     ;CLOCK   COUNT REG ERROR
001320  017555                          DH1                     ;ERRPC   ASR   WAS   S/B
001322  017764                          DT1                     ;$ERRPC, ACR, $BDDAT, $GDDAT
001324  020062                          DF0                     ;ALL NUMBERS ARE IN OCTAL FORM
```

```

                                 ;ITEM   6

001326  017423                           EM12                           ;CLOCK   COUNT FUNCTION ERROR
001330  017661                           DH12                           ;ERRPC   ASR
001332  020020                           DT12                           ;ERRPC, ASR
001334  020062                           DF0                            ;ALL NUMBERS ARE IN OCTAL FORM
(1)

                                 ;ITEM   7

001336  017452                           EM16                           ;CLOCK   INTERRUPT ERROR
001340  017661                           DH12                           ;ERRPC   ASR
001342  020020                           DT12                           ;$ERRPC, ASR
001344  020062                           DF0                            ;ALL NUMBERS ARE IN OCTAL FORM
(1)

                                 ;ITEM   10

001346  017503                           EM20                           ;CLOCK   REPEATABILITY ERROR
001350  017676                           DH20                           ;ERROR   ASR   2ND CNT 1ST CNT  3RD CNT
001352  020026                           DT20                           ;$ERRPC, ASR, $BDDAT, $GDDAT, $TMP0
001354  020062                           DF0                            ;ALL NUMBERS ARE IN OCTAL FORM
(1)

                                 ;ITEM   11

001356  017404                           EM11                           ;CLOCK   COUNT ERROR
001360  017555                           DH1                            ;ERRPC   ASR   WAS   S/B
001362  020042                           DT22                           ;$ERRPC, ASR, $BDDAT, $TMP0
001364  020062                           DF0                            ;ALL NUMBERS ARE IN OCTAL FORM
(1)

                                 ;ITEM   12

001366  017532                           EM26                           ;CLOCK ADDRESSING ERROR
001370  017737                           DH26                           ;ERRPC   CLOCK ADDR.
001372  020054                           DT26                           ;$ERRPC,$TMP0
001374  020062                           DF0                            ;ALL NUMBERS ARE IN OCTAL FORM
(1)

001376  170420                   ASR:    .WORD   ABASE
001400  170422                   ABR:    .WORD   ABASE+2
001402  000440                   VECT1:  .WORD   AVECT1
001404  000442                   VECTP:  .WORD   AVECT1+2
001406  000444                   VECT2:  .WORD   AVECT1+4               ;VECTOR ADDR. OF ST2 INTRS.
001410  000446                   VECT2P: .WORD   AVECT1+6
001412  000200                   PRIOR:  .WORD   APRIOR
001414  167774                   DR:     .WORD   167774
001416  167772                   DR2:    .WORD   167772
001420  000000                   $TMP0:  .WORD   0                      ;TEMP STORAGE.
001422  000000                   $TMP1:  .WORD   0                      ;TMP STORAGE.
001424  000000                   $TMP3:  .WORD   0
001426  000000                   ROTATE: .WORD   0                              ;POINT TO DEVICE UNDER TEST.
001430  000000                   UTEST:  .WORD   0                              ;KEEPS TRACK OF GOOD UNITS.
001432  000000                   ERCNT:  .WORD   0                              ;COUNTS ERRORS.
```

```
     001434  000000                      MDEVCT: .WORD   0                       ;COUNTS DEVICES TESTED.
     001436  000000                      TSTCNT: .WORD   0                       ;MAX DEVICES TO BE TESTED.
     001440  000000                      EXS:    .WORD   0                       ;=0, NORMAL: =1 SPECIAL TESTOR START, BY L+S @ 2
     001442  000000                      LCNT:   .WORD   0                       ;TOTAL UNITS TESTED.


     001444  012737  002144  001420      QSTART: MOV     #RSTART,$TMP0           ;LOAD SETUP RETURN ADDRESS
     001452  000137  001526                      JMP     INIT                    ;INIT THE PROGRAM VECTOR SPACE

     001456  005237  001440              TSTSTR: INC     EXS                     ;SET FOR TESTOR.
     001462  012737  000020  001436              MOV     #16.,TSTCNT             ;ALLOW 16 UNITS
     001470  000413                              BR      1$
             001472                      WSTART-.
     001472  012737  000020  001436              MOV     #16.,TSTCNT     ;TEST UP TO 16 UNITS.
     001500  005037  001440                      CLR     EXS
     001504  000405                              BR      1$
             001506                      START-.
     001506  012737  000004  001436              MOV     #4,TSTCNT       ;TEST UP TO FOUR UNITS.
     001514  005037  001440                      CLR     EXS
     001520  012737  001774  001420      1$:     MOV     #ZSTART,$TMP0           ;LOAD SETUP RETURN
     001526                              INIT:
(1)                                      .SBTTL  INITIALIZE THE COMMON TAGS
(1)                                      ;;CLEAR THE COMMON TAGS ($CMTAG) AREA
(1)  001526  012706  001100                      MOV     #$CMTAG,R6      ;;FIRST LOCATION TO BE CLEARED
(1)  001532  005026                              CLR     (R6)+           ;;CLEAR MEMORY LOCATION
(1)  001534  022706  001140                      CMP     #SWR,R6 ;;DONE?
(1)  001540  001374                              BNE     .-6             ;;LOOP BACK IF NO
(1)  001542  012706  001100                      MOV     #STACK,SP       ;;SETUP THE STACK POINTER
(1)                                      ;;INITIALIZE A FEW VECTORS
(1)  001546  012737  015136  000020              MOV     #$SCOPE,@#IOTVEC ;;IOT VECTOR FOR SCOPE ROUTINE
(1)  001554  012737  000340  000022              MOV     #340,@#IOTVEC+2 ;;LEVEL 7
(1)  001562  012737  014574  000030              MOV     #$ERROR,@#EMTVEC ;;EMT VECTOR FOR ERROR ROUTINE
(1)  001570  012737  000340  000032              MOV     #340,@#EMTVEC+2 ;;LEVEL 7
(1)  001576  012737  017152  000034              MOV     #$TRAP,@#TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
(1)  001604  012737  000340  000036              MOV     #340,@#TRAPVEC+2;LEVEL 7
(1)  001612  012737  016724  000024              MOV     #$PWRDN,@#PWRVEC ;;POWER FAILURE VECTOR
(1)  001620  012737  000340  000026              MOV     #340,@#PWRVEC+2 ;;LEVEL 7
(1)  001626  005037  001160                      CLR     $TIMES          ;;INITIALIZE NUMBER OF ITERATIONS
(1)  001632  005037  001162                      CLR     $ESCAPE         ;;CLEAR THE ESCAPE ON ERROR ADDRESS
(1)  001636  112737  000001  001115              MOVB    #1,$ERMAX       ;;ALLOW ONE ERROR PER TEST
(1)  001644  012737  001644  001106              MOV     #.,$LPADR       ;;INITIALIZE THE LOOP ADDRESS FOR SCOPE
(1)  001652  012737  001652  001110              MOV     #.,$LPERR       ;;SETUP THE ERROR LOOP ADDRESS
(2)                                      ;;SIZE FOR A HARDWARE SWITCH REGISTER. IF NOT FOUND OR IT IS
(2)                                      ;;EQUAL TO A ''-1'', SETUP FOR A SOFTWARE SWITCH REGISTER.
(2)  001660  013746  000004                      MOV     @#ERRVEC,-(SP)  ;;SAVE ERROR VECTOR
(2)  001664  012737  001720  000004              MOV     #64$,@#ERRVEC   ;;SET UP ERROR VECTOR
(2)  001672  012737  177570  001140              MOV     #DSWR,SWR       ;;SETUP FOR A HARDWARE SWICH REGISTER
(2)  001700  012737  177570  001142              MOV     #DDISP,DISPLAY  ;;AND A HARDWARE DISPLAY REGISTER
(2)  001706  022777  177777  177224              CMP     #-1,@SWR        ;;TRY TO REFERENCE HARDWARE SWR
(2)  001714  001012                              BNE     66$             ;;BRANCH IF NO TIMEOUT TRAP OCCURRED
(2)                                                                      ;;AND  THE HARDWARE SWR IS NOT - -1
(2)  001716  000403                              BR      65$             ;;BRANCH IF NO TIMEOUT
(2)  001720  012716  001726              64$:    MOV     #65$,(SP)       ;;SET UP FOR TRAP RETURN
(2)  001724  000002                              RTI
(2)  001726  012737  000176  001140      65$:    MOV     #SWREG,SWR      ;;POINT TO SOFTWARE SWR
(2)  001734  012737  000174  001142              MOV     #DISPREG,DISPLAY
```

```
  (2)  001742  012637  000004           66$:    MOV     (SP)+,@#ERRVEC  ;;RESTORE ERROR VECTOR
  (1)
  (2)  001746  005037  001202                   CLR     $PASS           ;;CLEAR PASS COUNT
  (2)  001752  132737  000200  001215           BITB    #APTSIZE,$ENVM  ;;TEST USER SIZE UNDER APT
  (2)  001760  001403                           BEQ     67$             ;;YES,USE NON-APT SWITCH
  (2)  001762  012737  001216  001140           MOV     #$SWREG,SWR     ;;NO,USE APT SWITCH REGISTER
  (2)  001770                           67$:
  226  001770  000177  177424                   JMP     @$TMP0                  ;EXIT PROGRAM VECTOR SETUP SPACE
  227
  228  001774                           ZSTART:
  (1)
  (1)  001774  012746  000340                   MOV     #340,-(SP)              ;SET CPU PRIORITY ON RETERN.
  (1)  002000  012746  002006                   MOV     #64$,-(SP)              ;SHOW RETURN ADDRESS.
  (1)  002004  000002                           RTI                             ;CAUSE A RETURN(PUTS STATUS IN STATUS REG.).
  (1)  002006                           64$:
  (1)
  229  002006  005037  001204                   CLR     $DEVCT          .ZERO DEVICE COUNT.
  230  002012  012737  017102  000004           MOV     #IOTRD,@#ERRVEC ;FIX TRAP CATCHER.
  231  002020  013737  001244  001402           MOV     $VECT1,VECT1    ;NOW FIX VECTOR ADDR.
  232  002026  013737  001250  001376           MOV     $BASE,ASR       ;FIX ADDRESS OF CSR.
  233
  234                                   .SBTTL  TYPE PROGRAM NAME
  (1)                                   ;;TYPE THE NAME OF THE PROGRAM IF FIRST PASS
  (1)  002034  005227  177777                   INC     #-1             ;;FIRST TIME?
  (1)  002040  001041                           BNE     65$             ;;BRANCH IF NO
  (1)  002042  104401  002110                   TYPE    ,66$            ;;TYPE ASCIZ STRING
  (2)                                   .SBTTL  GET VALUE FOR SOFTWARE SWITCH REGISTER
  (2)  002046  005737  000042                   TST     @#42            ;;ARE WE RUNNING UNDER XXDP/ACT?
  (2)  002052  001012                           BNE     67$             ;;BRANCH IF YES
  (2)  002054  123727  001214  000001           CMPB    $ENV,#1         ;;ARE WE RUNNING UNDER APT?
  (2)  002062  001406                           BEQ     67$             ;;BRANCH IF YES
  (2)  002064  023727  001140  000176           CMP     SWR,#SWREG      ;;SOFTWARE SWITCH REG SELECTED?
  (2)  002072  001005                           BNE     68$             ;;BRANCH IF NO
  (2)  002074  104406                           GTSWR                   ;;GET SOFT-SWR SETTINGS
  (2)  002076  000403                           BR      68$
  (2)  002100  112737  000001  001134   67$:    MOVB    #1,$AUTOB       ;;SET AUTO-MODE INDICATOR
  (2)  002106                           68$:
  (1)  002106  000416                           BR      65$             ;;GET OVER THE ASCIZ
  (1)                                   ;;66$:  .ASCIZ  <CRLF>#CVKWAC   KWV11 DIAGNOSTIC#<CRLF>
  (1)  002144                           65$:
  235  002144                           RSTART:
  236  002144  005737  001440                   TST     EXS             ;TESTOR MODE ENABLED??
  237  002150  001441                           BEQ     1$              ;NO DON'T TYPE NEXT MESSAGE.
  238  002152  104401  002160                   TYPE    ,65$            ;;TYPE ASCIZ STRING
  (1)  002156  000436                           BR      64$             ;;GET OVER THE ASCIZ
  (1)                                   ;;65$:  .ASCIZ  <15><12>#TESTOR MODE ENABLED--SEE DOCUMENTATION FOR INSTRUCTIONS.#
  (1)  002254                           64$:
  239  002254                           1$:
  (1)  002254  104401  002262                   TYPE    ,67$            ;;TYPE ASCIZ STRING
  (1)  002260  000411                           BR      66$             ;;GET OVER THE ASCIZ
  (1)                                   ;;67$:  .ASCIZ  <15><12>#TEST RUNNING...#
  (1)  002304                           66$:
  240  002304  005037  001434                   CLR     MDEVCT          ;TESTING FIRST UNIT.
  241  002310  005037  001432                   CLR     ERCNT           ;NO ERRORS.
  242  002314  005037  001202                   CLR     $PASS           ;NO PASSES.
  243  002320  012737  000001  001426           MOV     #1,ROTATE       ;POINT TO FIRST UNIT.
```

```
 244  002326  013737  001426  001430                 MOV     ROTATE,UTEST
 245  002334                                 LOOP:                                  ;COME HERE FOR NEXT UNIT,OR END PASS.
 246
 247  002334  042737  170000  001402                 BIC     #170000,VECT1          ;CLEAR OUT PRIORITY BITS.
 248  002342  013737  001402  001404                 MOV     VECT1,VECTP            ;NOW FIX VECTOR +2 'DDR.
 249  002350  062737  000002  001404                 ADD     #2,VECTP
 250  002356  013737  001402  001406                 MOV     VECT1,VECT2            ;LETS FIX ST2 VECTOR ADDR.
 251  002364  062737  000004  001406                 ADD     #4,VECT2               ;ITS 4 GREATER THEN THE 1ST.
 252  002372  013737  001406  001410                 MOV     VECT2,VECT2P           ;VECTOR +2 ADDR.
 253  002400  062737  000002  001410                 ADD     #2,VECT2P
 254
 255
 256  002406  013737  001376  001400                 MOV     ASR,ABR                ;FIX ADDR OF PRESET REG
 257  002414  062737  000002  001400                 ADD     #2,ABR                 ;CSR + 2
 294
 (1)
 (5)                                         ;;*****************************************************************
 (4)                                         ;*TEST 1          *TEST THE ADDRESSABILITY OF CLOCK CSR
 (4)                                         ;;*****************************************************************
 (3)  002422  000240                         TST1:   NOP
 (2)  002424  012737  000050  001160                 MOV     #50,$TIMES             ;;DO 50 ITERATIONS
 (2)  002432  012737  002454  001106                 MOV     #1$,$LPADR             ;;SET SCOPE LOOP ADDRESS
 (1)  002440  112737  000001  001102                 MOVB    #1,$TSTNM              ;SET TEST #1.
 (1)  002446  012737  002454  001110                 MOV     #1$,$LPERR
 (1)
 (1)
 (1)
 (1)  002454  013746  000004                 1$:     MOV     @#ERRVEC,-(SP)         ;SAVE CONTENTS OF ADDRS 6.
 (1)  002460  012737  002474  000004                 MOV     #2$,@#ERRVEC           ;SET TIME-OUT TRAP VECTOR TO HANDLER IN CASE.
 (1)                                                                                ;WE TIME-OUT WHEN ADDRESSING THE KW11.
 (1)  002466  005777  176704                         TST     @ASR                   ;ADDRESS THE CLOCK.
 (1)                                                                                ;IF CLOCK DOES NOT RETURN
 (1)                                                                                ;''BUS SSYN'' THEN WE'LL TIME-OUT
 (1)
 (1)  002472  000406                                 BR      3$                     ;THE CLOCK WAS THERE! EXIT SUB-TEST.
 (1)  002474                                 2$:
 (2)  002474  062706  000004                         ADD     #4,SP                          ;/ADD #4 TO STACK POINTER.
 (1)  002500  013737  001376  001420                 MOV     ASR,$TMP0              ;FOR ERROR TYPEOUT.
 (1)
 (2)
                                             ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 (1)  002506  104012                                 ERROR   12                     ;REPORT ERROR=CLOCK CSR FAILED TO RETURN
 (1)                                                                                ;''BUS SSYN'' WHEN ADDRESSED.
 (1)                                                                                ;NOTE: IF PROGRAM HAS INCORRECT
 (1)                                                                                ;ADDRESS THEN WE MIG NOT BE
 (1)                                                                                ;TALKING TO THE CLOCK. MAKE SURE
 (1)                                                                                ;OF CLOCK ADDRESS.
 (1)
 (2)
                                             ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 (1)  002510  012637  000004                 3$:     MOV     (SP)+,@#ERRVEC
 (1)
 295
 (5)                                         ;;*****************************************************************
 (4)                                        ;*TEST 2        *TEST THE ADDRESSABILITY OF CLOCK BUFFER REG.
 (4)                                        ;;**************************************************************
 (3)  002514  000004                        TST2.   SCOPE
 (1)
 (1)
 (1)  002516  013746  000004                1$:     MOV     @#ERRVEC,-(SP)  ;SAVE CONTENTS OF ADDRS 6.
 (1)  002522  012737  002536  000004                MOV     #2$,@#ERRVEC    ;SET TIME-OUT TRAP VECTOR TO HANDLER IN CASE.
 (1)                                                                        ;WE TIME-OUT WHEN ADDRESSING THE KW11.
 (1)  002530  005777  176644                        TST     @ABR            ;ADDRESS THE CLOCK.
 (1)                                                                        ;IF CLOCK DOES NOT RETURN
 (1)                                                                        ;''BUS SSYN'' THEN WE'LL TIME-OUT
 (1)
 (1)  002534  000406                                BR      3$              ;THE CLOCK WAS THERE! EXIT SUB-TEST.
 (1)  002536                                2$:
 (2)  002536  062706  000004                        ADD     #4,SP                   ;/ADD #4 TO STACK PCINTER.
 (1)  002542  013737  001400  001420                MOV     ABR,$TMPO       ;FOR ERROR TYPEOUT.
 (1)
 (2)
                                            ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 (1)  002550  104012                                ERROR   12              ;REPORT ERROR=CLOCK BUFFER REG. FAILED TO RETURN
 (1)                                                                        ;''BUS SSYN'' WHEN ADDRESSED.
 (1)                                                                        ;NOTE: IF PROGRAM HAS INCORRECT
 (1)                                                                        ;ADDRESS THEN WE MIG NOT BE
 (1)                                                                        ;TALKING TO THE CLOCK. MAKE SURE
 (1)                                                                        ;OF CLOCK ADDRESS.
 (1)
 (2)
                                            ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 (1)  002552  012637  000004                3$:     MOV     (SP)+,@#ERRVEC
 (1)
 303
 341
 342
 (1)                                            ;/#
 (5)                                            ;;*****************************************************************
 (4)                                            ;*TEST 3         *TEST THAT CLOCK A STATUS REGISTER BIT 14 CAN BE SET AND CLEARED
 (5)                                            ;*
 (5)                                            ;*CLOCK STATUS REGISTER BIT EXERCISE. ON FAILURE-SUSPECT INDIVIDUAL
 (5)                                            ;*F/FS OR GATES
 (5)                                            ;*
 (5)
 (4)                                            ;;*****************************************************************
 (3)  002556  000004                            TST3:   SCOPE
 (2)  002560  012737  000100  001160                    MOV     #100,$TIMES      ;;DO 100 ITERATIONS
 (1)
 (1)  002566  005077  176604                            CLR     @ASR             ;/CLEAR THE STATUS REGISTER.
 (1)  002572  052777  040000  176576                    BIS     #BIT14,@ASR      ;/SET BIT 14.
 (1)  002600  012737  040000  001124                    MOV     #BIT14,$GDDAT    ;/SET FOR ERROR TYPEOUT S/B.
 (1)  002606  017737  176564  001126                    MOV     @ASR,$BDDAT      ;/READ THE STATUS REGISTER.
 (1)  002614  023737  001124  001126                    CMP     $GDDAT,$BDDAT    ;/DID BIT 14 AND ONLY BIT 14 SET?
 (1)  002622  001402                                    BEQ     1$               ;/IF SO-LETS TRY CLEARING IT.
 (2)
                                                ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 (1)  002624  104002                                    ERROR   2                ;/ERROR CLOCK AS STATUS REGISTER
 (1)                                                                             ;/BIT 14 FAILED TO BIT SET.
 (2)
                                                ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 (1)  002626  000412                                    BR      2$               ;/BR TO END SUBTEST.
 (1)
 (1)  002630  042777  040000  176540    1$:             BIC     #BIT14,@ASR      ;/TRY CLEARING BIT 14.
 (1)  002636  005037  001124                            CLR     $GDDAT           ;/CLEAR S/B FOR TYPEOUT IF ANY.
 (1)  002642  017737  176530  001126                    MOV     @ASR,$BDDAT      ;/NOW READ IT BACK.
 (1)  002650  001401                                    BEQ     2$               ;/IF ZERO - NO ERROR!
 (1)
 (2)
                                                ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 (1)  002652  104002                                    ERROR   2                ;/ERROR - CLOCK A STATUS REGISTER.
 (1)                                                                             ;/BIT 14 FAILED TO CLEAR.
 (1)
 (2)
                                                ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 (1)  002654                                    2$:
 (1)
 343
 (1)                                                   ;/#
 (5)                                        ;;*****************************************************************
 (4)                                        ;*TEST 4        *TEST THAT CLOCK A STATUS REGISTER BIT 13 CAN BE SET AND CLEARED
 (5)                                        ;*
 (5)                                        ;*CLOCK STATUS REGISTER BIT EXERCISE. ON FAILURE-SUSPECT INDIVIDUAL
 (5)                                        ;*F/FS OR GATES
 (5)                                        ;*
 (5)
 (4)                                        ;;*****************************************************************
 (3)  002654  000004                        TST4:   SCOPE
 (2)  002656  012737  000100  001160                MOV     #100,$TIMES     ;.DO 100 ITERATIONS
 (1)
 (1)  002664  005077  176506                        CLR     @ASR            ;/CLEAR THE STATUS REGISTER.
 (1)  002670  052777  020000  176500                BIS     #BIT13,@ASR     ;/SET BIT 13.
 (1)  002676  012737  020000  001124                MOV     #BIT13,$GDDAT   ;/SET FOR ERROR TYPEOUT S/B.
 (1)  002704  017737  176466  001126                MOV     @ASR,$BDDAT     ;/READ THE STATUS REGISTER.
 (1)  002712  023737  001124  001126                CMP     $GDDAT,$BDDAT   ;/DID BIT 13 AND ONLY BIT 13 SET?
 (1)  002720  001402                                BEQ     1$              ;/IF SO-LETS TRY CLEARING IT.
 (2)
                                            ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 (1)  002722  104002                                ERROR   2               ;/ERROR CLOCK AS STATUS REGISTER
 (1)                                                                        ;/BIT 13 FAILED TO BIT SET.
 (2)
                                            ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 (1)  002724  000412                                BR      2$              ;/BR TO END SUBTEST.
 (1)
 (1)  002726  042777  020000  176442        1$:     BIC     #BIT13,@ASR     ;/TRY CLEARING BIT 13.
 (1)  002734  005037  001124                        CLR     $GDDAT          ;/CLEAR S/B FOR TYPEOUT IF ANY.
 (1)  002740  017737  176432  001126                MOV     @ASR,$BDDAT     ;/NOW READ IT BACK.
 (1)  002746  001401                                BEQ     2$              ;/IF ZERO - NO ERROR.
 (1)
 (2)
                                            ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 (1)  002750  104002                                ERROR   2               ;/ERROR - CLOCK A STATUS REGISTER.
 (1)                                                                        ;/BIT 13 FAILED TO CLEAR.
 (1)
 (2)
                                            ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 (1)  002752                                2$:
 (1)
 344
 (1)                                                   ;/#
 (5)                                           ;;****************************************************************
 (4)                                           ;*TEST 5         *TEST THAT CLOCK A STATUS REGISTER BIT 11 CAN BE SET AND CLEARED
 (5)                                           ;*
 (5)                                           ;*CLOCK STATUS REGISTER BIT EXERCISE. ON FAILURE-SUSPECT INDIVIDUAL
 (5)                                           ;*F/FS OR GATES
 (5)                                           ;*
 (5)
 (4)                                           ;;****************************************************************
 (3)  002752  000004                           TST5:   SCOPE
 (2)  002754  012737  000100  001160                   MOV     #100,$TIMES          ;;DO 100 ITERATIONS
 (1)
 (1)  002762  005077  176410                           CLR     @ASR                 ;/CLEAR THE STATUS REGISTER.
 (1)  002766  052777  004000  176402                   BIS     #BIT11,@ASR          ;/SET BIT 11.
 (1)  002774  012737  004000  001124                   MOV     #BIT11,$GDDAT        ;/SET FOR ERROR TYPEOUT S/B.
 (1)  003002  017737  176370  001126                   MOV     @ASR,$BDDAT          ;/READ THE STATUS REGISTER.
 (1)  003010  023737  001124  001126                   CMP     $GDDAT,$BDDAT        ;/DID BIT 11 AND ONLY BIT 11 SET?
 (1)  003016  001402                                   BEQ     1$                   ;/IF SO-LETS TRY CLEARING IT.
 (2)
                                               ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 (1)  003020  104002                                   ERROR   2                    ;/ERROR CLOCK AS STATUS REGISTER
 (1)                                                                                ;/BIT 11 FAILED TO BIT SET.
 (2)
                                               ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 (1)  003022  000412                                   BR      2$                   ;/BR TO END SUBTEST.
 (1)
 (1)  003024  042777  004000  176344   1$:             BIC     #BIT11,@ASR          ;/TRY CLEARING BIT 11.
 (1)  003032  005037  001124                           CLR     $GDDAT               ;/CLEAR S/B FOR TYPEOUT IF ANY.
 (1)  003036  017737  176334  001126                   MOV     @ASR,$BDDAT          ;/NOW READ IT BACK.
 (1)  003044  001401                                   BEQ     2$                   ;/IF ZERO - NO ERROR!
 (1)
 (2)
                                               ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 (1)  003046  104002                                   ERROR   2                    ;/ERROR - CLOCK A STATUS REGISTER.
 (1)                                                                                ;/BIT 11 FAILED TO CLEAR.
 (1)
 (2)
                                               ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 (1)  003050                                   2$:
 (1)
 345
```

```
  (1)                                              ;/#
  (5)                                              ;;*****************************************************************
  (4)                                              ;*TEST 6          *TEST THAT CLOCK A STATUS REGISTER BIT 6 CAN BE SET AND CLEARED
  (5)                                              ;*
  (5)                                              ;*CLOCK STATUS REGISTER BIT EXERCISE. ON FAILURE-SUSPECT INDIVIDUAL
  (5)                                              ;*F/FS OR GATES
  (5)                                              ;*
  (5)
  (4)                                              ;;*****************************************************************
  (3)  003050  000004                              TST6:   SCOPE
  (2)  003052  012737  000100  001160                      MOV     #100,$TIMES       ;;DO 100 ITERATIONS
  (1)
  (1)  003060  005077  176312                              CLR     @ASR              ;/CLEAR THE STATUS REGISTER.
  (1)  003064  052777  000100  176304                      BIS     #BIT6,@ASR        ;/SET BIT 6.
  (1)  003072  012737  000100  001124                      MOV     #BIT6,$GDDAT      ;/SET FOR ERROR TYPEOUT S/B.
  (1)  003100  017737  176272  001126                      MOV     @ASR,$BDDAT       ;/READ THE STATUS REGISTER.
  (1)  003106  023737  001124  001126                      CMP     $GDDAT,$BDDAT     ;/DID BIT 6 AND ONLY BIT 6 SET?
  (1)  003114  001402                                      BEQ     1$                ;/IF SO-LETS TRY CLEARING IT.
  (2)
                                                   ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

  (1)  003116  104002                                      ERROR   2                 ;/ERROR CLOCK AS STATUS REGISTER
  (1)                                                                                ;/BIT 6 FAILED TO BIT SET.
  (2)
                                                   ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

  (1)  003120  000412                                      BR      2$                ;/BR TO END SUBTEST.
  (1)
  (1)  003122  042777  000100  176246      1$:             BIC     #BIT6,@ASR        ;/TRY CLEARING BIT 6.
  (1)  003130  005037  001124                              CLR     $GDDAT            ;/CLEAR S/B FOR TYPEOUT IF ANY.
  (1)  003134  017737  176236  001126                      MOV     @ASR,$BDDAT       ;/NOW READ IT BACK.
  (1)  003142  001401                                      BEQ     2$                ;/IF ZERO - NO ERROR!
  (1)
  (2)
                                                   ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

  (1)  003144  104002                                      ERROR   2                 ;/ERROR - CLOCK A STATUS REGISTER.
  (1)                                                                                ;/BIT 6 FAILED TO CLEAR.
  (1)
  (2)
                                                   ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

  (1)  003146                                      2$:
  (1)
  346
  (1)                                          ;/#
  (5)                                          ;;*************************************************************
  (4)                                          ;*TEST 7         *TEST THAT CLOCK A STATUS REGISTER BIT 5 CAN BE SET AND CLEARED
  (5)                                          ;*
  (5)                                          ;*CLOCK STATUS REGISTER BIT EXERCISE. ON FAILURE-SUSPECT INDIVIDUAL
  (5)                                          ;*F/FS OR GATES
  (5)                                          ;*
  (5)
  (4)                                          ;;*************************************************************
  (3)  003146  000004                          TST7:   SCOPE
  (2)  003150  012737  000100  001160                  MOV     #100,$TIMES       ;;DO 100 ITERATIONS
  (1)
  (1)  003156  005077  176214                          CLR     @ASR              ;/CLEAR THE STATUS REGISTER.
  (1)  003162  052777  000040  176206                  BIS     #BIT5,@ASR        ;/SET BIT 5.
  (1)  003170  012737  000040  001124                  MOV     #BIT5,$GDDAT      ;/SET FOR ERROR TYPEOUT S/B.
  (1)  003176  017737  176174  001126                  MOV     @ASR,$BDDAT       ;/READ THE STATUS REGISTER.
  (1)  003204  023737  001124  001126                  CMP     $GDDAT,$BDDAT     ;/DID BIT 5 AND ONLY BIT 5 SET?
  (1)  003212  001402                                  BEQ     1$                ;/IF SO-LETS TRY CLEARING IT.
  (2)
                                               ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

  (1)  003214  104002                                  ERROR   2                 ;/ERROR CLOCK AS STATUS REGISTER
  (1)                                                                            ;/BIT 5 FAILED TO BIT SET.
  (2)
                                               ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

  (1)  003216  000412                                  BR      2$                ;/BR TO END SUBTEST.
  (1)
  (1)  003220  042777  000040  176150  1$:     BIC     #BIT5,@ASR        ;/TRY CLEARING BIT 5.
  (1)  003226  005037  001124                          CLR     $GDDAT            ;/CLEAR S/B FOR TYPEOUT IF ANY.
  (1)  003232  017737  176140  001126                  MOV     @ASR,$BDDAT       ;/NOW READ IT BACK.
  (1)  003240  001401                                  BEQ     2$                ;/IF ZERO - NO ERROR!
  (1)
  (2)
                                               ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

  (1)  003242  104002                                  ERROR   2                 ;/ERROR - CLOCK A STATUS REGISTER.
  (1)                                                                            ;/BIT 5 FAILED TO CLEAR.
  (1)
  (2)
                                               ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

  (1)  003244                                  2$:
  (1)
  347
```

```
                                                                        J 3
KWV11A DISAGNOSTIC  MAINDEC-11-CVKWA-C   MACY11 30G(1063)  08-AUG-79  10:53  PAGE 1-17
CVKWAC.P11    08-AUG-79 10:45            T7        *TEST THAT CLOCK A STATUS REGISTER BIT 5 CAN BE SET AND CLEARED              SEQ 0035

 (1)                                                 ;/#
 (5)                                       ;;*****************************************************************
 (4)                                       ;*TEST 10        *TEST THAT CLOCK A STATUS REGISTER BIT 4 CAN BE SET AND CLEARED
 (5)                                       ;*
 (5)                                       ;*CLOCK STATUS REGISTER BIT EXERCISE. ON FAILURE-SUSPECT INDIVIDUAL
 (5)                                       ;*F/FS OR GATES
 (5)                                       ;*
 (5)
 (4)                                       ;;*****************************************************************
 (3)  003244  000004                       TST10:  SCOPE
 (2)  003246  012737  000100  001160               MOV     #100,$TIMES      ;;DO 100 ITERATIONS
 (1)
 (1)  003254  005077  176116                       CLR     @ASR             ;/CLEAR THE STATUS REGISTER.
 (1)  003260  052777  000020  176110               BIS     #BIT4,@ASR       ;/SET BIT 4.
 (1)  003266  012737  000020  001124               MOV     #BIT4,$GDDAT     ;/SET FOR ERROR TYPEOUT S/B.
 (1)  003274  017737  176076  001126               MOV     @ASR,$BDDAT      ;/READ THE STATUS REGISTER.
 (1)  003302  023737  001124  001126               CMP     $GDDAT,$BDDAT    ;/DID BIT 4 AND ONLY BIT 4 SET?
 (1)  003310  001402                               BEQ     1$               ;/IF SO-LETS TRY CLEARING IT.
 (2)
                                           ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 (1)  003312  104002                               ERROR   2                ;/ERROR CLOCK AS STATUS REGISTER
 (1)                                                                        ;/BIT 4 FAILED TO BIT SET.
 (2)
                                           ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 (1)  003314  000412                               BR      2$               ;/BR TO END SUBTEST.
 (1)
 (1)  003316  042777  000020  176052       1$:     BIC     #BIT4,@ASR       ;/TRY CLEARING BIT 4.
 (1)  003324  005037  001124                       CLR     $GDDAT           ;/CLEAR S/B FOR TYPEOUT IF ANY.
 (1)  003330  017737  176042  001126               MOV     @ASR,$BDDAT      ;/NOW READ IT BACK.
 (1)  003336  001401                               BEQ     2$               ;/IF ZERO - NO ERROR.
 (1)
 (2)
                                           ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 (1)  003340  104002                               ERROR   2                ;/ERROR - CLOCK A STATUS REGISTER.
 (1)                                                                        ;/BIT 4 FAILED TO CLEAR.
 (1)
 (2)
                                           ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 (1)  003342                               2$:
 (1)
 348
```

```
   (1)                                                  ;/#
   (5)                                          ;;*************************************************************
   (4)                                          ;*TEST 11       *TEST THAT CLOCK A STATUS REGISTER BIT 3 CAN BE SET AND CLEARED
   (5)                                          ;*
   (5)                                          ;*CLOCK STATUS REGISTER BIT EXERCISE. ON FAILURE-SUSPECT INDIVIDUAL
   (5)                                          ;*F/FS OR GATES
   (5)                                          ;*
   (5)
   (4)                                          ;;*************************************************************
   (3)  003342  000004                          TST11:  SCOPE
   (2)  003344  012737  000100  001160                  MOV     #100,$TIMES     ;;DO 100 ITERATIONS
   (1)
   (1)  003352  005077  176020                          CLR     @ASR            ;/CLEAR THE STATUS REGISTER.
   (1)  003356  052777  000010  176012                  BIS     #BIT3,@ASR      ;/SET BIT 3.
   (1)  003364  012737  000010  001124                  MOV     #BIT3,$GDDAT    ;/SET FOR ERROR TYPEOUT S/B.
   (1)  003372  017737  176000  001126                  MOV     @ASR,$BDDAT     ;/READ THE STATUS REGISTER.
   (1)  003400  023737  001124  001126                  CMP     $GDDAT,$BDDAT   ;/DID BIT 3 AND ONLY BIT 3 SET?
   (1)  003406  001402                                  BEQ     1$              ;/IF SO-LETS TRY CLEARING IT.
   (2)
                                                ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

   (1)  003410  104002                                  ERROR   2               ;/ERROR CLOCK AS STATUS REGISTER
   (1)                                                                          ;/BIT 3 FAILED TO BIT SET.
   (2)
                                                ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

   (1)  003412  000412                                  BR      2$              ;/BR TO END SUBTEST.
   (1)
   (1)  003414  042777  000010  175754  1$:             BIC     #BIT3,@ASR      ;/TRY CLEARING BIT 3.
   (1)  003422  005037  001124                          CLR     $GDDAT          ;/CLEAR S/B FOR TYPEOUT IF ANY.
   (1)  003426  017737  175744  001126                  MOV     @ASR,$BDDAT     ;/NOW READ IT BACK.
   (1)  003434  001401                                  BEQ     2$              ;/IF ZERO - NO ERROR!
   (1)
   (2)
                                                ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

   (1)  003436  104002                                  ERROR   2               ;/ERROR - CLOCK A STATUS REGISTER.
   (1)                                                                          ;/BIT 3 FAILED TO CLEAR.
   (1)
   (2)
                                                ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

   (1)  003440                                  2$:
   (1)
   349
```

```
  (1)                                          ;/#
  (5)                                  ;;********************************************************************
  (4)                                  ;*TEST 12       *TEST THAT CLOCK A STATUS REGISTER BIT 2 CAN BE SET AND CLEARED
  (5)                                  ;*
  (5)                                  ;*CLOCK STATUS REGISTER BIT EXERCISE. ON FAILURE-SUSPECT INDIVIDUAL
  (5)                                  ;*F/FS OR GATES
  (5)                                  ;*
  (5)
  (4)                                  ;;********************************************************************
  (3)  003440  000004                  TST12:  SCOPE
  (2)  003442  012737  000100  001160          MOV     #100,$TIMES     ;;DO 100 ITERATIONS
  (1)
  (1)  003450  005077  175722                  CLR     @ASR            ;/CLEAR THE STATUS REGISTER.
  (1)  003454  052777  000004  175714          BIS     #BIT2,@ASR      ;/SET BIT 2.
  (1)  003462  012737  000004  001124          MOV     #BIT2,$GDDAT    ;/SET FOR ERROR TYPEOUT S/B.
  (1)  003470  017737  175702  001126          MOV     @ASR,$BDDAT     ;/READ THE STATUS REGISTER.
  (1)  003476  023737  001124  001126          CMP     $GDDAT,$BDDAT   ;/DID BIT 2 AND ONLY BIT 2 SET?
  (1)  003504  001402                          BEQ     1$              ;/IF SO-LETS TRY CLEARING IT.
  (2)
                                       ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

  (1)  003506  104002                          ERROR   2               ;/ERROR CLOCK AS STATUS REGISTER
  (1)                                                                  ;/BIT 2 FAILED TO BIT SET.
  (2)
                                       ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

  (1)  003510  000412                          BR      2$              ;/BR TO END SUBTEST.
  (1)
  (1)  003512  042777  000004  175656  1$:     BIC     #BIT2,@ASR      ;/TRY CLEARING BIT 2.
  (1)  003520  005037  001124                  CLR     $GDDAT          ;/CLEAR S/B FOR TYPEOUT IF ANY.
  (1)  003524  017737  175646  001126          MOV     @ASR,$BDDAT     ;/NOW READ IT BACK.
  (1)  003532  001401                          BEQ     2$              ;/IF ZERO - NO ERROR!
  (1)
  (2)
                                       ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

  (1)  003534  104002                          ERROR   2               ;/ERROR - CLOCK A STATUS REGISTER.
  (1)                                                                  ;/BIT 2 FAILED TO CLEAR.
  (1)
  (2)
                                       ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

  (1)  003536                          2$:
  (1)
  350
```

```
 (1)                                                  ;/#
 (5)                                          ;;*****************************************************************
 (4)                                          ;*TEST 13        *TEST THAT CLOCK A STATUS REGISTER BIT 1 CAN BE SET AND CLEARED
 (5)                                          ;*
 (5)                                          ;*CLOCK STATUS REGISTER BIT EXERCISE. ON FAILURE-SUSPECT INDIVIDUAL
 (5)                                          ;*F/FS OR GATES
 (5)                                          ;*
 (5)
 (4)                                          ;;*****************************************************************
 (3)  003536  000004                          TST13:  SCOPE
 (2)  003540  012737  000100  001160                  MOV     #100,$TIMES       ;;DO 100 ITERATIONS
 (1)
 (1)  003546  005077  175624                          CLR     @ASR              ;/CLEAR THE STATUS REGISTER.
 (1)  003552  052777  000002  175616                  BIS     #BIT1,@ASR        ;/SET BIT 1.
 (1)  003560  012737  000002  001124                  MOV     #BIT1,$GDDAT      ;/SET FOR ERROR TYPEOUT S/B.
 (1)  003566  017737  175604  001126                  MOV     @ASR,$BDDAT       ;/READ THE STATUS REGISTER.
 (1)  003574  023737  001124  001126                  CMP     $GDDAT,$BDDAT     ;/DID BIT 1 AND ONLY BIT 1 SET?
 (1)  003602  001402                                  BEQ     1$                ;/IF SO-LETS TRY CLEARING IT.
 (2)
                                              ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 (1)  003604  104002                                  ERROR   2                 ;/ERROR CLOCK AS STATUS REGISTER
 (1)                                                                            ;/BIT 1 FAILED TO BIT SET.
 (2)
                                              ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 (1)  003606  000412                                  BR      2$                ;/BR TO END SUBTEST.
 (1)
 (1)  003610  042777  000002  175560  1$:             BIC     #BIT1,@ASR        ;/TRY CLEARING BIT 1.
 (1)  003616  005037  001124                          CLR     $GDDAT            ;/CLEAR S/B FOR TYPEOUT IF ANY.
 (1)  003622  017737  175550  001126                  MOV     @ASR,$BDDAT       ;/NOW READ IT BACK.
 (1)  003630  001401                                  BEQ     2$                ;/IF ZERO - NO ERROR
 (1)
 (2)
                                              ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 (1)  003632  104002                                  ERROR   2                 ;/ERROR - CLOCK A STATUS REGISTER.
 (1)                                                                            ;/BIT 1 FAILED TO CLEAR.
 (1)
 (2)
                                              ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 (1)  003634                                  2$:
 (1)
 351
```

```
  (1)                                                  ;/#
  (5)                                            ;;*****************************************************************
  (4)                                            ;*TEST 14       *TEST THAT CLOCK A STATUS REGISTER BIT 0 CAN BE SET AND CLEARED
  (5)                                            ;*
  (5)                                            ;*CLOCK STATUS REGISTER BIT EXERCISE. ON FAILURE-SUSPECT INDIVIDUAL
  (5)                                            ;*F/FS OR GATES
  (5)                                            ;*
  (5)
  (4)                                            ;;*****************************************************************
  (3)  003634  000004                            TST14:  SCOPE
  (2)  003636  012737  000100  001160                    MOV     #100,$TIMES       ;;DO 100 ITERATIONS
  (1)
  (1)  003644  005077  175526                            CLR     @ASR              ;/CLEAR THE STATUS REGISTER.
  (1)  003650  052777  000001  175520                    BIS     #BIT0,@ASR        ;/SET BIT 0.
  (1)  003656  012737  000001  001124                    MOV     #BIT0,$GDDAT      ;/SET FOR ERROR TYPEOUT S/B.
  (1)  003664  017737  175506  001126                    MOV     @ASR,$BDDAT       ;/READ THE STATUS REGISTER.
  (1)  003672  023737  001124  001126                    CMP     $GDDAT,$BDDAT     ;/DID BIT 0 AND ONLY BIT 0 SET?
  (1)  003700  001402                                    BEQ     1$                ;/IF SO-LETS TRY CLEARING IT.
  (2)
                                                 ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

  (1)  003702  104002                                    ERROR   2                 ;/ERROR CLOCK AS STATUS REGISTER
  (1)                                                                              ;/BIT 0 FAILED TO BIT SET.
  (2)
                                                 ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

  (1)  003704  000412                                    BR      2$                ;/BR TO END SUBTEST.
  (1)
  (1)  003706  042777  000001  175462    1$:             BIC     #BIT0,@ASR        ;/TRY CLEARING BIT 0.
  (1)  003714  005037  001124                            CLR     $GDDAT            ;/CLEAR S/B FOR TYPEOUT IF ANY.
  (1)  003720  017737  175452  001126                    MOV     @ASR,$BDDAT       ;/NOW READ IT BACK.
  (1)  003726  001401                                    BEQ     2$                ;/IF ZERO - NO ERROR!
  (1)
  (2)
                                                 ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

  (1)  003730  104002                                    ERROR   2                 ;/ERROR - CLOCK A STATUS REGISTER.
  (1)                                                                              ;/BIT 0 FAILED TO CLEAR.
  (1)
  (2)
                                                 ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

  (1)  003732                                    2$:
  (1)
  352          000010                                    .RADIX  8
  383
```

```
385
(5)                                          ;;*****************************************************************
(4)                                          ;*TEST 15       *TEST THAT PATERN 125252 WILL SET AND CLEAR IN BUFFER REG.
(4)                                          ;;*****************************************************************
(3)  003732  000004                          TST15:  SCOPE
(1)
(1)  003734  005077  175440                          CLR     @ABR               ;/CLEAR THE BUFFER REG.
(1)  003740  012737  125252  001124                  MOV     #125252,$GDDAT     ;/RECORD PATTERN: 125252 .
(1)  003746  013777  001124  175424                  MOV     $GDDAT,@ABR        ;/SET PATTERN IN BUFFER REG.
(1)  003754  017737  175420  001126                  MOV     @ABR,$BDDAT        ;/READ THE BUFFER REG.
(1)
(1)  003762  023737  001124  001126                  CMP     $GDDAT,$BDDAT      ;/DID THE PATTERN SET OK?
(1)  003770  001402                                  BEQ     1$                 ;/YES-TRY CLEARING IT.
(1)
(2)
                                             ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

(1)  003772  104003                                  ERROR   3                  ;/ERROR PATTERN 125252 FAILED TO
(1)                                                                             ;/SET PROPERLY IN BUFFER REG.
(2)
                                             ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

(1)  003774  000412                                  BR      2$                 ;/GOTO SCOPE LOOP.
(1)
(1)  003776  042777  125252  175374  1$:             BIC     #125252,@ABR       ;/TRY CLEARING PATTERN.
(1)  004004  005037  001124                          CLR     $GDDAT             ;/EXPECT ZERO BACK.
(1)  004010  017737  175364  001126                  MOV     @ABR,$BDDAT        ;/READ BUFFER REG.,WAS IT ZERO?
(1)  004016  001401                                  BEQ     2$                 ;/YES-NEXT TEST.
(1)
(2)
                                             ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

(1)  004020  104003                                  ERROR   3                  ;/BUFFER REG. COULD NOT BE LOADED
(1)                                                                             ;/TO A ZERO.
(2)
                                             ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

(1)  004022                                  2$:
(1)
```

```
  387
  (5)                                          ;;*****************************************************************
  (4)                                          ;*TEST 16       *TEST THAT PATERN 052525 WILL SET AND CLEAR IN BUFFER REG.
  (4)                                          ;;*****************************************************************
  (3)  004022  000004                          TST16:  SCOPE
  (1)
  (1)  004024  005077  175350                          CLR     @ABR              ;/CLEAR THE BUFFER REG.
  (1)  004030  012737  052525  001124                  MOV     #052525,$GDDAT    ;/RECORD PATTERN: 052525 .
  (1)  004036  013777  001124  175334                  MOV     $GDDAT,@ABR       ;/SET PATTERN IN BUFFER REG.
  (1)  004044  017737  175330  001126                  MOV     @ABR,$BDDAT       ;/READ THE BUFFER REG.
  (1)
  (1)  004052  023737  001124  001126                  CMP     $GDDAT,$BDDAT     ;/DID THE PATTERN SET OK?
  (1)  004060  001402                                  BEQ     1$                ;/YES-TRY CLEARING IT.
  (1)
  (2)
                                               ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

  (1)  004062  104003                                  ERROR   3                 ;/ERROR PATTERN 052525 FAILED TO
  (1)                                                                            ;/SET PROPERLY IN BUFFER REG.
  (2)
                                               ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

  (1)  004064  000412                                  BR      2$                ;/GOTO SCOPE LOOP.
  (1)
  (1)  004066  042777  052525  175304          1$:     BIC     #052525,@ABR      ;/TRY CLEARING PATTERN.
  (1)  004074  005037  001124                          CLR     $GDDAT            ;/EXPECT ZERO BACK.
  (1)  004100  017737  175274  001126                  MOV     @ABR,$BDDAT       ;/READ BUFFER REG.,WAS IT ZERO?
  (1)  004106  001401                                  BEQ     2$                ;/YES-NEXT TEST.
  (1)
  (2)
                                               ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

  (1)  004110  104003                                  ERROR   3                 ;/BUFFER REG. COULD NOT BE LOADED
  (1)                                                                            ;/TO A ZERO.
  (2)
                                               ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

  (1)  004112                                  2$:
  (1)
  388
  389
  390                                                  .SBTTL  *
  391                                                  .SBTTL  * PHASE 2 ADVANCED BASIC LOGIC TESTS
  392                                                  .SBTTL  *
  393
  402
```

```
                                          ;;*****************************************************************
                                          ;*TEST 17        *TEST THE LOW BYTE OPERATION OF CLOCK'S STATUS REGISTER

                                          ;*
                                          ;*WE CAN SUCCESSFULLY WRITE EVERY BIT IN STATUS REG A
                                          ;*NOW LETS CHECK THE BYTE OPERATION OF THIS REGISTER.
                                          ;*

                                          ;;*****************************************************************
004112  000004                            TST17:  SCOPE
004114  012737  000050  001160                    MOV     #50,$TIMES         ;;DO 50 ITERATIONS

004122  005077  175250                            CLR     @ASR               ;MAKE SURE THE STATUS REGISTER IS CLEAR.
004126  112777  127677  175242                    MOVB    #127677,@ASR       ;TRY WRITING ALL BITS IN THE
                                                                             ;STATUS REGISTER. LOGIC SHOULD PREVENT IT
                                                                             ;FROM BEING WRITTEN INTO BECAUSE
                                                                             ;WE ARE USING A DATOB INSTRUCTION.

004134  017777  175236  174764                    MOV     @ASR,@$BDDAT       ;NOW EXAMINE THE
                                                                             ;STATUS REGISTER.
004142  013737  001126  001124                    MOV     $BDDAT,$GDDAT      ;FIX $GDDAT FOR ERROR TYPEOUT IF
004150  105037  001125                            CLRB    $GDDAT+1           ;ANY RROR HAS OCCURRED, UPPER BYTE CLEARED.

004154  105737  001127                            TSTB    $BDDAT+1           ;ARE ANY BITS IN THE UPPER BYTE
                                                                             ;OF THE STATUS REGISTER SET?
004160  001401                                    BEQ     1$                 ;BRANCH NEXT TEST IF UPPER BYTE-0.


                                          ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

004162  104001                                    ERROR   1                  ;ERROR - WROTE INTO UPPER BYTE OF
                                                                             ;CLOCK'S STATUS WHEN
                                                                             ;DOING A DATOB TO THE LOW BYTE.


                                          ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

004164                                    1$:

```

```
                                          ;;*****************************************************************
                                          ;*TEST 20        *TEST THE HIGH BYTE OPERATION OF A'S STATUS REGISTER

                                          ;*
                                          ;*WE CAN SUCCESSFULLY WRITE EVERY BIT IN STATUS REG A
                                          ;*NOW LETS CHECK THE BYTE OPERATION OF THIS REGISTER.
                                          ;*

                                          ;;*****************************************************************
004164  000004                            TST20:  SCOPE
004166  012737  000050  001160                    MOV     #50,$TIMES        ;;DO 50 ITERATIONS

004174  005077  175176                            CLR     @ASR              ;CLEAR THE STATUS REGISTER.

004200  005237  001376                            INC     ASR               ;ADD #1 TO THE STATUS REGISTER'S ADDRESS
                                                                            ;SO THAT WE WILL BE WRITING INTO
                                                                            ;THE HIGH BYTE.

004204  112777  177313  175164                    MOVB    #177313,@ASR      ;TRY WRITING ALL BITS IN THE STATUS
                                                                            ;REGISTER. LOGIC SHOULD PREVENT THE LOW
                                                                            ;BYTE OF THE STATUS REGISTER FROM
                                                                            ;BEING WRITTEN INTO BECAUSE WE ARE USING
                                                                            ;A DATOB INSTRUCTION WITH A00 SET.

004212  005337  001376                            DEC     ASR               ;FIX ADDRESS OF THE STATUS REGISTER ADDR.
                                                                            ;SO WE CAN LOOK AT THE WHOLE WORD.
004216  017737  175154  001126                    MOV     @ASR,$BDDAT       ;READ BACK WHAT THE STATUS REG. CONTAINS
004224  013737  001126  001124                    MOV     $BDDAT,$GDDAT     ;FIX $GDDAT FOR ERROR TYPEOUT IF AN ERROR
004232  105037  001124                            CLRB    $GDDAT            ;OCCURRED, LOWER BYTE CLEARED.
004236  105737  001126                            TSTB    $BDDAT            ;IS LOWER BYTE CLEAR?
004242  001401                                    BEQ     1$                ;BR IF YES TO NEXT SUBTEST.


                                          ;;$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

004244  104001                                    ERROR   1                 ;ERROR - WROTE INTO LOWER BYTE
                                                                            ;OF CLOCKS STATUS REGISTER WHEN
                                                                            ;DOING A DATOB TO THE HIGH BYTE.

                                          ;;$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

004246                                    1$:
```

```
                                     ;;*****************************************************************
                                     ;*TEST 21        *TEST CLOCK'S COUNT REGISTER WITH 125252 PATTERN
                                     ;;*****************************************************************
004246  000004                       TST21:  SCOPE
004250  012737  000100  001160               MOV     #100,$TIMES     ;;DO 100 ITERATIONS

004256  005077  175114                       CLR     @ASR            ;SELECT MODE 0.
004262  012777  125252  175110               MOV     #125252,@ABR    ;LOAD THE BUFFER REGISTER WITH
                                                                     ;PATTERN 125252. IT WILL BE
                                                                     ;TRANSFERRED TO THE COUNT REGISTER
                                                                     ;SINCE THIS IS MODE 0.
004270  052777  000001  175100               BIS     #BIT0,@ASR      ;SET GO BIT(ALLOWS BUFFER-COUNT REG XFER).

004276  012737  125252  001124               MOV     #125252,$GDDAT  ;SET EXPECTED TO PATTERN IN CASE OF
                                                                     ;NEED OF ERROR TYPEOUT.
004304  017746  175066                       MOV     @ASR,-(6)       ;/SAVE CSR
004310  011637  001424                       MOV     (6),$TMP3       ;/GET CSR.
004314  042737  177707  001424               BIC     #177707,$TMP3   ;/SAVE RATE BITS.
004322  052737  004005  001424               BIS     #BIT11!BIT2.BIT0,$TMP3  ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
004330  013777  001424  175040               MOV     $TMP3,@ASR              ;/LOAD CSR.
                                                                     ;/THIS MUST BE DONE IN
                                                                     ;/ORDER TO XFERR COUNTER
                                                                     ;/TO BUFFER ON ST2.
004336  052777  001000  175032               BIS     #BIT9,@ASR      ;/GENERATE ON ST2 PULSE
004344  017737  175030  001126               MOV     @ABR,$BDDAT     ;/READ THE PRESET BUFFER.
                                                                     ;/PREVIOUS COUNTER
004352  012677  175020                       MOV     (6)+,@ASR       ;/CONTENTS ARE IN $BDDAT.
004356  005737  001126                       TST     $BDDAT          ;/RESTORE CSR

004362  023737  001124  001126               CMP     $GDDAT,$BDDAT   ;DID ALL THE BITS AND NO OTHER BITS
                                                                     ;COME THROUGH?
004370  001401                               BEQ     1$              ;BR IF YES TO NEXT TEST.


                                     ;;$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

004372  104005                               ERROR   5               ;DATA ERROR CLOCK - PATTERN "125252"
                                                                     ;FAILED TO TRANSFER PROPERLY BETWEEN
                                                                     ;BUFFER AND COUNT REGISTERS.


                                     ;;$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

004374                               1$
```

```
                                      ;;*******************************************************************
                                      ;*TEST 22        *TEST CLOCKS COUNTER REGISTER WITH 052525 PATTERN
                                      ;;*******************************************************************
004374  000004                        TST22:  SCOPE
004376  012737  000050  001160                MOV     #50,$TIMES        ;;DO 50 ITERATIONS

004404  005077  174766                        CLR     @ASR              ;SELECT MODE 0.
004410  012777  052525  174762                MOV     #052525,@ABR      ;LOAD THE BUFFER REGISTER WITH
                                                                        ;PATTERN 052525. IT WILL BE
                                                                        ;TRANSFERRED TO THE COUNT REGISTER
                                                                        ;SINCE THIS IS MODE 0.
004416  052777  000001  174752                BIS     #BIT0,@ASR        ;SET B0 BIT(ALLOWS BUFFER-COUNT REG XFER).

004424  012737  052525  001124                MOV     #052525,$GDDAT    ;SET EXPECTED TO PATTERN IN CASE OF
                                                                        ;NEED OF ERROR TYPEOUT.
004432  017746  174740                        MOV     @ASR,-(6)         ;/SAVE CSR
004436  011637  001424                        MOV     (6),$TMP3         ;/GET CSR.
004442  042737  177707  001424                BIC     #177707,$TMP3     ;/SAVE RATE BITS.
004450  052737  004005  001424                BIS     #BIT11!BIT2!BIT0,$TMP3  ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
004456  013777  001424  174712                MOV     $TMP3,@ASR              ;/LOAD CSR.
                                                                        ;/THIS MUST BE DONE IN
                                                                        ;/ORDER TO XFERR COUNTER
                                                                        ;/TO BUFFER ON ST2.
004464  052777  001000  174704                BIS     #BIT9,@ASR        ;/GENERATE ON ST2 PULSE
004472  017737  174702  001126                MOV     @ABR,$BDDAT       ;/READ THE PRESET BUFFER,
                                                                        ;/PREVIOUS COUNTER
004500  012677  174672                        MOV     (6)+,@ASR         ;/CONTENTS ARE IN $BDDAT.
004504  005737  001126                        TST     $BDDAT            ;/RESTORE CSR

004510  023737  001124  001126                CMP     $GDDAT,$BDDAT     ;DID ALL THE BITS AND NO OTHER BITS
                                                                        ;COME THROUGH?
004516  001401                                BEQ     1$                ;BR IF YES TO NEXT TEST.


                                      ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

004520  104005                                ERROR   5                 ;DATA ERROR CLOCK - PATTERN "052525"
                                                                        ;FAILED TO TRANSFER PROPERLY BETWEEN
                                                                        ;BUFFER AND COUNT REGISTERS.


                                      ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

004522                                1$:
 519                                   ;;*************************************************************
 (3)                                   ;*TEST 23        *TEST THAT INIT CLEARS STATUS REGISTER
 (4)                                   ;*
 (4)                                   ;*TESTING OF THE INIT LOGIC AS RECEIVED FROM THE QBUS AND BUFFERED
 (4)                                   ;*TO STATUS REGISTER F/FS.
 (4)                                   ;*
 (3)                                   ;;*************************************************************
 (2)  004522  000004                   TST23:  SCOPE
 (1)  004524  012737  000005  001160           MOV     #5,$TIMES        ;;DO 5 ITERATIONS
 520
 521  004532  005037  001124                   CLR     $GDDAT           ;EXPECTED DATA IS ZERO.
 522  004536  012777  177777  174632           MOV     #177777,@ASR     ;SET ALL BITS IN THE STATUS REG.
 523
 524  004544  000005                           RESET                    ;SYSTEM INITIALIZE.
 525
 526  004546  017737  174624  001126           MOV     @ASR,$BDDAT      ;READ THE STATUS REG., ALL BITS SHOULD
 527                                                                    ;HAVE BEEN CLEARED BY INIT.
 528  004554  001402                           BEQ     1$               ;BR IF YES TO NEXT TEST.
 529
 530
                                       ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 531
 532  004556  104002                           ERROR   2                ;ERROR - SYSTEM INIT FAILED TO CLEAR
 533                                                                    ;STATUS REGISTER CLOCK A.
 534
 535
                                       ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 536  004560  000413                           BR      TST24            ;;
 537  004562                           1$:
 538  004562  005737  001440                   TST     EXS              ;TEST EXTERNAL SIGS?
 539  004566  001410                           BEQ     TST24            ;;
 540  004570  052777  016000  174620           BIS     #BIT11!BIT12!BIT10,@DR2 ;ENABLE ST1,ST2 TO LATCH.
 541  004576  032777  000006  174610           BIT     #6,@DR           ;ST1,ST2, OVERFLOW SET?
 542  004604  001401                           BEQ     TST24            ;;
 543
                                       ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 544  004606  104006                           ERROR   6                ;INIT FAILED TO CLEAR
 545                                                                    ;ST1,ST2, AND/OR OVERFLOW
 546
                                       ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 554
```

```
  556                                         ;;*******************************************************************
  (3)                                         ;*TEST 24        *TEST THAT INIT CLEARS BUFFER REGISTER
  (4)                                         ;*
  (4)                                         ;*THIS TEST IS DESIGNED TO SEE IF ''INIT H''
  (4)                                         ;*CLEARS THE BUFFER REGISTER. WE ALREADY
  (4)                                         ;*KNOW IT CLEARS THE STATUS REG.
  (4)                                         ;*
  (3)                                         ;;*******************************************************************
  (2)  004610  000004                         TST24:  SCOPE
  (1)  004612  012737  000005  001160                 MOV     #5,$TIMES          ;;DO 5 ITERATIONS
  557
  558  004620  005037  001124                         CLR     $GDDAT             ;CLEAR EXPECTED DATA.
  559  004624  012777  177777  174546                 MOV     #177777,@ABR       ;SET ALL BITS IN THE BUFFER REGISTER.
  560
  561  004632  000005                                 RESET                      ;ISSUE SYSTEM INITIALIZE.
  562
  563  004634  017737  174540  001126                 MOV     @ABR,$BDDAT        ;READ THE BUFFER REGISTER, ALL BITS
  564                                                                            ;SHOULD HAVE BEEN CLEARED BY INIT.
  565  004642  001401                                 BEQ     1$                 ;BR IF YES TO NEXT SUBTEST.
  566
  567
                                              ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

  568  004644  104003                                 ERROR   3                  ;ERROR - SYSTEM INIT FAILED
  569                                                                            ;TO CLEAR BUFFER REGISTER A.
  570
  571
                                              ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

  572  004646                                 1$:
  573  004646  005737  001440                         TST     EXS                ;TEST EXTERNAL SIGS?
  574  004652  001403                                 BEQ     TST25              ;;
  575  004654  052777  016000  174534                 BIS     #BIT11!BIT12!BIT10,@DR2 ;ENABLE THEM
  576
```

```
 578                                        ;;*****************************************************************
 (3)                                        ;*TEST 25       *TEST THE SETTING OF MAINTENANCE ST2 IN CLOCK BIT 15 TO SET
 (3)                                        ;;*****************************************************************
 (2)  004662  000004                        TST25:  SCOPE
 579
 580  004664  012777  000001  174504                MOV     #1,@ASR          ;SET THE GO BIT(ENABLES ST2 TO SET FLG).
 581  004672  052777  001000  174476                BIS     #BIT9,@ASR       ;SET MAINTENANCE ST2.
 582
 583  004700  005777  174472                        TST     @ASR             ;DID BIT15 (ST2 FLAG) SET?
 584  004704  100402                                BMI     1$               ;BR IF YES - NEXT TEST
 585
 586
                                            ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 587  004706  104001                                ERROR   1                ;ERROR - MAINTENANCE ST2 (BIT9)
 588                                                                         ;DID NOT SET BIT15 (ST2 FLAG).
 589
 590
                                            ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 591  004710  000410                                BR      TST26            ;;
 592  004712  005737  001440                1$:     TST     EXS              ;TEST EXTERNAL SIGNALS?
 593  004716  001405                                BEQ     TST26            ;;
 594  004720  032777  000004  174466                BIT     #BIT2,@DR        ;DID EXTERNAL ST2 GET SET?
 595  004726  001001                                BNE     TST26            ;;
 596
                                            ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 597  004730  104006                                ERROR   6                ;ST2 OUT NOT DETECTED
 598                                                                         ;BY TESTOR
 599
                                            ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 600
 601
 603                                    ;;*******************************************************************
 (3)                                    ;*TEST 26       *TEST THAT BIT00 IN CLOCK STATUS REG. WILL SET WHEN BIT13 AND MAIN. ST2
 (3)                                    ;;*******************************************************************
 (2)   004732  000004                   TST26:  SCOPE
 604
 605   004734  012777  020000  174434           MOV     #BIT13,@ASR       ;SET ''ST2 FNB COUNTER'' IN CLK  STATUS REG.
 606   004742  052777  001000  174426           BIS     #BIT9,@ASR        ;GENERATE A MAINTENANCE ST2.
 607   004750  032777  000001  174420           BIT     #BIT00,@ASR       ;DID BIT00 (GO) SET?
 608   004756  001001                           BNE     1$                ;BR IF YES - NEXT TEST.
 609
 610
                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 611   004760  104001                           ERROR   1                 ;ERROR - BIT00 OF CLOCK'S STATUS REGISTER
 612                                                                      ;FAILED TO SET WHEN BIT13 WAS SET
 613                                                                      ;AND A MAINTENANCE ST2 GENERATED.
 614
 615
                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 616   004762  005077  174410           1$:     CLR     @ASR              ;LEAVE SUBTEST WITH CLOCK CLEAR.
 617
 618                                            .SBTTL  *
 619                                            .SBTTL  *PHASE 3 COUNT TESTS
 620                                            .SBTTL  *
 621
```

```
                                 ;;*****************************************************************
                                 ;*TEST 27       *TEST TO SEE IF THE COUNTER WILL INCREMENT
                                 ;;*****************************************************************
 004766  000004                  TST27:  SCOPE

 004770  005077  174402                  CLR     @ASR             ;CLEAR THE CSR.
 004774  005077  174400                  CLR     @ABR             ;CLEAR THE BUFFER
 005000  052777  000061  174370          BIS     #BIT5.BIT4.BIT0,@ASR ;SET RATE:ST1, GO.
 005006  052777  000400  174362          BIS     #BIT8,@ASR       ;GENERATE A MAINTENANCE ST1.
                                                                  ;DID THE CLOCK COUNT?
 005014  017746  174356                  MOV     @ASR,-(6)        ;/SAVE CSR
 005020  011637  001424                  MOV     (6),$TMP3        ;/GET CSR.
 005024  042737  177707  001424          BIC     #177707,$TMP3    ;/SAVE RATE BITS.
 005032  052737  004005  001424          BIS     #BIT11.BIT2.BIT0,$TMP3  ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
 005040  013777  001424  174330          MOV     $TMP3,@ASR                ;/LOAD CSR.
                                                                  ;/THIS MUST BE DONE IN
                                                                  ;/ORDER TO XFERR COUNTER
                                                                  ;/TO BUFFER ON ST2.
 005046  052777  001000  174322          BIS     #BIT9,@ASR       ;/GENERATE ON ST2 PULSE
 005054  017737  174320  001126          MOV     @ABR,$BDDAT      ;/READ THE PRESET BUFFER,
                                                                  ;/PREVIOUS COUNTER
 005062  012677  174310                  MOV     (6)+,@ASR        ;/CONTENTS ARE IN $BDDAT.
 005066  005737  001126                  TST     $BDDAT           ;/RESTORE CSR
 005072  001001                          BNE     1$               ;YES, NEXT TEST.

                                 ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 005074  104006                          ERROR   6                ;CLOCK FAILED TO INCREMENT.


                                 ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 005076                          1$:

```

```
                                     ;;*****************************************************************
                                     ;*TEST 30        *SEE IF CLOCK WILL COUNT UP FROM A ZERO BASE, RATE:ST1
                                     ;*
                                     ;*        NOTE:   IN THIS TEST, LOOP ON ERROR WILL CAUSE A LOOP
                                     ;*                ON THE FAILING COUT PATTERN;
                                     ;*                WHILE LOOP ON TEST WILL START THE TEST
                                     ;*                AND THE CLOCK FROM ZERO TO THE FAILING COUNT.
                                     ;*
                                     ;;*****************************************************************
005076  000004                       TST30:  SCOPE
005100  012737  000010  001160               MOV     #10,$TIMES        ;;DO 10 ITERATIONS

005106  005077  174264                       CLR     @ASR              ;CLEAR THE CSR.
005112  005077  174262                       CLR     @ABR              ;CLEAR THE BUFFER REG
005116  012737  000000  001124               MOV     #0,$GDDAT         ;CLEAR EXPECTED.
005124  012737  005266  001110               MOV     #2$,$LPERR

005132  052777  000061  174236       1$:     BIS     #BIT5.BIT4!BIT0,@ASR ;START CLOCK, RATE:ST1.

005140  052777  000400  174230               BIS     #BIT8,@ASR        ;GENERATE A MAINTENANCE ST1
                                                                       ;CLOCK SHOULD COUNT ONCE.
005146  005737  001440                       TST     EXS               ;TEST EXTERNAL SIGNALS?
005152  001406                               BEQ     10$               ;NO
005154  032777  000002  174232               BIT     #BIT1,@DR         ;YES - DID ST1 GET SET?
005162  001002                               BNE     10$               ;YES

                                     ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

005164  104006                               ERROR   6                 ;ST1 OUT NOT DETECTED
                                                                       ;BY TESTOR

                                     ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

005166  000447                               BR      TST31             ;;
005170                               10$:
005170  017746  174202                       MOV     @ASR,-(6)         ;/SAVE CSR
005174  011637  001424                       MOV     (6),$TMP3         ;/GET CSR.
005200  042737  177707  001424               BIC     #177707,$TMP3     ;/SAVE RATE BITS.
005206  052737  004005  001424               BIS     #BIT11!BIT2!BIT0,$TMP3  ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
005214  013777  001424  174154               MOV     $TMP3,@ASR                ;/LOAD CSR.
                                                                       ;/THIS MUST BE DONE IN
                                                                       ;/ORDER TO XFERR COUNTER
                                                                       ;/TO BUFFER ON ST2.
005222  052777  001000  174146               BIS     #BIT9,@ASR        ;/GENERATE ON ST2 PULSE
005230  017737  174144  001126               MOV     @ABR,$BDDAT       ;/READ THE PRESET BUFFER,
                                                                       ;/PREVIOUS COUNTER
005236  012677  174134                       MOV     (6)+,@ASR         ;/CONTENTS ARE IN $BDDAT.
005242  005737  001126                       TST     $BDDAT            ;/RESTORE CSR
005246  005237  001124                       INC     $GDDAT            ;COUNT=OLD COUNT+1
005252  023737  001124  001126               CMP     $GDDAT,$BDDAT     ;COUNT READ=COUNT EXP'ED?
005260  001402                               BEQ     2$                ;YES - SEE IF WE'RE THROUGH.

                                     ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

005262  104011                               ERROR   11                ;CLOCK FAILED TO COUNT UP PROPERLY.
```

```
                                      ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 005264  000410                                 BR      3$              ;GOTO SCOPE LOOP.

 005266  005077  174104               2$:       CLR     @ASR
 005272  013777  001124  174100                 MOV     $GDDAT,@ABR
 005300  005737  001124                         TST     $GDDAT          ;ALL DONE?
 005304  001312                                 BNE     1$              ;NO DO NEXT INCREMEN'.
 005306                               3$:

                                      ;;*******************************************************************
                                      ;*TEST 31        *TEST THAT OVERFLOW (CSR B:T07) WILL SET ON OVERFLOW
                                      ;;*******************************************************************
 00^306  000004                       TST31:    SCOPE

 005310  005737  001440                         TST     EXS             ;TESTOR MODE ENABLED??
 005314  001411                                 BEQ     2$              ;NO-THEN SKIP NEXT SECTION OF CODE.

 005316  005037  170500                         CLR     @#170500        ;CLEAR TESTOR A/D
 005322  005737  170502                         TST     @#170502        ;DUMB READ OF A/D BUFFER.
 005326  052737  000040  170500                 BIS     #BIT5,@#170500  ;ENABLE EXTRENAL START OF A/D.
 005334  012700  000010                         MOV     #8.,R0          ;SET TIME OUT NUMBER.
 005340                               2$:
 005340  005077  174032                         CLR     @ASR            ;CLEAR THE CSR
 005344  012777  177777  174026                 MOV     #-1,@ABR        ;SET PRESET BUFFER TO ALL ONES.

 005352  052777  000061  174016                 BIS     #BIT5!BIT4.BIT0,@ASR ;START CLOCK, RATE ST1.

 005360  052777  000400  174010                 BIS     #BIT8,@ASR      ;COUNT CLOCK ONCE, OVERFLOW
                                                                        ;SHOULD OCCUR.
 005366  105777  174004                         TSTB    @ASR            ;DID OVERFLOW SET?
 005372  100402                                 BMI     1$              ;YES - THEN NEXT TEST


                                      ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 005374  104006                                 ERROR   6               ;ERROR - OVERFLOW, CSR BIT07
                                                                        ;FAILED TO SET ON OVERFLOW
 005376  000411                                 BR      TST32           ;;
 005400  005737  001440               1$:       TST     EXS             ;TEST EXTERNAL SIGNALS?
 005404  001406                                 BEQ     TST32           ;;
 005406  105737  170500                         TSTB    @#170500        ;IF  OVERFLOW GOT OUT,IT GAVE A/D START,
                                                                        ;WE'RE LOOKING FOR A/D DONE-DID IT GET SET?
 005412  100403                                 BMI     TST32           ;;
 005414  005300                                 DEC     R0              ;DID WE ALLOW ENOUGH TIME??
 005416  001370                                 BNE     1$              ;NO-THEN WAIT.

                                      ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 005420  104006                                 ERROR   6               ;OVERFLOW OUT NOT DETECTED
                                                                        ;BY TESTOR

                                      ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
```

```
                                       ;;*****************************************************************
                                       ;*TEST 32        *TEST THAT OVERFLOW WILL CLEAR THE GO BIT
                                       ;;*****************************************************************
005422  000004                         TST32:  SCOPE

005424  005077  173746                         CLR     @ASR            ;CLEAR THE CSR.

005430  012777  177777  173742                 MOV     #-1,@ABR        ;PRESET CLOCK TO -1.

005436  052777  000061  173732                 BIS     #BIT5!BIT4!BIT0,@ASR ;START CLOCK, RATE:ST1

005444  052777  000400  173724                 BIS     #BIT8,@ASR      ;COUNT ONCE, OVERFLOW
                                                                       ;SHOULD OCCUR CLEARING
                                                                       ;ENABLE (CSR BIT00)

005452  032777  000001  173716                 BIT     #BIT0,@ASR      ;DID THE ENABLE CLEAR?
005460  001401                                 BEQ     1$              ;YES - NEXT TEST.


                                       ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

005462  104006                                 ERROR   6               ;ERROR - OVERFLOW FAILED
                                                                       ;TO CLEAR ENABLE (CSR BIT00)

005464                                 1$:

                                       ;;*****************************************************************
                                       ;*TEST 33        *TEST THAT GO BIT DOES NOT CLEAR ON OVERFLOW, IF MODE 1
                                       ;;*****************************************************************
005464  000004                         TST33:  SCOPE

005466  005077  173704                         CLR     @ASR            ;CLEAR THE CSR.
005472  012777  177777  173700                 MOV     #-1,@ABR        ;PRESET BUFFER=ONE COUNT FROM OVERFLOW.
005500  052777  000063  173670                 BIS     #63,@ASR        ;MODE 1, RATE:ST1, GO.

005506  052777  000400  173662                 BIS     #BIT8,@ASR      ;GENERATE MAINTENANCE ST1.

005514  032777  000001  173654                 BIT     #BIT0,@ASR      ;DID ENABLE (GO BIT) CLEAR?
005522  001001                                 BNE     1$              ;NO (GOOD) NEXT TEST.

                                       ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

005524  104006                                 ERROR   6               ;GO BIT CLEARED ON OVERFLOW
                                                                       ;WHEN MODE 1 WAS SELECTED

                                       ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$


005526  005077  173644                 1$:     CLR     @ASR            ;CLEAR THE CLOCK.
```

```
 (5)                                        ;;*******************************************************************
 (4)                                        ;*TEST 34        *TEST THE ABILITY OF CLOCK TO COUNT AT 1MHZ RATE
 (5)
 (5)                                        ;*
 (5)                                        ;*THIS TEST IS DESIGNED TO TEST THE CLOCK'S ABILITY
 (5)                                        ;*TO COUNT AT 1MHZ RATE.
 (5)                                        ;*
 (4)                                        ;;*******************************************************************
 (3)  005532  000004                        TST34:  SCOPE
 (2)  005534  012737  000005  001160                MOV     #5,$TIMES         ;;DO 5 ITERATIONS
 (1)
 (1)
 (1)  005542  005077  173630                        CLR     @ASR              ;/CLEAR CLOCK
 (1)  005546  005077  173626                        CLR     @ABR              ;/CLEAR PRESET BUFFER
 (1)  005552  012777  000011  173616                MOV     #BIT0!10,@ASR     ;/START CLOCK, MODE0, RATE:1MHZ
 (1)  005560  005000                                CLR     R0                ;/NOW WE'LL DO A LITTLE DELAY. THIS DELAY
 (1)
 (1)  005562  005200                        1$:     INC     R0                ;/WILL AMOUNT TO APPROXIMATELY
 (1)  005564  001376                                BNE     1$                ;/369 MS.
 (1)
 (2)  005566  017746  173604                        MOV     @ASR,-(6)         ;/SAVE CSR
 (2)  005572  011637  001424                        MOV     (6),$TMP3         ;/GET CSR.
 (2)  005576  042737  177707  001424                BIC     #177707,$TMP3     ;/SAVE RATE BITS.
 (2)  005604  052737  004005  001424                BIS     #BIT11!BIT12!BIT0,$TMP3  ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
 (2)  005612  013777  001424  173556                MOV     $TMP3,@ASR               ;/LOAD CSR.
 (2)                                                                          ;/THIS MUST BE DONE IN
 (2)                                                                          ;/ORDER TO XFERR COUNTER
 (2)                                                                          ;/TO BUFFER ON ST2.
 (2)  005620  052777  001000  173550                BIS     #BIT9,@ASR        ;/GENERATE ON ST2 PULSE
 (2)  005626  017737  173546  001126                MOV     @ABR,$BDDAT       ;/READ THE PRESET BUFFER,
 (2)                                                                          ;/PREVIOUS COUNTER
 (2)  005634  012677  173536                        MOV     (6)+,@ASR         ;/CONTENTS ARE IN $BDDAT.
 (2)  005640  005737  001126                        TST     $BDDAT            ;/RESTORE CSR
 (1)  005644  001004                                BNE     2$                ;/YES - NEXT TEST.
 (1)  005646  105766  177776                        TSTB    -2(6)             ;/AT HIGH RATE MAY HAVE HAD OVERFLOW
 (1)                                                                          ;/NOTE: CSR HAD BEEN PUT ON STACK.
 (1)  005652  100401                                BMI     2$                ;/NEXT TEST IF OVERFLOW.
 (1)
 (2)
                                            ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 (1)  005654  104006                                ERROR   6                 ;/CLOCK FAILED TO COUNT AT
 (1)                                                                          ;/RATE:1MHZ
 (2)
                                            ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 (1)
 (1)  005656  005077  173514                2$:     CLR     @ASR              ;/CLEAR THE CLOCK.
 (1)
 (1)
```

```
808
 (5)                                     ;;*************************************************************
 (4)                                     ;*TEST 35        *TEST THE ABILITY OF CLOCK TO COUNT AT 100KHZ RATE
 (5)
 (5)                                     ;*
 (5)                                     ;*THIS TEST IS DESIGNED TO TEST THE CLOCK'S ABILITY
 (5)                                     ;*TO COUNT AT 100KHZ RATE.
 (5)                                     ;*
 (4)                                     ;;*************************************************************
 (3)  005662  000004                     TST35:  SCOPE
 (2)  005664  012737  000005  001160             MOV     #5,$TIMES          ;;DO 5 ITERATIONS
 (1)
 (1)
 (1)  005672  005077  173500                     CLR     @ASR               ;/CLEAR CLOCK
 (1)  005676  005077  173476                     CLR     @ABR               ;/CLEAR PRESET BUFFER
 (1)  005702  012777  000021  173466             MOV     #BIT0.20,@ASR      ;/START CLOCK, MODE0, RATE:100KHZ
 (1)  005710  005000                             CLR     R0                 ;/NOW WE'LL DO A LITTLE DELAY. THIS DELAY
 (1)
 (1)  005712  005200                     1$:     INC     R0                 ;/WILL AMOUNT TO APPROXIMATELY
 (1)  005714  001376                             BNE     1$                 ;/369 MS.
 (1)
 (2)  005716  017746  173454                     MOV     @ASR,-(6)          ;/SAVE CSR
 (2)  005722  011637  001424                     MOV     (6),$TMP3          ;/GET CSR.
 (2)  005726  042737  177707  001424             BIC     #177707,$TMP3      ;/SAVE RATE BITS.
 (2)  005734  052737  004005  001424             BIS     #BIT11!BIT2.BIT0,$TMP3  ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
 (2)  005742  013777  001424  173426             MOV     $TMP3,@ASR                ;/LOAD CSR.
 (2)                                                                        ;/THIS MUST BE DONE IN
 (2)                                                                        ;/ORDER TO XFERR COUNTER
 (2)                                                                        ;/TO BUFFER ON ST2.
 (2)  005750  052777  001000  173420             BIS     #BIT9,@ASR         ;/GENERATE ON ST2 PULSE
 (2)  005756  017737  173416  001126             MOV     @ABR,$BDDAT        ;/READ THE PRESET BUFFER,
 (2)                                                                        ;/PREVIOUS COUNTER
 (2)  005764  012677  173406                     MOV     (6)+,@ASR          ;/CONTENTS ARE IN $BDDAT.
 (2)  005770  005737  001126                     TST     $BDDAT             ;/RESTORE CSR
 (1)  005774  001004                             BNE     2$                 ;/YES - NEXT TEST.
 (1)  005776  105766  177776                     TSTB    -2(6)              ;/AT HIGH RATE MAY HAVE HAD OVERFLOW
 (1)                                                                        ;/NOTE: CSR HAD BEEN PUT ON STACK.
 (1)  006002  100401                             BMI     2$                 ;/NEXT TEST IF OVERFLOW.
 (1)
 (2)
                                         ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 (1)  006004  104006                             ERROR   6                  ;/CLOCK FAILED TO COUNT AT
 (1)                                                                        ;/RATE:100KHZ
 (2)
                                         ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 (1)
 (1)  006006  005077  173364             2$:     CLR     @ASR               ;/CLEAR THE CLOCK.
 (1)
 (1)
```

```
  810
  (5)                                               ;;*************************************************************
  (4)                                               ;*TEST 36        *TEST THE ABILITY OF CLOCK TO COUNT AT 10KHZ RATE
  (5)
  (5)                                               ;*
  (5)                                               ;*THIS TEST IS DESIGNED TO TEST THE CLOCK'S ABILITY
  (5)                                               ;*TO COUNT AT 10KHZ RATE.
  (5)                                               ;*
  (4)                                               ;;*************************************************************
  (3)  006012  000004                               TST36:  SCOPE
  (2)  006014  012737  000005  001160                       MOV     #5,$TIMES          ;;DO 5 ITERATIONS
  (1)
  (1)
  (1)  006022  005077  173350                               CLR     @ASR               ;/CLEAR CLOCK
  (1)  006026  005077  173346                               CLR     @ABR               ;/CLEAR PRESET BUFFER
  (1)  006032  012777  000031  173336                       MOV     #BIT0.30,@ASR      ;/START CLOCK, MODE0, RATE:10KHZ
  (1)  006040  005000                                       CLR     R0                 ;/NOW WE'LL DO A LITTLE DELAY. THIS DELAY
  (1)
  (1)  006042  005200                               1$:     INC     R0                 ;/WILL AMOUNT TO APPROXIMATELY
  (1)  006044  001376                                       BNE     1$                 ;/369 MS.
  ( )
  (2)  006046  017746  173324                               MOV     @ASR,-(6)          ;/SAVE CSR
  (2)  006052  011637  001424                               MOV     (6),$TMP3          ;/GET CSR.
  (2)  006056  042737  177707  001424                       BIC     #177707,$TMP3      ;/SAVE RATE BITS.
  (2)  006064  052737  004005  001424                       BIS     #BIT11!BIT2!BIT0,$TMP3  ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
  (2)  006072  013777  001424  173276                       MOV     $TMP3,@ASR                 ;/LOAD CSR.
  (2)                                                                                  ;/THIS MUST BE DONE IN
  (2)                                                                                  ;/ORDER TO XFERR COUNTER
  (2)                                                                                  ;/TO BUFFER ON ST2.
  (2)  006100  052777  001000  173270                       BIS     #BIT9,@ASR         ;/GENERATE ON ST2 PULSE
  (2)  006106  017737  173266  001126                       MOV     @ABR,$BDDAT        ;/READ THE PRESET BUFFER,
  (2)                                                                                  ;/PREVIOUS COUNTER
  (2)  006114  012677  173256                               MOV     (6)+,@ASR          ;/CONTENTS ARE IN $BDDAT.
  (2)  006120  005737  001126                               TST     $BDDAT             ;/RESTORE CSR
  (1)  006124  001004                                       BNE     2$                 ;/YES - NEXT TEST.
  (1)  006126  105766  177776                               TSTB    -2(6)              ;/AT HIGH RATE MAY HAVE HAD OVERFLOW
  (1)                                                                                  ;/NOTE: CSR HAD BEEN PUT ON STACK.
  (1)  006132  100401                                       BMI     2$                 ;/NEXT TEST IF OVERFLOW.
  (1)
  (2)
                                                    ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

  (1)  006134  104006                                       ERROR   6                  ;/CLOCK FAILED TO COUNT AT
  (1)                                                                                  ;/RATE:10KHZ
  (2)
                                                    ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

  (1)
  (1)  006136  005077  173234                       2$:     CLR     @ASR               ;/CLEAR THE CLOCK.
  (1)
  (1)
```

```
 812
 (5)                                         ;;*****************************************************************
 (4)                                         ;*TEST 37        *TEST THE ABILITY OF CLOCK TO COUNT AT 1KHZ RATE
 (5)
 (5)                                         ;*
 (5)                                         ;*THIS TEST IS DESIGNED TO TEST THE CLOCK'S ABILITY
 (5)                                         ;*TO COUNT AT 1KHZ RATE.
 (5)                                         ;*
 (4)                                         ;;*****************************************************************
 (3)  006142  000004                         TST37:  SCOPE
 (2)  006144  012737  000005  001160                 MOV     #5,$TIMES          ;;DO 5 ITERATIONS
 (1)
 (1)
 (1)  006152  005077  173220                         CLR     @ASR               ;/CLEAR CLOCK
 (1)  006156  005077  173216                         CLR     @ABR               ;/CLEAR PRESET BUFFER
 (1)  006162  012777  000041  173206                 MOV     #BIT0!40,@ASR      ;/START CLOCK, MODE0, RATE:1KHZ
 (1)  006170  005000                                 CLR     R0                 ;/NOW WE'LL DO A LITTLE DELAY. THIS DELAY
 (1)
 (1)  006172  005200                         1$:     INC     R0                 ;/WILL AMOUNT TO APPROXIMATELY
 (1)  006174  001376                                 BNE     1$                 ;/369 MS.
 (1)
 (2)  006176  017746  173174                         MOV     @ASR,-(6)          ;/SAVE CSR
 (2)  006202  011637  001424                         MOV     (6),$TMP3          ;/GET CSR.
 (2)  006206  042737  177707  001424                 BIC     #177707,$TMP3      ;/SAVE RATE BITS.
 (2)  006214  052737  004005  001424                 BIS     #BIT11.BIT2!BIT0,$TMP3  ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
 (2)  006222  013777  001424  173146                 MOV     $TMP3,@ASR                 ;/LOAD CSR.
 (2)                                                                            ;/THIS MUST BE DONE IN
 (2)                                                                            ;/ORDER TO XFERR COUNTER
 (2)                                                                            ;/TO BUFFER ON ST2.
 (2)  006230  052777  001000  173140                 BIS     #BIT9,@ASR         ;/GENERATE ON ST2 PULSE
 (2)  006236  017737  173136  001126                 MOV     @ABR,$BDDAT        ;/READ THE PRESET BUFFER,
 (2)                                                                            ;/PREVIOUS COUNTER
 (2)  006244  012677  173126                         MOV     (6)+,@ASR          ;/CONTENTS ARE IN $BDDAT.
 (2)  006250  005737  001126                         TST     $BDDAT             ;/RESTORE CSR
 (1)  006254  001004                                 BNE     2$                 ;/YES - NEXT TEST.
 (1)  006256  105766  177776                         TSTB    -2(6)              ;/AT HIGH RATE MAY HAVE HAD OVERFLOW
 (1)                                                                            ;/NOTE: CSR HAD BEEN PUT ON STACK.
 (1)  006262  100401                                 BMI     2$                 ;/NEXT TEST IF OVERFLOW.
 (1)
 (2)
                                             ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 (1)  006264  104006                                 ERROR   6                  ;/CLOCK FAILED TO COUNT AT
 (1)                                                                            ;/RATE:1KHZ
 (2)
                                             ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 (1)
 (1)  006266  005077  173104                 2$:     CLR     @ASR               ;/CLEAR THE CLOCK.
 (1)
 (1)
 814
 (5)                                          ;;*****************************************************************
 (4)                                          ;*TEST 40         *TEST THE ABILITY OF CLOCK TO COUNT AT 100HZ RATE
 (5)
 (5)                                          ;*
 (5)                                          ;*THIS TEST IS DESIGNED TO TEST THE CLOCK'S ABILITY
 (5)                                          ;*TO COUNT AT 100HZ RATE.
 (5)                                          ;*
 (4)                                          ;;*****************************************************************
 (3)  006272  000004                          TST40:  SCOPE
 (2)  006274  012737  000005  001160                  MOV     #5,$TIMES         ;;DO 5 ITERATIONS
 (1)
 (1)
 (1)  006302  005077  173070                          CLR     @ASR              ;/CLEAR CLOCK
 (1)  006306  005077  173066                          CLR     @ABR              ;/CLEAR PRESET BUFFER
 (1)  006312  012777  000051  173056                  MOV     #BIT0!50,@ASR     ;/START CLOCK, MODE0, RATE:100HZ
 (1)  006320  005000                                  CLR     R0                ;/NOW WE'LL DO A LITTLE DELAY. THIS DELAY
 (1)
 (1)  006322  005200                          1$:     INC     R0                ;/WILL AMOUNT TO APPROXIMATELY
 (1)  006324  001376                                  BNE     1$                ;/369 MS.
 (1)
 (2)  006326  017746  173044                          MOV     @ASR,-(6)         ;/SAVE CSR
 (2)  006332  011637  001424                          MOV     (6),$TMP3         ;/GET CSR.
 (2)  006336  042737  177707  001424                  BIC     #177707,$TMP3     ;/SAVE RATE BITS.
 (2)  006344  052737  004005  001424                  BIS     #BIT11!BIT2!BIT0,$TMP3  ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
 (2)  006352  013777  001424  173016                  MOV     $TMP3,@ASR              ;/LOAD CSR.
 (2)                                                                            ;/THIS MUST BE DONE IN
 (2)                                                                            ;/ORDER TO XFERR COUNTER
 (2)                                                                            ;/TO BUFFER ON ST2.
 (2)  006360  052777  001000  173010                  BIS     #BIT9,@ASR        ;/GENERATE ON ST2 PULSE
 (2)  006366  017737  173006  001126                  MOV     @ABR,$BDDAT       ;/READ THE PRESET BUFFER,
 (2)                                                                            ;/PREVIOUS COUNTER
 (2)  006374  012677  172776                          MOV     (6)+,@ASR         ;/CONTENTS ARE IN $BDDAT.
 (2)  006400  005737  001126                          TST     $BDDAT            ;/RESTORE CSR
 (1)  006404  001004                                  BNE     2$                ;/YES - NEXT TEST.
 (1)  006406  105766  177776                          TSTB    -2(6)             ;/AT HIGH RATE MAY HAVE HAD OVERFLOW
 (1)                                                                            ;/NOTE: CSR HAD BEEN PUT ON STACK.
 (1)  006412  100401                                  BMI     2$                ;/NEXT TEST IF OVERFLOW.
 (1)
 (2)
                                              ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 (1)  006414  104006                                  ERROR   6                 ;/CLOCK FAILED TO COUNT AT
 (1)                                                                            ;/RATE:100HZ
 (2)
                                              ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 (1)
 (1)  006416  005077  172754                  2$:     CLR     @ASR              ;/CLEAR THE CLOCK.
 (1)
 (1)
 (5)                                        ;;*************************************************************
 (4)                                        ;*TEST 41        *TEST THE ABILITY OF CLOCK TO COUNT AT LINEFREQ RATE
 (5)
 (5)                                        ;*
 (5)                                        ;*THIS TEST IS DESIGNED TO TEST THE CLOCK'S ABILITY
 (5)                                        ;*TO COUNT AT LINEFREQ RATE.
 (5)                                        ;*
 (4)                                        ;;*************************************************************
 (3)  006422  000004                        TST41:  SCOPE
 (2)  006424  012737  000005  001160                MOV     #5,$TIMES       ;;DO 5 ITERATIONS
 (1)
 (1)  006432  032777  010000  172500                BIT     #BIT12,@SWR     ;SHALL WE TEST
 (1)                                                                        ;LINE FREQ?
 (1)                                                                        ;SW12=1
 (3)  006440  001450                                BEQ     TST42           ;;
 (1)
 (1)  006442  005077  172730                        CLR     @ASR            ;/CLEAR CLOCK
 (1)  006446  005077  172726                        CLR     @ABR            ;/CLEAR PRESET BUFFER
 (1)  006452  012777  000071  172716                MOV     #BIT0.70,@ASR   ;/START CLOCK, MODE0, RATE:LINEFREQ
 (1)  006460  005000                                CLR     R0              ;/NOW WE'LL DO A LITTLE DELAY. THIS DELAY
 (1)
 (1)  006462  005200                        1$:     INC     R0              ;/WILL AMOUNT TO APPROXIMATELY
 (1)  006464  001376                                BNE     1$              ;/369 MS.
 (1)
 (2)  006466  017746  172704                        MOV     @ASR,-(6)       ;/SAVE CSR
 (2)  006472  011637  001424                        MOV     (6),$TMP3       ;/GET CSR.
 (2)  006476  042737  177707  001424                BIC     #177707,$TMP3   ;/SAVE RATE BITS.
 (2)  006504  052737  004005  001424                BIS     #BIT11!BIT2.BIT0,$TMP3  ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
 (2)  006512  013777  001424  172656                MOV     $TMP3,@ASR              ;/LOAD CSR.
 (2)                                                                        ;/THIS MUST BE DONE IN
 (2)                                                                        ;/ORDER TO XFERR COUNTER
 (2)                                                                        ;/TO BUFFER ON ST2.
 (2)  006520  052777  001000  172650                BIS     #BIT9,@ASR      ;/GENERATE ON ST2 PULSE
 (2)  006526  017737  172646  001126                MOV     @ABR,$BDDAT     ;/READ THE PRESET BUFFER,
 (2)                                                                        ;/PREVIOUS COUNTER
 (2)  006534  012677  172636                        MOV     (6)+,@ASR       ;/CONTENTS ARE IN $BDDAT.
 (2)  006540  005737  001126                        TST     $BDDAT          ;/RESTORE CSR
 (1)  006544  001004                                BNE     2$              ;/YES - NEXT TEST.
 (1)  006546  105766  177776                        TSTB    -2(6)           ;/AT HIGH RATE MAY HAVE HAD OVERFLOW
 (1)                                                                        ;/NOTE: CSR HAD BEEN PUT ON STACK.
 (1)  006552  100401                                BMI     2$              ;/NEXT TEST IF OVERFLOW.
 (1)
 (2)
                                            ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 (1)  006554  104006                                ERROR   6               ;/CLOCK FAILED TO COUNT AT
 (1)                                                                        ;/RATE:LINEFREQ
 (2)
                                            ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 (1)
 (1)  006556  005077  172614                2$:     CLR     @ASR            ;/CLEAR THE CLOCK.
 (1)
 (1)
```

```
                                  ;;*************************************************************
                                  ;*TEST 42        *TEST THAT COUNTER DOESN'T COUNT WHEN ''SLAVE IN'' RATE IS SELECTED
                                  ;;*************************************************************
006562  000004                    TST42:  SCOPE
006564  012737  000020  001160            MOV     #20,$TIMES         ;;DO 20 ITERATIONS

006572  005077  172600                    CLR     @ASR               ;CLEAR CSR.
006576  005077  172576                    CLR     @ABR               ;CLEAR PRESET BUFFER.

006602  052777  000001  172566            BIS     #BIT0,@ASR         ;SET GO BIT, RATE:''SLAVE IN''

006610  052777  000400  172560            BIS     #BIT8,@ASR         ;GENERATE A MAINTENANCE ST1.
006616  005000                            CLR     R0

006620  005200                    1$:     INC     R0                 ;NOW DO A SHORT DELAY.
006622  001376                            BNE     1$

006624  017746  172546                    MOV     @ASR,-(6)          ;/SAVE CSR
006630  011637  001424                    MOV     (6),$TMP3          ;/GET CSR.
006634  042737  177707  001424            BIC     #177707,$TMP3      ;/SAVE RATE BITS.
006642  052737  004005  001424            BIS     #BIT11!BIT2!BIT0,$TMP3  ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
006650  013777  001424  172520            MOV     $TMP3,@ASR                 ;/LOAD CSR.
                                                                     ;/THIS MUST BE DONE IN
                                                                     ;/ORDER TO XFERR COUNTER
                                                                     ;/TO BUFFER ON ST2.
006656  052777  001000  172512            BIS     #BIT9,@ASR         ;/GENERATE ON ST2 PULSE
006664  017737  172510  001126            MOV     @ABR,$BDDAT        ;/READ THE PRESET BUFFER,
                                                                     ;/PREVIOUS COUNTER
006672  012677  172500                    MOV     (6)+,@ASR          ;/CONTENTS ARE IN $BDDAT.
006676  005737  001126                    TST     $BDDAT             ;/RESTORE CSR
006702  001003                            BNE     2$                 ;IF ANY COUNT, ERROR.
006704  105777  172466                    TSTB    @ASR               ;CHECK FOR OVERFLOW.
006710  100003                            BPL     3$                 ;IF NO OVERFLOW, NEXT TEST

006712  005037  001124            2$:     CLR     $GDDAT             ;CLEAR FOR TYPEOUT, EXP'D ZERO.

                                  ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

006716  104011                            ERROR   11                 ;CLOCK COUNTED WHEN RATE:''SLAVE IN''
                                                                     ;WAS SELECTED.

                                  ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

006720  005077  172452            3$:     CLR     @ASR               ;CLEAR CLOCK'S CSR.



                                  ;;*************************************************************
                                  ;*TEST 43        *TEST THAT THE CLOCK WILL COUNT IN MODE 1
                                  ;;*************************************************************
006724  000004                    TST43:  SCOPE

006726  005077  172444                    CLR     @ASR               ;CLEAR THE CSR.
006732  012777  177777  172440            MOV     #-1,@ABR           ;PRESET BUFFER REG.
006740  052777  000013  172430            BIS     #13,@ASR           ;START CLOCK,RATE:1 MHZ,MODE 1.
006746  005000                            CLR     R0
006750  105200                    1$:     INCB    R0                 ;NOW DO A SHORT DELAY SO THAT THE
```

```
006752  001376                                   BNE     1$                 ;CLOCK CAN COUNT TO OVERFLOW.

006754  105777  172416                           TSTB    @ASR               ;OVERFLOW SHOULD HAVE SET.
006760  100401                                   BMI     2$                 ;GOTO NEXT TEST IF SO.


                                         ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

006762  104006                                   ERROR   6                  ;CLOCK FAILED TO COUNT UP AND SET
                                                                            ;OVERFLOW IN MODE 1.

                                         ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

006764                                   2$:


                                                 .SBTTL  *
                                                 .SBTTL  *PHASE 4 CLOCK INTERRUPT TEST.
                                                 .SBTTL  *


                                         ;;*************************************************************************
                                         ;*TEST 44        *TEST THAT THE CLOCK WILL INTERRUPT ON OVERFLOW
                                         ;;*************************************************************************
006764  000004                           TST44:  SCOPE
006766  012737  000020  001160                   MOV     #20,$TIMES         ;;DO 20 ITERATIONS


006774  012746  000340                           MOV     #340,-(SP)         ;PUT PRIORITY ON STACK.
007000  012746  007006                           MOV     #64$,-(SP)         ;PUT RETURN ADDRESS ON STACK
007004  000002                                   RTI                        ;DO AN RTI, PUTS PRIORITY IN CPU.
007006                                   64$:

007006  005077  172364                           CLR     @ASR               ;CLEAR CLOCK'S CSR.
007012  012777  177777  172360                   MOV     #-1,@ABR           ;SET PRESET BUFFER TO ALL ONES.

007020  012777  000161  172350                   MOV     #161,@ASR          ;START CLOCK, RATE:ST1.
007026  052777  000400  172342                   BIS     #BIT8,@ASR         ;GENERATE A MAINTENANCE ST1.
007034  012777  007074  172340                   MOV     #1$,@VECT1         ;SET INTERRUPT ADDR.

007042  012746  000000                           MOV     #0,-(SP)           ;PUT PRIORITY ON STACK.
007046  012746  007054                           MOV     #65$,-(SP)         ;PUT RETURN ADDRESS ON STACK
007052  000002                                   RTI                        ;DO AN RTI, PUTS PRIORITY IN CPU.
007054                                   65$:

007054  000240                                   NOP                        ;STALL TIME

007056  012746  000340                           MOV     #340,-(SP)         ;PUT PRIORITY ON STACK.
007062  012746  007070                           MOV     #66$,-(SP)         ;PUT RETURN ADDRESS ON STACK
007066  000002                                   RTI                        ;DO AN RTI, PUTS PRIORITY IN CPU.
007070                                   66$:

                                         ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

007070  104007                                   ERROR   7                  ;CLOCK FAILED TO INTERRUPT.

```

```
                                  ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

007072  000402                            BR      2$
007074                            1$:
007074  062706  000004                    ADD     #4,SP                   ;/ADD #4 TO STACK POINTER.
007100  005077  172272            2$:     CLR     @ASR            ;CLEAR THE CLOCK.


                                  ;;*****************************************************************
                                  ;*TEST 45        *TEST THAT ST2 WILL CAUSE AN INTERRUPT
                                  ;;*****************************************************************
007104  000004                    TST45:  SCOPE


007106  012746  000340                    MOV     #340,-(SP)      ;PUT PRIORITY ON STACK.
007112  012746  007120                    MOV     #64$,-(SP)      ;PUT RETURN ADDRESS ON STACK
007116  000002                            RTI                     ;DO AN RTI, PUTS PRIORITY IN CPU.
007120                            64$:

007120  005077  172252                    CLR     @ASR            ;CLEAR CLOCKS CSR.
007124  012777  007200  172254            MOV     #1$,@VECT2      ;SET UP INTERRUPT VECTOR.
007132  012777  040001  172236            MOV     #BIT14!BIT0,@ASR;SET "INT2",AND GO BIT.
007140  052777  001000  172230            BIS     #BIT9,@ASR      ;GENERATE A MAINTENANCE ST2.

007146  012746  000000                    MOV     #0,-(SP)        ;PUT PRIORITY ON STACK.
007152  012746  007160                    MOV     #65$,-(SP)      ;PUT RETURN ADDRESS ON STACK
007156  000002                            RTI                     ;DO AN RTI, PUTS PRIORITY IN CPU.
007160                            65$:

007160  000240                            NOP                     ;STALL TIME

007162  012746  000340                    MOV     #340,-(SP)      ;PUT PRIORITY ON STACK.
007166  012746  007174                    MOV     #66$,-(SP)      ;PUT RETURN ADDRESS ON STACK
007172  000002                            RTI                     ;DO AN RTI, PUTS PRIORITY IN CPU.
007174                            66$:

                                  ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

007174  104007                            ERROR   7               ;CLOCK FAILED TO INTERRUPT ON ST2.

                                  ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

007176  000402                            BR      2$
007200                            1$:
007200  062706  000004                    ADD     #4,SP                   ;/ADD #4 TO STACK POINTER.
007204  005077  172166            2$:     CLR     @ASR            ;CLEAR CLOCK'S CSR.

                                          .SBTTL  *
                                          .SBTTL  *PHASE 5 ADVANCED TESTING
                                          .SBTTL  *
                                          ;;*************************************************************
 (3)                                      ;*TEST 46       *TEST THAT THE ''FOR'' BIT WILL SET ON 2 ST2'S
 (3)                                      ;;*************************************************************
 (2)  007210  000004                      TST46:  SCOPE

      007212  005077  172160                      CLR     @ASR                ;START WITH CSR CLEAR.
      007216  005277  172154                      INC     @ASR                ;SET GO BIT.
      007222  052777  001000  172146              BIS #BIT9,@ASR              ; GENERATE THE 1ST ST2 PULSE.
      007230  052777  001000  172140              BIS     #BIT9,@ASR          ;GENERATE 2ND ST2 PULSE.
                                                                              ;THIS SHOULD CAUSE FOR BIT TO SET.
      007236  032777  010000  172132              BIT     #BIT12,@ASR         ;DID FOR BIT SET?
      007244  001007                              BNE     1$                  ;YES-THEN NEXT TEST.

      007246  017737  172124  001126              MOV     @ASR,$BDDAT         ;RECORD CSR.
      007254  012737  110001  001124              MOV     #BIT15!BIT12!BIT0,$GDDAT         ;RECORD S/B.

                                          ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

      007262  104001                              ERROR   1                   ;ERROR-''FOR'' BIT FAILED TO SET ON
                                                                              ;ON TWO SUCCESIVE ST2 PULSES.

                                          ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

      007264                              1$:


                                          ;;*************************************************************
 (3)                                      ;*TEST 47       *TEST THAT FOR BIT WILL SET ON TWO OVERFLOWS
 (3)                                      ;;*************************************************************
 (2)  007264  000004                      TST47:  SCOPE
 (1)  007266  012737  000002  001160              MOV     #2,$TIMES           ;;DO 2 ITERATIONS

      007274  005077  172076                      CLR     @ASR                ;START WITH CSR CLEAR.
      007300  012777  177777  172072              MOV     #-1,@ABR            ;PRELOAD BUFFER REG.
      007306  052777  000013  172062              BIS     #13,@ASR            ;START CLOCK,MODE 1,1MHZ.
      007314  005000                              CLR     R0                  ;NOW DO A SHORT DELAY.
      007316  105200                      1$:     INCB    R0                  ;DURING THIS DELAY, THE CLOCK WILL
      007320  001376                              BNE     1$                  ;HAVE OVERFLOWED TWICE-
                                                                              ;THIS SHOULD CAUSE THE FOR BIT TO SET.

      007322  032777  010000  172046              BIT     #BIT12,@ASR         ;DID FOR SET?
      007330  001007                              BNE     2$                  ;YES-NEXT TEST.

      007332  017737  172040  001126              MOV     @ASR,$BDDAT         ;NO-RECORD THE CSR.
      007340  012737  010213  001124              MOV     #010213,$GDDAT      ;RECORD S/B.

                                          ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

      007346  104001                              ERROR   1                   ;ERROR FOR BIT FAILED TO SET ON
                                                                              ; TWO SUCCESSIVE OVERFLOWS.

                                          ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

      007350                              2$:
                                          ;;*************************************************************
 (3)                                      ;*TEST 50       *TEST THAT FOR BIT WILL CLEAR IF GO BIT IS SET
 (3)                                      ;;*************************************************************
 (2)  007350  000004                    TST50:  SCOPE

      007352  012777  000001  172016            MOV     #BIT0,@ASR         ;CLEAR CSR,SET GO BIT.
      007360  052777  001000  172010            BIS     #BIT9,@ASR         ;SET 1ST ST2 PULSE.
      007366  052777  001000  172002            BIS     #BIT9,@ASR         ;GENERATE 2ND ST2 PULSE.
                                                                           ;FOR BIT SETS HERE.
      007374  042777  000001  171774            BIC     #BIT0,@ASR         ;CLEAR GO BIT.

      007402  052777  000001  171766            BIS     #BIT0,@ASR         ;SET THE ''GO'' BIT AGAIN -
                                                                           ;SHOULD CLEAR FOR BIT.

      007410  017737  171762  001126            MOV     @ASR,$BDDAT        ;READ THE CSR.

      007416  012737  100001  001124            MOV     #100001,$GDDAT     ;RECORD WHAT CSR S/B.
      007424  032737  010000  001126            BIT     #BIT12,$BDDAT      ;DID FOR BIT CLEAR?
      007432  001401                            BEQ     1$                 ;YES NEXT TEST.

                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

      007434  104001                            ERROR   1                  ;FOR BIT FALED TO CLEAR
                                                                           ;WHEN ''GO'' BIT WAS SET.

                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

      007436  005077  171734            1$:     CLR     @ASR               ;CLEAR THE CSR.


                                        ;;*****************************************************************
 (3)                                    ;*TEST 51       *TEST THAT WE CAN DISABLE THE INTERNAL OSC
 (3)                                    ;;*****************************************************************
 (2)  007442  000004                    TST51:  SCOPE
 (1)  007444  012737  000005  001160            MOV     #5,$TIMES          ;;DO 5 ITERATIONS

      007452  005077  171720                    CLR     @ASR               ;CLEAR THE CSR
      007456  005077  171716                    CLR     @ABR               ;CLEAR THE PRESET BUFFER
      007462  005037  001124                    CLR     $GDDAT             ;CLEAR EXPED.

      007466  012777  004000  171702            MOV     #BIT11,@ASR        ;DISABLE THE INTERNAL OSC.
      007474  052777  000011  171674            BIS     #BIT3!BIT0,@ASR ;START CLOCK:RATE 1MHZ.
      007502  005000                            CLR     R0
      007504  105200                    1$:     INCB    R0                 ;DELAY A SHORT TIME.
      007506  001376                            BNE     1$
      007510  017746  171662                    MOV     @ASR,-(6)          ;/SAVE CSR
 (1)  007514  011637  001424                    MOV     (6),$TMP3          ;/GET CSR.
 (1)  007520  042737  177707  001424            BIC     #177707,$TMP3      ;/SAVE RATE BITS.
 (1)  007526  052737  004005  001424            BIS     #BIT11!BIT2!BIT0,$TMP3   ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
 (1)  007534  013777  001424  171634            MOV     $TMP3,@ASR               ;/LOAD CSR.
 (1)                                                                       ;/THIS MUST BE DONE IN
 (1)                                                                       ;/ORDER TO XFERR COUNTER
 (1)                                                                       ;/TO BUFFER ON ST2.
 (1)  007542  052777  001000  171626            BIS     #BIT9,@ASR         ;/GENERATE ON ST2 PULSE
 (1)  007550  017737  171624  001126            MOV     @ABR,$BDDAT        ;/READ THE PRESET BUFFER,
 (1)                                                                       ;/PREVIOUS COUNTER
 (1)  007556  012677  171614                    MOV     (6)+,@ASR          ;/CONTENTS ARE IN $BDDAT.
 (1)  007562  005737  001126                    TST     $BDDAT             ;/RESTORE CSR
      007566  001401                            BEQ     2$                 ;NO - GOOD - NEXT TEST.

```

```
                                         ;;$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

       007570  104011                            ERROR   11               ;CLOCK DISABLE INTERNAL
                                                                          ;OSC. DID NOT WORK.

                                         ;;$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

       007572  005077  171600            2$:     CLR     @ASR             ;CLEAR THE CSR.

                                         ;;*****************************************************************
 (3)                                     ;*TEST 52       *TEST THAT CLOCK CAN BE COUNTED USING MAINTENANCE OSC
 (3)                                     ;;*****************************************************************
 (2)   007576  000004                    TST52:  SCOPE

       007600  005077  171572                    CLR     @ASR             ;CLEAR THE CSR.
       007604  005077  171570                    CLR     @ABR             ;CLEAR THE PRESET BUFFER.
       007610  052777  004000  171560            BIS     #BIT11,@ASR      ;DISABLE THE INTERNAL OSC.
       007616  052777  000011  171552            BIS     #BIT3!BIT0,@ASR  ;START CLOCK, 1MHZ, GO.
       007624  012700  177754                    MOV     #-20.,R0         ;SET TO COUNT 20 TIMES

       007630  052777  002000  171540    1$:     BIS     #BIT10,@ASR      ;GENERATE 1 MAINTENANCE OSC.
                                                                          ;NOTE: AT 1MHZ, IT TAKES 10
                                                                          ;MAINT. OSC TO EQUAL 1 COUNT
       007636  005200                            INC     R0               ;DO 20 MAINTENANCE OSC.
       007640  001373                            BNE     1$

       007642  017746  171530                    MOV     @ASR,-(6)        ;/SAVE CSR
 (1)   007646  011637  001424                    MOV     (6),$TMP3        ;/GET CSR.
 (1)   007652  042737  177707  001424            BIC     #177707,$TMP3    ;/SAVE RATE BITS.
 (1)   007660  052737  004005  001424            BIS     #BIT11!BIT2.BIT0,$TMP3   ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
 (1)   007666  013777  001424  171502            MOV     $TMP3,@ASR                ;/LOAD CSR.
 (1)                                                                      ;/THIS MUST BE DONE IN
 (1)                                                                      ;/ORDER TO XFERR COUNTER
 (1)                                                                      ;/TO BUFFER ON ST2.
 (1)   007674  052777  001000  171474            BIS     #BIT9,@ASR       ;/GENERATE ON ST2 PULSE
 (1)   007702  017737  171472  001126            MOV     @ABR,$BDDAT      ;/READ THE PRESET BUFFER.
 (1)                                                                      ;/PREVIOUS COUNTER
 (1)   007710  012677  171462                    MOV     (6)+,@ASR        ;/CONTENTS ARE IN $BDDAT.
 (1)   007714  005737  001126                    TST     $BDDAT           ;/RESTORE CSR
       007720  001001                            BNE     2$               ;YES - NEXT TEST.


                                         ;;$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

       007722  104011                            ERROR   11               ;ERROR COULD NOT COUNT USING
                                                                          ;MAINTENANCE OSC.

                                         ;;$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

       007724  005077  171446            2$:     CLR     @ASR             ;CLEAR THE CSR.

 (1)
 (5)                                           ;;*****************************************************************
 (4)                                           ;;*TEST 53        *TEST THE CLOCK'S 1MHZ DIVIDER
 (4)                                           ;;*****************************************************************
 (3)  007730  000004                           TST53:  SCOPE
 (2)  007732  012737  000005  001160                   MOV     #5,$TIMES          ;;DO 5 ITERATIONS
 (1)
 (1)  007740  005077  171432                           CLR     @ASR               ;/CLEAR THE CSR.
 (1)  007744  005077  171430                           CLR     @ABR               ;/CLEAR THE PRESET BUFFER.
 (1)  007750  052777  004000  171420                   BIS     #BIT11,@ASR        ;/DISABLE THE INTERNAL OSC.
 (1)  007756  052777  000011  171412                   BIS     #1.10,@ASR         ;/ENABLE CLOCK, RATE:1MHZ
 (1)
 (1)
 (1)  007764  012700  177766           10$:    MOV     #-10.,R0           ;/SET TO GENERATE 10 OSC PULSES.
 (1)
 (1)  007770  052777  002000  171400  1$:     BIS     #BIT10,@ASR        ;/GENERATE ONE OSC PULSE.
 (1)  007776  005200                                   INC     R0                 ;/DONE 10 OSC PULSES?
 (1)  010000  001373                                   BNE     1$                 ;/NO - DO ANOTHER ONE.
 (1)
 (1)
 (1)  010002  012737  000001  001124  2$:     MOV     #1,$GDDAT          ;/SET FOR ERROR TYPEOUT - IF ANY.
 (2)  010010  017746  171362                   MOV     @ASR,-(6)          ;/SAVE CSR
 (2)  010014  011637  001424                   MOV     (6),$TMP3          ;/GET CSR.
 (2)  010020  042737  177707  001424          BIC     #177707,$TMP3      ;/SAVE RATE BITS.
 (2)  010026  052737  004005  001424          BIS     #BIT11!BIT2 BIT0,$TMP3   ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
 (2)  010034  013777  001424  171334          MOV     $TMP3,@ASR               ;/LOAD CSR.
 (2)                                                                      ;/THIS MUST BE DONE IN
 (2)                                                                      ;/ORDER TO XFERR COUNTER
 (2)                                                                      ;/TO BUFFER ON ST2.
 (2)  010042  052777  001000  171326          BIS     #BIT9,@ASR         ;/GENERATE ON ST2 PULSE
 (2)  010050  017737  171324  001126          MOV     @ABR,$BDDAT        ;/READ THE PRESET BUFFER,
 (2)                                                                      ;/PREVIOUS COUNTER
 (2)  010056  012677  171314                   MOV     (6)+,@ASR          ;/CONTENTS ARE IN $BDDAT.
 (2)  010062  005737  001126                   TST     $BDDAT             ;/RESTORE CSR
 (1)  010066  013737  001124  001420          MOV     $GDDAT,$TMP0       ;/$TMP0 USED IN ERROR TYPEOUT.
 (1)
 (1)  010074  023737  001124  001126          CMP     $GDDAT,$BDDAT      ;/DID CLOCK ADVANCE ONCE?
 (1)
 (1)  010102  001402                           BEQ     3$                 ;/YES - NEXT TEST.
 (2)
                                               ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 (1)  010104  104011                           ERROR   11                 ;/ERROR ON CLOCK1MHZ PULSE
 (1)                                                                      ;/NOT GENERATED WHEN 10
 (1)                                                                      ;/OSC PULSES GENERATED.
 (2)
                                               ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 (1)  010106  000443                           BR      5$
 (1)  010110  012700  000011           3$:     MOV     #9.,R0  ;/GET THE NUMBER OF MORE OSC PULSES
 (1)                                                                      ;/TO BE GENERATED.
 (1)
 (1)  010114  052777  002000  171254  4$:     BIS     #BIT10,@ASR        ;/GENERATE ANOTHER OSC PULSE.
 (1)  010122  005300                                   DEC     R0                 ;/WHAT WE WANT TO CHECK
```

```
  (1)  010124  001373                         BNE     4$               ;/1MHZ PULSE ON 9 OSC PULSES.
  (1)
  (1)
  (2)  010126  017746  171244                 MOV     @ASR,-(6)        ;/SAVE CSR
  (2)  010132  011637  001424                 MOV     (6),$TMP3        ;/GET CSR.
  (2)  010136  042737  177707  001424         BIC     #177707,$TMP3    ;/SAVE RATE BITS.
  (2)  010144  052737  004005  001424         BIS     #BIT11!BIT2!BIT0,$TMP3  ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
  (2)  010152  013777  001424  171216         MOV     $TMP3,@ASR              ;/LOAD CSR.
  (2)                                                                  ;/THIS MUST BE DONE IN
  (2)                                                                  ;/ORDER TO XFERR COUNTER
  (2)                                                                  ;/TO BUFFER ON ST2.
  (2)  010160  052777  001000  171210         BIS     #BIT9,@ASR       ;/GENERATE ON ST2 PULSE
  (2)  010166  017737  171206  001126         MOV     @ABR,$BDDAT      ;/READ THE PRESET BUFFER,
  (2)                                                                  ;/PREVIOUS COUNTER
  (2)  010174  012677  171176                 MOV     (6)+,@ASR        ;/CONTENTS ARE IN $BDDAT.
  (2)  010200  005737  001126                 TST     $BDDAT           ;/RESTORE CSR
  (1)  010204  023737  001124  001126         CMP     $GDDAT,$BDDAT    ;/WAS ANOTHER 1MHZ PULSE GENERATED?
  (1)  010212  001401                         BEQ     5$               ;/NO - NEXT TEST.
  (2)
                                    ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

  (1)  010214  104011                         ERROR   11               ;/WE SEEM TO HAVE GENERATED
  (1)                                                                  ;/ANOTHER 1MHZ PULSE ON
  (1)                                                                  ;/ONLY 9 MAINTENANCE
  (1)                                                                  ;/OSC PULSES.
  (2)
                                    ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

  (1)  010216  005077  171154         5$:     CLR     @ASR             ;/CLEAR THE CSR.
  (1)
 1173
  (1)
  (5)                               ;;*****************************************************************
  (4)                               ;;*TEST 54        *TEST THE CLOCK'S 100KHZ DIVIDER
  (4)                               ;;*****************************************************************
  (3)  010222  000004                 TST54:  SCOPE
  (2)  010224  012737  000005  001160         MOV     #5,$TIMES        ;;DO 5 ITERATIONS
  (1)
  (1)  010232  005077  171140                 CLR     @ASR             ;/CLEAR THE CSR.
  (1)  010236  005077  171136                 CLR     @ABR             ;/CLEAR THE PRESET BUFFER.
  (1)  010242  052777  004000  171126         BIS     #BIT11,@ASR      ;/DISABLE THE INTERNAL OSC.
  (1)  010250  052777  000021  171120         BIS     #1!20,@ASR       ;/ENABLE CLOCK, RATE:100KHZ
  (1)
  (1)
  (1)  010256  012700  177634         10$:    MOV     #-100.,R0        ;/SET TO GENERATE 100 OSC PULSES.
  (1)
  (1)  010262  052777  002000  171106 1$:     BIS     #BIT10,@ASR      ;/GENERATE ONE OSC PULSE.
  (1)  010270  005200                         INC     R0               ;/DONE 100 OSC PULSES?
  (1)  010272  001373                         BNE     1$               ;/NO - DO ANOTHER ONE.
  (1)
  (1)
  (1)  010274  012737  000001  001124 2$:     MOV     #1,$GDDAT        ;/SET FOR ERROR TYPEOUT - IF ANY.
  (2)  010302  017746  171070                 MOV     @ASR,-(6)        ;/SAVE CSR
  (2)  010306  011637  001424                 MOV     (6),$TMP3        ;/GET CSR.
  (2)  010312  042737  177707  001424         BIC     #177707,$TMP3    ;/SAVE RATE BITS.
  (2)  010320  052737  004005  001424         BIS     #BIT11!BIT2!BIT0,$TMP3  ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
```

```
(2)  010326  013777  001424  171042           MOV     $TMP3,@ASR              ;/LOAD CSR.
(2)                                                                   ;/THIS MUST BE DONE IN
(2)                                                                   ;/ORDER TO XFERR COUNTER
(2)                                                                   ;/TO BUFFER ON ST2.
(2)  010334  052777  001000  171034           BIS     #BIT9,@ASR      ;/GENERATE ON ST2 PULSE
(2)  010342  017737  171032  001126           MOV     @ABR,$BDDAT     ;/READ THE PRESET BUFFER,
(2)                                                                   ;/PREVIOUS COUNTER
(2)  010350  012677  171022                   MOV     (6)+,@ASR       ;/CONTENTS ARE IN $BDDAT.
(2)  010354  005737  001126                   TST     $BDDAT          ;/RESTORE CSR
(1)  010360  013737  001124  001420           MOV     $GDDAT,$TMP0    ;/$TMP0 USED IN ERROR TYPEOUT.
(1)
(1)  010366  023737  001124  001126           CMP     $GDDAT,$BDDAT   ;/DID CLOCK ADVANCE ONCE?
(1)
(1)  010374  001402                           BEQ     3$              ;/YES - NEXT TEST.
(2)
                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

(1)  010376  104011                           ERROR   11              ;/ERROR ON CLOCK100KHZ PULSE
(1)                                                                   ;/NOT GENERATED WHEN 100
(1)                                                                   ;/OSC PULSES GENERATED.
(2)
                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

(1)  010400  000443                           BR      5$
(1)  010402  012700  000143           3$:     MOV     #99.,R0 ;/GET THE NUMBER OF MORE OSC PULSES
(1)                                                                   ;/TO BE GENERATED.
(1)
(1)  010406  052777  002000  170762   4$:     BIS     #BIT10,@ASR     ;/GENERATE ANOTHER OSC PULSE.
(1)  010414  005300                           DEC     R0              ;/WHAT WE WANT TO CHECK
(1)  010416  001373                           BNE     4$              ;/100KHZ PULSE ON 99 OSC PULSES.
(1)
(1)
(2)  010420  017746  170752                   MOV     @ASR,-(6)       ;/SAVE CSR
(2)  010424  011637  001424                   MOV     (6),$TMP3       ;/GET CSR.
(2)  010430  042737  177707  001424           BIC     #177707,$TMP3   ;/SAVE RATE BITS.
(2)  010436  052737  004005  001424           BIS     #BIT11!BIT2!BIT0,$TMP3  ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
(2)  010444  013777  001424  170724           MOV     $TMP3,@ASR              ;/LOAD CSR.
(2)                                                                   ;/THIS MUST BE DONE IN
(2)                                                                   ;/ORDER TO XFERR COUNTER
(2)                                                                   ;/TO BUFFER ON ST2.
(2)  010452  052777  001000  170716           BIS     #BIT9,@ASR      ;/GENERATE ON ST2 PULSE
(2)  010460  017737  170714  001126           MOV     @ABR,$BDDAT     ;/READ THE PRESET BUFFER,
(2)                                                                   ;/PREVIOUS COUNTER
(2)  010466  012677  170704                   MOV     (6)+,@ASR       ;/CONTENTS ARE IN $BDDAT.
(2)  010472  005737  001126                   TST     $BDDAT          ;/RESTORE CSR
(1)  010476  023737  001124  001126           CMP     $GDDAT,$BDDAT   ;/WAS ANOTHER 100KHZ PULSE GENERATED?
(1)  010504  001401                           BEQ     5$              ;/NO - NEXT TEST.
(2)
                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

(1)  010506  104011                           ERROR   11              ;/WE SEEM TO HAVE GENERATED
(1)                                                                   ;/ANOTHER 100KHZ PULSE ON
(1)                                                                   ;/ONLY 99 MAINTENANCE
(1)                                                                   ;/OSC PULSES.
(2)
                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
```

```
  (1)  010510  005077  170662           5$:    CLR     @ASR              ;/CLEAR THE CSR.
  (1)
 1174
  (1)
  (5)                                   ;;*************************************************************
  (4)                                   ;*TEST 55        *TEST THE CLOCK'S 10KHZ DIVIDER
  (4)                                   ;;*************************************************************
  (3)  010514  000004                   TST55:  SCOPE
  (2)  010516  012737  000005  001160           MOV     #5,$TIMES         ;;DO 5 ITERATIONS
  (1)
  (1)  010524  005077  170646                   CLR     @ASR              ;/CLEAR THE CSR.
  (1)  010530  005077  170644                   CLR     @ABR              ;/CLEAR THE PRESET BUFFER.
  (1)  010534  052777  004000  170634           BIS     #BIT11,@ASR       ;/DISABLE THE INTERNAL OSC.
  (1)  010542  052777  000031  170626           BIS     #1.30,@ASR        ;/ENABLE CLOCK, RATE:10KHZ
  (1)
  (1)
  (1)  010550  012700  176030           10$:    MOV     #-1000.,R0        ;/SET TO GENERATE 1000 OSC PULSES.
  (1)
  (1)  010554  052777  002000  170614   1$:     BIS     #BIT10,@ASR       ;/GENERATE ONE OSC PULSE.
  (1)  010562  005200                           INC     R0                ;/DONE 1000 OSC PULSES?
  (1)  010564  001373                           BNE     1$                ;/NO - DO ANOTHER ONE.
  (1)
  (1)
  (1)  010566  012737  000001  001124   2$:     MOV     #1,$GDDAT         ;/SET FOR ERROR TYPEOUT - IF ANY.
  (2)  010574  017746  170576                   MOV     @ASR,-(6)         ;/SAVE CSR
  (2)  010600  011637  001424                   MOV     (6),$TMP3         ;/GET CSR.
  (2)  010604  042737  177707  001424           BIC     #177707,$TMP3     ;/SAVE RATE BITS.
  (2)  010612  052737  004005  001424           BIS     #BIT11!BIT2!BIT0,$TMP3  ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
  (2)  010620  013777  001424  170550           MOV     $TMP3,@ASR              ;/LOAD CSR.
  (2)                                                                     ;/THIS MUST BE DONE IN
  (2)                                                                     ;/ORDER TO XFERR COUNTER
  (2)                                                                     ;/TO BUFFER ON ST2.
  (2)  010626  052777  001000  170542           BIS     #BIT9,@ASR        ;/GENERATE ON ST2 PULSE
  (2)  010634  017737  170540  001126           MOV     @ABR,$BDDAT       ;/READ THE PRESET BUFFER,
  (2)                                                                     ;/PREVIOUS COUNTER
  (2)  010642  012677  170530                   MOV     (6)+,@ASR         ;/CONTENTS ARE IN $BDDAT.
  (2)  010646  005737  001126                   TST     $BDDAT            ;/RESTORE CSR
  (1)  010652  013737  001124  001420           MOV     $GDDAT,$TMP0      ;/$TMP0 USED IN ERROR TYPEOUT.
  (1)
  (1)  010660  023737  001124  001126           CMP     $GDDAT,$BDDAT     ;/DID CLOCK ADVANCE ONCE?
  (1)
  (1)  010666  001402                           BEQ     3$                ;/YES - NEXT TEST.
  (2)
                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

  (1)  010670  104011                           ERROR   11                ;/ERROR ON CLOCK10KHZ PULSE
  (1)                                                                     ;/NOT GENERATED WHEN 1000
  (1)                                                                     ;/OSC PULSES GENERATED.
  (2)
                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

  (1)  010672  000443                           BR      5$
  (1)  010674  012700  001747           3$:     MOV     #999.,R0          ;/GET THE NUMBER OF MORE OSC PULSES
  (1)                                                                     ;/TO BE GENERATED.
  (1)
  (1)  010700  052777  002000  170470  4$:     BIS     #BIT10,@ASR         ;/GENERATE ANOTHER OSC PULSE.
  (1)  010706  005300                          DEC     R0                  ;/WHAT WE WANT TO CHECK
  (1)  010710  001373                          BNE     4$                  ;/10KHZ PULSE ON 999 OSC PULSES.
  (1)
  (1)
  (2)  010712  017746  170460                  MOV     @ASR,-(6)           ;/SAVE CSR
  (2)  010716  011637  001424                  MOV     (6),$TMP3           ;/GET CSR.
  (2)  010722  042737  177707  001424          BIC     #177707,$TMP3       ;/SAVE RATE BITS.
  (2)  010730  052737  004005  001424          BIS     #BIT11.BIT2.BIT0,$TMP3  ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
  (2)  010736  013777  001424  170432          MOV     $TMP3,@ASR              ;/LOAD CSR.
  (2)                                                                      ;/THIS MUST BE DONE IN
  (2)                                                                      ;/ORDER TO XFERR COUNTER
  (2)                                                                      ;/TO BUFFER ON ST2.
  (2)  010744  052777  001000  170424          BIS     #BIT9,@ASR          ;/GENERATE ON ST2 PULSE
  (2)  010752  017737  170422  001126          MOV     @ABR,$BDDAT         ;/READ THE PRESET BUFFER,
  (2)                                                                      ;/PREVIOUS COUNTER
  (2)  010760  012677  170412                  MOV     (6)+,@ASR           ;/CONTENTS ARE IN $BDDAT.
  (2)  010764  005737  001126                  TST     $BDDAT              ;/RESTORE CSR
  (1)  010770  023737  001124  001126          CMP     $GDDAT,$BDDAT       ;/WAS ANOTHER 10KHZ PULSE GENERATED?
  (1)  010776  001401                          BEQ     5$                  ;/NO - NEXT TEST.
  (2)
                                       ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

  (1)  011000  104011                          ERROR   11                  ;/WE SEEM TO HAVE GENERATED
  (1)                                                                      ;/ANOTHER 10KHZ PULSE ON
  (1)                                                                      ;/ONLY 999 MAINTENANCE
  (1)                                                                      ;/OSC PULSES.
  (2)
                                       ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

  (1)  011002  005077  170370          5$:     CLR     @ASR                ;/CLEAR THE CSR.
  (1)
 1175
 1176
  (1)
  (5)                                  ;;*************************************************************
  (4)                                  ;;*TEST 56       *TEST THE CLOCK'S 1KHZ DIVIDER
  (4)                                  ;;*************************************************************
  (3)  011006  000004                  TST56:  SCOPE
  (2)  011010  012737  000005  001160          MOV     #5,$TIMES           ;;DO 5 ITERATIONS
  (1)
  (1)  011016  005077  170354                  CLR     @ASR                ;/CLEAR THE CSR.
  (1)  011022  005077  170352                  CLR     @ABR                ;/CLEAR THE PRESET BUFFER.
  (1)  011026  052777  004000  170342          BIS     #BIT11,@ASR         ;/DISABLE THE INTERNAL OSC.
  (1)  011034  052777  000041  170334          BIS     #1.40,@ASR          ;/ENABLE CLOCK, RATE:1KHZ
  (1)
  (1)
  (1)  011042  012700  154360          10$:    MOV     #-10000.,R0         ;/SET TO GENERATE 10000 OSC PULSES.
  (1)
  (1)  011046  052777  002000  170322  1$:     BIS     #BIT10,@ASR         ;/GENERATE ONE OSC PULSE.
  (1)  011054  005200                          INC     R0                  ;/DONE 10000 OSC PULSES?
  (1)  011056  001373                          BNE     1$                  ;/NO - DO ANOTHER ONE.
  (1)
  (1)
  (1)  011060  012737  000001  001124  2$:     MOV     #1,$GDDAT           ;/SET FOR ERROR TYPEOUT - IF ANY.
  (2)  011066  017746  170304                  MOV     @ASR,-(6)           ;/SAVE CSR
```

```
   (2)  011072  011637  001424                     MOV    (6),$TMP3          ;/GET CSR.
   (2)  011076  042737  177707  001424             BIC    #177707,$TMP3      ;/SAVE RATE BITS.
   (2)  011104  052737  004005  001424             BIS    #BIT11.BIT2.BIT0,$TMP3   ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
   (2)  011112  013777  001424  170256             MOV    $TMP3,@ASR                 ;/LOAD CSR.
   (2)                                                                       ;/THIS MUST BE DONE IN
   (2)                                                                       ;/ORDER TO XFERR COUNTER
   (2)                                                                       ;/TO BUFFER ON ST2.
   (2)  011120  052777  001000  170250             BIS    #BIT9,@ASR         ;/GENERATE ON ST2 PULSE
   (2)  011126  017737  170246  001126             MOV    @ABR,$BDDAT        ;/READ THE PRESET BUFFER.
   (2)                                                                       ;/PREVIOUS COUNTER
   (2)  011134  012677  170236                     MOV    (6)+,@ASR          ;/CONTENTS ARE IN $BDDAT.
   (2)  011140  005737  001126                     TST    $BDDAT             ;/RESTORE CSR
   (1)  011144  013737  001124  001420             MOV    $GDDAT,$TMP0       ;/$TMP0 USED IN ERROR TYPEOUT.
   (1)
   (1)  011152  023737  001124  001126             CMP    $GDDAT,$BDDAT      ;/DID CLOCK ADVANCE ONCE?
   (1)
   (1)  011160  001402                             BEQ    3$                 ;/YES - NEXT TEST.
   (2)
                                            ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

   (1)  011162  104011                             ERROR  11                 ;/ERROR ON CLOCK1KHZ PULSE
   (1)                                                                       ;/NOT GENERATED WHEN 10000
   (1)                                                                       ;/OSC PULSES GENERATED.
   (2)
                                            ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

   (1)  011164  000443                             BR     5$
   (1)  011166  012700  023417             3$:     MOV    #9999.,R0          ;/GET THE NUMBER OF MORE OSC PULSES
   (1)                                                                       ;/TO BE GENERATED.
   (1)
   (1)  011172  052777  002000  170176     4$:     BIS    #BIT10,@ASR        ;/GENERATE ANOTHER OSC PULSE.
   (1)  011200  005300                             DEC    R0                 ;/WHAT WE WANT TO CHECK
   (1)  011202  001373                             BNE    4$                 ;/1KHZ PULSE ON 9999 OSC PULSES.
   (1)
   (1)
   (2)  011204  017746  170166                     MOV    @ASR,-(6)          ;/SAVE CSR
   (2)  011210  011637  001424                     MOV    (6),$TMP3          ;/GET CSR.
   (2)  011214  042737  177707  001424             BIC    #177707,$TMP3      ;/SAVE RATE BITS.
   (2)  011222  052737  004005  001424             BIS    #BIT11.BIT2!BIT0,$TMP3   ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
   (2)  011230  013777  001424  170140             MOV    $TMP3,@ASR                 ;/LOAD CSR.
   (2)                                                                       ;/THIS MUST BE DONE IN
   (2)                                                                       ;/ORDER TO XFERR COUNTER
   (2)                                                                       ;/TO BUFFER ON ST2.
   (2)  011236  052777  001000  170132             BIS    #BIT9,@ASR         ;/GENERATE ON ST2 PULSE
   (2)  011244  017737  170130  001126             MOV    @ABR,$BDDAT        ;/READ THE PRESET BUFFER.
   (2)                                                                       ;/PREVIOUS COUNTER
   (2)  011252  012677  170120                     MOV    (6)+,@ASR          ;/CONTENTS ARE IN $BDDAT.
   (2)  011256  005737  001126                     TST    $BDDAT             ;/RESTORE CSR
   (1)  011262  023737  001124  001126             CMP    $GDDAT,$BDDAT      ;/WAS ANOTHER 1KHZ PULSE GENERATED?
   (1)  011270  001401                             BEQ    5$                 ;/NO - NEXT TEST.
   (2)
                                            ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

   (1)  011272  104011                             ERROR  11                 ;/WE SEEM TO HAVE GENERATED
   (1)                                                                       ;/ANOTHER 1KHZ PULSE ON
   (1)                                                                       ;/ONLY 9999 MAINTENANCE
```

```
  (1)                                                                         ;/OSC PULSES.
  (2)
                                                   ;;$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

  (1)   011274  005077  170076                     5$:     CLR     @ASR              ;/CLEAR THE CSR.
  (1)
 1177
  (1)
  (5)                                              ;;*******************************************************************
  (4)                                              ;*TEST 57        *TEST THE CLOCK'S 100HZ DIVIDER
  (4)                                              ;;*******************************************************************
  (3)   011300  000004                             TST57:  SCOPE
  (2)   011302  012737  000005  001160                     MOV     #5,$TIMES         ;;DO 5 ITERATIONS
  (1)
  (1)   011310  005077  170062                             CLR     @ASR              ;/CLEAR THE CSR.
  (1)   011314  005077  170060                             CLR     @ABR              ;/CLEAR THE PRESET BUFFER.
  (1)   011320  052777  004000  170050                     BIS     #BIT11,@ASR       ;/DISABLE THE INTERNAL OSC.
  (1)   011326  052777  000051  170042                     BIS     #1.50,@ASR        ;/ENABLE CLOCK, RATE:100HZ
  (1)
  (1)   011334  012701  000012                             MOV     #10.,R1
  (1)
  (1)   011340  012700  154360                     10$:    MOV     #-10000.,R0       ;/SET TO GENERATE 10000 OSC PULSES.
  (1)
  (1)   011344  052777  002000  170024             1$:     BIS     #BIT10,@ASR       ;/GENERATE ONE OSC PULSE.
  (1)   011352  005200                                     INC     R0                ;/DONE 10000 OSC PULSES?
  (1)   011354  001373                                     BNE     1$                ;/NO - DO ANOTHER ONE.
  (1)
  (1)   011356  005301                                     DEC     R1
  (1)   011360  001367                                     BNE     10$
  (1)
  (1)   011362  012737  000001  001124             2$:     MOV     #1,$GDDAT         ;/SET FOR ERROR TYPEOUT - IF ANY.
  (2)   011370  017746  170002                             MOV     @ASR,-(6)         ;/SAVE CSR
  (2)   011374  011637  001424                             MOV     (6),$TMP3         ;/GET CSR.
  (2)   011400  042737  177707  001424                     BIC     #177707,$TMP3     ;/SAVE RATE BITS.
  (2)   011406  052737  004005  001424                     BIS     #BIT11!BIT2.BIT0,$TMP3  ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
  (2)   011414  013777  001424  167754                     MOV     $TMP3,@ASR                ;/LOAD CSR.
  (2)                                                                                ;/THIS MUST BE DONE IN
  (2)                                                                                ;/ORDER TO XFERR COUNTER
  (2)                                                                                ;/TO BUFFER ON ST2.
  (2)   011422  052777  001000  167746                     BIS     #BIT9,@ASR        ;/GENERATE ON ST2 PULSE
  (2)   011430  017737  167744  001126                     MOV     @ABR,$BDDAT       ;/READ THE PRESET BUFFER,
  (2)                                                                                ;/PREVIOUS COUNTER
  (2)   011436  012677  167734                             MOV     (6)+,@ASR         ;/CONTENTS ARE IN $BDDAT.
  (2)   011442  005737  001126                             TST     $BDDAT            ;/RESTORE CSR
  (1)   011446  013737  001124  001420                     MOV     $GDDAT,$TMP0      ;/$TMP0 USED IN ERROR TYPEOUT.
  (1)
  (1)   011454  023737  001124  001126                     CMP     $GDDAT,$BDDAT     ;/DID CLOCK ADVANCE ONCE?
  (1)
  (1)   011462  001402                                     BEQ     66$               ;/YES - NEXT TEST
  (2)
                                                   ;;$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

  (1)   011464  104011                                     ERROR   11                ;/ERROR ON CLOCK100HZ PULSE
  (1)                                                                                ;/NOT GENERATED WHEN 10000
  (1)                                                                                ;/OSC PULSES GENERATED.
  (2)
```

```
                                                ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 (1)  011466  000447                                    BR      5$
 (1)  011470  012701  000012                    66$:    MOV     #10.,R1
 (1)  011474  012700  023417                    3$:     MOV     #9999.,R0               ;/GET THE NUMBER OF MORE OSC PULSES
 (1)                                                                                    ;/TO BE GENERATED.
 (1)
 (1)  011500  052777  002000  167670            4$:     BIS     #BIT10,@ASR             ;/GENERATE ANOTHER OSC PULSE.
 (1)  011506  005300                                    DEC     R0                      ;/WHAT WE WANT TO CHECK
 (1)  011510  001373                                    BNE     4$                      ;/100HZ PULSE ON 9999 OSC PULSES.
 (1)  011512  005301                                    DEC     R1
 (1)  011514  001367                                    BNE     3$
 (1)
 (1)
 (2)  011516  017746  167654                            MOV     @ASR,-(6)               ;/SAVE CSR
 (2)  011522  011637  001424                            MOV     (6),$TMP3               ;/GET CSR.
 (2)  011526  042737  177707  001424                    BIC     #177707,$TMP3           ;/SAVE RATE BITS.
 (2)  011534  052737  004005  001424                    BIS     #BIT11.BIT2!BIT0,$TMP3    ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
 (2)  011542  013777  001424  167626                    MOV     $TMP3,@ASR                        ;/LOAD CSR.
 (2)                                                                                    ;/THIS MUST BE DONE IN
 (2)                                                                                    ;/ORDER TO XFERR COUNTER
 (2)                                                                                    ;/TO BUFFER ON ST2.
 (2)  011550  052777  001000  167620                    BIS     #BIT9,@ASR              ;/GENERATE ON ST2 PULSE
 (2)  011556  017737  167616  001126                    MOV     @ABR,$BDDAT             ;/READ THE PRESET BUFFFR.
 (2)                                                                                    ;/PREVIOUS COUNTER
 (2)  011564  012677  167606                            MOV     (6)+,@ASR               ;/CONTENTS ARE IN $BDDAT.
 (2)  011570  005737  001126                            TST     $BDDAT                  ;/RESTORE CSR
 (1)  011574  023737  001124  001126                    CMP     $GDDAT,$BDDAT           ;/WAS ANOTHER 100HZ PULSE GENERATED?
 (1)  011602  001401                                    BEQ     5$                      ;/NO - NEXT TEST.
 (2)
                                                ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 (1)  011604  104011                                    ERROR   11                      ;/WE SEEM TO HAVE GENERATED
 (1)                                                                                    ;/ANOTHER 100HZ PULSE ON
 (1)                                                                                    ;/ONLY 9999 MAINTENANCE
 (1)                                                                                    ;/OSC PULSES.
 (2)
                                                ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 (1)  011606  005077  167564                    5$:     CLR     @ASR                    ;/CLEAR THE CSR.
 (1)
 1178
 1196
```

```
                                          ;;*****************************************************************
                                          ;*TEST 60        *TEST THE CLOCK'S MODE 2 OPERATION
                                                  ;*
                                                  ;*IN THIS TEST WE'LL CHECK MODE 2 OPERATION
                                                  ;*MODE 2: EXTERNAL EVENTS TIMING MODE
                                                  ;*SETTING THE GO BIT CAUSES THE COUNTER TO BEGIN COUNTING FROM
                                                  ;*ZERO AND TO FREE-RUN UNTIL THE GO BIT IS WRITTEN
                                                  ;*TO A ZERO THE COUNTER WILL CONTINUE COUNTING AFTER
                                                  ;*OVERFLOW. AN EXTERNAL PULSE FROM SCHMITZ TRIGGER 2
                                                  ;*(WHEN ST2 GO ENABLE IS A '0') CAUSES DATA TO
                                                  ;*TRANSFER FROM THE COUNTER TO THE BUFFER/PRESET REG.
                                                  ;*WHILE THE COUNTER CONTINUES TO RUN.
                                                  ;*
                                                  ;*TO TEST THIS MODE, WE'LL DISABLE THE INTERNAL OSC AND USE
                                                  ;*MAINTENANCE OSC PULSES AS WELL AS A MAINTENANCE
                                                  ;*ST2.
                                                  ;*
                                          ;;*****************************************************************
011612  000004                            TST60:  SCOPE
011614  012737  000020  001160                    MOV     #20,$TIMES          ;;DO 20 ITERATIONS

011622  005077  167550                            CLR     @ASR                ;CLEAR THE CSR.
011626  005077  167546                            CLR     @ABR                ;CLEAR THE PRESET REG.
011632  012777  004015  167536                    MOV     #004015,@ASR        ;START CLOCK.

011640  012700  177754                    1$:     MOV     #-20.,R0            ;SET TO GIVE 20 MAINTENANCE OSC.
011644  052777  002000  167524            2$:     BIS     #BIT10,@ASR         ;GENERATE A MAINTENANCE OSC.
011652  005200                                    INC     R0
011654  001373                                    BNE     2$                  ;IF NOT DONE 20 TIMES, LOOP.

011656  052777  001000  167512            3$:     BIS     #BIT9,@ASR          ;HERE'S THE BIGGIE! AN ST2 HAS BEEN GENERATED
011664  012737  000002  001124                    MOV     #2,$GDDAT           ;THE PRESET BUFFER SHOULD BE 2.
011672  017737  167502  001126                    MOV     @ABR,$BDDAT         ;READ THE PRESET BUFFER.
011700  023737  001126  001124                    CMP     $BDDAT,$GDDAT       ;DID A COUNTER TO PRESET BUFFER OCCUR?
011706  001402                                    BEQ     4$                  ;YES - NEXT SUBTEST.

                                          ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

011710  104005                                    ERROR   5                   ;A COUNTER TO PRESET BUFFER DID NOT
                                                                              ;HAPPEN PROPERLY.

                                          ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

011712  000434                                    BR      5$

011714                                    4$:
011714  017746  167456                            MOV     @ASR,-(6)           ;/SAVE CSR
011720  011637  001424                            MOV     (6),$TMP3           ;/GET CSR.
011724  042737  177707  001424                    BIC     #177707,$TMP3       ;/SAVE RATE BITS.
011732  052737  004005  001424                    BIS     #BIT11.BIT2.BIT0,$TMP3   ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
011740  013777  001424  167430                    MOV     $TMP3,@ASR                ;/LOAD CSR.
                                                                              ;/THIS MUST BE DONE IN
                                                                              ;/ORDER TO XFERR COUNTER
                                                                              ;/TO BUFFER ON ST2.
011746  052777  001000  167422                    BIS     #BIT9,@ASR          ;/GENERATE ON ST2 PULSE
011754  017737  167420  001126                    MOV     @ABR,$BDDAT         ;/READ THE PRESET BUFFER.
```

```
                                                                             ;/PREVIOUS COUNTER
011762  012677  167410                  MOV     (6)+,@ASR           ;/CONTENTS ARE IN $BDDAT.
011766  005737  001126                  TST     $BDDAT              ;/RESTORE CSR
011772  023737  001124  001126          CMP     $GDDAT,$BDDAT       ;WAS THE COUNTER ACCIDENTLY ZEROED?
012000  001401                          BEQ     5$                  ;NO - NEXT TEST.

                                ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

012002  104005                          ERROR   5                   ;THE COUNT REGISTER SHOULD NOT
                                                                    ;HAVE BEEN EFFECTED BY THE ST2
                                                                    ;IN MODE 2.

                                ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

012004                          5$:


                                ;;*****************************************************************
                                ;*TEST 61        *TEST THE CLOCK'S MODE 3 OPERATION
                                        ;*
                                        ;*IN THIS TEST WE'LL CHECK MODE 3 OPERATION.
                                        ;*MODE 3 IS JUST LIKE MODE 2 EXCEPT THAT THE COUNT
                                        ;*REG IS ZEROED AFTER AN ST2.
                                        ;*
                                ;;*****************************************************************
012004  000004                  TST61:  SCOPE
012006  012737  000020  001160          MOV     #20,$TIMES          ;;DO 20 ITERATIONS

012014  005077  167356                  CLR     @ASR                ;CLEAR THE CSR.
012020  005077  167354                  CLR     @ABR                ;CLEAR THE BUFFER REG.
012024  012777  004017  167344          MOV     #4017,@ASR          ;START CLOCK.

012032  012700  177754          1$:     MOV     #-20.,R0            ;SET TO GIVE 20 MAINTENANCE OSC.
012036  052777  002000  167332  2$:     BIS     #BIT10,@ASR         ;GENERATE A MAINTENANCE OSC.
012044  005200                          INC     R0
012046  001373                          BNE     2$                  ;IF NOT DONE 20 TIMES, LOOP.

012050  052777  001000  167320  3$:     BIS     #BIT9,@ASR          ;HERE'S THE BIGGIE! AN ST2 HAS BEEN GENERATED
012056  012737  000002  001124          MOV     #2,$GDDAT           ;THE PRESET BUFFER SHOULD BE 2.
012064  017737  167310  001126          MOV     @ABR,$BDDAT         ;READ THE PRESET BUFFER.
012072  023737  001126  001124          CMP     $BDDAT,$GDDAT       ;DID A COUNTER TO PRESET BUFFER OCCUR?
012100  001402                          BEQ     4$                  ;YES - NEXT SUBTEST.

                                ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

012102  104005                          ERROR   5                   ;A COUNTER TO PRESET BUFFER DID NOT
                                                                    ;HAPPEN PROPERLY.

                                ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

012104  000445                          BR      TST62               ;;

012106  005037  001124          4$:     CLR     $GDDAT              ;EXPECT ZERO BACK FROM COUNT REG.
012112  017746  167260                  MOV     @ASR,-(6)           ;/SAVE CSR
012116  011637  001424                  MOV     (6),$TMP3           ;/GET CSR.
012122  042737  177707  001424          BIC     #177707,$TMP3       ;/SAVE RATE BITS.
```

```
 (1)  012130  052737  004005  001424          BIS     #BIT11!BIT2.BIT0,$TMP3  ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
 (1)  012136  013777  001424  167232          MOV     $TMP3,@ASR               ;/LOAD CSR.
 (1)                                                                   ;/THIS MUST BE DONE IN
 (1)                                                                   ;/ORDER TO XFERR COUNTER
 (1)                                                                   ;/TO BUFFER ON ST2.
 (1)  012144  052777  001000  167224          BIS     #BIT9,@ASR       ;/GENERATE ON ST2 PULSE
 (1)  012152  017737  167222  001126          MOV     @ABR,$BDDAT      ;/READ THE PRESET BUFFER,
 (1)                                                                   ;/PREVIOUS COUNTER
 (1)  012160  012677  167212                  MOV     (6)+,@ASR        ;/CONTENTS ARE IN $BDDAT.
 (1)  012164  005737  001126                  TST     $BDDAT           ;/RESTORE CSR
      012170  001402                          BEQ     5$               ;IF SO - NEXT TEST.

                                 ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

      012172  104005                          ERROR   5                ;THE CLOCK FORGOT TO ZERO THE COUNT
                                                                       ;REG. AFTER AN ST2 OCCURRED ON
                                                                       ;A MODE 3 COUNT.

                                 ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

      012174  000411                          BR      TST62            ;;
      012176                          5$:
      012176  005077  167174                  CLR     @ASR             ;NOW TRY CLEARING THE CSR.
      012202  017737  167170  001126          MOV     @ASR,$BDDAT      ;READ THE CSR - DID IT CLEAR?
      012210  001403                          BEQ     TST62            ;;
      012212  005037  001124                  CLR     $GDDAT           ;NO - RECORD S/B.

                                 ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

      012216  104002                          ERROR   2                ;CSR FAILED TO CLEAR

                                 ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$


                                 ;;*****************************************************************
 (3)                             ;*TEST 62         *IF ENABLED,CHECK THRESHOLD ST1 FROM TESTOR
 (3)                             ;;*****************************************************************
 (2)  012220  000004              TST62:  SCOPE

      012222  012737  000002  001160          MOV     #2,$TIMES        ;;DO 2 ITERATIONS.
      012230  005737  001440                  TST     EXS              ;OPERATING IN TESTOR MODE?
      012234  001002                          BNE     4$               ;YES DO THIS TEST.
      012236  000137  013056                  JMP     ENDP             ;NO-END PASS
      012242                          4$:

      012242  005077  167130                  CLR     @ASR             ;YES-CLEAR CSR.
      012246  012777  177775  167124          MOV     #-3,@ABR         ;SET TO COUNT THREE TIMES.
      012254  012777  000061  167114          MOV     #61,@ASR         ;SET RATE: ST1,MODE 1 GO.
      012262  104401  012270                  TYPE    ,65$             ;;TYPE ASCIZ STRING
 (1)  012266  000432                          BR      64$              ;;GET OVER THE ASCIZ
 (1)                              ;;65$:  .ASCIZ  <200><7><7>#SET ST1 THRESHOLD POT FULLY COUNTERCLOCKWIZE..#<7>
 (1)  012354                      64$:
      012354  004737  013740                  JSR     PC,ANYKEY        ;TYPE LAST MESSAGE,AND WAIT FOR OPERATER.
      012360  012737  177775  001124          MOV     #-3,$GDDAT       ;DON'T EXPECT COUNT TO CHANGE.
      012366  017746  167004                  MOV     @ASR,-(6)        ;/SAVE CSR
 (1)  012372  011637  001424                  MOV     (6),$TMP3        ;/GET CSR.
 (1)  012376  042737  177707  001424            BIC     #177707,$TMP3   ;/SAVE RATE BITS.
 (1)  012404  052737  004005  001424            BIS     #BIT11.BIT2.BIT0,$TMP3  ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
 (1)  012412  013777  001424  166756            MOV     $TMP3,@ASR              ;/LOAD CSR.
 (1)                                                                    ;/THIS MUST BE DONE IN
 (1)                                                                    ;/ORDER TO XFERR COUNTER
 (1)                                                                    ;/TO BUFFER ON ST2.
 (1)  012420  052777  001000  166750            BIS     #BIT9,@ASR      ;/GENERATE ON ST2 PULSE
 (1)  012426  017737  166746  001126            MOV     @ABR,$BDDAT     ;/READ THE PRESET BUFFER,
 (1)                                                                    ;/PREVIOUS COUNTER
 (1)  012434  012677  166736                    MOV     (6)+,@ASR       ;/CONTENTS ARE IN $BDDAT.
 (1)  012440  005737  001126                    TST     $BDDAT          ;/RESTORE CSR
      012444  001002                            BNE     2$        ;IF NON-ZERO,WE'RE OK.

                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

      012446  104002                            ERROR   2               ;COUNTERCLOCKWIZE THRESHOLD SETTING
                                                                        ;OF ST1 SHOULD HAVE INHIBITED
                                                                        ;ST1 FROM CAUSEING CLOCK TO COUNT.

                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

      012450  000463                            BR      TST63           ;;

      012452                            2$:
      012452  104401  012460                    TYPE    ,67$            ;;TYPE ASCIZ STRING
 (1)  012456  000425                            BR      66$             ;;GET OVER THE ASCIZ
 (1)                                    ;;67$:  .ASCIZ  <200><7><7>#SET ST1 THRESHOLD POT FULLY CLOCKWIZE#
 (1)  012532                            66$:
      012532  004737  013740            3$:     JSR     PC,ANYKEY       ;TYPE LAST MESS. AND WAIT FOR OPERATOR.
      012536  017746  166634                    MOV     @ASR,-(6)       ;/SAVE CSR
 (1)  012542  011637  001424                    MOV     (6),$TMP3       ;/GET CSR.
 (1)  012546  042737  177707  001424            BIC     #177707,$TMP3   ;/SAVE RATE BITS.
 (1)  012554  052737  004005  001424            BIS     #BIT11!BIT2!BIT0,$TMP3  ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
 (1)  012562  013777  001424  166606            MOV     $TMP3,@ASR              ;/LOAD CSR.
 (1)                                                                    ;/THIS MUST BE DONE IN
 (1)                                                                    ;/ORDER TO XFERR COUNTER
 (1)                                                                    ;/TO BUFFER ON ST2.
 (1)  012570  052777  001000  166600            BIS     #BIT9,@ASR      ;/GENERATE ON ST2 PULSE
 (1)  012576  017737  166576  001126            MOV     @ABR,$BDDAT     ;/READ THE PRESET BUFFER,
 (1)                                                                    ;/PREVIOUS COUNTER
 (1)  012604  012677  166566                    MOV     (6)+,@ASR       ;/CONTENTS ARE IN $BDDAT.
 (1)  012610  005737  001126                    TST     $BDDAT          ;/RESTORE CSR
      012614  001001                            BNE     TST63           ;;

                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

      012616  104002                            ERROR   2               ;CLOCKWIZE THRESHOLD SETTING OF
                                                                        ;ST1 SHOULD HAVE INHIBITED CLOCK
                                                                        ;FROM COUNTING.

                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$


                                        ;;*****************************************************************
 (3)                                    ;*TEST 63       *IF ENABLED, CHECK ST1,ST2 IN FROM TESTOR
 (3)                                    ;;*****************************************************************
 (2)  012620  000004                     TST63:  SCOPE
 (1)  012622  012737  000002  001160             MOV     #2,$TIMES           ;;DO 2 ITERATIONS

      012630  005737  001440                     TST     EXS                 ;OPERATING IN TESTOR MODE?
      012634  001510                             BEQ     ENDP                ;NO-EXIT THIS TEST.

      012636  005077  166534                     CLR     @ASR                ;CLEAR THE CSR
      012642  012777  177775  166530             MOV     #-3,@ABR            ;SET TO COUNT THREE TIMES
      012650  012777  000061  166520             MOV     #61,@ASR            ;SET RATE:ST1, MODE1, GO
      012656  104401  012664                     TYPE    ,65$                ;;TYPE ASCIZ STRING
 (1)  012662  000433                             BR      64$                 ;;GET OVER THE ASCIZ
 (1)                                     ;;65$:  .ASCIZ  <200><7><7>#SET ST1 THRESHOLD POT IN THE MIDDLE OF ITS RANGE.#
 (1)  012752                             64$:
      012752  004737  013740                     JSR     PC,ANYKEY           ;TYPE LAST MESS WAITE FOR OPERATOR.
      012756  005037  001124                     CLR     $GDDAT              ;EXPECT COUNTER TO BE CLEAR
      012762  017746  166410                     MOV     @ASR,-(6)           ;/SAVE CSR
 (1)  012766  011637  001424                     MOV     (6),$TMP3           ;/GET CSR.
 (1)  012772  042737  177707  001424             BIC     #177707,$TMP3       ;/SAVE RATE BITS.
 (1)  013000  052737  004005  001424             BIS     #BIT11.BIT2!BIT0,$TMP3  ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
 (1)  013006  013777  001424  166362             MOV     $TMP3,@ASR              ;/LOAD CSR.
 (1)                                                                         ;/THIS MUST BE DONE IN
 (1)                                                                         ;/ORDER TO XFERR COUNTER
 (1)                                                                         ;/TO BUFFER ON ST2.
 (1)  013014  052777  001000  166354             BIS     #BIT9,@ASR          ;/GENERATE ON ST2 PULSE
 (1)  013022  017737  166352  001126             MOV     @ABR,$BDDAT         ;/READ THE PRESET BUFFER,
 (1)                                                                         ;/PREVIOUS COUNTER
 (1)  013030  012677  166342                     MOV     (6)+,@ASR           ;/CONTENTS ARE IN $BDDAT.
 (1)  013034  005737  001126                     TST     $BDDAT              ;/RESTORE CSR
                                                                             ;OF NON-ZERO - REPORT ERROR
      013040  001402                             BEQ     2$

                                         ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

      013042  104002                             ERROR   2                   ;INCORRECT # OF ST1'S
                                                                             ;RECEIVED BY CLOCK

                                         ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

      013044  000404                             BR      ENDP

      013046                             2$:
      013046  005777  166324                     TST     @ASR                ;DID ST2 FLG SET?
      013052  100401                             BMI     ENDP

                                         ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

      013054  104006                             ERROR   6                   ;ST2 FLAG DID SET EVEN THOUGH
                                                                             ;SWITCH WAS TOGGLED.

                                         ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$


                                                 ;
                                                 ;NOW WE'LL DETERMINE IF WE ARE ALLOWED TO AUTO-SIZE.
                                                 ;IF SO, WE'LL FIND OUT IF THERE ARE OTHER CLOCKS OUT THERE
                                                 ;TO TEST.
```

```
                                                  ;

      013056  000004                      ENDP:   SCOPE


      013060  105737  001215                      TSTB    $ENVM             ;SEE IF APT WILL LET UP AUTO-SIZE.
      013064  100537                              BMI     2$                ;NO - EXIT.


      013066  023737  001434  001436              CMP     MDEVCT,TSTCNT     ;TESTED MAX. UNITS?
      013074  001507                              BEQ     4$                ;YES EXIT.
      013076  006337  001426                      ASL     ROTATE            ;POINT NEXT UNIT.
      013102  005237  001434                      INC     MDEVCT

      013106  062737  000004  001376              ADD     #4,ASR            ;YES, ADD TO BASE ADDR.
      013114  013746  000004                      MOV     ERRVEC,-(6)       ;SAVE CONTENTS OF LOC 4.
      013120  012737  013274  000004              MOV     #1$,ERRVEC        ;SET UP IN CASE NO MORE CLOCKS.

      013126  005777  166244                      TST     @ASR              ;TIME OUT HERE IF NO MORE CLOCKS.

                                                                            ;IF HERE, ANOTHER CLOCK FOUND.
      013132  005737  001202                      TST     $PASS             ;IS THIS 1ST PASS?
      013136  001003                              BNE     3$                ;NO-GET OUT.
      013140  053737  001426  001430              BIS     ROTATE,UTEST      ;YES-RECORD THIS UNIT.
      013146                              3$:
      013146  104401  013154                      TYPE     65$              ;;TYPE ASCIZ STRING
  (1) 013152  000405                              BR      64$               ;;GET OVER THE ASCIZ
  (1)                                     ;;65$:  .ASCIZ  <15><12>'UNIT #'
  (1) 013166                              64$:
      013166  013746  001204                      MOV     $DEVCT,-(SP)      ;;SAVE $DEVCT FOR TYPEOUT
  (1) 013172  104402                              TYPOC                     ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
      013174  104401  013202                      TYPE    ,67$              ;;TYPE ASCIZ STRING
  (1) 013200  000406                              BR      66$               ;;GET OVER THE ASCIZ
  (1)                                     ;;67$:  .ASCIZ  " COMPLETED "
  (1) 013216                              66$:
      013216  005237  001204                      INC     $DEVCT
      013222  104401  013230                      TYPE    ,69$              ;;TYPE ASCIZ STRING
  (1) 013226  000410                              BR      68$               ;;GET OVER THE ASCIZ
  (1)                                     ;;69$:  .ASCIZ  " TESTING UNIT #"
  (1) 013250                              68$:
      013250  013746  001204                      MOV     $DEVCT,-(SP)      ;;SAVE $DEVCT FOR TYPFOUT
  (1) 013254  104402                              TYPOC                     ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
      013256  012637  000004                      MOV     (6)+,ERRVEC       ;RESETORE LOC 4.
      013262  062737  000010  001402              ADD     #10,VECT1         ;UPDATE VECTOR ADDR.
      013270  000137  002334                      JMP     LOOP              ;TEST NEW UNIT.

      013274                              1$:
  (1) 013274  062706  000004                      ADD     #4,SP                       ;/ADD #4 TO STACK POINTER.
      013300  012637  000004                      MOV     (6)+,ERRVEC       ;RESTORE LOC 4
      013304  022737  000000  001204              CMP     #0,$DEVCT         ;TESTED ONLY ONE UNIT?
      013312  001424                              BEQ     2$                ;YES - NO NEED FOR TYPEOUT.

      013314                              4$:
      013314  104401  013322                      TYPE    ,71$              ;;TYPE ASCIZ STRING
  (1) 013320  000405                              BR      70$               ;;GET OVER THE ASCIZ
  (1)                                     ;;71$:  .ASCIZ  <15><12>'UNIT #'
```

```
 (1)  013334                             70$:
      013334  013746  001204                     MOV     $DEVCT,-(SP)      ;;SAVE $DEVCT FOR TYPEOUT
 (1)  013340  104402                             TYPOC                     ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
      013342  104401  013350                     TYPE    ,73$              ;;TYPE ASCIZ STRING
 (1)  013346  000406                             BR      72$               ;;GET OVER THE ASCIZ
 (1)                                     ;;73$:  .ASCIZ  " COMPLETED "
 (1)  013364                             72$:

      013364  013737  001250  001376     2$:     MOV     $BASE,ASR
      013372  013737  001244  001402             MOV     $VECT1,VECT1
      013400  013737  001204  001442             MOV     $DEVCT,LCNT
      013406  005237  001442                     INC     LCNT
      013412  012737  000000  001204             MOV     #0,$DEVCT

      013420  005037  001434                     CLR     MDEVCT            ;BEGIN TESTING 1ST UNIT.
      013424  012737  000001  001426             MOV     #1,ROTATE         ;POINT TO IT.


                                         .SBTTL  END OF PASS ROUTINE
 (1)
 (2)                                     ;;********************************************************************
 (1)                                     ;*INCREMENT THE PASS NUMBER ($PASS)
 (1)                                     ;*IF THERES A MONITOR GO TO IT
 (1)                                     ;*IF THERE ISN'T JUMP TO LOOP
 (1)
 (1)  013432                             $EOP:
 (2)  013432  000240                             NOP
 (1)  013434  005037  001102                     CLR     $TSTNM            ;;ZERO THE TEST NUMBER
 (1)  013440  005037  001160                     CLR     $TIMES            ;;ZERO THE NUMBER OF ITERATIONS
 (1)  013444  005237  001202                     INC     $PASS             ;;INCREMENT THE PASS NUMBER
 (1)  013450  042737  100000  001202             BIC     #100000,$PASS     ;;DON'T ALLOW A NEG. NUMBER
 (1)  013456  005327                             DEC     (PC)+             ;;LOOP?
 (1)  013460  000001                     $EOPCT: .WORD   1
 (1)  013462  003122                             BGT     $DOAGN            ;;YES
 (1)  013464  012737                             MOV     (PC)+,@(PC)+      ;;RESTORE COUNTER
 (1)  013466  000001                     $ENDCT: .WORD   1
 (1)  013470  013460                             $EOPCT
 (3)  013472  104401  013500                     TYPE    ,65$              ;;TYPE ASCIZ STRING
 (3)  013476  000406                             BR      64$               ;;GET OVER THE ASCIZ
 (3)                                     ;;65$:  .ASCIZ  <15><12>#ENDPASS  #
 (3)  013514                             64$:
 (3)  013514  013746  001202                     MOV     $PASS,-(SP)       ;;SAVE $PASS FOR TYPEOUT
 (3)  013520  104402                             TYPOC                     ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
 (3)  013522  104401  013530                     TYPE    ,67$              ;;TYPE ASCIZ STRING
 (3)  013526  000411                             BR      66$               ;;GET OVER THE ASCIZ
 (3)                                     ;;67$:  .ASCIZ  #  TOTAL ERRORS  #
 (3)  013552                             66$:
 (3)  013552  013746  001432                     MOV     ERCNT,-(SP)       ;;SAVE ERCNT FOR TYPEOUT
 (3)  013556  104402                             TYPOC                     ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
 (3)  013560  104401  013566                     TYPE    ,69$              ;;TYPE ASCIZ STRING
 (3)  013564  000407                             BR      68$               ;;GET OVER THE ASCIZ
 (3)                                     ;;69$:  .ASCIZ  #;  THERE ARE #
 (3)  013604                             68$:
 (3)  013604  013746  001442                     MOV     LCNT,-(SP)        ;;SAVE LCNT FOR TYPEOUT
 (3)  013610  104402                             TYPOC                     ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
 (3)  013612  104401  013620                     TYPE    ,71$              ;;TYPE ASCIZ STRING
```

```
   (3)  013616  000411                          BR      70$             ;;GET OVER THE ASCIZ
   (3)                                  ;;71$:  .ASCIZ  #  (OCTAL) UNITS.#
   (3)  013642                          70$:
   (3)  013642  104401  013650                  TYPE    ,73$            ;;TYPE ASCIZ STRING
   (3)  013646  000415                          BR      72$             ;;GET OVER THE ASCIZ
   (3)                                  ;;73$:  .ASCIZ  <200>#THE GOOD UNITS (L TO R) #
   (3)  013702                          72$:
   (3)  013702  013746  001430                  MOV     UTEST,-(SP)     ;;SAVE UTEST FOR TYPEOUT
   (3)  013706  104405                          TYPBN                   ;;GO TYPE--BINARY ASCII
   (1)  013710  013700  000042          $GET42: MOV     @#42,R0         ;;GET MONITOR ADDRESS
   (1)  013714  001405                          BEQ     $DOAGN          ;;BRANCH IF NO MONITOR
   (1)  013716  000005                          RESET                   ;;CLEAR THE WORLD
   (1)  013720  004710                  $ENDAD: JSR     PC,(R0)         ;;GO TO MONITOR
   (1)  013722  000240                          NOP                     ;;SAVE ROOM
   (1)  013724  000240                          NOP                     ;;FOR
   (1)  013726  000240                          NOP                     ;;ACT11
   (1)  013730                          $DOAGN:
   (1)  013730  000137                          JMP     @(PC)+          ;;RETURN
   (1)  013732  002334                  $RTNAD: .WORD   LOOP
   (1)  013734     377     377     000  $ENULL: .BYTE   -1,-1,0         ;;NULL CHARACTER STRING
   (1)          013740                          .EVEN
  1411
  1412                                          ;
  1413                                          ;THIS ROUTINE TYPES LAST MESSAGE AND WAITS FOR AN  OPERATOR
  1414                                          ;RESPONCE.
  1415                                          ;
  1416
  1417  013740  105777  165202          ANYKEY: TSTB    @$TKB           ;CLEAR TTY READY FLAG.
  1418  013744  104401  013752                  TYPE    ,65$            ;;TYPE ASCIZ STRING
   (1)  013750  000430                          BR      64$             ;;GET OVER THE ASCIZ
   (1)                                  ;;65$:  .ASCIZ  <200><7>#SWITCH ST1 3 TIMES,TYPE ANY KEY WHEN DONE..#<7>
   (1)  014032                          64$:
  1419
  1420  014032  105777  165106          1$:     TSTB    @$TKS           ;WAIT FOR OPERATOR.
  1421  014036  100375                          BPL     1$
  1422  014040  105777  165102                  TSTB    @$TKB           ;CLEAR TTY READY FLAG.
  1423  014044  000207                          RTS PC
  1443
```

```
                                      .SBTTL          ;
                                                      ;I/O SIGNAL TEST #1 ST1 IN AND ST2 OUT IN AND OUT
                                                      ;

                                              ;
                                              ;SWITCH PACK S2 MUST BE SET UP AS FOLLOWS:
                                              ;
                                              ;      SWITCH  1 - OFF
                                              ;              2 - ON
                                              ;              3 - OFF
                                              ;              4 - OFF
                                              ;              5 - ON
                                              ;              6 - ON
                                              ;              7 - NOT USED
                                              ;
                                              ; THIS SELECTS TTL THRESHOLDS AND POSITIVE SLOPE FOR
                                              ; SCHMITT TRIGGER 1.
                                              ;
                                              ;PLEASE REMOVE ANY PREVIOUS JUMPER.
                                              ;
                                              ;JUMPER THE FOLLOWING PINS TOGETHER:
                                              ;
                                              ;      J1 - SS (ST2 OUT)       TO J1 - VV (ST1-IN)
                                              ;
                                              ;LOAD AND START AT LOCATION 210
                                              ;END PASSES OCCUR IMMEDIATELY AND ARE NOT REPORTED
                                              ;ERRORS ARE REPORTED AS IN THE REGULAR LOGIC TEST AND
                                              ;THEIR PRINTOUT MAY BE INHIBITED

014046  012737  014060  001420  OITST1: MOV     #IOTST1,$TMPO     ;LOAD RETURN ADDRESS
014054  000137  001526                  JMP     INIT              ;PRIME THE PROGRAM VECTOR SPACE
014060  104407                  IOTST1: CKSWR                     ;CHECK THE SWR
014062  005077  165310          1$:     CLR     @ASR              ;CLEAR THE CSR
014066  005077  165306                  CLR     @ABR              ;CLEAR THE BUFFER REG.
014072  012777  000061  165276          MOV     #61,@ASR          ;RATE ST1, MODE 0, GO.
014100  052777  001000  165270          BIS     #BIT9,@ASR        ;GENERATE A MAINTENANCE ST2.
014106  012777  000005  165262          MOV     #5,@ASR           ;NOW SET TO READ COUNT REG
014114  052777  001000  165254          BIS     #BIT9,@ASR        ;FORCE COUNT -> BUFFER REG.
014122  027727  165252  000001          CMP     @ABR,#1           ;DID COUNT REG ADVANCE ONCE?
014130  001753                          BEQ     IOTST1            ;YES - LOOP.
014132  104000                          ERROR                     ;ST2 OUT TO ST1 IN FAILED.
014134  000751                          BR      IOTST1
```

```
                                                 ;
                                        .SBTTL   ;I/O SIGNAL TEST #2 CLOCK OVFLOW OUT TEST.
                                                 ;

                                        ;
                                        ;SWITCH PACK S2 MUST BE SET UP AS FOLLOWS:
                                        ;
                                        ;       SWITCH  1 - OFF
                                        ;               2 - OFF
                                        ;               3 - OFF
                                        ;               4 - ON
                                        ;               5 - OFF
                                        ;               6 - ON
                                        ;               7 - NOT USED
                                        ;
                                        ; THIS SELECTS TTL THRESHOLDS AND POSITIVE SLOPE FOR
                                        ; SCHMITT TRIGGER 2.
                                        ;
                                        ;PLEASE REMOVE ANY PREVIOUS JUMPER.
                                        ;
                                        ;JUMPER THE FOLLOWING PINS TOGETHER:
                                        ;
                                        ;       J1 - RR (CLK OV) TO J1 - TT (ST2-IN)
                                        ;
                                        ;LOAD AND START AT LOCATION 214.
                                        ;END PASSES OCCUR IMMEDIATELY AND ARE NOT REPORTED.
                                        ;ERRORS ARE REPORTED AS IN TH REGULAR LOGIC TEST AND
                                        ;THEIR PRINTOUT MAY BE INHIBITED.
                                        ;
014136  012737  014150  001420  OITST2: MOV     #IOTST2,$TMPO     ;LOAD RETURN ADDRESS
014144  000137  001526                  JMP     INIT              ;PRIME THE PROGRAM VECTOR SPACE
014150  104407                  IOTST2: CKSWR                     ;CHECK THE SWR.
014152  005077  165220                  CLR     @ASR              ;CLEAR THE CSR.
014156  012777  177777  165214          MOV     #-1,@ABR          ;PRELOAD PRESET BUFFER.
014164  012777  000063  165204          MOV     #63,@ASR          ;RATE ST1, MODE 1, GO.
014172  052777  000400  165176          BIS     #BIT8,@ASR        ;GENERATE A MAIN. ST1.
014200  000240                          NOP
014202  000240                          NOP
014204  005777  165166                  TST     @ASR              ;DID OVERFLOW SET ST2 FLAG?
014210  100757                          BMI     IOTST2            ;YES - LOOP
014212  104000                          ERROR                     ;CLK OV OUT TO ST2 IN FAILED.
014214  000755                          BR      IOTST2            ;LOOP
```

```
                                                       ;
                                        .SBTTL         ;I/O SIGNAL TEST #3 ST1 OUT AND ST2 IN
                                                       ;

                                                       ;
                                                       ;SWITCH PACK S2 MUST BE SET UP AS FOLLOWS:
                                                       ;        SWITCH  1 - OFF
                                                       ;                2 - OFF
                                                       ;                3 - OFF
                                                       ;                4 - ON
                                                       ;                5 - ON
                                                       ;                6 - ON
                                                       ;                7 - NOT USED
                                                       ; THIS SELECTS TTL THRESHOLD AND POSITIVE SLOPE FOR
                                                       ; SCHMITT TRIGGER 2.
                                                       ;
                                                       ;PLEASE REMOVE ANY PREVIOUS JUMPERS.
                                                       ;
                                                       ;JUMPER THE FOLLOWING PINS TOGETHER:
                                                       ;        J1 - UU (ST1 OUT)        TO J1 - TT (ST2-IN)
                                                       ;
                                                       ;LOAD AND START AT LOCATION 220
                                                       ;END PASSES OCCUR IMMEDIATELY AND ARE NOT REPORTED
                                                       ;ERRORS ARE REPORTED AS IN THE REGULAR LOGIC TEST AND
                                                       ;THEIR PRINTOUT MAY BE INHIBITED

014216  012737  014230  001420  OITST3: MOV     #IOTST3,$TMP0       ;LOAD RETURN ADDRESS
014224  000137  001526                  JMP     INIT                ;PRIME THE PROGRAM VECTOR SPACE
014230  104407                  IOTST3: CKSWR                       ;CHECK THE SWR
014232  012777  000001  165136          MOV     #1,@ASR             ;SET GO BIT.
014240  052777  000400  165130          BIS     #BIT8,@ASR          ;GENERATE A MAIN. ST1.
014246  005777  165124                  TST     @ASR                ;DID ST2 FLAG SET?
014252  100401                          BMI     1$
014254  104000                          ERROR                       ;ST1 OUT TO ST2 IN FAILED

014256  032777  010000  165112  1$:     BIT     #BIT12,@ASR         ;DID 'FOR' BIT SET?
014264  001761                          BEQ     IOTST3              ;NO - GOOD.
014266  104000                          ERROR                       ;'FOR' BIT SET ON ONLY 1 ST2.
014270  000757                          BR      IOTST3              ;LOOP
```

```
                                                .SBTTL
                                                .SBTTL  *SYSMAC ROUTINES
                                                .SBTTL
                                         .SBTTL  BINARY TO OCTAL (ASCII) AND TYPE
 (1)
 (2)                                     ;;*************************************************************
 (1)                                     ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 6-DIGIT
 (1)                                     ;*OCTAL (ASCII) NUMBER AND TYPE IT.
 (1)                                     ;*$TYPOS---ENTER HERE TO SETUP SUPPRESS ZEROS AND NUMBER OF DIGITS TO TYPE
 (1)                                     ;*CALL:
 (1)                                     ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
 (1)                                     ;*      TYPOS                   ;;CALL FOR TYPEOUT
 (1)                                     ;*      .BYTE   N               ;;N=1 TO 6 FOR NUMBER OF DIGITS TO TYPE
 (1)                                     ;*      .BYTE   M               ;;M=1 OR 0
 (1)                                     ;*                                      ;;1=TYPE LEADING ZEROS
 (1)                                     ;*                                      ;;0-SUPPRESS LEADING ZEROS
 (1)                                     ;*
 (1)                                     ;*$TYPON----ENTER HERE TO TYPE OUT WITH THE SAME PARAMETERS AS THE LAST
 (1)                                     ;*$TYPOS OR $TYPOC
 (1)                                     ;*CALL.
 (1)                                     ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
 (1)                                     ;*      TYPON                   ;;CALL FOR TYPEOUT
 (1)                                     ;*
 (1)                                     ;*$TYPOC---ENTER HERE FOR TYPEOUT OF A 16 BIT NUMBER
 (1)                                     ;*CALL:
 (1)                                     ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
 (1)                                     ;*      TYPOC                   ;;CALL FOR TYPEOUT
 (1)
 (1)  014272  017646  000000             $TYPOS: MOV     @(SP),-(SP)     ;;PICKUP THE MODE
 (1)  014276  116637  000001  014515             MOVB    1(SP),$0FILL    ;;LOAD ZERO FILL SWITCH
 (1)  014304  112637  014517                     MOVB    (SP)+,$OMODE+1  ;;NUMBER OF DIGITS TO TYPE
 (1)  014310  062716  000002                     ADD     #2,(SP)         ;;ADJUST RETURN ADDRESS
 (1)  014314  000406                             BR      $TYPON
 (1)  014316  112737  000001  014515     $TYPOC: MOVB    #1,$0FILL       ;;SET THE ZERO FILL SWITCH
 (1)  014324  112737  000006  014517             MOVB    #6,$OMODE+1     ;;SET FOR SIX(6) DIGITS
 (1)  014332  112737  000005  014514     $TYPON: MOVB    #5,$OCNT        ;;SET THE ITERATION COUNT
 (1)  014340  010346                             MOV     R3,-(SP)        ;;SAVE R3
 (1)  014342  010446                             MOV     R4,-(SP)        ;;SAVE R4
 (1)  014344  010546                             MOV     R5,-(SP)        ;;SAVE R5
 (1)  014346  113704  014517                     MOVB    $OMODE+1,R4     ;;GET THE NUMBER OF DIGITS TO TYPE
 (1)  014352  005404                             NEG     R4
 (1)  014354  062704  000006                     ADD     #6,R4           ;;SUBTRACT IT FOR MAX. ALLOWED
 (1)  014360  110437  014516                     MOVB    R4,$OMODE       ;;SAVE IT FOR USE
 (1)  014364  113704  014515                     MOVB    $0FILL,R4       ;;GET THE ZERO FILL SWITCH
 (1)  014370  016605  000012                     MOV     12(SP),R5       ;;PICKUP THE INPUT NUMBER
 (1)  014374  005003                             CLR     R3              ;;CLEAR THE OUTPUT WORD
 (1)  014376  006105                     1$:     ROL     R5              ;;ROTATE MSB INTO "C"
 (1)  014400  000404                             BR      3$              ;;GO DO MSB
 (1)  014402  006105                     2$:     ROL     R5              ;;FORM THIS DIGIT
 (1)  014404  006105                             ROL     R5
 (1)  014406  006105                             ROL     R5
 (1)  014410  010503                             MOV     R5,R3
 (1)  014412  006103                     3$:     ROL     R3              ;;GET LSB OF THIS DIGIT
 (1)  014414  105337  014516                     DECB    $OMODE          ;;TYPE THIS DIGIT?
```

```
  (1)   014420  100016                            BPL     7$              ;;BR IF NO
  (1)   014422  042703  177770                    BIC     #177770,R3      ;;GET RID OF JUNK
  (1)   014426  001002                            BNE     4$              ;;TEST FOR 0
  (1)   014430  005704                            TST     R4              ;;SUPPRESS THIS 0?
  (1)   014432  001403                            BEQ     5$              ;;BR IF YES
  (1)   014434  005204                    4$:     INC     R4              ;;DON'T SUPPRESS ANYMORE 0'S
  (1)   014436  052703  000060                    BIS     #'0,R3          ;;MAKE THIS DIGIT ASCII
  (1)   014442  052703  000040            5$:     BIS     #' ,R3          ;;MAKE ASCII IF NOT ALREADY
  (1)   014446  110337  014512                    MOVB    R3,8$           ;;SAVE FOR TYPING
  (1)   014452  104401  014512                    TYPE    ,8$             ;;GO TYPE THIS DIGIT
  (1)   014456  105337  014514            7$:     DECB    $OCNT           ;;COUNT BY 1
  (1)   014462  003347                            BGT     2$              ;;BR IF MORE TO DO
  (1)   014464  002402                            BLT     6$              ;;BR IF DONE
  (1)   014466  005204                            INC     R4              ;;INSURE LAST DIGIT ISN'T A BLANK
  (1)   014470  000744                            BR      2$              ;;GO DO THE LAST DIGIT
  (1)   014472  012605                    6$:     MOV     (SP)+,R5        ;;RESTORE R5
  (1)   014474  012604                            MOV     (SP)+,R4        ;;RESTORE R4
  (1)   014476  012603                            MOV     (SP)+,R3        ;;RESTORE R3
  (1)   014500  016666  000002  000004            MOV     2(SP),4(SP)     ;;SET THE STACK FOR RETURNING
  (1)   014506  012616                            MOV     (SP)+,(SP)
  (1)   014510  000002                            RTI                     ;;RETURN
  (1)   014512     000                    8$:     .BYTE   0               ;;STORAGE FOR ASCII DIGIT
  (1)   014513     000                            .BYTE   0               ;;TERMINATOR FOR TYPE ROUTINE
  (1)   014514     000                    $OCNT:  .BYTE   0               ;;OCTAL DIGIT COUNTER
  (1)   014515     000                    $OFILL: .BYTE   0               ;;ZERO FILL SWITCH
  (1)   014516  000000                    $OMODE: .WORD   0               ;;NUMBER OF DIGITS TO TYPE
 1547                                     .SBTTL  BINARY TO ASCII AND TYPE ROUTINE
  (1)
  (2)                                     ;;*************************************************************
  (1)                                     ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 16-BIT
  (1)                                     ;*BINARY-ASCII NUMBER AND TYPE IT.
  (1)                                     ;*CALL:
  (1)                                     ;*      MOV     NUMBER,-(SP)    ;;NUMBER TO BE TYPED
  (1)                                     ;*      TYPBN                   ;;TYPE IT
  (1)
  (1)   014520  010146                    $TYPBN: MOV     R1,-(SP)        ;;SAVE R1 ON THE STACK
  (1)   014522  016601  000006                    MOV     6(SP),R1        ;;GET THE INPUT NUMBER
  (1)   014526  000261                            SEC                     ;;SET "C" SO CAN KEEP TRACK OF THE NUMBER OF BITS
  (1)   014530  112737  000060  014572    1$:     MOVB    #'0,$BIN        ;;SET CHARACTER TO AN ASCII "0".
  (1)   014536  006101                            ROL     R1              ;;GET THIS BIT
  (1)   014540  001406                            BEQ     2$              ;;DONE?
  (1)   014542  105537  014572                    ADCB    $BIN            ;;NO--SET THE CHARACTER EQUAL TO THIS BIT
  (1)   014546  104401  014572                    TYPE    ,$BIN           ;;GO TYPE THIS BIT
  (1)   014552  000241                            CLC                     ;;CLEAR "C" SO CAN KEEP TRACK OF BITS
  (1)   014554  000765                            BR      1$              ;;GO DO THE NEXT BIT
  (1)   014556  012601                    2$:     MOV     (SP)+,R1        ;;POP THE STACK INTO R1
  (1)   014560  016666  000002  000004            MOV     2(SP),4(SP)     ;;ADJUST THE STACK
  (1)   014566  012616                            MOV     (SP)+,(SP)
  (1)   014570  000002                            RTI                     ;;RETURN TO USER
  (1)   014572     000     000            $BIN:   .BYTE   0,0             ;;STORAGE FOR ASCII CHAR. AND TERMINATOR
 1548
 1559
 1560                                     .SBTTL  ERROR HANDLER ROUTINE
  (1)
  (2)                                     ;;*************************************************************
  (1)                                     ;*THIS ROUTINE WILL INCREMENT THE ERROR FLAG AND THE ERROR COUNT,
   (1)                                          ;*SAVE THE ERROR ITEM NUMBER AND THE ADDRESS OF THE ERROR CALL
   (1)                                          ;*AND GO TO $ERRTYP ON ERROR
   (1)                                          ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
   (1)                                          ;*SW15=1         HALT ON ERROR
   (1)                                          ;*SW13=1         INHIBIT ERROR TYPEOUTS
   (1)                                          ;*SW10=1         BELL ON ERROR
   (1)                                          ;*SW09=1         LOOP ON ERROR
   (1)                                          ;*CALL
   (1)                                          ;*      ERROR    N        ;;ERROR EMT AND N=ERROR ITEM NUMBER
   (1)
   (1) 014574                                   $ERROR:
   (1) 014574  104407                                    CKSWR                      ;;TEST FOR CHANGE IN SOFT-SWR
   (1) 014576  105237  001103               7$:          INCB    $ERFLG             ;;SET THE ERROR FLAG
   (1) 014602  001775                                    BEQ     7$                 ;;DON'T LET THE FLAG GO TO ZERO
   (1) 014604  013777  001102  164330                    MOV     $TSTNM,@DISPLAY    ;;DISPLAY TEST NUMBER AND ERROR FLAG
   (1) 014612  032777  002000  164320                    BIT     #BIT10,@SWR        ;;BELL ON ERROR?
   (1) 014620  001402                                    BEQ     1$                 ;;NO - SKIP
   (1) 014622  104401  001164                            TYPE    ,$BELL             ;;RING BELL
   (1) 014626  005237  001112               1$:          INC     $ERTTL             ;;COUNT THE NUMBER OF ERRORS
   (1) 014632  011637  001116                            MOV     (SP),$ERRPC        ;;GET ADDRESS OF ERROR INSTRUCTION
   (1) 014636  162737  000002  001116                    SUB     #2,$ERRPC
   (1) 014644  117737  164246  001114                    MOVB    @$ERRPC,$ITEMB     ;;STRIP AND SAVE THE ERROR ITEM CODE
   (1) 014652  032777  020000  164260                    BIT     #BIT13,@SWR        ;;SKIP TYPEOUT IF SET
   (1) 014660  001004                                    BNE     20$                ;;SKIP TYPEOUTS
   (1) 014662  004737  015002                            JSR     PC,$ERRTYP         ;;GO TO USER ERROR ROUTINE
   (1) 014666  104401  001171                            TYPE    ,$CRLF
   (1) 014672                               20$:
   (1) 014672  122737  000001  001214                    CMPB    #APTENV,$ENV       ;;RUNNING IN APT MODE
   (1) 014700  001007                                    BNE     2$                 ;;NO,SKIP APT ERROR REPORT
   (1) 014702  113737  001114  014714                    MOVB    $ITEMB,21$         ;;SET ITEM NUMBER AS ERROR NUMBER
   (1) 014710  004737  016474                            JSR     PC,$ATY4           ;;REPORT FATAL ERROR TO APT
   (1) 014714     000                       21$:         .BYTE   0
   (1) 014715     000                                    .BYTE   0
   (1) 014716  000777                       22$:         BR      22$                ;;APT ERROR LOOP
   (1) 014720  005777  164214               2$:          TST     @SWR               ;;HALT ON ERROR
   (1) 014724  100002                                    BPL     3$                 ;;SKIP IF CONTINUE
   (1) 014726  000000                                    HALT                       ;;HALT ON ERROR!
   (1) 014730  104407                                    CKSWR                      ;;TEST FOR CHANGE IN SOFT-SWR
   (1) 014732  032777  001000  164200       3$:          BIT     #BIT09,@SWR        ;;LOOP ON ERROR SWITCH SET?
   (1) 014740  001402                                    BEQ     4$                 ;;BR IF NO
   (1) 014742  013716  001110                            MOV     $LPERR,(SP)        ;;FUDGE RETURN FOR LOOPING
   (1) 014746  005737  001162               4$:          TST     $ESCAPE            ;;CHECK FOR AN ESCAPE ADDRESS
   (1) 014752  001402                                    BEQ     5$                 ;;BR IF NONE
   (1) 014754  013716  001162                            MOV     $ESCAPE,(SP)       ;;FUDGE RETURN ADDRESS FOR ESCAPE
   (1) 014760                               5$:
   (3)
   (3) 014760  005237  001432                            INC     ERCNT              ;/UPDATE ERROR COUNT.
   (3) 014764  001002                                    BNE     10$                ;/BUT DON'T LET IT OVERFLOW.
   (3) 014766  005337  001432                            DEC     ERCNT              ;/KEEP AT 177777 IF OVERFLOW.
   (3) 014772                               10$:
   (3) 014772  043737  001426  001430                    BIC     ROTATE,UTEST       ;/REMOVE UNIT FROM LIST OF GOOD ONES.
   (3) 015000  000002                                    RTI                        ;/EXIT.
   (3)
  1561                                          .SBTTL  ERROR MESSAGE TYPEOUT ROUTINE
   (1)
   (2)                                          ;;*************************************************************
   (1)                                  ;*THIS ROUTINE USES THE "ITEM CONTROL BYTE" ($ITEMB) TO DETERMINE WHICH
   (1)                                  ;*ERROR IS TO BE REPORTED. IT THEN OBTAINS, FROM THE "ERROR TABLE" ($ERRTB),
   (1)                                  ;*AND REPORTS THE APPROPRIATE INFORMATION CONCERNING THE ERROR.
   (1)
   (1)  015002                          $ERRTYP:
   (1)  015002  104401  001171                  TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
   (1)  015006  010046                          MOV     R0,-(SP)        ;;SAVE R0
   (1)  015010  005000                          CLR     R0              ;;PICKUP THE ITEM INDEX
   (1)  015012  153700  001114                  BISB    @#$ITEMB,R0
   (1)  015016  001004                          BNE     1$              ;;IF ITEM NUMBER IS ZERO, JUST
   (1)                                                                  ;;TYPE THE PC OF THE ERROR
   (2)  015020  013746  001116                  MOV     $ERRPC,-(SP)    ;;SAVE $ERRPC FOR TYPEOUT
   (2)                                                                  ;;ERROR ADDRESS
   (2)  015024  104402                          TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
   (1)  015026  000426                          BR      6$              ;;GET OUT
   (1)  015030  005300                  1$:     DEC     R0              ;;ADJUST THE INDEX SO THAT IT WILL
   (1)  015032  006300                          ASL     R0              ;;      WORK FOR THE ERROR TABLE
   (1)  015034  006300                          ASL     R0
   (1)  015036  006300                          AS      R0
   (1)  015040  062700  001256                  ADD     #$ERRTB,R0      ;;FORM TABLE POINTER
   (1)  015044  012037  015054                  MOV     (R0)+,2$        ;;PICKUP "ERROR MESSAGE" POINTER
   (1)  015050  001404                          BEQ     3$              ;;SKIP TYPEOUT IF NO POINTER
   (1)  015052  104401                          TYPE                    ;;TYPE THE "ERROR MESSAGE"
   (1)  015054  000000                  2$:     .WORD   0               ;;"ERROR MESSAGE" POINTER GOES HERE
   (1)  015056  104401  001171                  TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
   (1)  015062  012037  015072          3$:     MOV     (R0)+,4$        ;;PICKUP "DATA HEADER" POINTER
   (1)  015066  001404                          BEQ     5$              ;;SKIP TYPEOUT IF 0
   (1)  015070  104401                          TYPE                    ;;TYPE THE "DATA HEADER"
   (1)  015072  000000                  4$:     .WORD   0               ;;"DATA HEADER" POINTER GOES HERE
   (1)  015074  104401  001171                  TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
   (1)  015100  011000                  5$:     MOV     (R0),R0         ;;PICKUP "DATA TABLE" POINTER
   (1)  015102  001004                          BNE     7$              ;;GO TYPE THE DATA
   (1)  015104  012600                  6$:     MOV     (SP)+,R0        ;;RESTORE R0
   (1)  015106  104401  001171                  TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
   (1)  015112  000207                          RTS     PC              ;;RETURN
   (1)  015114                          7$:
   (2)  015114  013046                          MOV     @(R0)+,-(SP)    ;;SAVE @(R0)+ FOR TYPEOUT
   (2)  015116  104402                          TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
   (1)  015120  005710                          TST     (R0)            ;;IS THERE ANOTHER NUMBER?
   (1)  015122  001770                          BEQ     6$              ;;BR IF NO
   (1)  015124  104401  015132                  TYPE    ,8$             ;;TYPE TWO(2) SPACES
   (1)  015130  000771                          BR      7$              ;;LOOP
   (1)  015132  020040     000          8$:     .ASCIZ  /  /            ;;TWO(2) SPACES
   (1)          015136                          .EVEN
 1562                                   .SBTTL  SCOPE HANDLER ROUTINE
   (1)
   (2)                                  ;;*******************************************************************
   (1)                                  ;*THIS ROUTINE CONTROLS THE LOOPING OF SUBTESTS. IT WILL INCREMENT
   (1)                                  ;*AND LOAD THE TEST NUMBER($TSTNM) INTO THE DISPLAY REG.(DISPLAY<7:0>)
   (1)                                  ;*AND LOAD THE ERROR FLAG ($ERFLG) INTO DISPLAY<15:08>
   (1)                                  ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
   (1)                                  ;*SW14=1        LOOP ON TEST
   (1)                                  ;*SW11=1        INHIBIT ITERATIONS
   (1)                                  ;*SW09=1        LOOP ON ERROR
   (1)                                  ;*SW08=1        LOOP ON TEST IN SWR<7:0>
   (1)                                  ;*CALL
 (1)                                     ;*      SCOPE           ;;SCOPE=IOT
 (1)
 (1)  015136                             $SCOPE:
 (1)  015136  104407                             CKSWR                   ;;TEST  FOR CHANGE IN SOFT-SWR
 (2)  015140  104407                             CKSWR
 (1)  015142  032777  040000  163770     1$:     BIT     #BIT14,@SWR     ;;LOOP ON PRESENT TEST?
 (1)  015150  001114                             BNE     $OVER           ;;YES IF SW14=1
 (1)                                     ;#####START OF CODE FOR THE XOR TESTER#####
 (1)  015152  000416                     $XTSTR: BR      6$              ;;IF RUNNING ON THE ''XOR'' TESTER CHANGE
 (1)                                                                     ;;THIS INSTRUCTION TO A ''NOP'' (NOP-240)
 (1)  015154  013746  000004                     MOV     @#ERRVEC,-(SP)  ;;SAVE THE CONTENTS OF THE ERROR VECTOR
 (1)  015160  012737  015200  000004             MOV     #5$,@#ERRVEC    ;;SET FOR TIMEOUT
 (1)  015166  005737  177060                     TST     @#177060        ;;TIME OUT ON XOR?
 (1)  015172  012637  000004                     MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
 (1)  015176  000463                             BR      $SVLAD          ;;GO TO THE NEXT TEST
 (1)  015200  022626                     5$:     CMP     (SP)+,(SP)+     ;;CLEAR THE STACK AFTER A TIME OUT
 (1)  015202  012637  000004                     MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
 (1)  015206  000423                             BR      7$              ;;LOOP ON THE PRESENT TEST
 (1)  015210                             6$:;#####END OF CODE FOR THE XOR TESTER#####
 (1)  015210  032777  000400  163722             BIT     #BIT08,@SWR     ;;LOOP ON SPEC. TEST?
 (1)  015216  001404                             BEQ     2$              ;;BR IF NO
 (1)  015220  127737  163714  001102             CMPB    @SWR,$TSTNM     ;;ON THE RIGHT TEST?    SWR<7:0>
 (1)  015226  001465                             BEQ     $OVER           ;;BR IF YES
 (1)  015230  105737  001103             2$:     TSTB    $ERFLG          ;;HAS AN ERROR OCCURRED?
 (1)  015234  001421                             BEQ     3$              ;;BR IF NO
 (1)  015236  123737  001115  001103             CMPB    $ERMAX,$ERFLG   ;;MAX. ERRORS FOR THIS TEST OCCURRED?
 (1)  015244  101015                             BHI     3$              ;;BR IF NO
 (1)  015246  032777  001000  163664             BIT     #BIT09,@SWR     ;;LOOP ON ERROR?
 (1)  015254  001404                             BEQ     4$              ;;BR IF NO
 (1)  015256  013737  001110  001106     7$:     MOV     $LPERR,$LPADR   ;;SET LOOP ADDRESS TO LAST SCOPE
 (1)  015264  000446                             BR      $OVER
 (1)  015266  105037  001103             4$:     CLRB    $ERFLG          ;;ZERO THE ERROR FLAG
 (1)  015272  005037  001160                     CLR     $TIMES          ;;CLEAR THE NUMBER OF ITERATIONS TO MAKE
 (1)  015276  000415                             BR      1$              ;;ESCAPE TO THE NEXT TEST
 (1)  015300  032777  004000  163632     3$:     BIT     #BIT11,@SWR     ;;INHIBIT ITERATIONS?
 (1)  015306  001011                             BNE     1$              ;;BR IF YES
 (1)  015310  005737  001202                     TST     $PASS           ;;IF FIRST PASS OF PROGRAM
 (1)  015314  001406                             BEQ     1$              ;;       INHIBIT ITERATIONS
 (1)  015316  005237  001104                     INC     $ICNT           ;;INCREMENT ITERATION COUNT
 (1)  015322  023737  001160  001104             CMP     $TIMES,$ICNT    ;;CHECK THE NUMBER OF ITERATIONS MADE
 (1)  015330  002024                             BGE     $OVER           ;;BR IF MORE ITERATION REQUIRED
 (1)  015332  012737  000001  001104     1$:     MOV     #1,$ICNT        ;;REINITIALIZE THE ITERATION COUNTER
 (1)  015340  013737  015416  001160             MOV     $MXCNT,$TIMES   ;;SET NUMBER OF ITERATIONS TO DO
 (1)  015346  105237  001102             $SVLAD: INCB    $TSTNM          ;;COUNT TEST NUMBERS
 (1)  015352  113737  001102  001200             MOVB    $TSTNM,$TESTN   ;;SET TEST NUMBER IN APT MAILBOX
 (1)  015360  011637  001106                     MOV     (SP),$LPADR     ;;SAVE SCOPE LOOP ADDRESS
 (1)  015364  011637  001110                     MOV     (SP),$LPERR     ;;SAVE ERROR LOOP ADDRESS
 (1)  015370  005037  001162                     CLR     $ESCAPE         ;;CLEAR THE ESCAPE FROM ERROR ADDRESS
 (1)  015374  112737  000001  001115             MOVB    #1,$ERMAX       ;;ONLY ALLOW ONE(1) ERROR ON NEXT TEST
 (1)  015402  013777  001102  163532     $OVER:  MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER
 (1)  015410  013716  001106                     MOV     $LPADR,(SP)     ;;FUDGE RETURN ADDRESS
 (1)  015414  000002                             RTI                     ;;FIXES PS
 (1)  015416  003720                     $MXCNT: 2000.                   ;;MAX. NUMBER OF ITERATIONS
                                         .SBTTL  TTY INPUT ROUTINE
 (1)
 (2)                                     ;;*************************************************************
```

```
(1)                                           .ENABL  LSB
(1)
(2)                                           ;;*******************************************************************
(1)                                           ;*SOFTWARE SWITCH REGISTER CHANGE ROUTINE.
(1)                                           ;*ROUTINE IS ENTERED FROM THE TRAP HANDLER, AND WILL
(1)                                           ;*SERVICE THE TEST FOR CHANGE IN SOFTWARE SWITCH REGISTER TRAP CALL
(1)                                           ;*WHEN OPERATING IN TTY FLAG MODE.
(1)  015420  022737  000176  001140  $CKSWR: CMP     #SWREG,SWR          ;;IS THE SOFT-SWR SELECTED?
(1)  015426  001074                           BNE     15$                 ;;BRANCH IF NO
(1)  015430  105777  163510                   TSTB    @$TKS               ;;CHAR THERE?
(1)  015434  100071                           BPL     15$                 ;;IF NO, DON'T WAIT AROUND
(1)  015436  117746  163504                   MOVB    @$TKB,-(SP)         ;;SAVE THE CHAR
(1)  015442  042716  177600                   BIC     #^C177,(SP)         ;;STRIP-OFF THE ASCII
(1)  015446  022726  000007                   CMP     #7,(SP)+            ;;IS IT A CONTROL G?
(1)  015452  001062                           BNE     15$                 ;;NO, RETURN TO USER
(1)  015454  123727  001134  000001           CMPB    $AUTOB,#1           ;;ARE WE RUNNING IN AUTO-MODE?
(1)  015462  001456                           BEQ     15$                 ;;BRANCH IF YES
(1)
(1)  015464  104401  016145                   TYPE    ,$CNTLG             ;;ECHO THE CONTROL-G (^G)
(1)  015470  104401  016152          $GTSWR: TYPE    ,$MSWR              ;;TYPE CURRENT CONTENTS
(2)  015474  013746  000176                   MOV     SWREG,-(SP)         ;;SAVE SWREG FOR TYPEOUT
(2)  015500  104402                           TYPOC                       ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
(1)  015502  104401  016163                   TYPE    ,$MNEW              ;;PROMPT FOR NEW SWR
(1)  015506  005046                  19$:     CLR     -(SP)               ;;CLEAR COUNTER
(1)  015510  005046                           CLR     -(SP)               ;;THE NEW SWR
(1)  015512  105777  163426          7$:      TSTB    @$TKS               ;;CHAR THERE?
(1)  015516  100375                           BPL     7$                  ;;IF NOT TRY AGAIN
(1)
(1)  015520  117746  163422                   MOVB    @$TKB,-(SP)         ;;PICK UP CHAR
(1)  015524  042716  177600                   BIC     #^C177,(SP)         ;;MAKE IT 7-BIT ASCII
(1)
(1)
(1)
(1)  015530  021627  000025          9$:      CMP     (SP),#25            ;;IS IT A CONTROL-U?
(1)  015534  001005                           BNE     10$                 ;;BRANCH IF NOT
(1)  015536  104401  016140                   TYPE    ,$CNTLU             ;;YES, ECHO CONTROL-U (^U)
(1)  015542  062706  000006          20$:     ADD     #6,SP               ;;IGNORE PREVIOUS INPUT
(1)  015546  000757                           BR      19$                 ;;LET'S TRY IT AGAIN
(1)
(1)
(1)  015550  021627  000015          10$:     CMP     (SP),#15            ;;IS IT A <CR>?
(1)  015554  001022                           BNE     16$                 ;;BRANCH IF NO
(1)  015556  005766  000004                   TST     4(SP)               ;;YES, IS IT THE FIRST CHAR?
(1)  015562  001403                           BEQ     11$                 ;;BRANCH IF YES
(1)  015564  016677  000002  163346           MOV     2(SP),@SWR          ;;SAVE NEW SWR
(1)  015572  062706  000006          11$:     ADD     #6,SP               ;;CLEAR UP STACK
(1)  015576  104401  001171          14$:     TYPE    ,$CRLF              ;;ECHO <CR> AND <LF>
(1)  015602  123727  001135  000001           CMPB    $INTAG,#1           ;;RE-ENABLE TTY KBD INTERRUPTS?
(1)  015610  001003                           BNE     15$                 ;;BRANCH IF NOT
(1)  015612  012777  000100  163324           MOV     #100,@$TKS          ;;RE-ENABLE TTY KBD INTERRUPTS
(1)  015620  000002                  15$:     RTI                         ;;RETURN
(1)  015622  004737  016406          16$:     JSR     PC,$TYPEC           ;;ECHO CHAR
(1)  015626  021627  000060                   CMP     (SP),#60            ;;CHAR < 0?
(1)  015632  002420                           BLT     18$                 ;;BRANCH IF YES
(1)  015634  021627  000067                   CMP     (SP),#67            ;;CHAR > 7?
(1)  015640  003015                           BGT     18$                 ;;BRANCH IF YES
```

```
    (1)  015642  042726  000060             BIC     #60,(SP)+          ;;STRIP-OFF ASCII
    (1)  015646  005766  000002             TST     2(SP)              ;;IS THIS THE FIRST CHAR
    (1)  015652  001403                     BEQ     17$                ;;BRANCH IF YES
    (1)  015654  006316                     ASL     (SP)               ;;NO, SHIFT PRESENT
    (1)  015656  006316                     ASL     (SP)               ;;   CHAR OVER TO MAKE
    (1)  015660  006316                     ASL     (SP)               ;;   ROOM FOR NEW ONE.
    (1)  015662  005266  000002     17$:    INC     2(SP)              ;;KEEP COUNT OF CHAR
    (1)  015666  056616  177776             BIS     -2(SP),(SP)        ;;SET IN NEW CHAR
    (1)  015672  000707                     BR      7$                 ;;GET THE NEXT ONE
    (1)  015674  104401  001170     18$:    TYPE    ,$QUES             ;;TYPE ?<CR><LF>
    (1)  015700  000720                     BR      20$                ;;SIMULATE CONTROL-U
    (1)                             .DSABL  LSB
    (1)
    (1)
    (2)                             ;;*****************************************************************
    (1)                             ;*THIS ROUTINE WILL INPUT A SINGLE CHARACTER FROM THE TTY
    (1)                             ;*CALL:
    (1)                             ;*      RDCHR                      ;;INPUT A SINGLE CHARACTER FROM THE TTY
    (1)                             ;*      RETURN HERE                ;;CHARACTER IS ON THE STACK
    (1)                             ;*                                 ;;WITH PARITY BIT STRIPPED OFF
    (1)                             ;
    (1)
    (1)  015702  011646                     $RDCHR: MOV     (SP),-(SP)         ;;PUSH DOWN THE PC
    (1)  015704  016666  000004  000002     MOV     4(SP),2(SP)        ;;SAVE THE PS
    (1)  015712  105777  163226     1$:     TSTB    @$TKS              ;;WAIT FOR
    (1)  015716  100375                     BPL     1$                 ;;A CHARACTER
    (1)  015720  117766  163222  000004     MOVB    @$TKB,4(SP)        ;;READ THE TTY
    (1)  015726  042766  177600  000004     BIC     #^C<177>,4(SP)     ;;GET RID OF JUNK IF ANY
    (1)  015734  026627  000004  000023     CMP     4(SP),#23          ;;IS IT A CONTROL-S?
    (1)  015742  001013                     BNE     3$                 ;;BRANCH IF NO
    (1)  015744  105777  163174     2$:     TSTB    @$TKS              ;;WAIT FOR A CHARACTER
    (1)  015750  100375                     BPL     2$                 ;;LOOP UNTIL ITS THERE
    (1)  015752  117746  163170             MOVB    @$TKB,-(SP)        ;;GET CHARACTER
    (1)  015756  042716  177600             BIC     #^C177,(SP)        ;;MAKE IT 7-BIT ASCII
    (1)  015762  022627  000021             CMP     (SP)+,#21          ;;IS IT A CONTROL-Q?
    (1)  015766  001366                     BNE     2$                 ;;IF NOT DISCARD IT
    (1)  015770  000750                     BR      1$                 ;;YES, RESUME
    (1)  015772  026627  000004  000140 3$: CMP     4(SP),#140         ;;IS IT UPPER CASE?
    (1)  016000  002407                     BLT     4$                 ;;BRANCH IF YES
    (1)  016002  026627  000004  000175     CMP     4(SP),#175         ;;IS IT A SPECIAL CHAR?
    (1)  016010  003003                     BGT     4$                 ;;BRANCH IF YES
    (1)  016012  042766  000040  000004     BIC     #40,4(SP)          ;;MAKE IT UPPER CASE
    (1)  016020  000002             4$:     RTI                        ;;GO BACK TO USER
    (2)                             ;;*****************************************************************
    (1)                             ;*THIS ROUTINE WILL INPUT A STRING FROM THE TTY
    (1)                             ;*CALL:
    (1)                             ;*      RDLIN                      ;;INPUT A STRING FROM THE TTY
    (1)                             ;*      RETURN HERE                ;;ADDRESS OF FIRST CHARACTER WILL BE ON THE STACK
    (1)                             ;*                                 ;;TERMINATOR WILL BE A BYTE OF ALL 0'S
    (1)
    (1)  016022  010346             $RDLIN: MOV     R3,-(SP)           ;;SAVE R3
    (1)  016024  012703  016130     1$:     MOV     #$TTYIN,R3         ;;GET ADDRESS
    (1)  016030  022703  016140     2$:     CMP     #$TTYIN+8.,R3      ;;BUFFER FULL?
    (1)  016034  101405                     BLOS    4$                 ;;BR IF YES
    (1)  016036  104410                     RDCHR                      ;;GO READ ONE CHARACTER FROM THE TTY
    (1)  016040  112613                     MOVB    (SP)+,(R3)         ;;GET CHARACTER
```

```
  (1)  016042  122713  000177           10$:    CMPB    #177,(R3)         ;;IS IT A RUBOUT
  (1)  016046  001003                           BNE     3$                ;;SKIP IF NOT
  (1)  016050  104401  001170           4$:     TYPE    ,$QUES            ;;TYPE A '?'
  (1)  016054  000763                           BR      1$                ;;CLEAR THE BUFFER AND LOOP
  (1)  016056  111337  016126           3$.     MOVB    (R3),9$           ;;ECHO THE CHARACTER
  (1)  016062  104401  016126                   TYPE    ,9$
  (1)  016066  122723  000015                   CMPB    #15,(R3)+         ;;CHECK FOR RETURN
  (1)  016072  001356                           BNE     2$                ;;LOOP IF NOT RETURN
  (1)  016074  105063  177777                   CLRB    -1(R3)            ;;CLEAR RETURN (THE 15)
  (1)  016100  104401  001172                   TYPE    ,$LF              ;;TYPE A LINE FEED
  (1)  016104  012603                           MOV     (SP)+,R3          ;;RESTORE R3
  (1)  016106  011646                           MOV     (SP),-(SP)        ;;ADJUST THE STACK AND PUT ADDRESS OF THE
  (1)  016110  016666  000004  000002           MOV     4(SP),2(SP)       ;;       FIRST ASCII CHARACTER ON IT
  (1)  016116  012766  016130  000004           MOV     #$TTYIN,4(SP)
  (1)  016124  000002                           RTI                       ;;RETURN
  (1)  016126     000                   9$:     .BYTE   0                 ;;STORAGE FOR ASCII CHAR. TO TYPE
  (1)  016127     000                           .BYTE   0                 ;;TERMINATOR
  (1)  016130  000010                   $TTYIN: .BLKB   8.                ;;RESERVE 8 BYTES FOR TTY INPUT
  (1)  016140  052536  005015     000   $CNTLU: .ASCIZ  /^U/<15><12>      ;;CONTROL 'U'
  (1)  016145     136  006507  000012   $CNTLG: .ASCIZ  /^G/<15><12>      ;;CONTROL 'G'
  (1)  016152  005015  053523  020122   $MSWR:  .ASCIZ  <15><12>/SWR = /
  (1)  016160  020075     000
  (1)  016163     040  047040  053505   $MNEW:  .ASCIZ  /  NEW = /
  (1)  016170  036440  000040
                                        .SBTTL  TYPE ROUTINE
  (1)
  (2)                                   ;;*************************************************************
  (1)                                   ;*ROUTINE TO TYPE ASCIZ MESSAGE. MESSAGE MUST TERMINATE WITH A 0 BYTE.
  (1)                                   ;*THE ROUTINE WILL INSERT A NUMBER OF NULL CHARACTERS AFTER A LINE FEED.
  (1)                                   ;*NOTE1:        $NULL CONTAINS THE CHARACTER TO BE USED AS THE FILLER CHARACTER.
  (1)                                   ;*NOTE2:        $FILLS CONTAINS THE NUMBER OF FILLER CHARACTERS REQUIRED.
  (1)                                   ;*NOTE3:        $FILLC CONTAINS THE CHARACTER TO FILL AFTER.
  (1)                                   ;*
  (1)                                   ;*CALL:
  (1)                                   ;*1) USING A TRAP INSTRUCTION
  (1)                                   ;*      TYPE    ,MESADR           ;;MESADR IS FIRST ADDRESS OF AN ASCIZ STRING
  (1)                                   ;*OR
  (1)                                   ;*      TYPE
  (1)                                   ;*      MESADR
  (1)                                   ;*
  (1)
  (1)  016174  105737  001157           $TYPE:  TSTB    $TPFLG            ;;IS THERE A TERMINAL?
  (1)  016200  100002                           BPL     1$                ;;BR IF YES
  (1)  016202  000000                           HALT                      ;;HALT HERE IF NO TERMINAL
  (1)  016204  000430                           BR      3$                ;;LEAVE
  (1)  016206  010046                   1$:     MOV     R0,-(SP)          ;;SAVE R0
  (1)  016210  017600  000002                   MOV     @2(SP),R0         ;;GET ADDRESS OF ASCIZ STRING
  (1)  016214  122737  000001  001214           CMPB    #APTENV,$ENV      ;;RUNNING IN APT MODE
  (1)  016222  001011                           BNE     62$               ;;NO,GO CHECK FOR APT CONSOLE
  (1)  016224  132737  000100  001215           BITB    #APTSPOOL,$ENVM   ;;SPOOL MESSAGE TO APT
  (1)  016232  001405                           BEQ     62$               ;;NO,GO CHECK FOR CONSOLE
  (1)  016234  010037  016244                   MOV     R0,61$            ;;SETUP MESSAGE ADDRESS FOR APT
  (1)  016240  004737  016464                   JSR     PC,$ATY3          ;;SPOOL MESSAGE TO APT
  (1)  016244  000000                   61$:    .WORD   0                 ;;MESSAGE ADDRESS
  (1)  016246  132737  000040  001215   62$:    BITB    #APTCSUP,$ENVM    ;;APT CONSOLE SUPPRESSED
  (1)  016254  001003                           BNE     60$               ;;YES,SKIP TYPE OUT
```

```
   (1)  016256  112046                  2$:     MOVB    (R0)+,-(SP)         ;;PUSH CHARACTER TO BE TYPED ONTO STACK
   (1)  016260  001005                          BNE     4$                  ;;BR IF IT ISN'T THE TERMINATOR
   (1)  016262  005726                          TST     (SP)+               ;;IF TERMINATOR POP IT OFF THE STACK
   (1)  016264  012600                  60$:    MOV     (SP)+,R0            ;;RESTORE R0
   (1)  016266  062716  000002          3$:     ADD     #2,(SP)             ;;ADJUST RETURN PC
   (1)  016272  000002                          RTI                         ;;RETURN
   (1)  016274  122716  000011          4$:     CMPB    #HT,(SP)            ;;BRANCH IF <HT>
   (1)  016300  001430                          BEQ     8$
   (1)  016302  122716  000200                  CMPB    #CRLF,(SP)          ;;BRANCH IF NOT <CRLF>
   (1)  016306  001006                          BNE     5$
   (1)  016310  005726                          TST     (SP)+               ;;POP  <CR><LF> EQUIV
   (1)  016312  104401                          TYPE                        ;;TYPE A CR AND LF
   (1)  016314  001171                          $CRLF
   (1)  016316  105037  016452                  CLRB    $CHARCNT            ;;CLEAR CHARACTER COUNT
   (1)  016322  000755                          BR      2$                  ;;GET NEXT CHARACTER
   (1)  016324  004737  016406          5$:     JSR     PC,$TYPEC           ;;GO TYPE THIS CHARACTER
   (1)  016330  123726  001156          6$:     CMPB    $FILLC,(SP)+        ;;IS IT TIME FOR FILLER CHARS.?
   (1)  016334  001350                          BNE     2$                  ;;IF NO GO GET NEXT CHAR.
   (1)  016336  013746  001154                  MOV     $NULL,-(SP)         ;;GET # OF FILLER CHARS. NEEDED
   (1)                                                                      ;;AND THE NULL CHAR.
   (1)  016342  105366  000001          7$:     DECB    1(SP)               ;;DOES A NULL NEED TO BE TYPED?
   (1)  016346  002770                          BLT     6$                  ;;BR IF NO--GO POP THE NULL OFF OF STACK
   (1)  016350  004737  016406                  JSR     PC,$TYPEC           ;;GO TYPE A NULL
   (1)  016354  105337  016452                  DECB    $CHARCNT            ;;DO NOT COUNT AS A COUNT
   (1)  016360  000770                          BR      7$                  ;;LOOP
   (1)
   (1)                                  ;HORIZONTAL TAB PROCESSOR
   (1)
   (1)  016362  112716  000040          8$:     MOVB    #' ,(SP)            ;;REPLACE TAB WITH SPACE
   (1)  016366  004737  016406          9$:     JSR     PC,$TYPEC           ;;TYPE A SPACE
   (1)  016372  132737  000007  016452          BITB    #7,$CHARCNT         ;;BRANCH IF NOT AT
   (1)  016400  001372                          BNE     9$                  ;;TAB STOP
   (1)  016402  005726                          TST     (SP)+               ;;POP SPACE OFF STACK
   (1)  016404  000724                          BR      2$                  ;;GET NEXT CHARACTER
   (1)  016406  105777  162536          $TYPEC: TSTB    @$TPS               ;;WAIT UNTIL PRINTER IS READY
   (1)  016412  100375                          BPL     $TYPEC
   (1)  016414  116677  000002  162530          MOVB    2(SP),@$TPB         ;;LOAD CHAR TO BE TYPED INTO DATA REG.
   (1)  016422  122766  000015  000002          CMPB    #CR,2(SP)           ;;IS CHARACTER A CARRIAGE RETURN?
   (1)  016430  001003                          BNE     1$                  ;;BRANCH IF NO
   (1)  016432  105037  016452                  CLRB    $CHARCNT            ;;YES--CLEAR CHARACTER COUNT
   (1)  016436  000406                          BR      $TYPEX              ;;EXIT
   (1)  016440  122766  000012  000002  1$:     CMPB    #LF,2(SP)           ;;IS CHARACTER A LINE FEED?
   (1)  016446  001402                          BEQ     $TYPEX              ;;BRANCH IF YES
   (1)  016450  105227                          INCB    (PC)+               ;;COUNT THE CHARACTER
   (1)  016452  000000                  $CHARCNT:.WORD  0                   ;;CHARACTER COUNT STORAGE
   (1)  016454  000207                  $TYPEX: RTS     PC
   (1)
  1565                                  .SBTTL  APT COMMUNICATIONS ROUTINE
   (1)
   (2)                                  ;;*************************************************************************
   (1)  016456  112737  000001  016722  $ATY1:  MOVB    #1,$FFLG            ;;TO REPORT FATAL ERROR
   (1)  016464  112737  000001  016720  $ATY3:  MOVB    #1,$MFLG            ;;TO TYPE A MESSAGE
   (1)  016472  000403                          BR      $ATYC
   (1)  016474  112737  000001  016722  $ATY4:  MOVB    #1,$FFLG            ;;TO ONLY REPORT FATAL ERROR
   (1)  016502                          $ATYC:
   (3)  016502  010046                          MOV     R0,-(SP)            ;;PUSH R0 ON STACK
  (3)  016504  010146                        MOV     R1,-(SP)          ;;PUSH R1 ON STACK
  (1)  016506  105737  016720                TSTB    $MFLG             ;;SHOULD TYPE A MESSAGE?
  (1)  016512  001450                        BEQ     5$                ;;IF NOT:  BR
  (1)  016514  122737  000001  001214        CMPB    #APTENV,$ENV      ;;OPERATING UNDER APT?
  (1)  016522  001031                        BNE     3$                ;;IF NOT:  BR
  (1)  016524  132737  000100  001215        BITB    #APTSPOOL,$ENVM   ;;SHOULD SPOOL MESSAGES?
  (1)  016532  001425                        BEQ     3$                ;;IF NOT:  BR
  (1)  016534  017600  000004                MOV     @4(SP),R0         ;;GET MESSAGE ADDR.
  (1)  016540  062766  000002  000004        ADD     #2,4(SP)                  ;;BUMP RETURN ADDR.
  (1)  016546  005737  001174        1$:     TST     $MSGTYPE          ;;SEE IF DONE W/ LAST XMISSION?
  (1)  016552  001375                        BNE     1$                ;;IF NOT:  WAIT
  (1)  016554  010037  001210                MOV     R0,$MSGAD         ;;PUT ADDR IN MAILBOX
  (1)  016560  105720                2$:     TSTB    (R0)+             ;;FIND END OF MESSAGE
  (1)  016562  001376                        BNE     2$
  (1)  016564  163700  001210                SUB     $MSGAD,R0         ;;SUB START OF MESSAGE
  (1)  016570  006200                        ASR     R0                ;;GET MESSAGE LNGTH IN WORDS
  (1)  016572  010037  001212                MOV     R0,$MSGLGT        ;;PUT LENGTH IN MAILBOX
  (1)  016576  012737  000004  001174        MOV     #4,$MSGTYPE       ;;TELL APT TO TAKE MSG.
  (1)  016604  000413                        BR      5$
  (1)  016606  017637  000004  016632  3$:   MOV     @4(SP),4$         ;;PUT MSG ADDR IN JSR LINKAGE
  (1)  016614  062766  000002  000004        ADD     #2,4(SP)                  ;;BUMP RETURN ADDRESS
  (3)  016622  013746  177776                MOV     177776,-(SP)      ;;PUSH 177776 ON STACK
  (1)  016626  004737  016174                JSR     PC,$TYPE          ;;CALL TYPE MACRO
  (1)  016632  000000                4$:     .WORD   0
  (1)  016634                        5$:
  (1)  016634  105737  016722        10$:    TSTB    $FFLG             ;;SHOULD REPORT FATAL ERROR?
  (1)  016640  001416                        BEQ     12$               ;;IF NOT:  BR
  (1)  016642  005737  001214                TST     $ENV              ;;RUNNING UNDER APT?
  (1)  016646  001413                        BEQ     12$               ;;IF NOT:  BR
  (1)  016650  005737  001174        11$:    TST     $MSGTYPE          ;;FINISHED LAST MESSAGE?
  (1)  016654  001375                        BNE     11$               ;;IF NOT:  WAIT
  (1)  016656  017637  000004  001176        MOV     @4(SP),$FATAL     ;;GET ERROR #
  (1)  016664  062766  000002  000004        ADD     #2,4(SP)                  ;;BUMP RETURN ADDR.
  (1)  016672  005237  001174                INC     $MSGTYPE          ;;TELL APT TO TAKE ERROR
  (1)  016676  105037  016722        12$:    CLRB    $FFLG             ;;CLEAR FATAL FLAG
  (1)  016702  105037  016721                CLRB    $LFLG             ;;CLEAR LOG FLAG
  (1)  016706  105037  016720                CLRB    $MFLG             ;;CLEAR MESSAGE FLAG
  (3)  016712  012601                        MOV     (SP)+,R1          ;;POP STACK INTO R1
  (3)  016714  012600                        MOV     (SP)+,R0          ;;POP STACK INTO R0
  (1)  016716  000207                        RTS     PC                ;;RETURN
  (1)  016720     000                $MFLG:  .BYTE   0                 ;;MESSG. FLAG
  (1)  016721     000                $LFLG:  .BYTE   0                 ;;LOG FLAG
  (1)  016722     000                $FFLG:  .BYTE   0                 ;;FATAL FLAG
  (1)          016724                        .EVEN
  (1)          000200                APTSIZE=200
  (1)          000001                APTENV=001
  (1)          000100                APTSPOOL=100
  (1)          000040                APTCSUP=040
 1566                                .SBTTL  POWER DOWN AND UP ROUTINES
  (1)
  (2)                                ;;*****************************************************************
  (1)                                ;POWER DOWN ROUTINE
  (1)  016724  012737  017064  000024  $PWRDN: MOV    #$ILLUP,@#PWRVEC ;;SET FOR FAST UP
  (1)  016732  012737  000340  000026          MOV    #340,@#PWRVEC+2 ;;PRIO:7
  (3)  016740  010046                          MOV    R0,-(SP)         ;;PUSH R0 ON STACK
  (3)  016742  010146                          MOV    R1,-(SP)         ;;PUSH R1 ON STACK
```

```
   (3)  016744  010246                         MOV     R2,-(SP)           ;;PUSH R2 ON STACK
   (3)  016746  010346                         MOV     R3,-(SP)           ;;PUSH R3 ON STACK
   (3)  016750  010446                         MOV     R4,-(SP)           ;;PUSH R4 ON STACK
   (3)  016752  010546                         MOV     R5,-(SP)           ;;PUSH R5 ON STACK
   (3)  016754  017746  162160                 MOV     @SWR,-(SP)         ;;PUSH @SWR ON STACK
   (1)  016760  010637  017070                 MOV     SP,$SAVR6          ;;SAVE SP
   (1)  016764  012737  016776  000024         MOV     #$PWRUP,@#PWRVEC   ;;SET UP VECTOR
   (1)  016772  000000                         HALT
   (1)  016774  000776                         BR      .-2                ;;HANG UP
   (1)
   (2)                                 ;;*****************************************************************
   (1)                                 ;POWER UP ROUTINE
   (1)  016776  012737  017064  000024 $PWRUP: MOV     #$ILLUP,@#PWRVEC   ;;SET FOR FAST DOWN
   (1)  017004  013706  017070                 MOV     $SAVR6,SP          ;;GET SP
   (1)  017010  005037  017070                 CLR     $SAVR6             ;;WAIT LOOP FOR THE TTY
   (1)  017014  005237  017070         1$:     INC     $SAVR6             ;;WAIT FOR THE INC
   (1)  017020  001375                         BNE     1$                 ;;OF  WORD
   (3)  017022  012677  162112                 MOV     (SP)+,@SWR         ;;POP STACK INTO @SWR
   (3)  017026  012605                         MOV     (SP)+,R5           ;;POP STACK INTO R5
   (3)  017030  012604                         MOV     (SP)+,R4           ;;POP STACK INTO R4
   (3)  017032  012603                         MOV     (SP)+,R3           ;;POP STACK INTO R3
   (3)  017034  012602                         MOV     (SP)+,R2           ;;POP STACK INTO R2
   (3)  017036  012601                         MOV     (SP)+,R1           ;;POP STACK INTO R1
   (3)  017040  012600                         MOV     (SP)+,R0           ;;POP STACK INTO R0
   (1)  017042  012737  016724  000024         MOV     #$PWRDN,@#PWRVEC   ;;SET UP THE POWER DOWN VECTOR
   (1)  017050  012737  000340  000026         MOV     #340,@#PWRVEC+2    ;;PRIO:7
   (1)  017056  104401                         TYPE                       ;REPORT THE POWER FAILURE
   (1)  017060  017072                 $PWRMG: .WORD   $POWER             ;;POWER FAIL MESSAGE POINTER
   (1)  017062  000002                         RTI
   (1)  017064  000000                 $ILLUP: HALT                       ;;THE POWER UP SEQUENCE WAS STARTED
   (1)  017066  000776                         BR      .-2                ;; BEFORE THE POWER DOWN WAS COMPLETE
   (1)  017070  000000                 $SAVR6: 0                          ;;PUT THE SP HERE
   (1)  017072  005015  047520  042527 $POWER: .ASCIZ  <15><12>'POWER'
   (1)  017100  000122
   (1)                                         .EVEN
  1567                                         ;*
  1568                                         ;*THIS ROUTINE WILL PROTECT THE PROGRAM
  1569                                         ;*FROM INTERUPTS (BAD ONES).
  1570                                         ;*
  1571                                         ;*THE TRAP CATCHER IS SET UP FOR
  1572                                         ;*       .WORD    .+2
  1573                                         ;*       JSR PC,R0
  1574                                         ;*
  1575                                         ;*ILLEGAL INTERRUPTS OR INTERRUPTS TO THE WRONG VECTOR
  1576                                         ;*GOTO THE VECTOR AND PCITK UP THE ''.+2'' AS AN ADDRESS
  1577
  1578                                         ;*AND ''4700'' AS NEW STATUS.
  1579                                         ;*THE .+2 AS A PC WILL CAUSE EXECUTION OF THE ''JSR PC,R0'' (AN ILLEGAL INSTR.).
  1580                                         ;*AND TRAP TO LOCATION ''4''. IN LOCATION 4 WE HAVE A
  1581                                         ;*POINTER HERE. IF THIS CONDITION CAUSES A TRAP TO LOC. 4.
  1582                                         ;*WE WILL REPORT IT IN THE SAME MANNER THAT WER WOULD
  1583                                         ;*REPORT ANY OTHER ERROR.
  1584                                         ;*IF A BUSS ERROR TRAP DID OCCUT AND CAUSE A TRAP TO 4.
  1585                                         ;*WE WILL HALT.
  1586
  1587  017102  011637  017746         IOTRD:  MOV     (6),TRTO           ;GET WHERE WE CAME TO.
```

```
017106  162737  000004  017146              SUB     #4,TRTO          ;FORM READ ADDR.

017114  023727  017146  001000              CMP     TRTO,#1000       ;DID TRAP FROM LESS THAN ADDR. 1000?
017122  003402                              BLE     2$               ;NO-CONTINUE.

017124  000000                      1$:     HALT                     ;A BUSS ERROR TIME OUT TRAP BROUGHT US HERE.
                                                                     ;ADDRESS CONTAINED IN TRTO.

017126  000776                              BR      1$               ;DON'T ALLOW CONTINUE.

017130  016637  000004  017150      2$:     MOV     4(6),TRFRO       ;GET TRAPPED FROM ADDR.
017136  062706  000004                      ADD     #4,SP                    ;/ADD #4 TO STACK POINTER.

                                    ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

017142  104004                              ERROR   4                ;ERROR! ILLEGAL INTERRUPT OR
                                                                     ;INTERRUPT TO WRONG VECTOR.
                                                                     ;IF TEST NO. IS LESS THAN 10,ITS
                                                                     ;LIKELY(BUT NO EXCLUSIVELY)TO BE A
                                                                     ;DEVICE OTHER THAN THE DEVICE UNDER TEST.
                                                                     ;IF THE INTERRUPT OCCURED
                                                                     ;DURING AN INTERRUPT TEST, I'D
                                                                     ;SUSPECT A PROBLEM WITH THE DEVICE UNDER TEST.
                                                                     ;IF THE ADDRESS THE INTERRUPT
                                                                     ;VECTORED TO IS WITHIN THE RANGE OF
                                                                     ;VECTORS ASSIGNED TO THE DEVICE,
                                                                     ;THEN I'D SUSPECT THE DEVICE
                                                                     ;INTERRUPTD ILLEGALLY.
                                                                     ;IF THE ADDRESS THE INTERRUPT
                                                                     ;VECTORED TO IS OUTSIDE OF THE
                                                                     ;RANGE ASSIGNED TO THE DEVICE
                                                                     ;I'D SUSPECT THAT THE
                                                                     ;DEVICE PUT THE WRONG INTERRUPT
                                                                     ;VICTOR ON THE BUS DURING THE INTERRUPT
                                                                     ;PROCESS.
                                                                     ;       NOTE:
                                                                     ;FOR THIS ERROR - DON'T USE
                                                                     ; ''LOOP ON ERROR'' OPTION.
                                                                     ;ALSO EXPECT THAT THE INTERRUPT TEST TO
                                                                     ;WILL REPOT THAT THE DEVICE DIDN'T
                                                                     ;INTERRUPT.
                                                                     ;FOLLOW THE RECOMMENDED PROCEEDURE
                                                                     ; IN THE DOCUMENT (ON THIS DIAGNOSTIC)
                                                                     ;FOR LOOPING ON TEST.


                                    ;;$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

017144  000002                              RTI
017146  000000                      TRTO:   .WORD   0                ;CONTAINS ADDR. WE TRAPPED OR INTERRUPTED TO.
017150  000000                      TRFRO:  .WORD   0                ;CONTAINS ADDR. WE TRAPPED OR INTR. FROM.
                                    .SBTTL  TRAP DECODER
 (1)
 (2)                                ;;*********************************************************************
 (1)                                ;*THIS ROUTINE WILL PICKUP THE LOWER BYTE OF THE ''TRAP'' INSTRUCTION
 (1)                                ;*AND USE IT TO INDEX THROUGH THE TRAP TABLE FOR THE STARTING ADDRESS
```

```
   (1)                                     ;*OF THE DESIRED ROUTINE. THEN USING THE ADDRESS OBTAINED IT WILL
   (1)                                     ;*GO TO THAT ROUTINE.
   (1)
   (1)  017152  010046                     $TRAP:  MOV     R0,-(SP)           ;;SAVE R0
   (1)  017154  016600  000002                     MOV     2(SP),R0           ;;GET TRAP ADDRESS
   (1)  017160  005740                             TST     -(R0)              ;;BACKUP BY 2
   (1)  017162  111000                             MOVB    (R0),R0            ;;GET RIGHT BYTE OF TRAP
   (1)  017164  006300                             ASL     R0                 ;;POSITION FOR INDEXING
   (1)  017166  016000  017206                     MOV     $TRPAD(R0),R0      ;;INDEX TO TABLE
   (1)  017172  000200                             RTS     R0                 ;;GO TO ROUTINE
   (1)
   (1)
   (1)                                     ;;THIS IS USE TO HANDLE THE ''GETPRI'' MACRO
   (1)
   (1)  017174  011646                     $TRAP2: MOV     (SP),-(SP)         ;;MOVE THE PC DOWN
   (1)  017176  016666  000004  000002             MOV     4(SP),2(SP)        ;;MOVE THE PSW DOWN
   (1)  017204  000002                             RTI                        ;;RESTORE THE PSW
   (1)
   (3)                                     .SBTTL  TRAP TABLE
   (3)
   (3)                                     ;*THIS TABLE CONTAINS THE STARTING ADDRESSES OF THE ROUTINES CALLED
   (3)                                     ;*BY THE ''TRAP'' INSTRUCTION.
   (3)
   (3)                                     ;       ROUTINE
   (3)                                     ;       -------
   (3)  017206  017174                     $TRPAD: .WORD   $TRAP2
   (3)  017210  016174                             $TYPE   ;;CALL=TYPE        TRAP+1(104401)  TTY TYPEOUT ROUTINE
   (3)  017212  014316                             $TYPOC  ;;CALL=TYPOC       TRAP+2(104402)  TYPE OCTAL NUMBER (WITH LEADING ZEROS)
   (3)  017214  014272                             $TYPOS  ;;CALL=TYPOS       TRAP+3(104403)  TYPE OCTAL NUMBER (NO LEADING ZEROS)
   (3)  017216  014332                             $TYPON  ;;CALL=TYPON       TRAP+4(104404)  TYPE OCTAL NUMBER (AS PER LAST CALL)
   (3)  017220  014520                             $TYPBN  ;;CALL=TYPBN       TRAP+5(104405)  TYPE BINARY (ASCII) NUMBER
   (1)
   (3)  017222  015470                             $GTSWR  ;;CALL=GTSWR       TRAP+6(104406)  GET SOFT-SWR SETTING
   (1)
   (3)  017224  015420                             $CKSWR  ;;CALL=CKSWR       TRAP+7(104407)  TEST FOR CHANGE IN SOFT-SWR
   (3)  017226  015702                             $RDCHR  ;;CALL=RDCHR       TRAP+10(104410) TTY TYPEIN CHARACTER ROUTINE
   (3)  017230  016022                             $RDLIN  ;;CALL=RDLIN       TRAP+11(104411) TTY TYPEIN STRING ROUTINE
  1636  017232  005015  046103  041517  EM1:    .ASCIZ  <15><12>/CLOCK SR FUNCTION ERROR/
        017240  020113  051123  043040
        017246  047125  052103  047511
        017254  020116  051105  047522
        017262  000122
  1637  017264  005015  046103  041517  EM2:    .ASCIZ  <15><12>/CLOCK SR DATA ERROR/
        017272  020113  051123  042040
        017300  052101  020101  051105
        017306  047522  000122
  1638  017312  005015  046103  041517  EM3:    .ASCIZ  <15><12>/CLOCK BR DATA ERROR/
        017320  020113  051102  042040
        017326  052101  020101  051105
        017334  047522  000122
  1639  017340  044600  052116  051105  EM4:    .ASCIZ  <200>/INTERRUPT ERROR/
        017346  052522  052120  042440
        017354  051122  051117     000
  1640  017361     015  041412  052517  EM5:    .ASCIZ  <15><12>/COUNT REG. ERROR/
        017366  052116  051040  043505
        017374  020056  051105  047522
```

```
 017402  000122
 017404  005015  047503  047125  EM11:   .ASCIZ  <15><12>#COUNT ERROR #
 017412  020124  051105  047522
 017420  020122     000
 017423     015  041412  052517  EM12:   .ASCIZ  <15><12>#COUNT FUNCTION ERROR#
 017430  052116  043040  047125
 017436  052103  047511  020116
 017444  051105  047522  000122
 017452  005015  046103  041517  EM16:   .ASCIZ  <15><12>#CLOCK INTERRUPT ERROR #
 017460  020113  047111  042524
 017466  051122  050125  020124
 017474  051105  047522  020122
 017502     000
 017503     015  051012  050105  EM20:   .ASCIZ  <15><12>#REPEATABILITY ERROR #
 017510  040505  040524  044502
 017516  044514  054524  042440
 017524  051122  051117  000040
 017532  005015  042101  051104  EM26:   .ASCIZ  <15><12>#ADDRESSING ERROR#
 017540  051505  044523  043516
 017546  042440  051122  051117
 017554     000

 017555     015  042412  051122  DH1:    .ASCIZ  <15><12>#ERRPC  ASR     WAS     S/B#
 017562  041520  040411  051123
 017570  053411  051501  051411
 017576  041057     000
 017601     015  042412  051122  DH3:    .ASCIZ  <15><12>#ERRPC  ABR     WAS     S/B#
 017606  041520  040411  051102
 017614  053411  051501  051411
 017622  041057     000
 017625     200  051105  050122  DH4A:   .ASCIZ  <200>#ERRPC   TO      FROM ADDR.#
 017632  020103  020040  047524
 017640  020040  020040  020040
 017646  051106  046517  040440
 017654  042104  027122     000
 017661     015  042412  051122  DH12:   .ASCIZ  <15><12>#ERRPC  ASR     #
 017666  041520  040411  051123
 017674  000011
 017676  005015  051105  050122  DH20:   .ASCIZ  <15><12>#ERRPC  ASR     2NDCNT  1STNCT  3RDCNT#
 017704  004503  051501  004522
 017712  047062  041504  052116
 017720  030411  052123  041516
 017726  004524  051063  041504
 017734  052116     000
 017737     015  042412  051122  DH26:   .ASCIZ  <15><12>#ERRPC  CLOCK ADDR.#
 017744  041520  041411  047514
 017752  045503  040440  042104
 017760  027122     000


         017764                          .EVEN

 017764  001116  001376  001126  DT1:    .WORD   $ERRPC,ASR,$BDDAT,$GDDAT,0
 017772  001124  000000
 017776  001116  001400  001126  DT3:    .WORD   $ERRPC,ABR,$BDDAT,$GDDAT,0
 020004  001124  000000
 020010  001116  017146  017150  DT4:    .WORD   $ERRPC,TRTO,TRFRO,0
```

```
      020016  000000
1659  020020  001116  001376  000000  DT12:   .WORD   $ERRPC,ASR,0
1660  020026  001116  001376  001126  DT20:   .WORD   $ERRPC,ASR,$BDDAT,$GDDAT,$TMP0,0
      020034  001124  001420  000000
1661  020042  001116  001376  001126  DT22:   .WORD   $ERRPC,ASR,$BDDAT,$TMP0,0
      020050  001420  000000
1662  020054  001116  001420  000000  DT26:   .WORD   $ERRPC,$TMP0,0
1663
1664  020062  000000  000000          DF0:    .WORD   0,0
1665
1666          000001                          .END
```

```
                                                               J 8
KWV11A DISAGNOSTIC  MAINDEC-11-CVKWA-C  MACY11 30G(1063)  08-AUG-79  10:53  PAGE 28
CVKWAC.P11    08-AUG-79 10:45           CROSS REFERENCE TABLE -- USER SYMBOLS                                            SEQ 0100

ABASE  = 170420       102#    112     189     190
ABR      001400       190#    256*    257*    295     385*    387*    463*    471     489*    497     559*    563     626*
                      630     650*    668     678*    694*    724*    744*    806*    808*    810*    812*    814*    816*
                      822*    832     848*    881*    1021*   1063*   1071    1082*   1093    1172*   1173*   1174*   1176*
                      1177*   1201*   1211    1220    1241*   1251    1261    1287*   1292    1304    1318*   1323    1462*
                      1467    1490*   1657
ACDW1  = 000000       112
ACDW2  = 000000       112
ACPUOP= 000000        112
ADDW0  = 000000       112
ADDW1  = 000000       112
ADDW10= 000000        112
ADDW11= 000000        112
ADDW12= 000000        112
ADDW13= 000000        112
ADDW14= 000000        112
ADDW15= 000000        112
ADDW2  = 000000       112
ADDW3  = 000000       112
ADDW4  - 000000       112
ADDW5  = 000000       112
ADDW6  = 000000       112
ADDW7  = 000000       112
ADDW8  = 000000       112
ADDW9  = 000000       112
ADEVCT= 000000        112
ADEVM  = 000000       112
AENV   - 000000       112
AENVM  = 000000       112
AFATAL= 000000        112
AMADR1= 000000        112
AMADR2= 000000        112
AMADR3- 000000        112
AMADR4= 000000        112
AMAMS1= 000000        112
AMAMS2= 000000        112
AMAMS3= 000000        112
AMAMS4= 000000        112
AMSGAD= 000000        112
AMSGLG= 000000        112
AMSGTY= 000000        112
AMTYP1= 000000        112
AMTYP2= 000000        112
AMTYP3= 000000        112
AMTYP4= 000000        112
ANYKEY  013740        1290    1303    1321    1417#
APASS  = 000000       112
APRIOR- 000200        104#    112     195
APTCSU- 000040        1564    1565#
APTENV  000001        1560    1564    1565#
APTSIZ= 000200        225     1565#
APTSPO- 000100        1564    1565#
ASR     001376        189#    232*    256     294     342*    343*    344*    345*    346*    347*    348*    349*    350*
                      351*    406*    407*    412     432*    434*    438*    444*    446     462*    467*    471*    488*
                      493*    497*    522*    526     580*    581*    583     605*    606*    607     616*    625*    627*
                      628*    630*    649*    654*    656*    668*    677*    693*    696*    698*    700     722*    726*
```

```
                                                                 K  8
KWV11A DISAGNOSTIC  MAINDEC-11-CVKWA-C  MACY11 30G(1063)  08-AUG-79  10:53  PAGE 28-1
CVKWAC.P11    08-AUG-79 10:45           CROSS REFERENCE TABLE -- USER SYMBOLS                          SEQ 0101

                          728*    732     743*    745*    747*    749     756*    806*    808*    810*    812*    814*    816*
                          821*    824*    826*    832*    834     842*    847*    849*    854     880*    883*    884*    895*
                          901*    903*    904*    914*    1002*   1003*   1004*   1005*   1007    1010    1020*   1022*   1028
                          1031    1040*   1041*   1042*   1044*   1046*   1049    1058*   1062*   1066*   1067*   1071*   1077*
                          1081*   1083*   1084*   1087*   1093*   1100*   1172*   1173*   1174*   1176*   1177*   1200*   1202*
                          1205*   1209*   1220*   1240*   1242*   1245*   1249*   1261*   1270*   1271    1286*   1288*   1292*
                          1304*   1317*   1319*   1323*   1333    1358*   1362    1389*   1461*   1463*   1464*   1465*   1466*
                          1489*   1491*   1492*   1495    1530*   1531*   1532    1536    1656    1659    1660    1661
ASWREG= 000000            112
ATESTN= 000000            112
AUNIT  = 000000           112
AUSWR  = 000000           112
AVECT1= 000440            103#    112     191     192     193     194
AVECT2= 000000            112
BIT0   = 000001           100#    351     467     471     493     497     627     630     654     668     696     726     732
                          749     806     808     810     812     814     816     824     832     903     1011    1040    1044
                          1046    1067    1071    1084    1093    1172    1173    1174    1176    1177    1220    1261    1292
                          1304    1323
BIT00  = 000001           100#    607
BIT01  = 000002           100#
BIT02  = 000004           100#
BIT03  = 000010           100#
BIT04  = 000020           100#
BIT05  = 000040           100#
BIT06  = 000100           100#
BIT07  = 000200           100#
BIT08  = 000400           100#    1562
BIT09  = 001000           100#    1560    1562
BIT1   = 000002           100#    350     660
BIT10  = 002000           100#    540     575     1087    1172    1173    1174    1176    1177    1205    1245    1560
BIT11    004000           100#    344     471     497     540     575     630     668     806     808     810     812     814
                          816     832     1066    1071    1083    1093    1172    1173    1174    1176    1177    1220    1261
                          1292    1304    1323    1562
BIT12  = 010000           100#    540     575     816     1007    1011    1028    1052    1536
BIT13  = 020000           100#    343     605     1560
BIT14  = 040000           100#    342     903     1562
BIT15    100000           100#    1011
BIT2   = 000004           100#    349     471     497     594     630     668     806     808     810     812     814     816
                          832     1071    1093    1172    1173    1174    1176    1177    1220    1261    1292    1304    1323
BIT3   = 000010           100#    348     1067    1084
BIT4   = 000020           100#    347     627     654     696     726
BIT5   = 000040           100#    346     627     654     690     696     726
BIT6   = 000100           100#    345
BIT7     000200           100#
BIT8   = 000400           100#    628     656     698     728     747     826     884     1492    1531
BIT9   = 001000           100#    471     497     581     606     630     668     806     808     810     812     814     816
                          832     904     1004    1005    1041    1042    1071    1093    1172    1173    1174    1176    1177
                          1209    1220    1249    1261    1292    1304    1323    1464    1466
BPTVEC= 000014            100#
CKSWR  = 104407           1460    1488    1529    1560    1562    1635#
CR     = 000015           100#    1564
CRLF   = 000200           100#    234     1564
DDISP  = 177570           100#    112     225
DF0      020062           124     131     138     145     152     159     166     173     180     187     1664#
DH1      017555           122     129     150     178     1647#
DH12     017661           157     164     1650#
```

```
DH20      017676         171      1651#
DH26      017737         185      1652#
DH3       017601         136      1648#
DH4A      017625         143      1649#
DISPLA    001142         112#      225*     1560*     1562*
DISPRE    000174          78#      225
DR        001414         196#      541       594       660
DR2       001416         197#      540*      575*
DSWR   =  177570         100#      112       225
DT1       017764         123       130       151      1656#
DT12      020020         158       165      1659#
DT20      020026         172      1660#
DT22      020042         179      1661#
DT26      020054         186      1662#
DT3       017776         137      1657#
DT4       020010         144      1658#
EMTVEC-   000030         100#      225*
EM1       017232         121      1636#
EM11      017404         177      1641#
EM12      017423         156      1642#
EM16      017452         163      1643#
EM2       017264         128      1637#
EM20      017503         170      1644#
EM26      017532         184      1645#
EM3       017312         135      1638#
EM4       017340         142      1639#
EM5       017361         149      1640#
ENDP      013056        1283      1315      1330      1334      1346#
ERCNT     001432         203#      241*     1410      1560*
ERRVEC=   000004         100#      225*      230*      294*      295*     1359      1360*     1375*     1380*     1562*
EXS       001440         206#      214*      219*      223*      236       538       573       592       658       685       707      1281      1314
GNS    -  ****** U       234       238       239      1289      1302      1320      1369      1371      1373      1385      1387      1410      1418
                        1635
GTSWR     104406         234      1635#
HT     =  000011         100#     1564
INIT      001526         212       225#     1459      1487      1528
IOTRD     017102          76       230      1587#
IOTST1    014060        1458      1460#     1468      1470
IOTST2    014150        1486      1488#     1496      1498
IOTST3    014230        1527      1529#     1537      1539
IOTVEC-   000020         100#      225*
LCNT      001442         207#     1391*     1392*     1410
LF     =  000012         100#     1564
LOOP      002334         245#     1377      1410
MDEVCT    001434         204#      240*     1353      1356*     1395*
OITST1    014046          88      1458#
OITST2    014136          89      1486#
OITST3    014216          90      1527#
PIRQ   -  177772         100#
PIRQVE=   000240         100#
PRIOR     001412         195#
PR0    =  000000         100#
PR1    =  000040         100#
PR2    =  000100         100#
PR3       000140         100#
PR4    -  000200         100#
```

```
PR5     = 000240         100#
PR6     = 000300         100#
PR7     = 000340         100#
PS      = 177776         100#
PSW     = 177776         100#
PWRVEC= 000024           100#     225*     1566*
QSTART   001444           87      211#
RDCHR  = 104410         1563     1635#
RDLIN  = 104411         1635#
RESVEC- 000010           100#
ROTATE   001426          201#     243*     244     1355*    1367     1396*    1560
RSTART   002144          211      235#
STACK  = 001100          100#     225
START  = 001506           86      221#
STKLMT= 177774           100#
SWR      001140          112#     225*     234      816     1560     1562     1563*    1566*
SWREG    000176           79#     225      234     1563
SW0    = 000001          100#
SW00   = 000001          100#
SW01   = 000002          100#
SW02   = 000004          100#
SW03   = 000010          100#
SW04   = 000020          100#
SW05   = 000040          100#
SW06   = 000100          100#
SW07   = 000200          100#
SW08   - 000400          100#
SW09   = 001000          100#
SW1    = 000002          100#
SW10   = 002000          100#
SW11   = 004000          100#
SW12   = 010000          100#
SW13   = 020000          100#
SW14   = 040000          100#
SW15   = 100000          100#
SW2    = 000004          100#
SW3    = 000010          100#
SW4    = 000020          100#
SW5    = 000040          100#
SW6    = 000100          100#
SW7    - 000200          100#
SW8    = 000400          100#
SW9    - 001000          100#
TBITVE= 000014           100#
TKVEC  = 000060          100#
TPVEC  = 000064          100#
TRAPVE= 000034           100#     225*
TRFRO    017150         1598*    1634#    1658
TRTO     017146         1587*    1588*    1590     1633#    1658
TRTVEC= 000014           100#
TSTCNT   001436          205#     215*     218*     222*    1353
TSTSTR   001456           95      214#
TST1     002422          294#
TST10    003244          347#
TST11    003342          348#
TST12    003440          349#
```

```
TST13    003536            350#
TST14    003634            351#
TST15    003732            385#
TST16    004022            387#
TST17    004112            404#
TST2     002514            295#
TST20    004164            430#
TST21    004246            460#
TST22    004374            486#
TST23    004522            519#
TST24    004610            536      539      542      556#
TST25    004662            574      578#
TST26    004732            591      593      595      603#
TST27    004766            623#
TST3     002556            342#
TST30    005076            647#
TST31    005306            666      683#
TST32    005422            706      708      711      720#
TST33    005464            741#
TST34    005532            806#
TST35    005662            808#
TST36    006012            810#
TST37    006142            812#
TST4     002654            343#
TST40    006272            814#
TST41    006422            816#
TST42    006562            816      819#
TST43    006724            845#
TST44    006764            876#
TST45    007104            897#
TST46    007210           1000#
TST47    007264           1018#
TST5     002752            344#
TST50    007350           1038#
TST51    007442           1060#
TST52    007576           1079#
TST53    007730           1172#
TST54    010222           1173#
TST55    010514           1174#
TST56    011006           1176#
TST57    011300           1177#
TST6     003050            345#
TST60    011612           1198#
TST61    012004           1238#
TST62    012220           1258     1268     1272     1278#
TST63    012620           1299     1305     1312#
TST7     003146            346#
TYPBN  = 104405           1410     1635#
TYPE   = 104401            234      238      239     1289     1302     1320     1369     1371     1373     1385     1387     1410     1418
                          1546     1547     1560     1561     1563     1564     1566     1635#
TYPOC  = 104402           1370     1374     1386     1410     1561     1563     1635#
TYPON  = 104404           1635#
TYPOS  = 104403           1635#
UTEST    001430            202#     244*    1367*    1410     1560*
VECTP    001404            192#     248*     249*
VECT1    001402            191#     231*     247*     248      250      885*    1376*    1390*
```

```
VECT2   001406          193#    250*    251*    252     902*
VECT2P  001410          194#    252*    253*
WSTART= 001472           93     217#
ZSTART  001774          224     228#
$APTHD  001000          111#
$ASTAT= ****** U       1565
$ATYC   016502         1565#
$ATY1   016456         1565#
$ATY3   016464         1564    1565#
$ATY4   016474         1560    1565#
$AUTOB  001134          112#    234*    1563
$BASE   001250          112#    232     1389
$BDADR  001122          112#
$BDDAT  001126          112#    342*    343*    344*    345*    346*    347*    348*    349*    350*    351*    385*    387*
                        412*    414     417     446*    447     449     471*    473     497*    499     526*    563*    630*
                        668*    670     806*    808*    810*    812*    814*    816*    832*   1010*   1031*   1049*   1052
                       1071*   1093*   1172*   1173*   1174*   1176*   1177*   1211*   1212    1220*   1221    1251*   1252
                       1261*   1271*   1292*   1304*   1323*   1656    1657    1660    1661
$BELL   001164          112#   1560
$BIN    014572         1547#*
$CDW1   001254          112#
$CHARC  016452         1564#*
$CKSWR  015420         1563#   1635
$CMTAG  001100          112#    225
$CM3  - 000000          112#
$CNTLG  016145         1563#
$CNTLU  016140         1563#
$CPUOP  001222          112#
$CRLF   001171          112#   1560    1561    1563    1564
$DEVCT  001204          112#    229*   1370    1372*   1374    1381    1386    1391    1393*
$DEVM   001252          112#
$DOAGN  013730         1410#
$ENDAD  013720          109    1410#
$ENDCT  013466         1410#
$ENULL  013734         1410#
$ENV    001214          112#    234    1560    1564    1565
$ENVM   001215          112#    225    1349    1564    1565
$EOP    013432         1410#
$EOPCT  013460         1410#
$ERFLG  001103          112#   1560*   1562*
$ERMAX  001115          112#    225*   1562*
$ERROR  014574          225    1560#
$ERRPC  001116          112#   1560*   1561    1656    1657    1658    1659    1660    1661    1662
$ERRTB  001256          112#   1561
$ERRTY  015002         1560    1561#
$ERTTL  001112          112#   1560*
$ESCAP  001162          112#    225*   1560    1562*
$ETABL  001214          112#
$ETEND  001256          111     112#
$FATAL  001176          112#   1565*
$FFLG   016722         1565#*
$FILLC  001156          112#   1564
$FILLS  001155          112#   1564
$GDADR  001120          112#
$GDDAT  001124          112#    342*    343*    344*    345*    346*    347*    348*    349*    350*    351*    385*    387*
                        414*    415*    447*    448*    469*    473     495*    499     521*    558*    651*    669*    670
```

```
                                                                C 9
KWV11A DISAGNOSTIC  MAINDEC-11-CVKWA-C  MACY11 30G(1063)  08-AUG-79  10:53  PAGE 28-6
CVKWAC.P11    08-AUG-79 10:45           CROSS REFERENCE TABLE -- USER SYMBOLS                          SEQ 0106

                           678     679     837*   1011*   1032*   1051*   1064*   1172*   1173*   1174*   1176*   1177*   1210*
                          1212    1221    1250*   1252    1260*   1273*   1291*   1322*   1656    1657    1660
$GET42   013710           1410#
$GTSWR   015470           1563#   1635
$HD    = 000001             54
$HIBTS   001000            111#
$ICNT    001104            112#   1562*
$ILLUP   017064           1566#
$INTAG   001135            112#   1563
$ITEMB   001114            112#   1560*   1561
$LF      001172            112#   1560    1563    1564
$LFLG    016721           1565#*
$LPADR   001106            112#    225*    294*   1562*
$LPERR   001110            112#    225*    294*    652*   1560    1562*
$MADR1   001226            112#
$MADR2   001232            112#
$MADR3   001236            112#
$MADR4   001242            112#
$MAIL    001174            111     112#    225     234    1560    1562    1564
$MAMS1   001224            112#
$MAMS2   001230            112#
$MAMS3   001234            112#
$MAMS4   001240            112#
$MBADR   001002            111#
$MFLG    016720           1565#*
$MNEW    016163           15:3#
$MSGAD   001210            112#   1565*
$MSGLG   001212            112#   1565*
$MSGTY   001174            112#   1565*
$MSWR    016152           1563#
$MTYP1   001225            112#
$MTYP2   001231            112#
$MTYP3   001235            112#
$MTYP4   001241            112#
$MXCNT   015416           1562#
$NULL    001154            112#   1564
$NWTST   000001            294#    295#    342#    343#    344#    345#    346#    347#    348#    349#    350#    351#    385#
                           387#    404#    430#    460#    486#    519#    556#    578#    603#    623#    647#    683#    720#
                           741#    806#    808#    810#    812#    814#    816#    819#    845#    876#    897#   1000#   1018#
                          1038#   1060#   1079#   1172#   1173#   1174#   1176#   1177#   1198#   1238#   1278#   1312#
$OCNT    014514           1546#*
$OMODE   014516           1546#*
$OVER    015402           1562#
$PASS    001202            112#    225*    242*   1365    1410*   1562
$PASTM   001006            111#
$POWER   017072           1566#
$PWRDN   016724            225    1566#
$PWRMG   017060           1566#
$PWRUP   016776           1566#
$QUES    001170            112#   1560    1563    1564
$RDCHR   015702           1563#   1635
$RDDEC=  ****** U         1635
$RDLIN   016022           1563#   1635
$RDOCT=  ****** U         1635
$RDSZ  = 000010           1563#
$RTNAD   013732           1410#
```

```
$R2A   = ****** U        1635
$SAVRE= ****** U         1635
$SAVR6  017070           1566#*
$SCOPE  015136            225     1562#
$SETUP= 000117            210#     225      234     1410     1560     1562     1563
$STUP = 177777            210#
$SVLAD  015346           1562#
$SVPC  - 000244           109#
$SWR   = 167400              9#      54       56      106#     112      225      294      295      342      343      344      345      346
                          347      348      349      350      351      385      387      404      430      460      486      519      556
                          578      603      623      647      683      720      741      806      808      810      812      814      816
                          819      845      876      897     1000     1018     1038     1060     1079     1172     1173     1174     1176
                         1177     1198     1238     1278     1312     1410     1560     1562     1566
$SWREG  001216            112#     225
$SWRMK= 000000             56     1562
$TESTN  001200            112#    1562*
$TIMES  001160            112#     225*     294*     342*     343*     344*     345*     346*     347*     348*     349*     350*     351*
                          404*     430*     460*     486*     519*     556*     647*     806*     808*     810*     812*     814*     816*
                          819*     876*    1018*    1060*    1172*    1173*    1174*    1176*    1177*    1198*    1238*    1280*    1312*
                         1410*    1562*
$TKB    001146            112#    1417     1422     1563
$TKS    001144            112#    1420     1563*
$TMP0   001420            198#     211*     224*     226      294*     295*    1172*    1173*    1174*    1176*    1177*    1458*    1486*
                         1527*    1660     1661     1662
$TMP1   001422            199#
$TMP3   001424            200#     471*     497*     630*     668*     806*     808*     810*     812*     814*     816*     832*    1071*
                         1093*    1172*    1173*    1174*    1176*    1177*    1220*    1261*    1292*    1304*    1323*
$TN    - 000064            54#     107#     294#     295#     342#     343#     344#     345#     346#     347#     348#     349#     350#
                          351#     385#     387#     404#     430#     460#     486#     519#     536      539      542      556#     574
                          578#     591      593      595      603#     623#     647#     666      683#     706      708      711      720#
                          741#     806#     808#     810#     812#     814#     816#     819#     845#     876#     897#    1000#    1018#
                         1038#    1060#    1079#    1172#    1173#    1174#    1176#    1177#    1198#    1238#    1258     1268     1272
                         1278#    1299     1305     1312#
$TPB    001152            112#    1564*
$TPFLG  001157            112#    1564
$TPS    001150            112#    1564
$TRAP   017152            225     1635#
$TRAP2  017174           1635#
$TRP   = 000012          1635#
$TRPAD  017206           1635#
$TSTM   001004            111#
$TSTNM  001102            112#     294*    1410*    1560     1562*
$TTYIN  016130           1563#
$TYPBN  014520           1547#    1635
$TYPDS- ****** U         1635
$TYPE   016174           1564#    1565     1635
$TYPEC  016406           1563     1564#
$TYPEX  016454           1564#
$TYPOC  014316           1546#    1635
$TYPON  014332           1546#    1635
$TYPOS  014272           1546#    1635
$UNIT   001206            112#
$UNITM  001010            111#
$USWR   001220            112#
$VECT1  001244            112#     231     1390
$VECT2  001246            112#
```

```
$XTSTR  015152          1562#
$$GET4= 000000          1410#
$OFILL  014515          1546#*
$4OCAT- ****** U        1560     1562
.     = 020066            60#      71       72#      75#      77#      80#      85#      92#      94#     109#     110#     111#     112#
                         217      221      225      238#    1289#    1302#    1320#    1369#    1385#    1410#    1418#    1560     1561#
                        1562     1563#    1564     1565#    1566     1654#
.$ASTA- ****** U        1565
.$X   - 001000           111#
```

```
                                                                    F  9
KWV11A DISAGNOSTIC  MAINDEC-11-CVKWA-C  MACY11 30G(1063)  08-AUG-79  10:53  PAGE 29
CVKWAC.P11    08-AUG-79 10:45           CROSS REFERENCE TABLE -- MACRO NAMES                                      SEQ 0109

ADTST     258#    294    295
BUFLO     353#    385    387
COMMEN    100#
COUNTM    758#    806    808    810    812    814    816
CSRDTA    304#    342    343    344    345    346    347    348    349    350    351
DFC       114#    124    131    138    145    152    159    166    173    180    187
DIVCH    1102#   1172   1173   1174   1176   1177
ECB        12#    294    295    342    343    344    345    346    347    348    349    350    351    385    387
          421     426    452    456    477    482    503    508    530    535    543    546    567    571    586
          590     596    599    610    615    632    635    662    665    672    674    703    714    717    735
          751     754    806    808    810    812    814    816    838    841    857    860    890    892    909
          911    1012   1015   1033   1036   1054   1057   1073   1076   1096   1099   1172   1173   1174   1176
         1177    1214   1217   1223   1227   1254   1257   1263   1267   1274   1276   1294   1298   1306   1310
         1326    1329   1335   1338   1600   1631
ENDCOM    100#
ENDPAS   1397#   1410
ERROR     100#    294    295    342    343    344    345    346    347    348    349    350    351    385    387
          422     453    478    504    532    544    568    587    597    611    633    663    673    704    715
          736     752    806    808    810    812    814    816    839    858    891    910   1013   1034   1055
         1074    1097   1172   1173   1174   1176   1177   1215   1224   1255   1264   1275   1295   1307   1327
         1336    1469   1497   1534   1538   1601
ESCAPE    100#
GETPRI    100#
GETSWR    100#    234#
INSTR2   1549#   1560
LOCKM     868#    878    886    889    899    905    908
MULT      100#
NEWTST    100#    294    295    342    343    344    345    346    347    348    349    350    351    385    387
          404     430    460    486    519    556    578    603    623    647    683    720    741    806    808
          810     812    814    816    819    845    876    897   1000   1018   1038   1060   1079   1172   1173
         1174    1176   1177   1198   1238   1278   1312
POP       100#   1565   1566
POPSP2     24#    294    295    894    913   1379   1599
PR         28#    228
PUSH      100#   1565   1566
RDCLK      37#    471    497    630    668    806    808    810    812    814    816    832   1071   1093   1172
         1173    1174   1176   1177   1220   1261   1292   1304   1323
REPORT    100#
SCOPE     100#    295    342    343    344    345    346    347    348    349    350    351    385    387    404
          430     460    486    519    556    578    603    623    647    683    720    741    806    808    810
          812     814    816    819    845    876    897   1000   1018   1038   1060   1079   1172   1173   1174
         1176    1177   1198   1238   1278   1312   1346
SETPRI    100#
SETTRA   1635#
SETUP     100#    225
SKIP      100#    536    539    542    574    591    593    595    666    706    708    711    816   1258   1268
         1272    1299   1305
SLASH     100#
SPACE     100#
STARS     100#    109    111    112    294    295    342    343    344    345    346    347    348    349    350
          351     385    387    404    430    460    486    519    556    578    603    623    647    683    720
          741     806    808    810    812    814    816    819    845    876    897   1000   1018   1038   1060
         1079    1172   1173   1174   1176   1177   1198   1238   1278   1312   1410   1546   1547   1560   1561
         1562    1563   1564   1565   1566   1635
SWRSU     100#    225#
TRMTRP   1635#
```

```
TYPBIN     100#    1410
TYPDEC     100#
TYPNAM     100#     234
TYPNUM     100#
TYPOCS       6#    100#
TYPOCT     100#    1370    1374    1386    1410    1561    1563
TYPTXT     100#     238     239    1289    1302    1320    1369    1371    1373    1385    1387    1410    1418
ZIOTM     1424#    1448    1476
ZP21       394#     404     430
ZP25       511#     519
ZP25A      547#     556
ZZ1        296#     342     343     344     345     346     347     348     349     350     351    638#     647    806#    808#
           810#    812#    814#    816#   1179#    1198   1230#    1238
$$CMRE     112#
$$CMTM     112#
$$ESCA     100#
$$NEWT     100#     294     295     342     343     344     345     346     347     348     349     350     351     385     387
           404      430     460     486     519     556     578     603     623     647     683     720     741     806     808
           810      812     814     816     819     845     876     897    1000    1018    1038    1060    1079    1172    1173
          1174     1176    1177    1198    1238    1278    1312
$$SET     1635#
$$SETM     225#
$$SKIP     100#     536     539     542     574     591     593     595     666     706     708     711     816    1258    1268
          1272     1299    1305
.EQUAT       6#     100
.HEADE       5#      54
.SETTR       5#
.SETUP       5#     210
.SWRHI       6#      56
.SWRLO      56#
.TRMTR       5#
.$ACT1       8#     109
.$APTB     112#
.$APTH       8#     111
.$APTY       8#    1565
.$CATC       6#
.$CMTA       6#     112
.$EOP        7#    1410
.$ERRO       7#    1560
.$ERRT       7#    1561
.$POWE       6#    1566
.$RDOC       5#
.$READ       7#    1563
.$SCOP       7#    1562
.$TRAP       5#    1635
.$TYPB       5#    1547
.$TYPD       7#
.$TYPE       7#    1564
.$TYPO       6#    1546

. ABS.   020066     000     OVR    RO     REL    LCL    I

 ERRORS DETECTED:  0
```

```
CVKWAC,CVKWAC/CRF=CVKWAC
RUN-TIME: 28 17 1 SECONDS
RUN-TIME RATIO: 78/47=1.6
CORE USED:  27K  (53 PAGES)
```